UNDERGRADUATE BULLETIN

(A Compilation of Information on EWU)

EAST WEST UNIVERSITY

Progoti Foundation for Education and Development

Permanent Sanad Holder

UNDERGRADUATE BULLETIN

(14th Edition)

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UNIVERSITY PROFILE

Mission Statement

East West University (EWU), one of the leading private universities of Bangladesh, promotes eastern culture and values, and blends meaningfully eastern and western thoughts and innovations. As an institution of higher learning, EWU inculcates ethical standards, values and norms in its student, and strives to live up to ideals such as equal opportunity, transparency, and non-discrimination. The primary mission of EWU is to provide tertiary education at a reasonable cost in a range of subjects particularly relevant to current and anticipated societal needs. Central to the university's mission is its aim to provide students with opportunities, resources and expertise to achieve academic excellence, and to pursue personal and career goals in a stimulating and supportive environment. EWU strives not only to maintain high quality in both instruction and research, but also attempts to render community service through dissemination of information, organization of training programs and other activities. Sensitive to the needs of its students, EWU is committed to providing a responsive and invigorating atmosphere for productive learning and innovative thinking.

History

The idea of establishing a private university to provide quality education at an affordable cost in Bangladesh was first mooted by a group of prominent academics, business leaders, professionals and education enthusiasts led by Professor Dr. Mohammed Farashuddin. With this end in view, this group formed a non-profit, non-political, charitable organization called Progoti Foundation for Education and Development (PFED) in June, 1996. EWU originated from an endowment of the Foundation. Members of the Foundation now serve as Trustees of the University as per the Private University Act of 2010. The original Board of Trustees included: Mr. Jalaluddin Ahmed (deceased), Mr. S.M. Nousher Ali (deceased), Mr. Farooque B. Chaudhury, Dr. Rafiqul Huda Chaudhury, Syed Manzur Elahi, Professor Dr. Mohammed Farashuddin, Mr. Mohammad Zahedul Haque, R.Ph., Dr. Saidur Rahman Lasker, Dr. Muhammad A. Mannan, Professor Dr. M. Mosleh-Uddin (Not a member anymore effective from 26 April 2016), Mr. Shelley A. Mubdi, Mr. M.A. Mumin (deceased), Dr. Khalilur Rahman, Mr. H.N. Ashequr Rahman, MP, Mrs. Razia Samad and the Vice Chancellor (ex-officio). After being accorded permission by the Government under the Private University Act (Act 34) of 1992, EWU was launched in 1996. Classes started in September 1996 with 6 faculty members and 20 students in a rented space at 43, Mohakhali Commercial Area, Dhaka.

EWU has achieved a major milestone by shifting to its own campus at Aftabnagar, Dhaka on 12 May 2012. At present, there are over 418 faculty members. The University has over 10177 students who enroll after a rigorous process of selection. Its growth testifies to its steady and significant progress towards promoting quality university education.

EAST WEST UNIVERSITY AT A GLANCE		
Government Approval	:	January 1996
Classes Started	:	September 1996
Permanent Sanad Received	:	26 January 2016
Initial Enrollment	:	20 Students
Gross Enrollment to Date	:	45616 (admitted so far)
Current Enrollment	:	10177 (attending classes currently)

Faculty Members	:	Full Time: 304, Adjunct:114

Accreditation and Collaboration

East West University is accredited by the Government of the People's Republic of Bangladesh and its curricula and programs have been approved by the University Grants Commission of Bangladesh. EWU received Permanent Sanad from the Government of Bangladesh on 26 January 2016. The President of the People's Republic of Bangladesh is the Chancellor of EWU. The Vice Chancellor, the Pro-Vice Chancellor, and the Treasurer are appointees of the President of the country in his capacity as the Chancellor of the University. East West University has formal collaboration agreements with the following leading universities:

Pace University, New York, USA
Suffolk University, Boston, USA
Southern Illinois University at Carbondale, USA
University of Luton, Bedfordshire, England, UK
University of Fukui, Fukui City, Japan

Location

The permanent campus of East West University is located at Aftabnagar, Rampura on Progoti Sarani, close to BTV Bhaban, on 7.4 bighas of land. The total floor area of the 9 storied university complex is 4, 58, 957.04 sft. and it is equipped with all modern facilities. East West University has also bought 594.75 decimals (5.95 acres) of land at Mouja Vadham, P.S. Tongi, District Gazipur. In addition, it has received an allotment of one bigha of land in Uttara from Rajuk.

Faculties

There are currently three academic faculties:

Faculty of Business and Economics
Faculty of Sciences and Engineering
Faculty of Liberal Arts and Social Sciences

There are 15 (fifteen) separate departments operating under these three faculties. English is the medium of instruction and of examinations for all programs.

Degrees Offered

Currently, EWU offers the following four-year Bachelor's Degrees:

1. Bachelor of Business Administration (BBA) (Majors in Accounting, Marketing, Finance, Management, International Business, Human Resource Management (HRM) & Management Information System (MIS)
2. B.S.S. in Economics
3. B.S.S. in Sociology
4. B.S.S. in Information Studies and Library Management (ISLM)
5. B.A. in English
6. Bachelor of Laws [LL. B. (Hons.)]
7. B.S. in Applied Statistics
8. B.Sc. in Computer Science and Engineering
9. B.Sc. in Electronic and Telecommunication Engineering
10. B.Sc. in Information and Communications Engineering
11. B.Sc. in Electrical and Electronic Engineering

12. B.Sc. in Civil Engineering
13. Bachelor of Pharmacy (B. Pharm)
14. B.Sc. in Genetic Engineering and Biotechnology

EWU plans to offer B.Sc. in Nursing degree & B.Sc. (Hons) in Mathematics.

EWU also offers the following Master's Degrees:

1. MBA, Regular and Executive
2. Master of Arts in English (MA in English)
3. Master of Arts in English Language Teaching (MA in ELT)
4. Master of Bank Management (MBM)
5. Master in Development Studies (MDS)
6. M.S.S. in Economics
7. MS in Applied Statistics
8. Master of Science in Actuarial Science
9. Master of Science in Computer Science and Engineering (MS in CSE)
10. Master of Science in Telecommunications Engineering (MS in TE)
11. Master of Science in Applied Physics and Electronics (MS in APE)
12. Master of Population, Reproductive Health, Gender and Development (MPRHGD)
13. Postgraduate Diploma in Population, Public Health and Disaster Management (PPDM)
14. Master of Pharmacy in Clinical Pharmacy and Molecular Pharmacology
15. Master of Laws (LL.M)

Semesters

All programs (except B. Pharm) operate on a trimester system (i.e. 3 semesters per year):

Spring Semester: January-April (starting on the second Sunday of January)

Summer Semester: May-August (starting on the second Sunday of May)

Fall Semester: September-December (starting on the second Sunday of September)

The B.Pharm Program is divided into two semesters:

Spring Semester (January-June)

Fall Semester (July-December).

Classes

Classes are held from Sunday through Thursday. For each 3-credit course, there are 2 (two) classes per week, each of one and a half hour duration. For 1 credit of lab, 2 hours of lab work per week is assigned. There are four class-slots available in a week:

Slot Days

ST Sunday and Tuesday

SR Sunday and Thursday

TR Tuesday and Thursday

MW Monday and Wednesday

If classes cannot be held as scheduled due to unavoidable reasons, make-up classes are arranged to ensure that no classes are lost and session jam avoided.

The Growth of EWU

East West University (EWU) has achieved remarkable success within a short period of time. In the Spain-based international 'Webometrics' survey report of 2013, East West University was ranked the number one private University of Bangladesh. In July 2007 and July 2008, East West University had been ranked the number one private University of Bangladesh as well. It was also ranked as the second best private university of Bangladesh by the same organization in January 2008. It should be noted here that 'Webometrics' is a European Union-funded Spain based research organization.

East West University, which had its beginning in 1996 with only 20 students and 6 faculty members, now has approximately 10144 students and over 436 faculty members. Its growth testifies to its steady and significant progress towards promoting quality university education. It has already produced 16, 208 graduates from its Undergraduate and Graduate programs. Most of them are working in important positions in industry as well as government offices and have been demonstrating competence professionally.

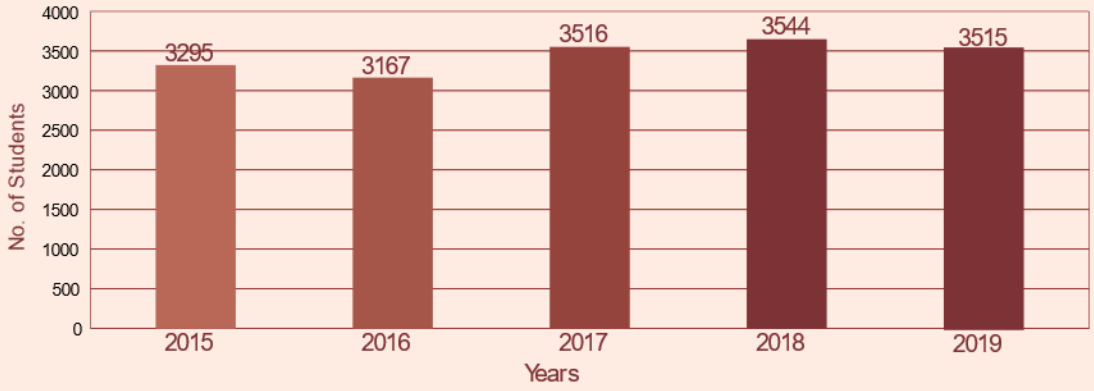
The dynamic growth of EWU can be seen in the figures provided in the next page:

Semester-wise Statistics of Admission and Enrollment of Students
(From Spring Semester 2017- Fall Semester 2019)

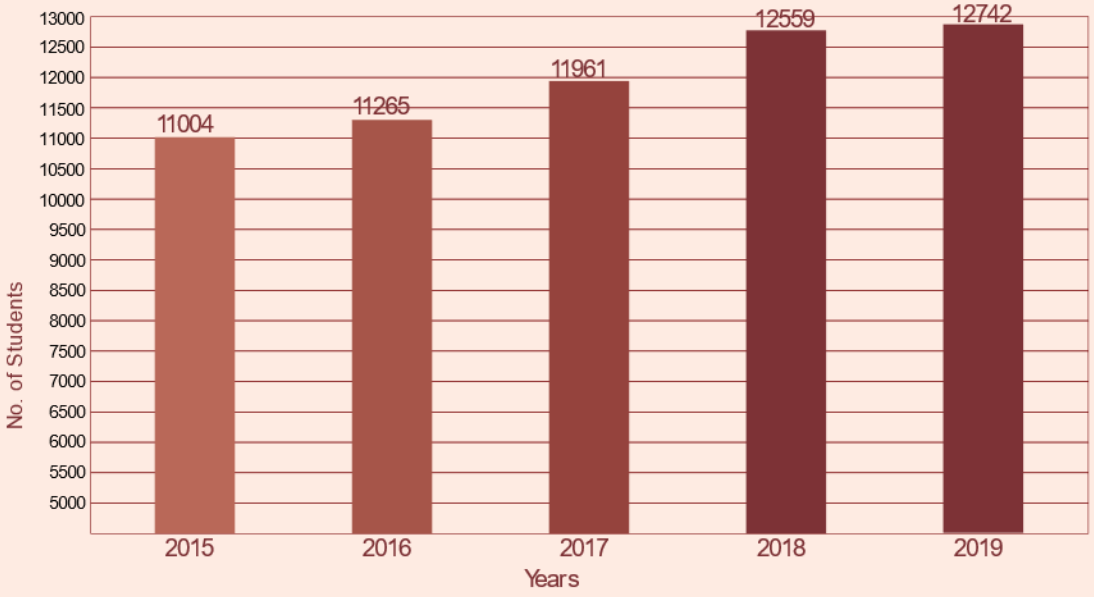
Programs	Spring 2017		Summer 2017		Fall 2017		Spring 2018		Summer 2018		Fall 2018		Spring 2019		Summer 2019		Fall 2019	
Undergraduate	Admitted	Enrolled	Admitted	Enrolled	Admitted	Enrolled	Admitted	Enrolled	Admitted	Enrolled	Admitted	Enrolled	Admitted	Enrolled	Admitted	Enrolled	Admitted	Enrolled
BBA	360	3385	277	3377	193	3248	341	3324	221	3289	139	3141	332	3147	232	3096	262	3093
ECO	73	549	48	526	36	508	87	531	74	535	48	516	83	512	64	537	39	516
ENG	94	629	55	627	58	634	74	659	64	697	62	714	78	704	64	725	63	748
CSE	169	1161	168	1246	103	1254	267	1428	136	1461	121	1445	264	1544	94	1496	156	1504
ICE	33	257	32	279	21	179	42	306	49	324	35	321	58	326	35	321	28	316
ETE	45	335	30	332	15	303	26	289	23	274	16	247	29	247	15	220	10	204
EEE	105	589	43	471	34	536	83	559	62	572	35	562	74	549	35	529	35	509
CIVIL ENGG.	27	26	33	55	28	77	63	130	41	159	44	187	61	228	43	245	30	253
B. PHRM	118	641	82	641		647	102	656	100	656		651	100	665	101	665		679
GEB	27	198	31	211	11	199	55	239	51	263	34	286	83	319	38	328	26	330
APPL.STA.	6	105	3	103	8	104	10	106	3	96		77		65		44		30
Soclology	18	220	35	227	19	219	38	243	39	254	20	237	39	227	37	237	29	225
LL.B	65	307	50	336	54	380	47	415	48	461	49	501	50	530	50	560	50	571
ISLM	16	71	19	78	15	87	19	102	22	109	11	118	19	137	15	138	13	134
Total	1156	8473	906	8609	622	8375	1254	8473	933	9150	614	9003	1270	9200	823	9141	741	9112
Graduate																		
MBA	140	688	114	698	120	685	108	664	106	648	80	622	112	581	109	591	86	589
EMBA	42	225	43	207	29	210	41	208	37	190	25	185	20	155	35	159	38	158
MBM		29		22		14		9		6		5		1		1		1
MDS	7	56	11	52	6	47	13	54	9	48	5	43	14	51	7	48	10	45
MA In ENG	9	72	17	82	15	81	10	68	8	61	15	57	15	54	14	58	6	50
MA-ELT	12	60	10	66	16	68	10	67	4	61	3	57	14	61	9	54	7	47
MS In TEL	5	16	6	17		12	4	9	2	7	2	7		7		7		1
MS CSE		17		7	11	17	5	17	9	22	9	28	9	36	8	31	11	30
MPRHGD	5	20	8	26	2	23	6	23	4	22	4	21	6	26	6	23	6	25
M. PHARM	41	69		69	43	95	28	109			39	104	19	97			22	87
MS-APE	2	4		4	3	1		1										
MSS-ECO	27	86	14	87	27	91	20	89	14	79	11	76	9	65	18	64	15	52
MS-APPL.STA.	6	15	7	20		20	3	16	6	16	2	8		10	23	28	12	33
MS in Actuarial Science		3	2	4		5		2										
LL.M	8	21	8	28	10	27	8	31	8	24	3	20	4	16	9	23	7	23
PPDM			4	4	2	5	1	3	2	3		3	1	3		1	2	1
Total	304	1378	244	1393	284	1401	257	1370	209	1187	198	1236	223	1163	238	1088	220	1142
Grand-Total	1460	9851	1150	10002	906	9776	1511	10357	1142	10337	812	10239	1493	10363	1061	10229	961	10254

Graphical Representations of Students: Year-w ise

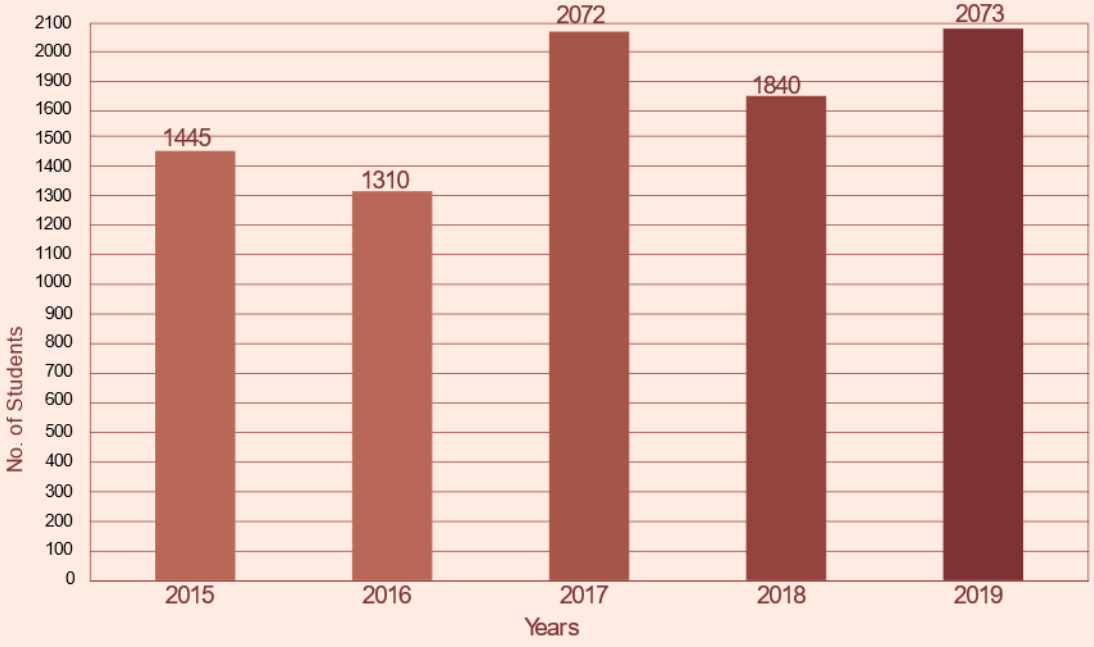
Newly Admitted Students : Yearwise



Enrolled Students : Yearwise



Graduating Students : Yearwise



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East West University believes that every type of discrimination, whether social or cultural, whether based on race, gender, color, social condition, language or religion, is to be overcome and eradicated.

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The content of this catalog is subject to change without notice. Every student accepted for registration in the University shall be deemed to have agreed to such deletions, revisions or addition whether made before or after his/her acceptance.

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Senior Medical Officer	Dr. Farida Begum, MBBS

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1. Department of Business Administration

a. Undergraduate Program

Bachelor of Business Administration (BBA) - 123 Credits

b. Graduate Programs

i. Master of Business Administration (MBA) - 60 Credits

ii. Master of Business Administration, Executive Program (EMBA) - 42 Credits

2. Department of Economics

a. Undergraduate Program

Bachelor of Social Science in Economics - 123 Credits

b. Graduate Programs

i. Master of Bank Management - 60 Credits

ii. Master of Development Studies - 39 Credits

iii. Master of Social Science in Economics - 36 Credits

Faculty of Liberal Arts and Social Sciences

1. Department of English

a. Undergraduate Program

BA in English - 123 Credits

b. Graduate Programs

i. Master of Arts in English (MA in English) - 36 Credits / 45 credits

ii. Master of Arts in English Language Teaching (MA in ELT) - 42 Credits/48 Credits/66 Credits

2. Department of Social Relations

Graduate Program

i. Master of Population, Reproductive Health, Gender and Development (MPRHGD) - 48 Credits

ii. Post Graduate Diploma in Population, Public Health and Disaster Management (PPDM) - 21 Credits

3. Department of Sociology

Undergraduate Program

Bachelor of Social Science in Sociology-123 Credits

4. Department of Information Studies and Library Management

BSS in Information Studies & Library Management -123 Credits

5. Department of Law

a. Undergraduate Program

Bachelor of Laws [LL. B. (Hons.)] - 135 Credits

b. Graduate Program

Master of Laws (LL.M) - 36 Credits

Faculty of Sciences and Engineering

1. Department of Electronics and Communications Engineering

a. Undergraduate Programs

i. B.Sc. in Electronic and Telecommunication Engineering (ETE) - 140 Credits

ii. B.Sc. in Information and Communications Engineering (ICE) - 140 Credits

b. Graduate Programs

i. Master of Science in Telecommunications Engineering (MS in TE) - 35 Credits
ii. Master of Science in Applied Physics and Electronics (MS in APE) - 35 Credits

2. Department of Computer Science and Engineering

a. Undergraduate Program

B.Sc. in Computer Science and Engineering (CSE) - 140 Credits

b. Graduate Program

Master of Science in Computer Science and Engineering (MS in CSE) - 33 Credits

3. Department of Electrical and Electronic Engineering Undergraduate Program

B.Sc. in Electrical and Electronic Engineering (EEE) - 140 Credits

4. Department of Civil Engineering

Undergraduate Program

Bachelor of Science in Civil Engineering -156.5 Credits

5. Department of Mathematical and Physical Sciences

a. Undergraduate Program

Bachelor of Science (BS) in Applied Statistics- 127 Credits

b. Graduate Program

i. MS in Applied Statistics - 35 Credits
ii. Master of Science in Actuarial Science- 36 Credits

6. Department of Pharmacy

a. Undergraduate Program

Bachelor of Pharmacy (B. Pharm) – 158 Credits

b. Graduate Program

Master of Pharmacy in Clinical Pharmacy and Molecular Pharmacology - 30 Credits

7. Department of Genetic Engineering and Biotechnology

Undergraduate Program

Bachelor of Science in Genetic Engineering and Biotechnology -133 Credits

Graduation Requirements

Graduation Requirements for Undergraduate Programs

Meeting the graduation requirements is the student's responsibility. This includes:

1. Credit completion requirement for:

a. BBA - a minimum of 123 credits
b. BSS in Economics - a minimum of 123 credits
c. BA in English - a minimum of 123 credits
d. BSS in Sociology - 123 credits
e. BSS in ISLM- 123 credits
f. LL.B (Honours) - 135 credits
g. BS in APS - 127 credits
h. B.Sc. in CSE - 140 credits
i. B.Sc. in ETE- 140 credits
j. B.Sc. in ICE - 140 credits
k. B.Sc in EEE - 140 credits
l. B.Sc. in CE – 156.5 credits
m. B. Pharm - 158 credits

n. B.Sc. in GEB - 133 credits

Residency requirement requires that at least 75% of courses must be completed at EWU. Number of credits will increase for the students interested to do minor in other areas and/or for the students of B.B.A. willing to do concentration in two areas (double major).

2. Earning at least a minimum CGPA of 2.00. The CGPA will be calculated on the basis of grades earned in the courses required for the particular Degree.

3. Applying to the Controller of Examinations stating their intentions that they want to be considered for the award of the Bachelor degree in the relevant discipline. **A Graduation Fee is mandatory for every graduating applicant and is due at the time of submitting the application.**

4. Payment of all university dues.

5. All university properties must have been returned.

6. Previous Academic Records must be authenticated by the respective degree awarding authority/institution.

Fulfillment of the above conditions does not necessarily mean that a degree will be conferred on the student. The university reserves the right to refuse the awarding of a degree on disciplinary or similar grounds. **Generally the stipulated time limit for completion of Degree at Undergraduate level is four years; however, on compassionate ground to be approved by the authority, this time limit may be extended upto Seven (7) years maximum.**

University also reserves the right to cancel a degree which has already been awarded, if any fraud or forgery is found in any documents or information which the student provided earlier.

Minor

Undergraduate students are allowed to do minor in one or more areas. The minor must be from the department other than his/her own. Students doing minor must complete a minimum of seven courses of which at least four courses must be for the minor only. Students intending to do a minor must apply in writing to the respective Dean of Faculty for permission after completing 50% of courses with a minimum CGPA of 2.50 for his/her base degree. Students must have a minimum CGPA of 2.00 to qualify for a minor.

Requirements

The courses students have to complete for a minor for each area are given below.

Business Administration

Compulsory Courses: ACT 101, FIN 101, MGT 101 & MKT 101
Optional Courses: (Any Three)

ACT 201, BUS 231, BUS 361, ECO 328, FIN 201, MGT 251, MGT 337 & MKT 201

Economics

ECO 101, ECO 102, MAT 110, ECO 301, ECO 302 plus any two 300/400 level economics courses.

English

Core Courses: ENG 145/ENG 191, ENG 309, ENG 310 Elective Courses: ENG 226, ENG 313, ENG 430, ENG 435

Information and Communication Engineering

Group A: Any five from the following courses: ICE 211, ICE 302, ICE 303, ICE 310, ICE 312, ICE 314, ICE 320, ICE 412

Group B: Any two from the following courses: ICE 414, ICE 415, ICE 423, ICE 435

Electronic and Telecommunication Engineering

Group A: Any five from the following courses:

ETE 107, ETE 207, ETE 212, ETE 216, ETE 302, ETE 314, ETE 350

Group B: Any two from the following courses:

ETE 401, ETE 403, ETE 430, ETE 441, ETE 442, ETE 444

Computer Science and Engineering

Group A: Any five from the following courses:

CSE 105, CSE 107, CSE 207, CSE 245, CSE 301, CSE 209, CSE 251, CSE 345

Group B: Any two from the following courses:

CSE 411, CSE 348, CSE 442, CSE 480

Electrical and Electronic Engineering

Group A: Any five from the following courses:

EEE 101, EEE 102, EEE 201, EEE 301, EEE 302, EEE 303, EEE 306, EEE 307, EEE 308

Group B: Any two from the following courses:

EEE 401, EEE 403, EEE 416, EEE 423, EEE 445

Double Major

Students of B.B.A. may be allowed to do concentration in two areas. In such cases students will have to complete additional 18 credits from a second area of concentration. However, students may complete the double major in shorter period if they choose the three mandatory open elective courses from the second area of concentration. This way interested students may take three additional courses from the second area of concentration, which would enable them to obtain a double major (e.g. Marketing and Finance) with 132 credits (123 credits + 9 credits). Students interested to do double major are advised to inform the department through their respective advisors prior to choosing the open elective courses.

Academic Awards

For excellent academic achievement following awards are given to the students at the Convocation ceremony as per the policy mentioned below:

1. Gold Medal: An undergraduate student graduating with a CGPA of 4.00 or above (out of 4.00) within a period of four years will be eligible for getting a gold medal. A student admitted in this university on transfer of credits from other university(s) and/or availing himself or herself of the advantage of retaking any course any time, will not be eligible for this award. A student of a graduate program graduating with a CGPA of 3.99 or above (out of 4.00) within the stipulated time for the respective degree (1 to 2 years, as the case may be) will be eligible for getting a gold medal. A student admitted in this university on waiver/transfer of credits from other university(s) and/or availing himself or herself of the advantage of retaking any course any time, will not be eligible for this award.

2. Summa Cum Laude: An undergraduate student graduating with a CGPA of 3.90 or above (out of 4.00) within four years will be eligible for the award ‘Summa Cum Laude’. A EWU student availing himself or herself of the advantage of retaking any course any time will not be eligible for this award.

3. Magna Cum Laude: An undergraduate student graduating with a CGPA of 3.80 to less than 3.90 (out of 4.00) within four years will be eligible for the award ‘Magna Cum Laude’. A EWU student availing himself or herself of the advantage of retaking any course any time will not be eligible for this award.

4. Cum Laude: An undergraduate student graduating with a CGPA of 3.75 to less than 3.80 (out of 4.00) within four years will be eligible for the award ‘Cum Laude’. A EWU student availing himself or herself of the advantage of retaking any course any time at EWU will not be eligible for this award.

Department of Business Administration

The Department of Business Administration at East West University started its operation in September 1996. Since its inception, it has been offering undergraduate program in Business Administration. Graduate Programs include M.B.A., & E.M.B.A. Programs. The contemporary and innovative curriculum of B.B.A. degree is based upon a compelling philosophy of teaching that allows students to cope with the radical transformation that business activities have been undergoing in the wake of globalization. It covers recent developments in business as well as the areas that have traditionally formed the core of the business discipline.

Vision

Business Knowledge Leadership for Social Transformation

Mission

We create an enabling environment for our students to pursue knowledge meaningfully and fully, to be successful business leaders of tomorrow through the scholarly pursuits of our faculty members. Our aim is to produce business professionals who will also prove to be responsible citizens.

Core Values

1. Nurturing Academic Freedom and Wisdom
2. Promoting Innovation and Entrepreneurship
3. Inculcating Leadership and Professionalism
4. Cultivating Integrity and Equity
5. Practicing Social Responsibility and Accountability
6. Valuing Patriotism and Cultural Heritage

Program Educational Objectives (PEOs)

PEO 1	To help our graduates establish themselves as effective business professionals, critical and fair-minded thinkers, capable of solving real life problems through the use of management science knowledge and skills.
PEO 2	To help our graduates display ethical, social, environmental, civic and professional qualities in their actions and add value to society.
PEO 3	To help our graduates equip with leadership and entrepreneurship skills as business managers and leaders.
PEO 4	To help our graduates engage themselves in life-long learning to address the needs of an ever-changing business environment and adapt themselves easily to the multidisciplinary nature of business relationships.

Program Outcomes (POs)

Sl.	Graduate Attributes	Domain	Program Outcome
PO 1	Business Functional Areas	Cognitive	Our graduates will be able to understand key business functional areas (e.g., accounting, finance, human resource management, management, management information systems, marketing, production and operations management, supply chain management, etc.), and promote their interactions and interrelationships in contemporary business environments.
PO 2	Communication skills	Cognitive, affective, and psychomotor	Our graduates will develop interpersonal capabilities and will be influential communicators through writing effective business documents, preparing and delivering effective oral business presentations.
PO 3	Critical Thinking and Problem Solving	Cognitive	Our graduates will be able to apply analytical and reflective thinking and implement appropriate quantitative and qualitative techniques in developing viable alternatives and solving business problems.
PO 4	Information Technology	Cognitive, and affective	Our graduates will demonstrate effective application of IT skills in the areas of acquisition, processing, and dissemination of information and designing business solutions through appropriate tools.
PO 5	Ethics and Social Responsibilities	Cognitive, and affective	Our graduates will be able to identify and comply with ethical, professional, regulatory, environmental and socially responsible organizational policies and practices.
PO 6	Teamwork	Cognitive, affective, and psychomotor	Our graduates will demonstrate the ability to collaborate and play the role of members and leaders in diverse and multidisciplinary settings to achieve common objectives.
PO 7	Leadership and Entrepreneurship	Cognitive, affective, and psychomotor	Our graduates will develop leadership traits; foster entrepreneurial and creative thinking and be drivers of innovative ideas testifying to their effectiveness as business managers and leaders.
PO 8	Globalization	Cognitive and affective	Our graduates will be able to address relevant regional and global factors that influence business decision making in the global marketplace.
PO 9	Life-long Learning	Cognitive, and affective	Our graduates will engage themselves in independent updating, continuous professional development and dedicate themselves

			to life-long learning.
PO 10	Patriotism and Cultural Heritage	Cognitive and affective	Our graduates will care for their cultural heritage, show respect towards the motherland.

Present Status and Future Direction

At present the B.B.A. program at EWU offers concentration in seven areas: Accounting, Finance Marketing, Human Resources Management, Management Information System, Management, and International Business. To qualify for the B.B.A. degree at EWU one has to complete a minimum of 41 courses (123 credits) that normally takes four years. Students may complete the degree earlier by enrolling in more than three courses each semester. Of the 41 courses that a student must complete for the degree, 11 are General Education Courses, 20 are Core Courses, 3 are Open Elective Courses, and 6 are Concentration Courses and Internship/Project work. Students may be allowed to do concentration in two areas. Students who have already graduated may also be allowed to do relevant courses for concentration for which a separate certificate will be issued by the Department Chair. Students are also required to do Internship/Project that helps expose them to practical world of corporate business. The course curriculum is continuously updated to suit the needs of the market. We continuously keep in touch with the corporate world through a number of programs.

Total number of students currently enrolled in the B.B.A. program is about 3685. The number of applicants seeking admission into the B.B.A. program of EWU has been increasing at a very high rate. The acceptance rate in the last two semesters was about 25 percent only. One reason is the deliberate policy of the university to keep the number of students at or around its present level. We are putting more emphasis on quality than on quantity. So far a total of 6376 students graduated from this department. A sizeable number of them are now working with reputation in very prestigious National and Multinational organizations like, Unilever (Bd.) Ltd., Grameen Phone Ltd. Banglalink Robi, ADCOM, ASIATIC, Nestle, Local Commercial and Multinational Banks, Insurance companies, Square Group, Beximco group, Rahim Afroz, IDLC Finance limited, credit agencies in Bangladesh , AC Nelson, British American Tobacco Company Ltd and others.

The main strength of the B.B.A. program at EWU lies in its highly skilled and dedicated faculty members. We have a large number of full-time faculty members. The department has been striving to maintain a reasonably high teacher-student ratio.

The courses that are offered for B.B.A. students are shown in the following pages.

Bachelor of Business Administration (BBA)

Minimum Requirement 123 Credits

Course Title Credit

General Requirements 33

Compulsory General Education Courses 24

BUS 101 Introduction to Business 3

CSE 101 Introduction to Computers I 3

ECO 104 Introduction to Statistics 3

ENG 100 Improving Oral Communication Skills 3

ENG 101 Basic English 3

ENG 102 Composition and Communication Skills3

GEN 226 Emergence of Bangladesh 3

MAT 110 Mathematics for Business and Economics I 3

Optional General Education Courses 9

Choose any three courses from the following

BUS 301 Business Ethics 3

MGT 321 Industrial Management **(For the student of FSE)** 3

CSE 102 Introduction to Computers II 3

GEN 201 Bangladesh Studies 3

GEN 202 Eastern Culture and Heritage 3

GEN 203 Ecological System and Environment 3

GEN 204 Western Thought 3

GEN 205 Introduction to Psychology 3

GEN 207 Industrial Psychology 3

GEN 208 Introduction to Philosophy 3

GEN 209 Introduction to Social Psychology 3

GEN 210 International Relations 3

GEN 211 Concepts of Journalism & Media Studies 3

GEN 212 Women in Development 3

GEN213 Introduction to German Language 3

GEN 214 Introduction to Development Studies 3

GEN 215 Introduction to French Language 3

GEN 216 Introduction to Spanish Language 3

GEN 217 Introduction to Chinese Language 3

GEN 218 Introduction to Arabic Language 3

GEN 220 Principles of Public Relations 3

GEN 221 Globalization, Development and Change3

GEN 223 Contemporary Security Studies in Asia-Pacific 3

GEN 224 Bangla Language 3

GEN 239 Professional Ethics 3

MAT100 College Mathematics (Compulsory for those students who have no mathematics in HSC or equivalent level) 3

POP 201 Health Challenges of Adolescents and Youth 3

POP 202 Introduction to Public Health 3

POP 203 Introduction to Population Studies 3

SOC 101 Introduction to Sociology 3

SOC 102 Introduction to Anthropology 3

SOC 209 Industrial Sociology 3

SOC 217 Religion, Ethnicity, Culture and Development in South Asia 3

SOC 310 Sociology of Organization 3

Core Requirements 60

ACT 101 Financial Accounting 3

ACT 201 Management Accounting 3

BUS 231 Business Communication 3

BUS 361 Legal Environment of Business 3

ECO 101 Principles of Microeconomics 3

ECO 102 Introduction to Macroeconomics 3

ECO 204 Statistics for Business and Economics 3

FIN 101 Principles of Finance 3

FIN 201 Business Finance 3

ITB 301 International Business 3

MAT 211 Mathematics for Business and Economics II 3

MGT 101 Principles of Management 3

MGT 251 Organizational Behavior 3

MGT 337 Production Operations Management 3

HRM 301 Human Resources Management 3

MGT 480 Strategic Management 3

MIS 101 Introduction to Management Information System 3

MIS 305 Enterprise Information System 3

MKT 101 Principles of Marketing 3

MKT 201 Marketing Management 3

Concentration Requirements 18

Students may be allowed to do concentration in two areas

a) Concentration in Accounting

ACT 311 Taxation 3

ACT 411 Intermediate Accounting-I 3

ACT 421 Intermediate Accounting-II 3

ACT 441 Cost Accounting 3

Choose any two courses from the following

ACT 427 Auditing 3

ACT 430 Accounting Information System 3

ACT 456 Accounting Theory 3

ACT 478 Advanced Accounting 3

b) Concentration in Finance

FIN 425 Investment Analysis and Management 3

FIN 435 Managerial finance 3

FIN/ITB 465 International Financial Management3

Choose any three courses from the following

ACT 311 Taxation 3

FIN 335 Financial Institutions and Markets 3

FIN 350 Real Estate Finance 3

FIN 380 Management of Commercial Bank 3

FIN 408 Financial Analysis and Control 3

FIN 410 Risk Management and Insurance 3

FIN 450 Cases in Financial Management 3

FIN 475 Option and Future 3

c) Concentration in International Business

ITB 401 International Operations 3

ITB 428/ ECO328 International Economics 3

ITB /FIN465 International Finance Management 3

Choose any three courses from the following

ITB 445 International Financial Institution 3

ITB 450 International Businesses Negotiations 3

ITB 455 Country Risk Analysis 3

ITB 460 International Competitiveness 3

ITB/MKT 408 International Marketing 3

d) Concentration in Management

MGT 402 Management Science 3

MGT 421 Entrepreneurship Development 3

MGT 465 Leadership Management 3

Choose any three courses from the following

MGT 405 Organizational Development and Change 3

MGT 410 International Labor Management 3

MGT 425 Total Quality Management 3

MGT 437 Small Business Management 3

MGT 448 Managing Globalization 3

e) Concentration in Management Information System

MIS 401 Structured Programming 3

MIS 402 System Analysis and Design 3

MIS 404 Networking and Operating System 3

MIS 406 Relational Database Management Systems 3

Choose any two courses from the following

MIS 403 Object Oriented Programming 3

MIS 407 System Integration & Security and Internet 3

MIS 408 Internetworking with TCP/IP and

Implementing Exchange Server 3

MIS 409 Client/Server Administration 3

MIS 410 Database Systems 3

MIS 415 Decision Support Systems 3

MIS 419 E-Commerce and Web Programming 3

f) Concentration in Marketing

MKT 410 Consumer Behavior 3

MKT 414 Marketing Research 3

Choose any four courses from the following

MKT 401 Sales Management 3

MKT 402 Integrated Marketing Communication 3

MKT/ITB 408 International Marketing 3

MKT 412 Service Marketing 3

MKT 411 Export-Import Management 3

MKT 416 Brand Management 3

MKT 418 Supply Chain Management 3

MKT 430 Strategic Marketing 3

g) Concentration in Human Resource Management

HRM411 Human Resource Planning 3

HRM412 Compensation Management 3

HRM413 Industrial Relations and Labour Law 3

Choose any three courses from the following

HRM415 Training and Development 3

HRM416 Strategic Human Resource Management3

HRM417 Human Resource Information System 3

HRM418 Job Analysis and Performance Appraisal3

HRM419 Leadership, Power and Influence 3

HRM420 Organizational Development 3

HRM421 International Human Resource Management 3

Open Electives 9

Students must take three 300/400 level courses as open electives to qualify for the B.B.A. degree. They can choose any 300/400 level course from BA, and/or CSE, and/or ICE, and/or ENG, and/or ECO department. Students will not be allowed to take the following two courses as open elective course: ICE 301 (Network Technology) and ICE 403 (Local Area Network). Students must complete relevant prerequisite courses to qualify for enrollment into these open elective courses. Students willing to enroll into open elective courses of other departments must consult with the chairpersons and course instructors concerned.

Internship/Project Work 3

Choose one course from the following

BUS 498 Project Work 3

BUS 499 Internship 3

Credit requirements for a second major for non-B.B.A. students 51

Required core courses 33

MAT 110 Mathematics for Business and Economics I 3
ECO 104 Introduction to Statistics 3
ECO 101 Principles of Microeconomics 3
ECO 102 Introduction to Macroeconomics 3
MAT 211 Mathematics for Business and Economics II 3
ECO 204 Statistics for Business and Economics 3
ACT 101 Financial Accounting 3
FIN 101 Principles of Finance 3
MGT 101 Principles of Management 3
MKT 101 Principles of Marketing 3
BUS 231 Business Communication 3

Any One ACT 201/FIN 201/MKT 201/MGT 2513

Major courses

ACT/FIN/ITB/MGT/MIS/MKT/HRM 15

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BBA in Finance (University of Dhaka)

Md. Humayun Kabir
MBA in Finance
(North South University)
BBA in Finance
(East West University)

Jannatul Ferdous Shetu
MBA in International Business
(University of Dhaka)
BBA in International Business
(University of Dhaka)

Fariza Binte Mahbub
MBA in International Business
(University of Dhaka)
BBA in International Business
(University of Dhaka)

Sunny Saha
MBM in Supply Chain Management
(Chongqing Jiaotong University, China)
MBA in Marketing
(University of Dhaka)
BBA in Marketing
(University of Dhaka)

Marzia Tamanna
MBA in Management Information Systems
(University of Dhaka)
BBA in Management Information Systems
(University of Dhaka)

Nurun Naher Popy
MBA in Marketing
(University of Dhaka)
BBA in Marketing
(University of Dhaka)

Md. Shafiqul Islam Shuvo
MBA Major in AIS
(University of Dhaka)
BBA Major in AIS
(University of Dhaka)

Nuzat Nawar Tofa

MBA Major in Finance
(East West University)
BBA Major in Finance
(East West University)

Adviser, Students' Welfare & Head of CCC

Nahid Hasan Khan
M.Com in Accounting
(University of Dhaka)
B.Com (Hons) in Accounting
(University of Dhaka)

Department of Economics

Vision of the Department of Economics:

- To become a leading institution in Economics of South Asia

Mission of the Department of Economics:

- To prepare students by enriching their knowledge and values in economics and develop career goals to address economic and social challenges in an interdependent world through education, research and training.

At East West University, the BSS program in Economics is designed to meet the challenges of modern times. Students are trained in both theoretical and applied aspects of Economics, Development, and Business. Keeping in view the demand in the job market, programs in Economics are flexible but rigorous to get a grip on the challenges of globalization. The teaching faculty comprises highly qualified and experienced professors as well as bright young economists. Research is of high priority in the department.

The Department offers BSS in Economics with options to complete a second major in Management, Marketing, Finance, Computer Science, English or in any other undergraduate disciplines available at EWU.

Department of Economics also offers a multidisciplinary program at the graduate level. The Master's in Bank Management is designed to produce an efficient workforce for banking and financial organizations.

The Department has developed its second multidisciplinary graduate program in Development Studies with specializations in Evaluation and Design, Development Studies, Development Policy and Development Management. Master's in Development Studies is intended to be the best academic program in the country in this field. Furthermore, the Department is currently working on developing curriculum for the Master's in Economics and Law, the Master's in Public Policy, and the Master's of Social Science in Economics.

Visiting Faculty

Department of Economics strongly believes in academic interactions with other economics departments at home and abroad. For this reason, at least 20 percent of the courses are usually planned to be taught by visiting faculty members from reputed universities at home and abroad.

Academic Programs

Undergraduate Studies

Bachelor in Social Science (Economics) - 123 Credits

Graduate Studies

Master of Bank Management - 60 credits

Master of Development Studies - 39 credits

Master of Economics and Law - 50 credits (under preparation)

Master of Public Policy - 30 credits (under preparation)

Master of Social Science in Economics - 36 credits

Research

In close collaboration with the East West University Center for Research and Training (EWUCRT), the department is planning to undertake policy research particularly relevant to the macroeconomic and social policy framework of the country. The department envisages significant research involvement in the areas of small and medium enterprise (SME), environment, resource planning and entrepreneurship development.

Center for Urban Studies and Sustainable Development (CUSSD)

To address the important challenges regarding urbanization and sustainable development in developing countries such as Bangladesh, a center titled "Center for Urban Studies and Sustainable Development (CUSSD)" has been established in April 2018 in the Department of Economics, East West University. Salim Rashid, Professor Emeritus University of Illinois, Urbana Champaign, has agreed to direct the Center. Southeast Bank Ltd. has provided the funding for the Center as part of its Corporate Social Responsibility.

Bachelor of Social Science (BSS) in Economics

Minimum Requirement 123 Credits

Course Category	Credits
Compulsory General Education Courses (CGED)	24
Optional General Education and Sociology Courses (OGEC)	9
Core Courses (CORE)	54
Open Elective Course (OPEN)	36
Total	**123**

Compulsory General Education Courses 24

Course ID	Course Title	Credit
BUS 101	Introduction to Business	3
CSE 101	Introduction to Computers I	3
ENG 100	Spoken English/ Improving Oral Communication Skills	3
ENG 101	Basic English	3
ENG 102	Composition and Communication Skills	3
ECO 104	Statistics for Business and Economics I	3
GEN 226	Emergence of Bangladesh	3
MAT 110	Mathematics For Business and Economics I	3

* MAT 100 for those who have no Mathematics in HSC Level

Optional General Education Courses 9

Course ID	Course Title	Credit
CSE 102	Introduction to Computers II	3
GEN 204	Western Thought	3
GEN 201	Bangladesh Studies	3
GEN 205	Introduction to Psychology	3
GEN 207	Industrial Psychology	3
GEN 210	International Relation	3
GEN 211	Concepts of Journalism & Media Studies	3
GEN 213	Introduction to German Language	3

ACT 101	Financial Accounting	3
ENG 145	Introduction to Linguistic	3
ETE 101	Introduction to Telecommunication Engineering	3
FIN 101	Principles of Finance	3
MAT 101	Differential and Integral Calculus	3
MAT 102	Differential Equation and Special Function	3
MGT 101	Principles of Management	3
MIS 101	Introduction to Management Information System	3
MKT 101	Principles of Marketing	3
MAT100	College Mathematics (* MAT 100 for those who have no Mathematics in HSC or equivalent Level)	3
SOC 101	Introduction to Sociology	3
SOC 102	Introduction to Anthropology	3
SOC 211	Eastern Culture and Heritage	3
SOC 212	Social Ecology, Environment & Society	3
SOC 215	Principles of Social & Public Relations	3

** These are the list of suggested courses for Optional General Education.

** Any other course of 1xx level, (3-credit) from any discipline can be taken as Optional General Education course.

** Students are advised to complete some foundation courses (like introductory Finance, Accounting and Marketing, etc) at least in one subject of their choice from Business discipline so that they have the option and flexibility to choose from 3xx and 4xx level of courses from these disciplines.

Core Courses 54

Course I	Course Title	Credit
ECO 101	Principles of Microeconomics	3
ECO 102	Introduction to Macroeconomics	3
ECO 260	Environmental & Natural Resource Economics	3
ECO 301	Intermediate Microeconomic Theory I	3
ECO 302	Intermediate Macroeconomic Theory I	3
ECO 310	Money and Banking	3
ECO 315	Public Finance	3
ECO 328	International Trade and Finance	3
ECO 349	Economics of Development	3
ECO 360	Socio-Economic Profiles of Bangladesh	3
ECO 465	Basic Econometrics	3
ECO 467	Intermediate Microeconomic Theory II	3
ECO 475	History of Economic Thought	3
ECO 477	Intermediate Macroeconomic Theory II	3
ECO 490	Research Methodology	3
ECO 495	Supervised Research Paper	3
MAT 211	Mathematics for Business and Economics II	3
ECO 204	Statistics For Business & Economics II	3

Open Elective Courses:

Students must complete 36 credits from the pool of Open Elective courses. Out of these 36 credits at least 15 credits must be from Economics courses. The other 18 credits can be from any other disciplines.

At least 06 credits must be from 2xx level [including BUS 231]

At least 12 credits must be from 3xx level

At least 18 credits must be from 4xx level

Open Elective Courses (2xx pool) 06

Course ID	Course Title	Credit
ACT 201	Management Accounting	3
BUS 231	Business Communication	3
CSE 205	Discrete Mathematics	3
ECO 200	Agricultural Economics	3
ECO 220	Behavioral Economics	3
ENG 200	Advanced Verbal Communication Skills	3
FIN 201	Business Finance	3
MAT 201	Linear Algebra	3
MGT 251	Organizational Behavior	3
MKT 201	Marketing Management	3

**BUS 231 must be completed.

** Any courses from 2xx level (3 credits) (that fulfills the prerequisites) that are not listed above can also be advised as Open Elective Courses.

Open Elective Courses (3xx pool) 12

Course ID	Course Title	Credit
ECO 304	Economics of Health	3
ECO 312	Industrial Organization	3
ECO 314	Public Sector Economics	3
ECO 329	Contemporary Issues in International Economics	3
ECO 353	Economics of Development in South Asia	3
ECO 354	Environmental & Natural Resource Economics-II	3
ECO 355	Blue Economics	3
ECO 357	Mathematical Economics	3
ECO 375	Foundations in Financial Economics	3
ECO 382	Economic Valuation of Environment	3
BUS 361	Legal Environment of Business	3
ENG 313	English for the Media	3
FIN 335	Financial Institution and Market	3
FIN 350	Real State Finance	3
FIN 380	Management of Commercial Bank	3
HRM 301	Human Resource Management	3
MGT 337	Production Operation Management	3

** Any courses from 3xx level (3 credits) (that fulfills the prerequisites) that are not listed above can also be advised as Open Elective courses.

Open Elective Courses (4xx pool) 18

Course ID	Course Title	Credit
ECO 406	International Economic Theory	3

ECO 414	Trade Policy Analysis	3
ECO 433	Gender and Development	3
ECO 443	Social Mobilization, Rural Banking & Community Organization	3
ECO 447	Applied Economics	3
ECO 449	Economics of Information	3
ECO 450	Labor Economics	3
ECO 453	Game Theory and Applications	3
ECO 455	Asian and Emerging Economies	3
ECO 460	Managerial Economics	3
ECO 461	Competition Law and Economics	3
ECO 474	Mathematical Economics II	3
ECO 480	Urban Economics	3
ECO 484	Project Analysis and Evaluation	3
ECO 485	Cost Benefit Analysis	3
ECO 486	Energy Economics and Policy	3
ECO 487	Applied Econometrics	3
ECO 489	Forecasting Methods in Business and Economics	3
ECO 491	Welfare Economics	3
ECO 492	Law and Economics	3
MAT 407	Advanced Calculus	3
MAT 470	Real Analysis	3
STA 427	Mathematical Statistics	3
FIN 408	Financial Analysis and Control	3
FIN 410	Risk Management and Insurance	3
FIN 425	Investment Analysis and Management	3
FIN 435	Managerial Finance	3
FIN 450	Cases in Financial Management	3
FIN 475	Option and Future	3
HRM 411	Human Resource Planning	3
HRM 414	Industrial Relations	3
HRM 419	Leadership Power and Influence	3
HRM 420	Organization Development	3
MGT 402	Management Science	3
MGT 405	Organizational Development and Change	3
MGT 410	International Labor Market	3
MKT 410	Consumer Behavior	3
MKT 411	Export Import Management	3
MKT 412	Service Marketing	3
MKT 414	Marketing Research	3
MKT 406	Brand Management	3

** Any courses from 4xx level (3 credits) (that fulfills the prerequisites) that are not listed above can also be advised as Open Elective courses.

SECOND MAJOR IN ECONOMICS

A second major in Economics is open to all undergraduate students at EWU who are not enrolled in BSS in Economics. Once a student earns a second major his/her degree will have a suffix Economics, like BBA (Marketing and Economics), etc.

The following is the curriculum for completing a second major for non-Economics undergraduate students at EWU.

a) Compulsory Credits 39

b) ECO 3XX/ECO 4XX Level credits 06

Total Credit Requirement 45

Economics Courses Required Compulsory Courses 39

ECO 101 Principles of Microeconomics 3
ECO 102 Principles of Macroeconomics 3
ECO 260 Environmental & Natural Resource Economics 3
ECO 315 Public Finance 3
MAT 110 Mathematics for Business & Economics I 3
ECO 104 Statistics for Business and Economics I 3
ECO 301 Intermediate Microeconomic Theory I3
ECO 302 Intermediate Macroeconomic Theory I 3
ECO 465 Basic Econometrics 3
ECO 467 Intermediate Microeconomic Theory II 3
ECO 477 Intermediate Macroeconomic Theory II 3
MAT 211 Mathematics for Business & Economics II 3
ECO 204 Statistics for Business & Economics II 3

Elective Courses: Any two from ECO three or four hundred level courses: 6 Credits (ECO 3XX OR ECO 4XX)

Faculty Members of the Department of Economics

Visiting Professor

Adviser and Coordinator

Mohammed Farashuddin
Ph.D. in Economics
(Boston University, USA)
MA in Political Economy
(Boston University, USA)
MA in Economics
(Boston University, USA)
MA in Economics
(University of Dhaka)
BA (Hon's) in Economics
(University of Dhaka)

Professor

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B.Sc. London School of Economics

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BSS (Hon's) in Economics
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Ph.D. in Economics
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MA in Economics
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M.Sc. in Economics
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BBA with Finance
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Ph.D. in Public Policy
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Assistant Professor

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Ph.D. in Economics
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M.Sc. in Economics
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B.Sc. in Economics
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MA in Economics
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BS in Economics
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(On Leave)

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BS in Economics (North South University)

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BSS in Economics
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BSS in Economics
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Gazi Quamrul Hasan

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BSS (Hon's) in Economics
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Lecturer

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MS in Economics
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BSS in Economics
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Estiaque Bari
M.Sc. in Economics
(United International University)
BSS in Economics (BRAC University)

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Mobasshir Anjum
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BSS in Economics (University of Dhaka)

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MSS in Economics (East West University)
BSS in Economics (East West University)

Adjunct Faculty

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Ph.D. in Economics
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MA in Economics
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M.Sc. in Economics
(Jahangirnagar University)
B.Sc. (Hon's) in Economics
(Jahangirnagar University)

Mudabber Ahmed
Ph.D. in Economics
(Dalhousie University, Canada)
MA in Economics (Dalhousie University, Canada)
MSS in Economics (University of Chittagong)
BSS (Hon's) in Economics (University of Chittagong)

Niaz Ahmed Khan
Post-doc in Development Studies
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Post-doc in Development Studies
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Ph.D. in Development Studies
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Certificate Program in Interpersonal Skills and
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Kh. Mezbauddin Ahmed
Ph.D. in Mathematics (Athens University, Greece)
M.Sc. in Applied Mathematics (University of Dhaka)
B.Sc. in Mathematics (University of Dhaka)

Md. Nisar Ahmed Shams
M.Sc. in Development of Resource Economics
(Norwegian University of Life Science)
M.Sc. in Economics, (Jahangirnagar University)
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MA in International and Development Economics
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MSS in Social Science
(University of Chittagong)
BSS (Hon's) in Social Science
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(University of Bonn, Germany)
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Masters in Development Economics
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BS in Economics (North South University)

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B.Sc. in Economics (Jahangirnagar University)

Noara Razzak
BA in Physics and Comparative Literature
(Bryn Mawr College, PA, USA)
MSS in Economics (East West University)

Tonima Hamid
MA in General History
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BA (Hon's) in General History

(University of Dhaka)

Tahseen H. Ali, Ph.D
Ph.D History
(Modern South Asia, British Empire, Modern U.S.)
MA History
(Modern South Asia, British Empire)
(University of Houston - Main Campus)
BA History (Political Science)
(University of Houston - Main Campus)

Department of English

Vision

To achieve individual and collective excellence in academic practices and professional competence.

Mission

In line with the mission of the university, the Department of English offers a BA in English program to prepare undergraduate students to serve in globalized settings. By providing excellent instruction and practical guidance, the program strives to attain internationally acceptable standards in preparing knowledgeable and skilled graduates who are not only equipped with the ability to think critically, but also with advanced reading and writing skills that they can use for a range of professions.

The English Department, characteristically associated with diverse aspects like literature, culture, literary history, and language, encourages its students to pursue an academic path whereby they become not only learned individuals, but also competent professionals. English graduates are people who read, think, and write critically and emphatically. They are able to communicate effectively. Hence, English majors work in various fields, such as teaching and education, law, editing and publishing, advertising and marketing, freelance and technical writing, research, corporate communications, and government and public service. All English courses require extensive writing, critical reading, and analysing issues. The focus is on honing these skills with emphasis on developing concise and incisive arguments and research questions, so that the graduates become competent and responsible individuals. Also central to the mission of the department, as a liberal arts discipline, is the importance of imparting humanist values, sensibilities, and ethics to students.

Present Status of the Department

The English Department at East West University takes a balanced approach in offering study of literature and linguistics. It acquaints students, on one hand, with the British, American, and world literatures written in English, and on the other, with linguistics and language teaching. In order to keep students abreast of the new developments in this discipline, the department consistently upgrades its syllabi and curricula. The department, which started its journey in August 1996, is among the oldest departments of East West University. Since the beginning the department has flourished full-fledged, and now it boasts of having 28 full-time faculty members, with 10 on study leave and 10 working part-time. Currently, the department offers a wide variety of undergraduate and graduate courses covering English language, linguistics, and literature in its undergraduate and graduate programs to more than 1002 students. It also offers a number of compulsory service courses to all students of East West University.

At the undergraduate level, the department offers a 4-year BA program in English. The program comprises two major areas: English Literature and English Language Teaching (ELT)/Applied Linguistics. At the graduate level, students may go for an MA in English with a concentration in either Literature or ELT. The department offers two MA programs: MA in English and MA in ELT. MA in English is designed to meet the specific needs of students with diverse interests. The focus on critical thinking, analytical reasoning and lucid writing, which is central to the mission of the program attempts to make students competent to work in different work places. MA in ELT is a practical course aimed at making students more aware of contemporary methods and techniques of pedagogy in English and designed for those who are interested in a career in teaching of English as a foreign language. So far, 933 students have received BA degrees; 348 students have graduated with an MA in English degree and 202 with an MA in ELT from the Department of English.

Faculty

The faculty members play key roles in the university's academic life. They are committed to mentoring students with their research expertise and excellent teaching skills. Many of the teaching staff have international exposures from the USA, Canada, UK, Australia, Germany, Japan, Malaysia, and India. The department thrives on the ability and quality of these teachers. The welcoming atmosphere along with the helpful and friendly teachers makes the Department of English an exciting and stimulating place to be.

Academic Life

The department organizes national and international conferences, seminar series, workshops which provide the faculty members and students a supportive forum for conducting research and for exchanging and developing ideas. The department has been organizing seminars since 2004. In-house faculty members and scholars from other universities are invited to present their papers in these seminars. In the presence of colleagues, guests, and students, speakers at the seminar series engage in meaningful academic and scholarly discussions. The department has organized five international conferences in the years 2006, 2008, 2009, 2016 and 2019.

Besides, the department provides modern teaching and learning facilities, such as a multimedia language lab (self-access centre), a writing centre, a seminar room, and a rich library. Each classroom is also supported by multimedia. Students and teachers also have access to internet on the campus. Furthermore, there are extracurricular activities. The department guides the English Conversation Club which organizes co-academic and social events throughout the year.

Future Directions

The department intends to maintain its current status and expand it further to compete regionally and globally. To achieve further excellence in teaching, peer observation by faculty members will be introduced to create opportunities for teachers to learn from each others' best practices and a formal record will be maintained. In addition, to improve the quality of the programs offered in the department, stakeholder's feedback will be taken on a regular basis and will be incorporated in the program.

Program Outcomes

Undergraduate students of the Department of English are expected to acquire the qualifications elaborated below:

A. **Knowledgeable**	Students will achieve a high level of competence and expertise in the field of literature, cultural studies, literary criticism, applied linguistics and ELT. They will have in-depth knowledge of the theoretical underpinnings of literary language and ways of thinking in their field. They will develop a capacity for logical and critical thinking and will be able to apply their theoretical knowledge in analyzing diverse texts in diverse contexts from interdisciplinary perspectives. They will be able to synthesize a range of critical discourses to draw conclusions on their own. Students will be able to extend the boundaries of their knowledge through extensive research and through the application of such knowledge in solving real-life problems.
B. **Proactive**	Students will gain the confidence to carry out research and involve themselves actively in taking initiatives across a range of fields. They will develop the capacity to identify, evaluate, and apply personal learning strategies, and update such strategies according to their academic and professional needs.
C. **Creative**	Students will be motivated to discover, expand, create, and explore new ideas. They will be innovation-oriented. They will develop an ability to create new opportunities and will be ready to implement.
D. **Responsible**	Students will develop a strong sense of their civic responsibilities and will be motivated to apply themselves to social amelioration. They will explore different issues of moral concern and sustainability and attempt to utilize their learning experience in their social behavior. They will develop a strong sense of national identity as well as intercultural competence. They will be able to analyze local and global situations from socio-political, economic, and historical perspectives.
E. **Collaborative**	Students will acquire skills in working in diverse learning environments: they will be ready for individual, peer, group and team work. They will be able to contribute as valuable members of teams in decision-making and taking initiatives. They will be able to operate in a range of roles while working in teams to fulfil common goals. They will develop strong networking skills, respect the opinions and contributions of others, and assert their own opinions and lead others when necessary.

F. **Articulate**	They will be competent in reading, writing, listening, and speaking in English. They will be able to convey their ideas clearly and effectively in front of a diverse audience in diverse professional and cultural settings. They will be able to express themselves effectively in written, verbal, or digital communication. They will be capable of actively engaging themselves in relevant online communities and share their productive ideas with their peers around the globe.
G. Life-long Learning	Students will be proficient in learning and knowledge dissemination throughout their life and view the practice as a never-ending process. They will develop their knowledge according to the needs of society and evolve continuously, mastering challenges they encounter, through their skills in interpretation and communication.

Program Structure

To complete the BA in English degree at EWU, a student has to successfully complete at least 23 credits. Courses mainly range from these areas: (1) General Language Skills (2) Literature (3) Applied Linguistics, and (4) English Language Teaching. There are three different options:

a) Students can take all 10 elective courses from Literature concentration (Concentration A)

b) Students can take all 10 elective courses from ELT and Applied Linguistics concentration (Concentration B)

c) Students can take any 10 courses from both concentrations (from Concentration A and B above)

To complete the BA in English degree at EWU one has to successfully complete at least 123 credits. The courses that are offered for English Department students are displayed on the following page:

Bachelor of Arts (BA) in English: Courses

Minimum Requirement 123 Credits

1. General Requirements 33

Compulsory General Education Courses 18

Course	Title	Credit
BUS 101:	Introduction to Business	3
CSE 101:	Introduction to Computers	3
ENG 100:	Improving Oral Communication Skills	3
ENG 101:	Basic English	3
ENG 102:	Composition and Communication Skills	3
GEN 226:	Emergence of Bangladesh Prerequisite: ENG 102	3

Optional General Education Courses 15

Choose five courses from

CSE 102:	Introduction to Computers Prerequisite: None	3
GEN 204	Western Thought	3
GEN 205:	Introduction to Psychology	3

(Compulsory for English Dept. Students)

GEN 201: Bangladesh Studies 3
Prerequisite: ENG 102

GEN 207: Industrial Psychology 3
Prerequisite: ENG 102

GEN 208: Introduction to Philosophy 3
(Compulsory for English Dept. Students)

GEN 209 Introduction to Social Psychology 3
Prerequisite: ENG 102

GEN 210: International Relations 3
Prerequisite: ENG 102

GEN 211: Concept of Journalism and Media 3

(Compulsory for English Dept. Students)
Prerequisite: ENG 102

GEN 212 Women in Development 3
Prerequisite: ENG 101

GEN213 Introduction to German Language 3
Prerequisite: None

GEN215 Introduction to French Language 3
Prerequisite: None

GEN216 Introduction to Spanish Language 3
Prerequisite: None

GEN217 Introduction to Chinese Language 3
Prerequisite: None

GEN218 Introduction to Arabic Language 3
Prerequisite: ENG102, GEN210

GEN220 Principles of Public Relations 3
Prerequisite: ENG102

GEN221 Globalization, Development and Change 3
Prerequisite: ENG102

GEN223 Contemporary Security Studies in Asia-Pacific 3
Prerequisite: ENG102 + GEN210

GEN224 Bangla Language 3
Prerequisite: None

GEN239 Professional Ethics Prerequisite: ENG102 3

POP201 Health Challenges of Adolescents and Youths 3
Prerequisite: None

POP202 Introduction to Public Health 3
Prerequisite: None

POP 203 Introduction to Population Studies 3

SOC 101 Introduction to Sociology 3
(Compulsory for English Dept. Students)

SOC 102 Introduction to Anthropology 3

SOC 202 Social Psychology 3

SOC 211 Eastern Culture & Heritage 3

SOC 212 Social Ecology, Environment & Society 3

SOC 213 Women in Development 3

SOC 214 Introduction to Development Studies 3

SOC 215 Principles of Social & Public Relations 3

SOC 216 Globalization and Social Identity 3

SOC 217 Religion, Ethnicity, Culture and Development in South Asia 3

2. Core Requirements 60

ENG 145 Introduction to Linguistics 3
Prerequisite: None

ENG 154 English Phonetics and Phonology 3
Prerequisite: ENG 145

ENG 155 Improving Reading and Writing Skills 3
Prerequisite: ENG 102

ENG 191 Introduction to Literature: Fiction and Non-Fiction Prose, Prerequisite: None
This course is the prerequisite for all literature courses. 3

ENG 192 Introduction to Literature: 3
Poetry and Drama Prerequisite: None

ENG 205 History of the English Language 3
Prerequisite: ENG 145

ENG 207 Psycholinguistics 3
Prerequisite: ENG 145

ENG 208 Sociolinguistics 3
Prerequisite: ENG 145

ENG 209 Political and Social History of England 3
Prerequisite: None

ENG 230 Nineteenth Century Novel 3
Prerequisite: ENG 191

ENG 245 Romantic Poetry 3
Pre-requisite: ENG 192

ENG 301 Elizabethan and Restoration Drama 3
Prerequisite: ENG 192

ENG 306 Methodology of Language Teaching 3
Prerequisite: ENG 145

ENG 309 Advanced Reading and Writing 3
Prerequisite: ENG 155

ENG 310 Shakespeare 3
Prerequisite: ENG 301+ ENG 192

ENG 315 Seventeenth and Eighteenth Century Poetry 3
Prerequisite: ENG 192+ENG 245

ENG 403 Modern Novel 3
Prerequisite: ENG 230

ENG 412 Techniques of Teaching English Language Skills 3
Prerequisite: ENG 145 and ENG 306

ENG 426 American Literature (Modern to

	Contemporary)	3
	Prerequisite: ENG 230 +245+301+315	
ENG 438	Literary Criticism	3
	Prerequisite: ENG 301 + ENG 310	

3. Elective Requirements 30

Students will select ten courses from one of the two following concentrations.

Concentration A: Literature

ENG 211	Representation of Women in Literature	3
	Prerequisite: ENG 191 + ENG 192	
ENG 213	English Satire	3
	Prerequisite: ENG 191 + ENG 192	
ENG 222	Introduction to Bangla Literature	3
	Prerequisite: ENG 191 / ENG 192	
ENG 320	Victorian Prose and Poetry	3
	Prerequisite: ENG191+ENG192+ENG245	
ENG 330	English Prose from Bacon to Swift	3
	Prerequisite: ENG 191	
ENG 340	Eighteenth Century Fiction	3
	Prerequisite ENG 191	
ENG 410	Continental Literature	3
	Prerequisite: ENG 230 + ENG301	
ENG 420	American Literature (1620-1891)	3
	Prerequisite: - ENG 192	
ENG 423	Old and Middle English	3
	Prerequisite: ENG 192 + ENG 301	
ENG 424	Classics in Translation	3
	Prerequisite: ENG 192 + ENG 301	
ENG 430	Cultural Studies	3
	Prerequisite: ENG 301	
ENG 435	Postcolonial Theory and Literature	3
	Prerequisite: ENG 310	
ENG 440	Literary Theory	3
	Prerequisite: ENG 438	
ENG 445	Modern Poetry	3
	Prerequisite: ENG 320	
ENG 450	Modern Drama	3
	Prerequisite: ENG 301 + ENG 310	
ENG 452	Contemporary Literature in English	3
	Prerequisite: ENG 426	
ENG 455	Comparative Literature	3
	Prerequisite: ENG 211	
ENG 458	Feminist Readings of Literature	3
	Prerequisite: ENG 211 + ENG 230	

Concentration B: ELT/Applied Linguistics

ENG 200	Advanced Oral Communication	3

	Skills (Open elective)	
ENG 201	Theories of Writing Prerequisite: ENG 155	3
ENG 226	Business and Professional Communication (Open elective) Prerequisite: ENG 102	3
ENG 235	Teaching Language through Literature Prerequisite: ENG 145 and ENG 306	3
ENG 255	Second Language Acquisition (SLA) Prerequisite: ENG 145+ENG 207	3
ENG 303	Syllabus and Material Design Prerequisite: ENG 145 + ENG 306	3
ENG 305	Linguistic Theories Prerequisite: ENG 145 + ENG 154	3
ENG 307	Academic Writing Prerequisite: ENG 155	3
ENG 313	English for the Media (Open elective) Prerequisite: ENG 102	3
ENG 316	English for Specific Purposes Prerequisite: ENG 303 + ENG 306	3
ENG 319	Translation Studies (Open elective) Prerequisite: ENG 102	3
ENG 402	Pragmatics and Discourse Analysis Prerequisite: ENG208	3
ENG 405	Creative Writing Prerequisite: ENG 155+ENG 309	3
ENG 411	Language Acquisition Theories for EFL/ESL Contexts Prerequisite: ENG 207	3
ENG 413	Language Testing and Evaluation Prerequisite: ENG145, ENG207 and ENG306	3
ENG 414	Research Methodology in ELT Prerequisite: ENG207 +ENG208 + ENG306	3
ENG 415	Language Policy and Planning Prerequisite: ENG 208	3
ENG 417	Problems & Prospects of ELT in Bangladesh Prerequisite: ENG 412	3
ENG 422	Bilingualism and EFL/ESL Prerequisite: ENG 207 + ENG 208	3
ENG 436	ELT Research Project (3 Credits) Prerequisite: ENG 414	3
ENG 451	Computer Assisted Language Learning /Teaching (CALL/CALT) Prerequisite: ENG 145 + ENG 306	3

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Department of Social Relations

The Department of Social Relations (DSR) is a center of excellence for reflective education, training and research in social science. The specific aims of the DSR are to develop an understanding among students of the principles that influence human societies; help them develop their analytical skills and critical thinking; equip students with cutting-edge techniques for social research. In other words, it promotes interdisciplinary approach and cross-cultural perspectives in the learning process as we encounter diverse, complex, and risk prone environment in the country.

More importantly, the DSR offers MA in Population, Reproductive Health, Gender and Development (MPRHGD), Post Graduate Diploma in Population, Public Health and Disaster Management (PPDM) and courses on General Education. The programs of the department are run by highly qualified faculty members who are internationally acclaimed in diversified disciplines such as sociology, population science, political science, public administration, development studies, environmental studies, international relations, psychology, gender studies, and communication. As we practice reflective learning approach, our faculty members are very friendly and cooperative in order to nurture vibrant intellectual environment for the learners. Most notably, the department is committed to educating a new generation of learners in the region who will help ensure the development of Bangladesh and beyond in the 21st century.

Programs Offered

General Education

MA in Population, Reproductive Health, Gender and Development (MPRHGD)

Post Graduate Diploma in Population, Public Health and Disaster Management (PPDM)

General Education:

Department of Social Relations offers wide range of General Education (GEN) Courses. Undergraduate students from all departments at EWU are required to complete up to 12 credits of their total credit requirement through various interdisciplinary courses. Courses are designed aiming to multiply students' interests and talents as well as to explore the academic landscape. The department offers courses in the following academic areas:

Course	Title	Prerequisite	Credits
Compulsory	**General Education Courses**	-	-
GEN226	Emergence of Bangladesh	ENG102	3
Optional	**General Education Courses**	-	-
GEN201	Bangladesh Studies	ENG102	3
GEN202	Eastern Culture and Heritage	None	3
GEN203	Ecological System and Environment	None	3

Course	Title	Prerequisite	Credits
GEN204	Western Thought	None	3
GEN205	Introduction to Psychology	ENG102	3
GEN207	Industrial Psychology	ENG102	3
GEN208	Introduction to Philosophy	None	3
GEN209	Introduction to Social Psychology	ENG102	3
GEN210	International Relations	ENG102	3
GEN211	Concepts of Journalism & Media Studies	ENG102	3
GEN212	Women in Development	ENG101	3
GEN213	Introduction to German Language	None	3
GEN214	Introduction to Development Studies	ENG102	3
GEN215	Introduction to French Language	None	3
GEN216	Introduction to Spanish Language	None	3
GEN217	Introduction to Chinese Language	None	3
GEN218	Introduction to Arabic Language	None	3
GEN220	Principles of Public Relations	ENG102	3
GEN221	Globalization, Development and Change	ENG102	3
GEN223	Contemporary Security Studies in Asia-Pacific	ENG102, GEN210	3

Course	Title	Prerequisite	Credits
GEN224	Bangla Language	None	3
GEN239	Professional Ethics	ENG102	3
POP201	Health Challenges of Adolescents and Youths	None	3
POP202	Introduction to Public Health	None	3
POP203	Introduction to Population Studies	None	3

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Department of Sociology

Bachelor of Social Science (BSS) in Sociology

Program Philosophy and Pedagogy

In the present age of industrialization, urbanization and transmigration, and rapid social change, it is indispensable to offer a holistic education through inclusive curriculum to internalize the social problems such as, conflict, violence, crime, disaster, gender disparity, poverty, alienation, HIV/AIDS pandemic, aging population, education, rural development, family crisis, drug addiction, and other cross-cutting/cultural issues. In such a context/setting/environment, East West University introduces an Undergraduate Program-Bachelor of Social Science (BSS) under the Department of Sociology to address emerging social problems, trends, and crises of the society. This program is based on the philosophy of reflective and interactive learning that would allow students achieve excellence in acquiring knowledge through practical and applied orientation in the field of specialization. In other words, this philosophy of reflective and interactive learning process would inspire students to connect between classroom learning and real-life activities. In such practices, students would find opportunities, means, and ways to thrive in an innovative and creative learning environment to build their academic and professional career to address the contemporary needs and aspirations of the society. Moreover, the students are required to undertake research projects/monographs/internships in their final semester for the development of their skills, knowledge, and leadership. Importantly the program would provide the students with theoretical, practical and methodological tools and substantive insights which can help them better understand social life and accompanying problems.

Program Mission and Objectives

The mission and purpose of the BSS in Sociology program of the University is to develop analytical skills and intellectual aptitudes of the learners thereby preparing them as resourceful and competent professionals. The program intends to provide students with transformative skills and creative learning mind for a deeper understanding of social, cultural, political, and economic issues in order to extend well-organized services to the community at a time of social crisis, ethical degradation, and environmental disorder. The department is committed to providing students with an educational experience that will serve them for a lifetime. Our teaching and research expertise cover a diverse range of topics that are central to understanding and explaining the state of society, culture, social and organizational change, sociology of gender, non-governmental organization, community health, gender development, participatory research, indigenous knowledge, and economic development.

Career Prospects

The graduates would be able to successfully and consistently compete for careers in the challenging arena of global social transformation and development. The department places its students in various international, national, local and regional agencies and organizations as interns and trainees.

Collaboration and Partnership

Partnership and cooperation would be established with North American, European and Asian universities and international and national organizations to ensure academic excellence and distinction in the field.

Bachelor of Social Science in Sociology

Requirement: 123 Credits

Compulsory General Courses		Total Credits 18
Course Code	**Course Title**	**Credit hours**
ENG 100	Spoken English	3

ENG 101	Basic English	3
ENG 102	Composition and Communication Skills	3
CSE 101	Introduction to Computer	3
GEN 226	Emergence of Bangladesh	3
GEN 224	Bangla Language	3

Compulsory Foundation Courses **Total Credits 9**

Course Code	Course Title	Credit hours
SOC 101	Introduction to Sociology	3
SOC 102	Introduction to Anthropology	3
SOC 106	Historical Sociology	3

Required Core Courses (19 Courses) **Total Credits 57**

Course Code	Course Title	Credit hours
SOC 107	Social Problem and analysis	3
SOC 201	Sociology of Family and Marriage	3
SOC 202	Social Psychology	3
SOC 205	Rural Sociology	3
SOC 206	Statistics for Sociology	3
SOC 210	Community, Communication, and Culture	3
SOC 218	Sociology of Gender	3
SOC 220	Quantitative Research Methodology	3
SOC 301	Qualitative Research Methodology	3

SOC 302	Social Structure of Bangladesh	3
SOC 303	Urban Sociology	3
SOC 304	Sociology of Environment	3
SOC 305	Medical Sociology	3
SOC 306	Social Problem Analysis	3
SOC 309	Sociology of Education	3
SOC 312	Social Demography	3
SOC 319	Early Social Thought	3
SOC 401	Classical Sociological Theories	3
SOC 406	Sociology of Development	3
SOC 407	Contemporary Sociological Theories	3
Elective Courses (choose any 11 courses)	**Total Credits 33**	
Course Code	**Course Title**	**Credit hours**
SOC 105	Peasant Societies	3
SOC 203	Social Group and Social Development	3
SOC 208	Sociology of Social Stratification and Inequality	3
SOC 209	Industrial Sociology	3
SOC 217	Religion, Ethnicity, Culture and Development in South Asia.	3
SOC 219	Sociology of Race and Ethnicity	3
SOC 221	Social History and World Civilization	
SOC 307	Bangladesh Society and Culture	3

SOC 308	Social Services in Banglsdesh	3
SOC 310	Sociology of Organization	3
SOC 311	Feminist Thought	3
SOC 313	Criminology	3
SOC 314	Sociology of Aging	3
SOC 315	Principles of Economic Sociology	3
SOC 316	Globalization, Migration, Development and Refugee Issues	3
SOC 317	Sociology of Science and Technology	3
SOC 318	Sociology of Religion	3
SOC 320	Social Gerentology	
SOC 402	Sociology of Poverty	3
SOC 403	Political Sociology	3
SOC 404	Marxist Sociology	3
SOC 405	Social Forestry	3
SOC 408	Sociology of Gender Planning and Development	**3**
SOC 409	Sociology of Mass Communication	**3**
SOC 410	Community Development Organizations and Social Change	**3**
SOC 411	Human Rights and Social Justice	3
SOC 412	Social intervention and practices	3
SOC 415	Women, Society and Development	3
SOC 416	Social Changes in Bangladesh	3

Course Code	Course Title	Credit hours
SOC 413	Research Project/Monograph	6
SOC 414	Practicum and Internship	6

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Lecturer

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MSS in Sociology
(University of Dhaka)
BSS in Sociology
(University of Dhaka)

S. M. Anowarul Kayes Shimul
MSS in Sociology
(University of Dhaka)
BSS in Sociology
(University of Dhaka)

Manzuma Ahsan
MSS in Sociology
(University of Dhaka)
BSS in Sociology
(University of Dhaka)

Adjunct Faculty

Dr. A. I. Mahbub Uddin Ahmed
PhD in Sociology
(York University, Toronto, Canada)
MA in Sociology
(Dalhousie University, Halifax, Canada)
MA in Sociology, (University of Dhaka)
BA(Honors) in Sociology, (University of Dhaka)

Dr. Sudhangshu Sekhar Roy
PhD in Mass Communication and Journalism
(University of Dhaka)
MA in Mass Communication and Journalism
(University of Dhaka)

Department of Information Studies and Library Management

Information is instrumental in socioeconomic development of a nation, and the ability to use information in effective decision-making process has been considered as a source of power. A big portion of the whole population of Bangladesh is still lagging behind in terms of expressing their exact information need, awareness about access to information, skills in figuring out the exact information, and the ability to apply them in the appropriate decision-making process. In the 21st century, governments have recognized this need for information use and literacy about information as a means of development. The role of information centers in this regard has also been realized, eventually, a nationwide infrastructural development of knowledge management sector at rural, semi-urban, and urban level is an on-going attention of the governments. Due to large-scale changes of information technology and sources, it is very difficult for the less trained information professionals to perform their job. Therefore, skilled information professionals at every level are key to carry on such efforts of the government fruitfully. Only Information Studies and relevant programs with dynamic educational systems has the capability to produce such skilled workforce having the ability to work individually or collaboratively with their pedagogical and vocational skills at different circumstances.

Inception of Information Studies and Library Management Department

The country needs a large pool of trained information specialists to cope with the recent trends, and to carry out extensible responsibilities of the information centers in making the community ranging from rural to urban as information literate. In recognition of the urgent need for trained expert information professionals in the country and to fill the vacuum of trained experts in the field, East West University offers four years integrated BSS in Information Studies and Library Management. The department began its journey in East West University on Spring 2016. At present there are more than two hundred students in this program.

Program Mission

The primary mission of the Information Studies and Library Management department of East West University is to develop skills of students in managing information and knowledge in the existing world of information explosion. The program intends to enrich students with all aspects of information and knowledge with the glimpse of modern technology which include acquisition of information materials, organization and dissemination of the materials using information retrieval tools, digitization and preservation of recorded knowledge and so on.

Program Objectives

- To develop a workforce capable of working as effective and efficient knowledge and information practitioners at different executive levels.
- To develop and come up with skilled human resources capable of contributing to the discipline of Information Studies and Library Management in terms of research and teaching.
- To provide students with skills and creative mind for improved understanding and effective management of Information Studies and Library Management issues.

Program Structure

BSS in Information Studies and Library Management consists of total 123 credit hours distributed across 12 semesters. The program is completed in four years.

Courses	Number of Courses	Credit Hours
Compulsory General Education Courses	6	18
Optional General Education Courses	2	6

Core Courses	27	84
Elective Courses	3	12
Individual Research/ Internship	1	3
Total courses and credits to be completed	**39**	**123**

Admission Requirements

Applicants must appear for a written test for admission into this program. Minimum requirements are as follows:

A level or HSC certificate or its equivalent in any group having at least 2nd division/class or GPA of not less than 2.50 in all public examinations.

Must pass EWU admission test.

Admission is open for Bangladeshi and foreign students.

Career Prospects

The program has attractive career opportunities at home and abroad which include National and International Research and Knowledge Organizations, Media Centers, NGOs, Government Organizations, Academic Institutions, Libraries, Archives, Record Centers, Museums, Documentation Centers, Information Centers, Embassies, Cultural Centers, Resource Centers, Newspapers, TV Channels, Digital media-based services and Corporate Organizations etc. as a Knowledge Manager, Communication Manager, Information Officer, Librarian, Documentation Officer, Record Manager and so on.

Activities and Future Direction

Information Studies and Library Management department of East West University regularly organizes different programs and events to accomplish its mission and vision. The department organizes lectures on recent issues in information and knowledge management with national and international scholars in the field, workshops for professional skills building, visiting program to different information institutions, competition like essay writing, visual literacy quiz, digital literacy skills assessment etc.

To complement educational activities, the department arranges sports events like badminton tournament, re-union through potluck, fresher's reception, study tour etc.

The department has successfully arranged international seminars and conferences on the burning issues in the subject field and is also planning to publish international standard journal on Information Studies and Library Management.

Research

East West University and the department of Information Studies and Library Management always patronize and promote research. As a result more than fifty research publications have been published by the distinguished faculty members of the department which include journal articles, conference proceedings, book chapters etc.

EWU Information Club

The department of Information Studies and Library Management has launched EWU Information Club. This Club primarily aims to improve the skills of students in the field of information need determination, authenticity checking of information, information searching and retrieval, proper use and application of information in academic and outside programs through its various initiatives like workshop, seminars, visual information literacy competition and some other innovative activities.

BSS in Information Studies and Library Management

Minimum Requirement 123 Credits

Compulsory General Education Course (6 courses)

Course	Title	Credit
CSE101	Introduction to Computers I	3
CSE 102	Introduction to Computers II	3
ENG100	Improving Oral Communication Skills	3
ENG 101	Basic English	3
ENG 102	Composition and Communication Skills	3
GEN 226	Emergence of Bangladesh	3
	Total Credits	**18**

Optional General Education Course (Any 2 courses)

Course	Title	Credit
GEN201	Bangladesh Studies	3
GEN202	Eastern Culture and Heritage	3
GEN203	Ecological System and Environment	3
GEN204	Western Thought	3
GEN205	Introduction to Psychology	3
GEN207	Industrial Psychology	3
GEN208	Introduction to Philosophy	3
GEN209	Social Psychology	3
GEN210	International Relations	3

GEN211	Concepts of Journalism & Media Studies	3
GEN212	Women in Development	3
GEN213	Introduction to German Language	3
GEN214	Introduction to Development Studies	3
GEN215	Introduction to French Language	3
GEN216	Introduction to Spanish Language	3
GEN217	Introduction to Chinese Language	3
GEN218	Introduction to Arabic Language	3
GEN220	Principles of Public Relations	3
GEN221	Globalization, Development and Change	3
GEN223	Contemporary Security Studies in Asia-Pacific	3
GEN224	Bengali Language	3
GEN239	Professional Ethics	3
MIS101	Introduction to Management Information System	3
POP201	Health Challenges of Adolescents and Youths	3
POP202	Introduction to Public Health	3
POP203	Introduction to Population Studies	3
SOC209	Industrial Sociology	3

Core Courses (27 courses)

Course	Title	Credit
ISL 101	Introduction to Information Studies and Library Management	3
ISL 102	Organization of Information	3
ISL 103	Information and Society	3
ISL 104	New Technologies and Current Trends in Information Science	3
ISL 201	Information Resources Development	3
ISL 202	Information Users and their Needs	3
ISL 203	Management of Information Institutions	3
ISL 204	Information Sources and Services	3
ISL 205	Writing, Editing and Publishing	3
ISL 206	Bibliography, Reference and Citation	3
ISL 207	Indexing and Abstracting	3
ISL 208	Automation of Information Institutions	3
ISL 301	Records and Archives Management	3
ISL 302	Information Production, Marketing and Public Relation	3
ISL 303	Documentation and Communication	3
ISL 304	Research Methodology	3
ISL 305	Organization of Knowledge (Classification Theory)	3
ISL 306	Organization of Knowledge (Cataloguing Theory)	3
ISL 307	Comparative Study of Information Systems	3
ISL 308	Information Architecture	3

ISL 309	Organization of Knowledge (Classification Practical)	4
ISL 310	Organization of Knowledge (Cataloguing Practical)	4
ISL 311	Applied Statistics	3
ISL 401	Information Networking and Resource Sharing	3
ISL 402	Analysis and Design of Information Systems	3
ISL 403	Information Literacy	3
ISL 409	Integrated Library System Development	4
	Total Credits	**84**

Elective Course (Any 3 courses)

Course	Title	Credit
ISL 404	Computer Hardware Maintenance and Troubleshooting	4
ISL 405	Server Administration	4
ISL 406	Content Management System	4
ISL 407	Database Design and Applications in Library and Information Systems	4
ISL 408	Web Technologies and Web-based Information Services	4
	Total Credits	**12**

Individual Research/ Internship (Any 1 course)

Course	Title	Credit
ISL 498	Project/Research Monograph	3
ISL 499	Internship in Information Institutions	3
	Total Credits	**3**

Faculty Members of the Department of Information Studies and Library Management

Associate Professor and Chairperson

Dr. Dilara Begum
Librarian (In-Charge)
Ph.D. in Information Literacy
(Punjabi University, Patiala, India)
MA in Library and Information Science
(University of Dhaka)
BA (Honors) in Library and Information Science
(University of Dhaka)

Senior Lecturer

Md. Hasinul Elahi
MA in Information Science and Library Management
(1st Position, Awardee of Dean's Merit List of Honor-2013) (University of Dhaka)
BA (Honors) in Information Science and Library Management
(1st Position, Awardee of Dean's Merit List of Honor-2012) (University of Dhaka)

Lecturer

Tamanna Hossain
MA in Information Science and Library Management
(1st Position, Awardee of Dean's Merit List of
Honor-2014) (University of Dhaka)
BA (Honors) in Information Science and Library Management (2nd Position) (University of Dhaka)

Abdur Rahaman Sumon
MA in Information Science and Library Management (2nd Position, Awardee of Dean's Merit List of Honor-2016) (University of Dhaka)
BA (Honors) in Information Science and Library Management (2nd Position) (University of Dhaka)

Rumana Rahman
MA in Information Science and Library Management (4th Position) (University of Dhaka)
BA (Honors) in Information Science and Library Management (4th Position) (University of Dhaka)

Adjunct Faculty

M. Nasiruddin Munshi, Ph.D.
Professor
Department of Information Science and Library Management (University of Dhaka)
Ph.D. in Information Science and Library Management (University of Dhaka)
MA in Library and Information Science
(1st Class, 1st Position) (University of Dhaka)
BA (Honors) in Library and Information Science
(1st Class, 2nd Position) (University of Dhaka)

Kazi Mostak Gausul Hoq, Ph.D.

Professor
Department of Information Science and Library Management
University of Dhaka
Ph.D. in Information Needs Analysis and Systems Development (University of Dhaka)
MA in Library and Information Science
(1st Class, 1st Position) (University of Dhaka)
BA (Honors) in Library and Information Science
(1st Class, 1st Position) (University of Dhaka)

Md. Roknuzzaman, Ph.D.
Professor
Department of Information Science and Library Management
University of Dhaka
Ph.D. in Knowledge Science
Japan Advanced Institute of Science and Technology (JAIST), Japan
MA in Library and Information Science
(1st Class, 1st Position) (University of Dhaka)
BA (Honors) in Library and Information Science
(1st Class, 1st Position) (University of Dhaka)

Dr. Md. Saiful Alam
Professor
Department of Information Science and Library Management
University of Dhaka
Ph.D. in MIS of Health and Population Sector Programs in Bangladesh
(University of Dhaka)
Masters in Computer Application
(University of Comilla)
MA in Library and Information Science (1st Class)
(University of Dhaka)
BA (Honors) in Library and Information Science (1st Class)
(University of Dhaka)

Department of Law

Legal education in Bangladesh has undergone a paradigm shift during the last decade. Law is now a fascinating subject, with a great tradition and a dynamic future. The option to study law is now by choice rather than by chance. Studying law develops skills of analysis, argument and persuasion. Law students engage with the very organization of society and through the lens of law, they examine all its constituent elements: commercial, social, political and economic relationships, families and associations, individuals and governments, countries and international organizations. These will equip students for the vocational stage of training, and ultimately for practice as a legal professional. Thus, actuated by a noble mission to equip students with required skills to face the legal challenges of the twenty first century, East West University has carefully devised this program of LL.B. (Hon's). Utmost importance has been attached to the most contemporary and contextual topics to be included in the syllabus. The program integrates theoretical knowledge in practice and focuses on innovating leadership in law and related areas.

Objectives

The program essentially leads to the legal profession. A successful completion of the course should be able to produce some of the finest lawyers of the country. However, the program will ensure that more than this happens and for that, it aims to introduce students to legal theories in a practical, commercial context, so that whether they end up in practice as a lawyer, or working in a different sector outside the law, their LL.B. (Hon's) degree will further their vocational goals and prospects.

Duration of the Program

LL.B. (Hon's) program consists of twelve semesters within a span of four academic years.

Admission Requirements

To be eligible for admission in the program, the candidate must have a minimum of GPA 3.00 respectively in both SSC and HSC.

Total Courses and Credit Hours

Students are required to undertake 135 credit hours. Following is the distribution of credit hours:

Program Structure	Credit Hours
Core Courses	96
Legal Drafting (Civil & Criminal)	09
Trial and Advocacy Training	06
Supervised Dissertation	03
General Education Courses	21
Total	135

Value:

The LL.B. (Hon's) program is approved by UGC of Bangladesh.
The graduates from this department are allowed to sit for enrollment examination of Bangladesh Bar Council.
The graduates will have the opportunity to sit for Bangladesh Judicial Service Commission examinations.
The degree is recognized both nationally and internationally.

The graduates from the department can apply for any kind of government and non-government organizations in the concerned legal field.

Career Prospects

Lawyer (Advocate, Attorney and Barrister)
Judge
Legal Academic
Legal Consultant to the Government Organizations
Legal Consultant to the NGOs
Human Rights Activist

Activities of the Department

EWU Department of Law regularly organizes different events and runs wider range of activities to coach the law students for the practical legal field. They organize different workshops, seminars on different legal issues in collaboration with different organizations like US Department of Justice, German Embassy, Onuronon, International Committee of the Red Cross, Liberation War Museum, Youth for Human Rights International (YHRI), Bangladesh Legal Aid and Services Trust – BLAST, Bangladesh National Women Lawyers' Association.

Leading lawyers, academicians, justices, scholars, activists of the country are invited to provide lectures on different dimension of law in Seminars and Conferences. For example - Md. Ashraful Kamal, Honorable Justice of Bangladesh Supreme Court; Iqbal Sobhan Chowdhury, Media Advisor of Prime Minister; Abu Saleh Sk. Md. Zahirul Haque, Secretary of the Law and Justice Division, Ministry of Law; Additional Commissioner Monirul Islam, Chief of Counter Terrorism and Transnational Crime Unit; Senior Advocate Abdul Baset Majumder, Vice Chairman, Bangladesh Bar Council; Kaji Najibullah Hiru, Chairman, Legal Education Committee, Bangladesh Bar Council have visited the department and praised the students.

The students are also taken to the lower and higher courts of Bangladesh to gain practical experience of advocacy in the real field. Besides many international scholars & academician from India, Sri Lanka, Nepal, Philippines, and so on participated in the 1st international conference on legal education. In addition to the educational activities, the Department organizes different social activities such as warm clothes distribution, survey, field trip, iftar mahfil, cultural programs and educational tour each year. Moreover, the students further conduct several surveys to explore the contemporary issues.

Department of Law also gives utmost importance to moot court practice. Such practice develops students' research skills, both written and oral communication skills and presentation skills. The Department organizes an Intra Department Moot Court competition in a year. The best nine mooters are chosen from this competition to be trained up by national and international experts. The purpose of the training is to ensure participation of the students in different international mooting competitions like Henry Dunant Moot Court Competition, Jessup Moot Court Competition, ICC Moot Court Competition and so on.

Bachelor of Laws [LL.B. (Hon's) Program]

Minimum Requirement 135 Credits

List of the Courses for LL.B. (Hon's) Program

Core Courses

Course	Title	Credit
LAW101	Law of Contract I	3.00
LAW102	Muslim Law I	3.00
LAW103	Law of Contract II	3.00

Course	Title	Credit
LAW104	Muslim Law II	3.00
LAW105	Interpretation of Statutes and English for Law	3.00
LAW106	Constitutional Law I	3.00
LAW107	Legal System of Bangladesh	3.00
LAW108	Administrative Law	3.00
LAW201	Constitutional Law II	3.00
LAW202	Criminal Law I	3.00
LAW203	Hindu Law	3.00
LAW204	Criminal Law II	3.00
LAW205	Law of Tort	3.00
LAW206	Land Law	3.00
LAW207	Criminology	3.00
LAW208	Laws on Partnership, Sale and Carriage of Goods	3.00
LAW209	Laws on Equity and Trust	3.00
LAW301	Laws on Taxation	3.00
LAW302	Jurisprudence	3.00
LAW303	Laws on Transfer of Property and Registration	3.00
LAW304	Labour Law	3.00
LAW305	Law of Evidence I	3.00
LAW306	Law on Insurance & Negotiable Instrument	3.00
LAW307	Laws on Specific Relief and Limitation	3.00

Course	Title	Credit
LAW308	Company Law	3.00
LAW309	Law of Evidence II	3.00
LAW310	Law on Criminal Procedure I	3.00
LAW311	Law on Civil Procedure I	3.00
LAW312	International Law I	3.00
LAW401	Law on Criminal Procedure II	3.00
LAW402	Law on Civil Procedure II	3.00
LAW403	International Law II	3.00
LAW404	Legal Drafting I (Criminal)	3.00
LAW405	Legal Drafting II (Civil)	3.00
LAW406	Supervised Dissertation	3.00
LAW407	Legal Drafting III (Civil)	3.00
LAW408	Trial and Advocacy Training (Criminal)	3.00
LAW409	Trial and Advocacy Training (Civil)	3.00

Compulsory General Education Courses

Course	Title	Credit
ENG100	Improving Oral Communication Skills	3.00
ENG101	Basic English	3.00
ENG102	Composition and Communication Skills	3.00
CSE101	Introduction to Computer I	3.00
GEN 226	Emergence of Bangladesh	3.00

Course	Title	Credit
Optional General Education Courses (any two suitable courses from general education courses offered by university, meeting the requirement of the courses.) **For example: any two general education courses from amongst the courses offered by the university.**		

Course	Title	Credit
GEN201	Bangladesh Studies	3.00
GEN205	Introduction to Psychology	3.00
GEN210	International Relation	3.00
GEN239	Professional Ethics	3.00

Faculty Members of the Department of Law

Advisor

Professor Dr. Shima Zaman
Department of Law, University of Dhaka
Ph.D. in Trade and Human Rights Law
(Macquarie University, Sydney)
LL.M. (Intellectual Property Law)
(George Washington University, Washington, DC)
LL.M. (University of Dhaka)
LL.B. (Hon's) (University of Dhaka)

Assistant Professor

Nabaat Tasnima Mahbub
Ph.D. (International Law)
(Xiamen University, China)
LL.M (International Law & Development)
(University of Nottingham, UK)
LL.M. (University of Dhaka)
LL.B. (Hon's) (University of Dhaka)
Member, Bangladesh Bar Council
Advocate, Supreme Court of Bangladesh

Assistant Professor and Chairperson

Dr. Md. Mehedi Hasan
Ph.D. (International Law)
(Xiamen University, China)

LL.M. in Commercial Law (University of Dhaka)
LL.B. (Hon's) (University of Dhaka)
Member, Bangladesh Bar Council

Advocate, Dhaka Judge Court

Senior Lecturer

Mohammad Ataul Karim
LL.M in Intellectual Property Law
(with specialization on patents and designs Law)
WIPO Academy, Turkish Patents Institute and Ankara University
LL.M. (University of Dhaka)
LL.B. (Hon's) (University of Dhaka)
Member, Bangladesh Bar Council
Advocate, Supreme Court of Bangladesh

Adity Rahman Shah
LL.M. in International Human Rights Law
(University of Dhaka)
LL.B. (Hon's) (University of Dhaka)

Monira Nazmi Jahan
MSS in Criminology & Criminal Justice
(University of Dhaka)
LL.M. (University of Rajshahi)
LL.B. (Hon's) (BRAC University)
Member, Bangladesh Bar Council
Advocate, Dhaka Judge Court

Md. Khairul Islam
LL.M in comparative Law
(McGill University, Canada)
LL.M. (1st Class) (University of Dhaka)
LL.B. (Hon's) (University of Dhaka)
Advocate, Supreme Court of Bangladesh

Sk. Md. Habibullah
LL.M. (University of Dhaka)
LL.B. (Hon's) (University of Dhaka)

Mohammed Shahjalal
Ph.D. (Glasgow Caledonian University, UK)
LL.M. (Buckingham University, UK)
Post- Graduate Diploma in International Law
LL.B. (Northumbria University, UK)

Fariha Abedin
LL.M. (University of Dhaka)
LL.B. (Hon's) (University of Dhaka)

Lecturer

Nabila Farhin
MSS in Industrial Relations and Labour Studies
(University of Dhaka)

LL.M. (Thesis) (University of Chittagong)
LL.B. (Hon's) (University of Chittagong)
Member, Bangladesh Bar Council
Advocate, Chittagong Judge Court

Md. Pizuar Hossain
LL.M. (East West University)
(Chancellor's Gold Medalist)
LL.B. (BRAC University)
(Vice-Chancellor's Gold Medalist)
Member, Bangladesh Bar Council
Advocate, Dhaka Judge Court

Mridul Bepari
LL.M. (University of Dhaka)
LL.B. (Hon's) (University of Dhaka)
Member, Bangladesh Bar Council
Advocate, Dhaka Judge Court

Riad Mahmud
LL.M. (University of Dhaka)
LL.B. (University of Dhaka)
Member, Bangladesh Bar Council
Advocate, Dhaka Judge Court

Nadia Rahaman
LL.M. (University of Dhaka)
LL.B. (Hon's) (University of Dhaka)

Sayeed Hossain Sarwar
LL.M. (University of Dhaka)
LL.B. (Hon's) (University of Dhaka)

Department of Electronics and Communications Engineering (ECE)

Electronics & Communications Engineering (ECE) Department at East West University is housed under the Faculty of Sciences and Engineering. With technology becoming all pervasive in everyday life, opportunities for electronic and communication engineers are endless. ECE department at East West University prepares students for careers in this constantly evolving discipline both in home and abroad. Telecommunication Engineering is the most exciting frontier in engineering in recent years. Nowadays, modern civilization is absolutely governed by telecommunication engineering. The fixed and cellular telephony, satellite communication, ICT, Internet of Things and Nanoelectronics are perhaps the most visible applications of telecommunications engineering.

Graduates with a degree in ETE or ICE have best job prospects in the following fields:

a) Network design and operation for public and private telecom operators
b) Design of network for financial services applications (banks, financial services centre, building societies)
c) Technical marketing including network design
d) Telecommunication research organizations
e) Telecommunication consultants
f) Telecommunication software development
g) Software Firms

Academic Programs

At present, the department offers the following programs:

B.Sc in Electronic & Telecommunication Engineering (ETE)

B.Sc in Information & Communications Engineering (ICE)

MS in Telecommunication Engineering (MSTE)

Vision & Mission of B. Sc in Electronic and Telecommunication Engineering (ETE)

Vision

To produce globally competitive graduates in electronics, information and communications engineering having excellence in education, innovation, leadership and professional ethics for the sustainable advancement of the society.

Mission

i. To render students the state-of-the art education in electronics, information and communications engineering.
ii. To provide up-to-date facilities for improving teaching-learning process.
iii. To develop skills, knowledge and attitude of the students that will help enhancing the creativity and ethical standards.
iv. To inculcate the thirst for lifelong learning among the graduates.
v. To provide academic environment that will implant the spirit of innovation, teamwork and leadership skills among the graduates.

Vision & Mission of B.Sc. in Information and Communications Engineering (ICE)

Vision

To produce globally competitive graduates in information and communication engineering having excellence in education, innovation, leadership and professional ethics for the sustainable advancement of the society.

Mission

i. To provide students the state-of-the-art education in information and communication engineering.

ii. To provide up-to-date facilities for improving teaching-learning process.

iii. To develop skills, knowledge and attitude of the students that will help enhancing the creativity and ethical standards.

iv. To inculcate the thirst for lifelong learning among the graduates.

v. To provide academic environment that will implant the spirit of innovation, teamwork and leadership skill among the graduates.

Program Educational Objectives (PEO) for the B. Sc. in ETE program

PEOs are statements that elaborately convey the accomplishments of the graduates achieved from the B. Sc. in ETE program in their career and professions. Graduates of the B. Sc. in ETE program are anticipated to attain the following PEO's within a few (3-5) years of graduation.

PEO1: Successfully prove themselves as leading engineers and continuously develop professional competency in innovative electronics and telecommunication engineering.

PEO2: Contribute to the sustainable development of the society exercising and practicing the knowledge regarding electronics and telecommunication engineering in an ethical and sensible accountability.

PEO3: Engage in lifelong learning for successful adaptation to technological updates.

Program Educational Objectives (PEO) for the B. Sc. in ICE program

PEOs are statements that elaborately convey the accomplishments of the graduates achieved from the B. Sc. in ICE program in their career and professions. Graduates of the B. Sc. in ICE program are anticipated to attain the following PEO's within a few (3-5) years of graduation.

PEO1: Successfully prove themselves as leading engineers and continuously develop professional competency in innovative Information and Communication Engineering.

PEO2: Contribute to the sustainable development of the society exercising and practicing the knowledge regarding Information and Communication Engineering in an ethical and sensible accountability.

PEO3: Engage in lifelong learning for successful adaptation to technological updates.

The Program Outcomes (PO) or the Graduate Attributes of the programs

Program Outcomes (PO) for the B.Sc. in ETE and ICE

POs are narrower statements that describe what students are expected to know and be able to do by the time of graduation. These relate to the knowledge, skills and attitudes that students acquire while progressing through the program. The students of the B.Sc. in ETE and B.Sc. ICE programs are expected to achieve the following graduate attributes or program outcomes at the time of graduation.

PO1 – Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.

PO2 – Problem analysis: Identify, formulate, research the literature and analyze complex engineering problems and reach substantiated conclusions using first principles of mathematics, the natural sciences and the engineering sciences.

PO3 – Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety as well as cultural, societal and environmental concerns.

PO4 – Investigation: Conduct investigations of complex problems, considering design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions.

PO5 – Modern tool usage: Create, select and apply appropriate techniques, resources and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6 – The engineer and society: Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.

PO7 – Environment and sustainability: Understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate the knowledge of, and need for sustainable development.

PO8 – Ethics: Apply ethical principles and commit to professional ethics, responsibilities and the norms of the engineering practice.

PO9 – Individual work and teamwork: Function effectively as an individual and as a member or leader of diverse teams as well as in multidisciplinary settings.

PO10 – Communication: Communicate effectively about complex engineering activities with the engineering community and with society at large. Be able to comprehend and write effective reports, design documentation, make effective presentations and give and receive clear instructions.

PO11 – Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work as a member or a leader of a team to manage projects in multidisciplinary environments.

PO12 – Life-long learning: Recognize the need for and have the preparation and ability to engage in independent, life-long learning in the broadest context of technological change.

Employment Opportunities for the ICE and ETE Graduates in Bangladesh

- Mobile operators: BanglaLink, GrameenPhone, Robi, TeleTalk, Airtel, etc. and other relevant multinational companies
- BTTB: Graduates of ICE and ETE have job opportunities in BTTB.
- Govt. Job: Graduates can take part in BCS examination for relevant government jobs
- Military EME corpse
- Software industry
- Electronic manufacturing corporations and industries
- Any organization related to computer networking and IT, such as software firms, ISPs, banking systems etc.
- Different electronics industries, such as television and radio manufacturers and other related firms
- Teaching positions in electronic, computer science and telecommunications engineering.

ECE department has a visiting program with UKM (University Kebangsaan Malaysia) with partial financial support of ITP, Italy. Prof Dr. Md. Mamun Bin Ibne Reaz, Profesor of Department of Electrical, Electronic and Systems Engineering, Universiti Kebangsaan Malaysia, visits every year for 40 days. This program is for 3 years.

Research Activities under ECE Department

The present research activities of the Department include research work in the fields of Wireless & Mobile Communication, RF and Antenna Engineering, Communication Networks, Optical Communication, Teletraffic Engineering, Digital Signal Processing, Telemedicine, Signal, Image & Multimedia Processing, Materials Science & Plasma Technology and Renewable Energy.

Additional Activities of the Department Internship & Job Placement

Some graduating students of ECE department have already had outplacements for a few months in the industry like GrameenPhone, BTTB, TeleTalk, Citycell, Airtel, OneTel, CSL etc. during their internship program. It has to be mentioned that EWU B.Sc. in ICE graduates have already made their mark in the industries with good placements in different telecom and other related companies of the country. Most graduates have secured prestigious positions in different sectors.

Colloquium

This is a weekly academic research discussion/ seminars in the department conducted by faculty members, senior B.Sc. and M.S. students and the visitors.

Workshops & Seminars

ECE department regularly organizes various workshops/Seminars on different telecom related topics. Top level researchers/experts from various universities/ corporate organization are usually invited to deliver talks in the seminars.

Study Tours & Field Trips

Every year ECE dept. organizes study tours and field trips for the senior students to give them the real life flavor of industries.

Curriculum of B.Sc. in Electronic & Telecommunication Engineering (ETE) Program: Courses

Minimum Requirement 140 Credits

Credit requirement for the degree of B.Sc. in ETE: Total minimum credit hours of the curriculum are 140 and the credit distributions are described below:

A. Language & General Education Requirements	18C
B. Mathematics & Basic Sciences	26C
C. ETE Core (including optional core)	81C
D. ETE Technical Electives (depth as well as breadth)	15C
Total	**140C**

A. General Education Requirements

(i) Compulsory General Education Courses (Three courses - 9 credit hours)

Course Number & Name	Credit Hours
ENG 101 Basic English	3
ENG 102 Composition & Communication Skills	3
GEN 226 Emergence of Bangladesh	3
Total	**9**

(ii) Optional General Education Courses (1 course, OPT001 - 3 credit hours)

Course Number & Name	Credit Hours
GEN 201 Bangladesh Studies	3
GEN 202 Eastern Culture and Heritage	3
GEN 203 Ecological System & Environment	3
GEN 204 Western Thought	3
GEN 205 Introduction to Psychology	3
GEN 207 Industrial Psychology	3
GEN 208 Introduction to Philosophy	3
GEN 209 Introduction to Social Psychology	3
GEN 210 International Relations	3
GEN 211 Concepts of Journalism & Media Studies	3

GEN 212 Women in Development 3

GEN 213 Introduction to German Language 3

GEN 214 Introduction to Development Studies 3

GEN 215 Introduction to French Language 3

GEN 216 Introduction to Spanish Language 3

GEN 217 Introduction to Chinese Language 3

GEN 218 Introduction to Arabic Language 3

GEN 220 Principles of Public Relations 3

GEN 221 Globalization, Development and Change 3

GEN 223 Contemporary Security Studies in Asia-Pacific 3

GEN 224 Bangla Language 3

GEN 239 Professional Ethics 3

POP 201 Health Challenges of Adolescents and Youth 3

POP 202 Introduction to Public Health 3

POP 203 Introduction to Population Studies 3

SOC 101 Introduction to Sociology 3

SOC 102 Introduction to Anthropology 3

GEN 2XX Any other GEN course approved by the university 3

Total 3

(iii) Optional Courses from Business & Economics (2 courses, OPT002 and OPT003) (Choose any two courses - 3+3=6 credit hours)

Course Number & Name	**Credit Hour**
ACT 101 Financial Accounting	3
BUS 101 Introduction to Business	3
BUS 321 Business for Engineering & Technology	3
ECO 101 Principles of Microeconomics	3
ECO 102 Introduction to Macroeconomics	3
FIN 101 Principles of Finance	3
MGT 101 Principles of Management	3
MIS 101 Introduction to Management Information Systems	3
MKT 101 Principles of Marketing	3
Total	**6**

B. Mathematics and Basic Sciences

These courses stress the scientific principles upon which the engineering discipline is based on. (Total 26 credit hours)

Course Number & Name	**Credit Hours**
MAT 101 Differential and Integral Calculus	3
MAT 102 Differential Equations &Special Functions	3

MAT 104 Coordinate Geometry and Vector Analysis	3
MAT 205 Linear Algebra & Complex Variables	3
STA 102 Probability and Statistics	3
CHE 109 Engineering Chemistry - I	4
PHY 109 Engineering Physics - I (Introductory Classical Physics)	4
PHY 209 Engineering Physics - II (Introductory Quantum Physics)	3
Total	**26**

C. Electronic & Telecommunication Engineering Core

These courses stress fundamental electronics and telecommunication engineering concepts- a total of 81C.

Course Number and Name	Credit Hours
ETE 103 Structured Programming	4
ETE 107 Electrical Circuits - I	4
ETE 110 Electrical Circuits - II	4
ETE 212 Electronic Circuits - I	4
ETE 214 Electronic Circuits - II	4
ETE 216 Signals & Systems	3
ETE 217 Digital Electronics	4
ETE 223 Data Structure & Algorithm	4
ETE 302 Computer Communications & Networks	4
ETE 310 Electromagnetic Theory	3
ETE 312 Communication Theory	3
ETE 313 Microprocessors & Interfacing	4
ETE 314 Digital Communications	4
ETE 319 Electronic Properties of Materials	3
ETE 322 Digital Signal Processing	4
ETE 325 Control Systems	4
ETE 370 Applied Numerical Methods	3
ETE 417 Electrical Drives and Power Electronics	3
ETE 439 Engineering Ethics	3
ETE 441 Wireless & Mobile Communications	3
ETE 473 Project Management Entrepreneurship and Industry Interaction	3
ETE 496 Capstone Project	6
Total	**81**

D. ETE Technical Electives (TEE001-TEE005)

These upper-class elective courses stress the rigorous analysis and design principles practiced in the sub-disciplines of electronic and telecommunication engineering and other areas. A student has to choose total five courses (TEE001 - TEE005), taking at least one course from each of the first two groups (GROUP A and GROUP B).

(i) Group A (Electronics Engineering)

Course Number & Name	Credit Hours

ETE 400 Semiconductor Devices 3
ETE 401 VLSI Circuit Design 4
ETE 403 Optoelectronics 3
ETE 409 Semiconductor Processing & Fabrication 3
ETE 411 Analog Integrated Circuits 3
ETE 413 Introduction to Nanotechnology 3
ETE 419 Biomedical Electronics 3
ETE 422 Renewable Energy Technology 3

(ii) Group B (Telecommunications Engineering)

Course Number & Name	Credit Hours
ETE 434 Microwave Engineering	4
ETE 442 Optical Fiber Communications	4
ETE 446 Satellite Communication	3
ETE 448 Information Theory & Coding	3
ETE 452 Multimedia Communications	3

(iii) Group C (General)

Course Number & Name	Credit Hours
ETE 418 Introduction to Embedded Systems	3
ETE 453 Computer and Cyber Security	3
ETE 461 Object Oriented Programming	4
ETE 462 Database Systems	4
ETE 466 Operating Systems	3
ETE 469 Computer Architecture	3
ETE 472 Speech & Image Processing	4
ETE 476 Artificial Intelligence	3
ETE 478 Machine Learning	3
ETE 479 Robotic Engineering	3

E. Flowchart of ETE Program

Year-wise flowchart shows the sequence of courses to be followed by a student of ETE undergraduate program during the four-year study at EWU.

Year/ Semester	**1st Year**		**2nd Year**		**3rd Year**		**4th Year**	
	Courses	**Prereq.**	**Courses**	**Prereq.**	**Courses**	**Prereq.**	**Courses**	**Prereq.**
1st Semester	**ENG101(3)** **ETE103(4)** **MAT101(3)**	ENG099 None None	**ETE212(4)** **MAT205(3)** **GEN226(3)**	ETE110 MAT102 & MAT104 ENG102	**ETE302(4)** **ETE310(3)** **ETE312(3)** **ETE313(4)**	ETE223 MAT205 ETE216 ETE217	**ETE417(3)** **ETE441(3)** **ETE439(3)** **ETE496(6)**	ETE110 ETE314 All 300 Level courses

			STA102(3)	MAT101				100Credits
2nd Semester	**ENG102(3)** **ETE107(4)** **MAT102(3)** **PHY109(4)**	ENG101 None MAT101 None	**ETE214(4)** **ETE223(4)** **OPT001(3)** **PHY209(3)**	ETE212 ETE103 ENG102 PHY109 & MAT205	**ETE314(4)** **ETE319(3)** **ETE322(4)**	ETE312 PHY209 ETE216	**ETE473(3)** **TEE001(3/4)** **TEE002(3/4)**	All 300 Level courses
3rd Semester	**CHE109(4)** **ETE110(4)** **MAT104(3)**	None ETE107 MAT101	**ETE216(3)** **ETE217(4)** **OPT002(3)**	MAT205 ETE214 ENG102	**OPT003(3)** **ETE325(4)** **ETE370(3)**	ENG102 ETE322 MAT205	**TEE003(3/4)** **TEE004(3/4)** **TEE005(3/4)**	All 300 Level courses
Total Credits	**35 Credits**		**37 Credits**		**35 Credits**		**33-38 Credits**	

Legend: OPT001: One Optional General Education Course

OPT002, OPT003: Two Optional Courses from Business & Economics

TEE001- TEE 005: Five Technical Elective Courses

N.B. The course ETE 496 (Capstone Project) is continued for three semesters. Although the registration for this course will be done in SEM 1 of 4th year, the grades for this course will be assigned at the end of SEM 3 of 4th year. Grade X (continuation) will be assigned at the end of 4th year.

Curriculum for the B.Sc. in Information & Communications Engineering (ICE) Program: Courses

Minimum Requirement 140 Credits

Credit Requirements for the degree of B.Sc. in ICE
Total credit hours of the curriculum are 140 and the credit distributions are described below:

A General Education Requirements	21C
B Mathematics & Basic Sciences	26C
C ICE Core	81C
D Technical Electives	12C
Total	**140C**

A. General Education Requirements

(i) Compulsory General Education Courses (three courses - 9 credit hours)

Course Number & Name	Credit Hours
ENG 101 - Basic English	3
ENG 102 - Composition & Communication Skills	3
GEN 226–Emergence of Bangladesh	3
Total	**9**

(ii) Optional General Education Courses (2 Courses, OPT001 and OPT002) (3+3=6 credit hours)

Course Number & Name	Credit Hours
GEN 201 Bangladesh Studies	3
GEN 202 Eastern Culture and Heritage	3
GEN 203 Ecological System & Environment	3
GEN 204 Western Thought	3
GEN 205 Introduction to Psychology	3
GEN 207 Industrial Psychology	3
GEN 208 Introduction to Philosophy	3
GEN 209 Introduction to Social Psychology	3
GEN 210 International Relations	3
GEN 211 Concepts of Journalism & Media Studies	3
GEN 212 Women in Development	3
GEN 213 Introduction to German Language	3
GEN 214 Introduction to Development Studies	3
GEN 215 Introduction to French Language	3
GEN 216 Introduction to Spanish Language	3
GEN 217 Introduction to Chinese Language	3
GEN 218 Introduction to Arabic Language	3
GEN 220 Principles of Public Relations	3
GEN 221 Globalization, Development and Change	3
GEN 223 Contemporary Security Studies in Asia-Pacific	3
GEN 224 Bangla Language	3
GEN 239 Professional Ethics	3
POP 201 Health Challenges of Adolescents and Youth	3
POP 202 Introduction to Public Health	3
POP 203 Introduction to Population Studies	3
SOC 101 Introduction to Sociology	3
SOC 102 Introduction to Anthropology	3
GEN 2XX Any other GEN course approved by the university	3
Total	**6**

(iii) Optional Courses from Business & Economics (any two courses OPT003 and OPT004 - 6 credit hours)

Course Number & Name	Credit Hours

ACT 101 Financial Accounting 3

BUS 101 Introduction to Business 3

BUS 321 Business for Engineering and Technology 3

ECO 101 Principles of Microeconomics 3

ECO 102 Introduction to Macroeconomics 3

FIN 101 Principles of Finance 3

MGT 101 Principles of Management 3

MIS 101 Introduction to Management Information Systems 3

MKT 101 Principles of Marketing 3

Total 6

B. Mathematics and Basic Sciences

These courses stress the scientific principles upon which the engineering discipline is based. (a total of 26 credit hours)

Course Number and Name	Credit Hours
MAT 101 Differential and Integral Calculus	3
MAT 102 Differential Equations & Special Functions	3
MAT 104 Coordinate Geometry and Vector Analysis	3
MAT 205 Linear Algebra & Complex Variables	3
PHY 109 Engineering Physics -I	4
PHY 209 Engineering Physics -II	3
CHE 109 Engineering Chemistry -I	4
STA 102 Probability and Statistics	3
Total	**26**

C. Information & Communication Engineering Core

These courses stress fundamental Information & Communication Engineering concepts (a total of 81 credit hours).

Course Number and Name	Credit Hours
ICE 103 Structured Programming	4
ICE 107 Object Oriented Programming	4
ICE 109 Electrical Circuits	4
ICE 204 Discrete Mathematics	3
ICE 207 Data Structures	4
ICE 213 Electronic Circuits	4
ICE 216 Signals & Systems	3
ICE 217 Digital Electronics	4
ICE 245 Algorithms	4
ICE 275 Operating Systems	3
ICE 302 Computer Communications & Networks	4
ICE 305 Database Systems	4
ICE 310 Electromagnetic Theory	3
ICE 312 Communication Theory	3
ICE 313 Microprocessors & Interfacing	4
ICE 314 Digital Communications	4

ICE 322 Digital Signal Processing	4
ICE 370 Applied Numerical Methods	3
ICE 439 Engineering Ethics	3
ICE 441 Wireless & Mobile Communications	3
ICE 473 Project Management Entrepreneurship and Industry Interaction	3
ICE 496 Capstone Project	6
Total	**81**

D. Technical Electives

These upper-class elective courses stress the rigorous analysis and design principles practiced in the sub-disciplines of Information & Communication Engineering. A student has to take total four courses, taking at least one course from each group.

Group A (Information Technology)

Course Number & Name	Credit Hours
ICE 453 Computer and Cyber Security	3
ICE 469 Computer Architecture	3
ICE 471 Network Programming	4
ICE 472 Speech & Image Processing	4
ICE 474 Computer Graphics & Visualizations	3
ICE 476 Artificial Intelligence	3
ICE 478 Machine Learning	3
ICE 479 Robotic Engineering	3
ICE 483 Data Science	3
ICE 484 Cyber Ethics and Legal Framework	3
ICE 485 Internet of Things	3

Group B (Communication)

Course Number & Name	Credit Hours
ICE 401 VLSI Circuit Design	4
ICE 434 Microwave Engineering	4
ICE 442 Optical Fiber Communications	4
ICE 446 Satellite Communications	4
ICE 448 Information Theory and Coding	3
ICE 452 Multimedia Communications	3

E. Flowchart for Undergraduate ICE Courses

Flowchart for courses to be followed during the FOUR YEARS of the Undergraduate Program of ICE (Numbers in parentheses indicate Credit Hours)

Year/ Semester	1st Year		2nd Year		3rd Year		4th Year	
	Course	Pre-requisites	Course	Pre-requisites	Course	Pre-requisites	Course	Pre-requisites

1st Semester	**ENG 101 (3)** **ICE 103 (4)** **MAT 101 (3)**	ENG 099 None None	**ICE 204 (3)** **ICE 207 (4)** **MAT 205 (3)** **GEN 226 (3)**	ICE 103 ICE 107 MAT 102 & MAT 104 ENG 102	**ICE 305 (4)** **ICE 310 (3)** **OPT 002 (3)** **STA 102 (3)**	ICE 275 PHY 209 ENG 102 MAT101	**ICE 439 (3)** **ICE 441 (3)** **ICE 496 (6)** **OPT003 (3)**	ENG 102 ICE 314 100 Credits ENG 102
2nd Semester	**ENG 102 (3)** **ICE 109 (4)** **MAT 102 (3)** **PHY 109 (4)**	ENG 101 None MAT 101 None	**ICE 213 (4)** **ICE 245 (4)** **PHY 209 (3)** **OPT001(3)**	ICE109 ICE 207 PHY 109 & MAT 205 ENG 102	**ICE 302 (4)** **ICE 312 (3)** **ICE 313 (4)**	ICE 245 ICE 216 ICE 217	**ICE 473 (3)** **OPT 004 (3)** **TEE 001 (3/4)**	300 Level Courses ENG 102 300 Level Courses
3rd Semester	**ICE 107 (4)** **MAT 104 (3)** **CHE 109 (4)**	ICE 103 MAT 101 None	**ICE 275 (3)** **ICE 216 (3)** **ICE 217 (4)**	ICE245 ICE 109 & MAT205 ICE 213	**ICE 314 (4)** **ICE 322 (4)** **ICE 370 (3)**	ICE 312 ICE 216 MAT205	**TEE 002 (3/4)** **TEE 003 (3/4)** **TEE 004 (3/4)**	300 Level Courses
Total Credit	**35 Credits**		**37 Credits**		**35 Credits**		**33-37 Credits**	

Legends: **OPT001 & OPT 002:** Two optional General Education Courses approved by the University.

OPT 003 & OPT 004: Two optional Courses from Business and Economics.

TEE001, TEE002, TEE003, TEE 004: Four Technical Elective Courses

N.B. The course ICE 496 (Capstone Project) is spread over two semesters. Although the registration for this course will be done in SEM 1 of 4th year, the grades for this course will be assigned at the end of SEM 3 of 4th year. Grade X (continuation) will be assigned at the end of 4th year.

Faculty Members of the Department of Electronics and Communications Engineering (ECE)

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Ph.D. in Photonics
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Senior Lecturer

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M.Sc. in Electrical and Electronic Engineering
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(Dakota State University, USA)
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Machine Learning & Artificial Intelligence

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Supercontinuum Generation, Nonlinear Optics
Optical Communication and Waveguide Design

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Machine Learning, Big Data

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Department of Computer Science and Engineering (CSE)

Outcome-Based Curriculum of B. Sc. in CSE Program

(Effective from Summer Semester 2018)

Vision Statement of CSE Department

To be internationally renowned in Computer Science and Engineering and to exalt excellence in education, research and industrial profession for sustainable transformation of the society.

Mission of CSE Department

To advance knowledge and learning of evolving challenges in Computer Science and Engineering through quality education and research towards the development of the society.

To sustain an outstanding hub dedicated to excellence in teaching, learning, and research and to become internationally recognized to meet national and international needs.

To enhance the quality of students with advanced knowledge and skills of Computer Science and Engineering to meet contemporary industrial requirements.

Program Educational Objectives (PEOs) of B. Sc. in CSE Program

Graduates of the B. Sc. in Computer Science and Engineering (CSE) program are expected to attain the following Program Educational Objectives (PEO) within few years, such as 3-5 years, of graduation.

PEO1	Graduates will establish themselves as leading computational professionals and continue to learn and address evolving challenges in Computer Science and Engineering.
PEO2	Graduates will engage in lifelong pursuit of knowledge and interdisciplinary learning for industrial, research, and academic careers.
PEO3	Graduates will contribute to sustainable development and the well-being of society through the use of Computer Science and Engineering principles, practices and tools in an ethical and responsible manner.

Program Outcomes (POs) of B. Sc. in CSE Program

Graduates of the B. Sc. in Computer Science and Engineering (CSE) program are expected to attain the following Program Outcomes (POs) by the time of graduation.

PO	Description

PO	Description
PO1: Engineering Knowledge	Apply knowledge of mathematics, natural science, engineering fundamentals and an engineering specialization as specified in K1 to K4 respectively to the solution of complex computer science and engineering problems (EP1 to EP7).
PO2: Problem Analysis	Identify, formulate, research literature and analyze complexcomputer science and engineering problems (EP1 to EP7) reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences. (K1 to K4)
PO3: Design/ Development of Solutions	Design solutions for complex computer science and engineering problems (EP1 to EP7) and design systems, components or processes that meet specified needs with app ropriate consideration for public health and safety, cultural, societal, and environmental considerations. (WK5)
PO4: Investigation	Conduct investigations of complex computer science and engineering problems (EP1 to EP7) using research-based knowledge (WK8) and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.
PO5: Modern Tool Usage	Create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modeling, to complex computer science and engineering problems (EP1 to EP7), with an understanding of the limitations. (WK6)
PO6: The Engineer and Society	Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional computer science and engineering practice and solutions to complex computer science and engineering problems (EP1 to EP7). (WK7)
PO7: Environment and Sustainability	Understand and evaluate the sustainability and impact of professional computer science and engineering work in the solution of complex computer science and engineering problems (EP1 to EP7) in societal and environmental contexts. (WK7)

PO	Description
PO8: Ethics	Apply ethical principles and commit to professional ethics and responsibilities and norms of computer science and engineering practice. (WK7)
PO9: Individual Work and Teamwork	Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.
PO10: Communication	Communicate effectively on complex computer science and engineering activities (EA1 to EA5) with the computer science and engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11: Project Management and Finance	Demonstrate knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12: Life-Long Learning	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Course Summery

Course Category	Credits
Compulsory Language and General Education Courses	9
Elective General Education Courses	9
Basic Science Courses	11
Mathematics and Statistics Courses	15
Core Computer Science and Engineering Courses	62
Capstone Project	6
Major Compulsory and Elective Computer Science and Engineering Courses	20

Non-major Elective Computer Science and Engineering Courses	8
Total	**140**

List of Courses

Course	Credits	Prerequisite
Compulsory Language and General Education Courses	**9**	
ENG101 Basic English	3	
ENG 102 Composition and Communication Skills	3	ENG101
GEN226 Emergence of Bangladesh	3	ENG102

Elective General Education Courses	**9**	
Social Science Courses (any one course)	***3***	
ECO101 Principle of Microeconomics	3	None
GEN203 Ecological System and Environment	3	None
GEN214 Development Studies	3	ENG102
SOC317 Sociology of Science and Technology	3	None
Arts and Humanities Courses (any one course)	***3***	
GEN201 Bangladesh Studies	3	ENG102
GEN204 Western Thought	3	None
GEN210 International Relation	3	ENG102
SOC211 Eastern Culture and Heritage	3	None

Course	Credits	Prerequisite
SOC217 Religion, Ethnicity, Culture and Development in South Asia	3	ENG102
Business Courses (any one course)	***3***	
ACT101 Financial Accounting	3	None
BUS321 Business for Engineering and Technology	3	ENG102
BUS231 Business Communication	3	ENG102
MGT321 Industrial Management	3	ENG102
MGT337 Production Operations Management	3	STA102
FIN101 Principle of Finance	3	STA102
MKT101 Principle of Marketing	3	None

Core Natural Science Courses	**9+2=11**	
PHY109 Engineering Physics-I (Introductory Classical Physics)	3+1=4	MAT102
PHY209 Engineering Physics-II (Introductory Quantum Physics)	3+0=3	MAT205
CHE109 Engineering Chemistry	3+1=4	

Core Mathematics and Statistics Course	**15**	
MAT101 Differential and Integral Calculus	3	
MAT102 Differential Equations and Special Functions	3	MAT101
MAT104 Coordinate Geometry and Vector Analysis	3	MAT101
MAT205 Linear Algebra and Complex Variable	3	MAT102

Course	Credits	Prerequisite
STA102 Statistics and Probability	3	

Core Computer Science and Engineering Courses	48+14=62	
CSE103 Structured Programming	3+1.5=4.5	
CSE106 Discrete Mathematics	3+0=3	CSE103
CSE110 Object Oriented Programming	3+1.5=4.5	CSE106
CSE200 Computer-Aided Engineering Drawing	0+1=1	
CSE209 Electrical Circuits	3+1=4	
CSE207 Data Structures	3+1=4	CSE110
CSE251 Electronic Circuits	3+1=4	CSE209
CSE221 Operating Systems	3+1=4	CSE207
CSE326 Algorithms	3+1.5=4.5	CSE207
CSE302 Database Systems	3+1.5=4.5	CSE106
CSE345 Digital Logic Design	3+1=4	CSE251
CSE347 Information System Analysis and Design	3+1=4	CSE302
CSE360 Computer Architecture	3+0=3	CSE221
CSE405 Computer Networks	3+1=4	CSE326
CSE407 Green Computing	3+0=3	CSE405
CSE487 Cyber Security, Ethics and Law	3+0=3	CSE405
CSE495 IT Project Management and Entrepreneurship	3+0=3	CSE347

Course	Credits	Prerequisite
Core Capstone Project	**0+6=6**	
CSE400 Capstone Project	0+6=6	Completed at least 105 credit hours
Major Requirements	**Courses from the selected major area**	
Student should select one of the four major areas for degree major requirement	Two Compulsory courses (6+2=8 credits)	Three elective courses (9+3=12 credits)
Non-Major Elective Requirements		
Minimum 8 credits (two to three courses depending on credits of the courses) from one or more major/non-major areas other than selected major area		

Four Major Areas and Courses (2 Compulsory and 3 Elective Courses)	**15+5=20**	

1. Intelligent Systems and Data Science	**15+5=20**	
Compulsory Courses	***6+2=8***	
CSE303 Statistics for Data Science	3+1=4	STA102
CSE366 Artificial Intelligence	3+1=4	CSE326
Elective Courses (Any 3 Courses)	***9+3=12***	
CSE420 Computer Graphics	3+1=4	CSE326
CSE438 Digital Image Processing	3+1=4	CSE326

Course	Credits	Prerequisite
CSE445 Computer Vision	3+1=4	CSE326
CSE452 Distributed Systems and Algorithms	3+1=4	CSE221
CSE474 Pattern Recognition	3+1=4	CSE366
CSE475 Machine Learning	3+1=4	CSE366
CSE477 Data Mining	3+1=4	CSE366
CSE481 Nature-Inspired Computing	3+1=4	CSE326
CSE486 Bioinformatics Algorithms	3+1=4	CSE326
CSE488 Big Data Analytics	3+1=4	CSE302

2. Software Engineering	**15+5=20**	
Compulsory Courses	***6+2=8***	
CSE412 Software Engineering	3+1=4	CSE347
CSE430 Software Testing and Quality Assurance	3+1=4	CSE412
Elective Courses (Any 3 Courses)	***9+3=12***	
CSE422 Simulation and Modeling	3+1=4	CSE326
CSE423 Software Architecture	3+1=4	CSE412
CSE428 Human Computer Interactions	3+1=4	CSE412
CSE452 Distributed Systems and Algorithms	3+1=4	CSE221
CSE464 Advanced Database System	3+1=4	CSE302
CSE479 Web Programming	3+1=4	CSE302

Course	Credits	Prerequisite
CSE489 Mobile Programming	3+1=4	CSE326
3. Communications and Networking	**15+5=20**	
Compulsory Courses	***6+2=8***	
CSE350 Data Communications	3+1=4	CSE251
CSE432 Digital Signal Processing	3+1=4	CSE326
Elective Courses (Any 3 Courses)	***9+3=12***	
CSE452 Distributed Systems and Algorithms	3+1=4	CSE221
CSE453 Wireless Networks	3+1=4	CSE405
CSE457 Cellular Networks	3+1=4	CSE405
CSE472 Advanced Network Services and Management	3+1=4	CSE405
CSE473 Network Security and Systems	3+1=4	CSE405
CSE489 Mobile Programming	3+1=4	CSE326

4. Hardware Engineering	**15+5=20**	
Compulsory Courses	***6+2=8***	
CSE355 Digital System Design	3+1=4	CSE345
CSE442 Microprocessors and Microcontrollers	3+1=4	CSE360
Elective Courses (Any 3 Courses)	***9+3=12***	
CSE406 Internet of Things	3+1=4	CSE405
CSE446 ASIC Design Using FPGA	3+1=4	CSE345

Course	Credits	Prerequisite
CSE491 VLSI Design	3+1=4	CSE345
CSE492 Robotics	3+1=4	CSE366
CSE494 Embedded Systems	3+1=4	CSE442
Non-Major Area: Computational Theory		
CSE225 Numerical Methods	3+1=4	CSE103
CSE313 Theory of Computations	3+0=3	CSE326
CSE460 Cryptography	3+0=3	CSE326
CSE471 Compiler Design	3+1=4	CSE326
CSE483 Graph Theory	3+0=3	CSE326
CSE484 Computational Geometry	3+0=3	CSE326

Course Flowchart

	1st Year		2nd Year		3rd Year		4th Year	
	Course (Credit)	Pre-requisite	Course	Pre-requisite	Course	Pre-requisite	Course	Pre-requisite
1st Semester	ENG101 Basic English (3)		GEN226 Emergence of Bangladesh (3)	ENG102	Elective General Education-III (3)		CSE400 Capstone Project-I (0+1=1)	
	MAT101 Differential and Integral Calculus (3)		STA102 Statistics and Probability (3)		CSE326 Algorithms (3+1.5=4.5)	CSE207	CSE407 Green Computing (3+0=3)	CSE405
	CSE103 Structured Programming (3+1.5=4.5)		CSE200 Computer-Aided Engineering Drawing (0+1=1)		CSE302 Database Systems (3+1.5=4.5)	CSE106	Elective Major-I (3+1=4)	
			CSE209 Electrical Circuits (3+1=4)				Elective Non-Major-I (3+1=4)	
2nd Semester	ENG102 Composition And Communication Skills (3)	ENG101	Elective General Education-I (3)		CSE345 Digital Logic Design (3+1=4)	CSE251	CSE400 Capstone Project-II (0+2=2)	
	MAT102 Differential Equations and Special Functions (3)	MAT101	MAT205 Linear Algebra and Complex Variables (3)	MAT102	CSE347 Information System Analysis and Design (3+1=4)	CSE302	CSE487 Cyber Security, Ethics and Law (3+0=3)	CSE405
	CSE106 Discrete Mathematics (3+0=3)	CSE103	CSE207 Data Structures (3+1=4)	CSE110	Compulsory Major-I (3+1=4)		Elective Major-II (3+1=4)	
	CHE109 Engineering Chemistry (3+1=4)		CSE251 Electronic Circuits (3+1=4)	CSE209			Elective Non-Major-II (3+1=4)	
3rd Semester	PHY109 Engineering Physics-I (3+1=4)	MAT102	Elective General Education-II (3)		CSE360 Computer Architecture (3+0=3)	CSE221	CSE400 Capstone Project-III (0+3=3)	
	MAT104 Coordinate Geometry and Vector Analysis (3)	MAT101	PHY209 Engineering Physics-II (3+0=3)	MAT205	CSE 405 Computer Networks (3+1=4)	CSE326	CSE495 IT Project Management and Entrepreneurship (3+0=3)	CSE347
	CSE110 Object Oriented Programming (3+1.5=4.5)	CSE106	CSE221 Operating Systems (3+1=4)	CSE207	Compulsory Major-II (3+1=4)		Elective Major-III (3+1=4)	
Year-Credit	35		35		35		35	

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Department of Electrical and Electronic Engineering (EEE)

Electrical and Electronic Engineering (EEE) plays a vital role in modern civilization. Almost all aspects of modern human lives are affected by EEE. The Department of EEE offers the B.Sc. program in EEE with a view to producing engineering leaders who are compassionate and ethical members of the society.

Vision statement: To create excellent engineers instilled with quality education, human values and professional ethics.

Mission statement: The department is dedicated to endow students with knowledge, skills and values that prepare them to excel as leading engineering professionals and responsible citizens committed to life-long learning.

Program Educational Objectives (PEO) for the B.Sc. in EEE: PEOs are broad statements that describe the career and professional accomplishments that the B.Sc. in EEE program is preparing graduates to achieve. Graduates of the B.Sc. in EEE program are expected to attain the following PEO's within a few (3 – 5) years of graduation.

1. Establish themselves as leading engineering professionals or in advanced study and research
2. Contribute to the society through the use of electrical and electronic engineering principles, practices and tools in an ethical and responsible manner
3. Continue to learn and address evolving challenges in electrical and electronic engineering

Graduate Attributes (GA) or Program Outcomes (PO) for the B.Sc. in EEE: POs are narrower statements that describe what students are expected to know and be able to do by the time of graduation. These relate to the knowledge, skills and attitudes that students acquire while progressing through the program. The students of the B.Sc. in EEE program are expected to achieve the following graduate attributes or program outcomes at the time of graduation.

PO1 – Engineering knowledge: Apply knowledge of mathematics, natural science, engineering fundamentals and an engineering specialization as specified in K1 to K4 respectively to the solution of complex electrical and electronic engineering problems.

PO2 – Problem analysis: Identify, formulate, research literature and analyze complex electrical and electronic engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences. (K1 to K4)

PO3 – Design/development of solutions: Design solutions for complex electrical and electronic engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations. (K5)

PO4 – Investigation: Conduct investigations of complex electrical and electronic engineering problems using research-based knowledge (K8) and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.

PO5 – Modern tool usage: Create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex electrical and electronic engineering problems, with an understanding of the limitations. (K6)

PO6 – The engineer and society: Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice and solutions to complex electrical and electronic engineering problems. (K7)

PO7 – Environment and sustainability: Understand and evaluate the sustainability and impact of professional engineering work in the solution of complex electrical and electronic engineering problems in societal and environmental contexts. (K7)

PO8 – Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice. (K7)

PO9 – Individual work and teamwork: Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.

PO10 – Communication: Communicate effectively on complex electrical and electronic engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 – Project management and finance: Demonstrate knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12 – Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

The B.Sc. in EEE program is also committed to ensure that its curriculum encompasses all the attributes of Knowledge Profile (K1 – K8) as presented in Table 1 and as included in the PO statements.The ranges of Complex Problem Solving (P1 – P7) and Complex Engineering Activities (A1 – A5) that should be addressed in the program are given in Tables 2 and 3, respectively.

Table 1: Knowledge Profile

S.No.	Attribute
K1	A systematic, theory-based understanding of the natural sciences applicable to the discipline
K2	Conceptually based mathematics, numerical analysis, statistics and the formal aspects of computer and information science to support analysis and modeling applicable to the discipline
K3	A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline
K4	Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline, much of which is at the forefront of the discipline
K5	Knowledge that supports engineering design in a practice area
K6	Knowledge of engineering practice (technology) in the practice areas in the engineering discipline
K7	Comprehension of the role of engineering in society and identified issues in engineering practice in the discipline: ethics and the engineer's professional responsibility for public safety; the impacts of engineering activity; economic, social, cultural, environmental and sustainability
K8	Engagement with selected knowledge in the research literature of the discipline

Table 2: Range of Complex Engineering Problem Solving

Attribute	**Complex Engineering Problems** have characteristic P1 and some or all of P2 to P7:

Depth of knowledge required	P1: Cannot be resolved without in-depth engineering knowledge at the level of one or more of K3, K4, K5, K6 or K8, which allows for a fundamentals-based, first principles analytical approach
Range of conflicting requirements	P2: Involves wide-ranging or conflicting technical, engineering and other issues
Depth of analysis required	P3: There is no obvious solution, and abstract thinking and originality in analysis are required to formulate suitable models
Familiarity of issues	P4: Involves infrequently encountered issues
Extent of applicable codes	P5: Are outside problems encompassed by standards and codes of practice for professional engineering
Extent of stakeholder involvement and conflicting requirements	P6: Involves diverse groups of stakeholders with widely varying needs
Interdependence	P7: High level problems including many component parts or sub-problems

Table 3: Range of Complex Engineering Activities

Attribute	**Complex activities** means (engineering) activities or projects that have some or all of the following characteristics:
Range of resources	A1: Involves the use of diverse resources (for this purpose, resources include people, money, equipment, materials, information and technologies)
Level of interaction	A2: Requires resolution of significant problems arising from interactions among wide-ranging or conflicting technical, engineering or other issues
Innovation	A3: Involves creative use of engineering principles and research-based knowledge in novel ways
Consequences for society and the environment	A4: Has significant consequences in a range of contexts; characterized by difficulty of prediction and mitigation
Familiarity	A5: Can extend beyond previous experiences by applying principles-based approaches

Table 4: Mapping between PO's and PEO's

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
PEO1	X		X		X					X		
PEO2						X	X	X			X	
PEO3		X		X					X			X

Curriculum of Bachelor of Science (B.Sc.) in Electrical and Electronic Engineering (EEE)

A.	**General Education Requirement:**	**21 credits**
B.	**Core Requirement:**	**93 credits**
C.	**Elective Requirement:**	**20 credits**
D.	**Final Year Design Project Requirement:**	**6 credits**
	Total:	**140 credits**

A. General Education Requirement (21 credits)

(i) Compulsory General Education Courses		*12 credits*
ENG 101	Basic English	3
ENG 102	Composition and Communication Skills	3
GEN 226	Emergence of Bangladesh	3
EEE 399	Engineering Project Management	3
(ii) Optional General Education Courses		6 credits
	Choose any two approved General Education courses	

(iii) Optional Course from non-Engineering Subjects		3 credits
	Choose one course	

B. Core Courses (93 credits)

EEE 101	Electrical Circuits I	3+1=4
EEE 102	Electronic Circuits I	3+1=4
EEE 105	Computer Programming	3+1=4
EEE 201	Electrical Circuits II	3+1=4
EEE 202	Electronic Circuits II	3+1=4
EEE 204	Numerical Analysis for Electrical Engineering	3+1=4
EEE 205	Digital Logic Design	3+1=4
EEE 300	Electrical Services Design	3+0=3
EEE 301	Electrical Machines	3+1=4
EEE 302	Microprocessors and Interfacing	3+1=4
EEE 303	Signals and Linear Systems	3+0=3
EEE 304	Electrical Power Systems	3+1=4
EEE 305	Electromagnetic Fields and Waves	3+0=3
EEE 307	Telecommunication Engineering	3+1=4
EEE 308	Electronic Properties of Materials	3+0=3
EEE 309	Digital Signal Processing	3+1=4
EEE 402	Control Systems	3+1=4

EEE 403	Engineer and Society	3+0=3
CHE 101	Introduction to Chemistry	3+1=4
MAT 101	Differential and Integral Calculus	3+0=3
MAT 102	Differential Equations and Special Functions	3+0=3
MAT 104	Co-ordinate Geometry and Vector Analysis	3+0=3
MAT 205	Linear Algebra and Complex Variables	3+0=3
PHY 109	Engineering Physics – I (Introductory Classical Physics)	3+1=4
PHY 209	Engineering Physics – II (Introductory Quantum Physics)	3+0=3
STA 102	Statistics and Probability	3+0=3

C. Elective Courses (20 Credits)

Students have to choose six elective courses (ELTV1-ELTV6) taking three courses from the major group of the students' choice. The remaining three courses have to be taken from at least two other groups. Out of six elective courses, at least two of these have to be 4 credits course, of which one from major and one from other groups.

GROUP A (Electronics)

EEE 413	Fundamentals of Nanotechnology	3+0=3
EEE 414	Optoelectronics	3+0=3
EEE 415	Semiconductor Processing and Fabrication	3+1=4
EEE 416	VLSI Circuits and Systems	3+1=4
EEE 417	Semiconductor Devices	3+0=3
EEE 418	Analog Integrated Circuits	3+1=4
EEE 419	Biomedical Electronics	3+0=3

GROUP B (Communication Engineering and Signal Processing)

EEE 421	RF and Microwave Engineering	3+1=4
EEE 422	Digital Communications	3+1=4
EEE 423	Wireless and Mobile Communications	3+1=4
EEE 425	Digital Image Processing	3+0=3
EEE 426	Advanced Telecommunication Engineering	3+0=3

GROUP C (Computer Engineering)

EEE 433	Computer Networks	3+1=4
EEE 434	Computer Architecture	3+1=4
EEE 435	Embedded Systems	3+1=4
CSE 436	Multimedia Design and Development	3+0=3
CSE 450	Data Structure and Algorithm	3+1=4

GROUP D (Power Engineering)

EEE 441	Power Stations	3+0=3
EEE 442	Switchgear and Protective Relays	3+1=4
EEE 444	High Voltage Engineering	3+0=3
EEE 445	Renewable Energy	3+0=3
EEE 446	Power System Operation and Reliability	3+0=3
EEE 447	Power Electronics	3+1=4

Special elective courses

EEE 450	Special Topic in Electrical and Electronic Engineering	3+0=3

EEE 490	Research Project	3+0=3

D. Design Project

EEE 400A	Final Year Design Project (part 1 of 3)	0+1=1
EEE 400B	Final Year Design Project (part 2 of 3)	0+2=2
EEE 400C	Final Year Design Project (part 3 of 3)	0+3=3

Legends

OGEC Optional General Education Courses.

ONEC Optional Courses from non-Engineering courses.

ELTV Elective Courses

Table 5: Flow-Chart for Courses to be followed during the FOUR YEARS of the Undergraduate Program of EEE (Numbers in parentheses indicate Credits)

Semester	**Year I**		**Year II**		**Year III**		**Year IV**	
I	PHY 109	(4)	STA 102	(3)	EEE 301	(4)	EEE 402	(4)
	MAT 101	(3)	EEE 102	(4)	EEE 302	(4)	EEE 403	(3)
	CHE 101	(4)	OGEC-I	(3)	EEE 303	(3)	ELTV-I	(3/4)
			GEN 226	(3)			EEE 400A	(1)
		(11)		**(13)**		**(11)**		**(11/12)**
II	ENG 101	(3)	OGEC-II	(3)	EEE 300	(3)	ELTV-II	(3/4)
	MAT 102	(3)	MAT 205	(3)	EEE 304	(4)	ELTV-III	(3/4)
	EEE 101	(4)	EEE 202	(4)	EEE 305	(3)	ELTV-IV	(3/4)
			ONEC-I	(3)	EEE 399	(3)	EEE 400B	(2)

		(10)		**(13)**		**(13)**		**(11/14)**
III	ENG 102	(3)	PHY 209	(3)	EEE 307	(4)	ELTV-V	(3/4)
	MAT 104	(3)	EEE 204	(4)	EEE 308	(3)	ELTV-VI	(3/4)
	EEE 105	(4)	EEE 205	(4)	EEE 309	(4)	EEE 400C	(3)
	EEE 201	(4)						
		(14)		**(11)**		**(11)**		**(09/11)**

Assessment and grading: assessment of students' performance in a course is an important task that relates to assigning grades, assessing attainment of course outcomes and giving feedback. The selection of appropriate assessment tools in a course depends on many factors, such as, the course outcomes, the topics, the course level, available resources, and the delivery of course contents. Alignment of the assessment tools in a course with the course outcomes, and delivery of contents is essential. Traditional exam based assessment tools are not suitable for assessing many of the course outcomes, especially those related to professional skills. Alternative methods to assess such outcomes may include practical projects, design projects, formal reports and presentations, hands-on activities in the lab, etc. Rubrics are in particular suitable for evaluating students' works under non-exam assessment tools. A rubric allows interpretation and grading of the student work using pre-set marking criteria or indicators and expected performance standards. The grades assigned to students in any course should be based on formal assessment and should be consistent with the university grading policy.

Table 6: Mapping of Course Outcomes (CO's) of EEE core courses to Program Outcomes (PO's)

Course#	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
EEE101	X				X							
EEE102	X				X							
EEE105	X											
EEE201	X				X							
EEE202	X		X		X							
EEE204	X	X										
EEE205	X		X		X							
EEE300		X	X			X				X		

EEE301	X		X		X							
EEE302	X		X	X	X							
EEE303	X	X										
EEE304	X		X		X							
EEE305	X	X										X
EEE307	X	X	X		X							
EEE308	X	X					X					X
EEE309	X	X	X	X					X			
EEE399							X			X	X	
EEE402	X	X	X	X					X			
EEE403						X	X	X		X		
EEE400A			X			X	X	X	X		X	X
EEE400B		X	X					X	X			
EEE400C			X	X	X			X	X	X	X	

Table 7: Mapping of selected courses to POs along with Knowledge Profile (K1 – K8), Complex Engineering Problem Solution (P1 – P7) and Complex Engineering Activities (A1 – A5)

Course #	Program Outcomes												Knowledge Profile								Complex Engineering Problem Solving							Complex Engineering Activities				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	K1	K2	K3	K4	K5	K6	K7	K8	P1	P2	P3	P4	P5	P6	P7	A1	A2	A3	A4	A5
	Needs K1-K4		K5	K8	K6	K7	K7																					Related to PO10				
	Needs complex engineering problem solution (P1 + another P)																															
	Engineering knowledge	Problem analysis	Design/development of solutions	Investigation	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual work and teamwork	Communication	Project management and finance	Life-long learning	Science	Math	Eng fundamentals	Eng specialization	Design	Technology	Society	Research	Knowledge K3-K6, K8	Wide ranging/conflicting	No obvious solution	Infrequent issues	Outside problems	Diverse groups	Many components	Range of resources	Level of interaction	Innovation	Consequences	Familiarity
204	X	X												X	X						X		X								
300			X			X				X							X		X		X	X			X			X			X	
302			X	X	X												X	X		X	X			X							
304	X				X											X		X			X	X										
305	X											X	X	X	X						X		X									
307		X			X											X		X			X				X							
308							X					X	X		X				X		X					X						
309		X		X					X							X				X	X		X									
399										X	X								X									X	X			
402			X						X							X	X				X		X									
403						X	X	X		X									X										X		X	
400 (Capstone)		X	X	X	X	X	X	X	X	X	X	X			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

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Department of Pharmacy

Introduction

The global demand for Pharmacy graduates in the academic and research institutions, pharmaceutical industries, hospitals and other health related fields is increasing at rapid pace at both home and abroad. Throughout history, Pharmacy has successfully adapted to the changes within the pharmaceutical industries and medicines.

Pharmacy is concerned with the design, evaluation, production and use of medicines. It is based on the chemical, biological and medical sciences; in particular, it offers the pursuit of an interest in science, the opportunity for research and development.

Pharmacists are acknowledged to be the experts in medicines. They must be knowledgeable about the composition of drugs, their chemical and physical properties, and their manufacturing and uses, as well as how products are tested for purity, strength and quality. Additionally, a pharmacist needs to understand the activity of a drug and its mechanism of action.

Objective of the Department of Pharmacy is to provide comprehensive, integrated and advanced knowledge of drugs both in and outside the class.

Direction

Pharmacy program has been designed to equip the students with proper scientific information and knowledge so that they can contribute to the innovation, formulation, production, quality control and quality assurance of the pharmaceutical products. The course also strengthens the students' proper theoretical and practical knowledge and skill in overall management of medicines including the marketing and distribution processes. Thus, the course generates skilled and efficient manpower to serve pharmaceutical companies as well as retail pharmacy, hospital pharmacy, community pharmacy and other government bodies related to health and research.

Program

Pharmacy Department, with its approval from University Grants Commission (UGC) and accreditation from Pharmacy Council of Bangladesh, is now in full operation with its undergraduate course, Bachelor of Pharmacy (B.Pharm) and graduate course, M.Pharm in Clinical Pharmacy and Molecular Pharmacology.

The Bachelor of Pharmacy of East West University is a four year program divided into 8 semesters (2 semesters/year) requiring completion of 158 credits. Students are placed in different reputed pharmaceutical industries for in-plant training (a non-credit program) after completion of 158 credits. The Department also organizes regular training lectures by the experienced top level professionals from pharma industries.

Mission and Future Prospect

The rapid expansion of pharmaceutical industry and advances in the health sector have created a lot of opportunities for pharmacists to be involved in the process of drug design, dosage form design, drug formulation, production & distribution, clinical pharmacy services, clinical research and biotechnological advancements. Here the pharmacist must keep abreast of innovation in all areas of pharmaceutical sciences including the development of new drug delivery systems and expanding contemporary pharmaceutical services to fulfill the unique demands for pharmacists in societies at home and abroad and to cope with the unprecedented development in the field of medical and pharmaceutical sciences. In the Pharmacy Department of East West University, we have developed new approaches to pharmacy education and created an environment for basic and fundamental research.

Research activities

In the Pharmacy Department of East West University, we have embraced new technologies, developed new approaches to pharmacy education and created an environment for innovative research. Our objective is to create knowledge through research and to put that knowledge into practice.

We have a close association with the pharmaceutical industries, other universities and some renowned research institutions of Bangladesh. They are as follows:

Faculty of Pharmacy, University of Dhaka.

Department of Pharmacy, Jahangirnagar University, Savar, Dhaka.

School of Pharmacy, The University of Mississippi, USA.

Department of Molecular & Cellular Biology, Harvard University, USA.

WHO & TWAS laboratories, International Center for Chemical & Biological Sciences, Karachi, Pakistan.

BIRDEM, Dhaka.

ICDDR, B, Dhaka.

National Institute of Cardiovascular Diseases, Dhaka.

Institute of Child Health, Dhaka.

Institute of Public Health, Dhaka.

Laboratory

There are 21 laboratory courses and a research project to be carried out by undergraduate students of Department of Pharmacy. Current laboratory facilities of Department of Pharmacy include highly advanced and sophisticated state-of-the-art instruments like-

High Performance Liquid Chromatography (HPLC) with auto-injector, duel detectors (Refractive Index and Photodiode Array detectors) and high pressure gradient pump control by PC.

Fourier Transform Infrared Spectrophotometer (FT-IR) with Temperature Controlled High-Sensitivity DLATGS Detector and advanced Dynamic Alignment System

Capillary Gas Chromatography (GC) with Flame Ionization, Flame Thermionic, Electron Captured Detectors and Multi-Capillary Advanced Columns

PC controlled UV-visible spectrophotometer and Pan Coating machine, Digital Colony Counter, Centrifuges and Ultra-centrifuge, Bench-Top Freeze Dryer, Electronic Balance, Programmable Digital Autoclave, High Resolution Microscopes, Digital Automatic Karl-Fischer Titration Apparatus, Digital Hot-Air Oven, Digital Tablet Friability Test Apparatus, Disintegration Tester, Dissolution Tester, Polarimeter, Gel Electrophoresis (Vertical & Horizontal), Thermocycler for PCR, ELISA Reader, Ultra-Low-Deep Freezer (-80oC), Gel Electrophoresis, Distillation Apparatus, Double cone blender, Clean Bench, Soxhlet apparatus etc.

Admission Criteria

i) Candidates must have a minimum aggregate GPA 6.50 in SSC/ “O” level or equivalent and HSC/ “A” level or equivalent examinations (in a total scale of 10).

ii) Candidates must pass SSC/ “O” level or recognized equivalents and HSC/ “A” level or recognized equivalents in Science Group and obtain a minimum GPA 3.0 (in a scale of 5) without any additional subject.

iii) Candidates must pass HSC/ “A” level or recognized equivalent examination with a minimum GPA 3.0 in Chemistry and Biology separately and a minimum GPA 2.0 in Mathematics (in a scale of 5).

iv) Candidates must pass HSC/ “A” level or recognized equivalent examination in current year or one previous year.

v) Foreign students must have passed 12 education years and got same grades in equivalent examinations from foreign recognized institutions.

vi) Students must pass HSC/ “A” level or recognized equivalents with the following science subjects: Physics, Chemistry, Biology and Mathematics.

vii) However, candidates having no Mathematics at the HSC/ “A” level or recognized equivalents may be admitted, but they need to take an extra 3 (three) credits course on Mathematics relevant to B. Pharm. curriculum.

viii) Admission should be based on competitive written test evaluations. In addition to written test, an oral test may be taken for further assessment.

(Recognized equivalents mean Education Board, Madrasah Board and Bangladesh Technical Education Board)

The courses offered for the B. Pharm degree are listed on the next page.

Bachelor of Pharmacy: Courses

Minimum Requirement 158 Credits

The credit distribution is given below:

A.	General Education Requirement	18 Credits
B.	Core Requirement	140 Credits
C.	Pharmaceutical Research/Project (Within 140 Credits)	5 Credits
D.	Industrial Training	
Total		**158 Credits**

A. Compulsory General Education Requirement 18

Course Title		Credits
PHY 100	Introductory Physics	3
MAT 100	Mathematics	3
ENG 101	Basic English	3
ENG 102	Composition and Communication Skills	3
GEN 226	Emergence of Bangladesh	3
GEN 207	Industrial Psychology	3

B. Core Requirement 140

Course Title		Credits
PHRM 101	Physical Pharmacy I	4
PHRM 102	Cell Biology and Anatomy	3
PHRM 103	Organic Pharmacy I	4
PHRM 201	Human Physiology I	4
PHRM 202	Basic Microbiology	4
PHRM 203	Pharmaceutical Analysis I	4
PHRM 204	Physical Pharmacy II	4
PHRM 205	Inorganic Pharmacy	4
PHRM 206	Biochemistry	4
PHRM 207	Pharmacognosy I	4
PHRM 208	Human Physiology II	4
PHRM 209	Statistics for Pharmaceutical Sciences	3
PHRM 210	Pharmaceutics I	4
PHRM 211	Organic Pharmacy II	3
PHRM 301	Pharmacology I	3
PHRM 302	Medicinal Chemistry I	3
PHRM 303	Pharmacognosy II	3
PHRM 304	Medicinal Chemistry II	4
PHRM 305	Pharmaceutical Microbiology	4
PHRM 306	Pharmacology II	4
PHRM 307	Pharmaceutical Technology I	3
PHRM 308	Pharmaceutics II	4
PHRM 309	Pharmaceutical Analysis II	4
PHRM 310	Toxicology	3
PHRM 311	Clinical & Hospital Pharmacy	3
PHRM 312	Pharmaceutical Analysis III	3

PHRM 401 Pharmaceutical Management & Marketing 3
PHRM 402 Pharmaceutical Technology II 4
PHRM 403 Drug Design and Development 3
PHRM 404 Pharmaceutical Research 5
PHRM 405 Pharmacy Quality Assurance 3
PHRM 406 Biopharmaceutics & Pharmacokinetics 4
PHRM 407 Pharmaceutical Biotechnology 3
PHRM 409 Advanced Pharmaceutical Analysis 4
PHRM 410 Pharmacy Law and Ethics 3
PHRM 411 Cosmetology 4
PHRM 412 Medicinal Chemistry III 3
PHRM 413 Pharmacology III 4
PHRM 414 Pharmaceutical Engineering 3

Flowchart for courses to be followed during four (4) years of the undergraduate program of Pharmacy

Semester	Year I		Year II		Year III		Year IV	
	Course Code	**Credits**	**Course Code**	**Credits**	**Course Code**	**Credits**	**Course Code**	**Credits**
1st	ENG 101	3	GEN 226	3	PHRM 305	4	PHRM 403	3
	MAT 100	3	PHRM 205	4	PHRM 306	4	PHRM 404	5
	PHRM 101	4	PHRM 207	4	PHRM 307	3	PHRM 405	3
	PHRM 102	3	PHRM 208	4	PHRM 308	4	PHRM 406	4
	PHRM 103	4	PHRM210	4	PHRM 309	4	PHRM 411	4
	PHRM202	4					PHRM 413	4
Sub-Total (Semester)		**21**		**19**		**19**		**23**
2nd	ENG 102	3	GEN 207	3	PHRM 304	4	PHRM 401	3
	PHY 100	3	PHRM 203	4	PHRM 310	3	PHRM 409	4
	PHRM 201	4	PHRM 206	4	PHRM 312	3	PHRM 410	3
	PHRM 204	4	PHRM 301	3	PHRM 402	4	PHRM 412	3
	PHRM 209	3	PHRM 302	3	PHRM 407	3	PHRM 414	3
	PHRM 211	3	PHRM 303	3	PHRM 311	3		
Sub-Total (Semester)		**20**		**20**		**20**		**16**

Sub-Total (Year)		**41**		**39**		**39**		**39**

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Department of Genetic Engineering and Biotechnology

Introduction

The field of genetic engineering and biotechnology is expanding rapidly with widespread application in many areas of biological science, most notably, in medical, agricultural, pharmaceutical, industrial, etc. sectors. Students graduating from this subject can go for higher studies in biology-related subjects and after achieving a considerable amount of expertise in the respective field, they can become a researcher and find jobs in national/international research centers, pharmaceutical industries, medical research institutes, etc. Alternatively, after completing post-graduate studies, students can go for academic positions in universities. East West University established the Department of Genetic Engineering and Biotechnology in 2012 to address the growing need for people skilled in these fields who want a career related with biological science. The courses offered by the faculty members and the laboratories of the department will prepare the dedicated students well for higher studies and for industrial or research related jobs.

Direction

East West University attract extraordinarily well qualified applicants for its Professor and Lecturer positions. As we grow, we expect to rapidly build a department that is staffed with experienced scientists with an up to date knowledge of technology and the insights necessary to guide the students to areas of greatest potential. Also, the department has the advantage of immediate access to and use of the existing lab facilities currently in active research use by the Pharmacy Department and expects to expand those facilities as more faculty members join the department and make their individual research needs known.

Laboratory Facilities

Presently, the department has three well-established laboratories equipped with advanced instruments like UV-Vis Spectrophotometer, Themocycler for PCR, Laminar Air Flow Cabinet, Digital Gel Documentation System, Microcentrifuge Machine, Incubator, Shaker Incubator, Water Distillation System, Autoclave chamber, and many other important instruments necessary to conduct lab classes of different courses of the syllabus. The department aims to establish few more labs dedicated to specific research works, like plant-growth room, green house chamber, bioinformatics lab, etc., in coming future. These laboratories will help students immensely to develop practical skill in research works which will allow them to adjust themselves confidently in any international labs with state-of-the-art facilities.

Admission Requirements

In addition to the minimum general admission criteria for EWU, students should have Physics, Chemistry and Biology/Mathematics at HSC or equivalent level, and Biology at SSC level.

Bachelor of Genetic Engineering and Biotechnology

Minimum Requirement 133 Credits

The Bachelor of Genetic Engineering and Biotechnology at East West University is a four year program divided into 12 semesters (3 semesters per year) requiring completion of 133 credits.

Section	Description	Credit Hours
I	General Education Requirements	21
II	Mathematics and Basic Sciences	32
III	GEB Core Curriculum	68
IV	Elective GEB Courses	12
Total		133

Section I. General Education Requirements (21 Credit Hours)

Section I A: Compulsory General Education Courses (Three courses: 9 credit hours)

Course Number/Course title	Credit Hours
ENG 101:Basic English	3

ENG 102:Composition & Communication Skills	3
GEN 226 : Emergence of Bangladesh	3
Total	**9**

Section I B: Optional General Education Courses (2 courses, OPT001 and OPT002).

For GEB, students should choose Gen 239 and one other course, a total of 3+3 = 6 Credit Hours).

Course Number/Course title	**Credit Hours**
GEN 201:Bangladesh Studies	3
GEN 204:Western Thought	3
GEN 205:Introduction to Psychology	3
GEN 207:Industrial Psychology	3
GEN 208:Introduction to Philosophy	3
GEN 210:International Relations	3
GEN 211:Concepts of Journalism & Media Studies	3
GEN 239:Professional Ethics	3
CSE 102: Introduction to Computers II	3
POP 201: Health Challenges of Adolescents and Youths	3
POP 202: Introduction to Public Health	3
SOC 101: Introduction to Sociology	3
SOC 202: Social Psychology	3
SOC 211: Eastern Culture & Heritage	3
SOC 212: Social Ecology, Environment & Society	3
Total	**6**

Section I C: Optional Courses from Business & Economics (2 courses, OPT003 and OPT004).

GEB students may choose any two courses: 3+3 = 6 credit hours).

GEN 2XX: Any other GEN course approved by the University 3

ACT 101:Financial Accounting	3
BUS 101: Introduction to Business	3
ECO 101:Principles of Microeconomics	3
ECO 102:Introduction to Macroeconomics	3
FIN 101 : Principles of Finance	3
MGT 101: Principles of Management	3
MKT 101: Principles of Marketing	3
MGT 251: Organizational Behavior	3
Total	**6**

Section II: Mathematics and Basic Sciences (32 Credit Hours)

These courses stress the scientific principles upon which the engineering disciplines including GEB are based. GEB students should take a total of 32 credit hours.

Note: Unless otherwise mentioned, a four credit course contains three hours of classroom instruction and one hour of laboratory instruction/ experimentation.

Course Number/Course title	**Credit Hours**

MAT 101: Differential & Integral Calculus	3
MAT 102: Differential Equations & Special Functions	3
MAT 205: Linear Algebra & Complex Variables	3
STA 208: Statistics for Biologists	3
CSE 108: Computer and Software Fundamentals	4
CHE 108: Chemistry for Biologists - I	4
CHE 208: Chemistry for Biologists - II	4
PHY 108: Physics for Biologists - I	4
PHY 208: Physics for Biologists - II	4
Total	**32**

Section III. Genetic Engineering and Biotechnology Core Courses (68 Credit Hours)

The following courses stress fundamental Genetic Engineering & Biotechnology concepts.

Course Number/Course title	**Credit Hours**
GEB 101: Basic Biology	3
GEB 103: Cell Biology-I	3
GEB 104: Basic Microbiology	4
GEB 105: Cell Biology-II	3
GEB 201: Basic Biochemistry	4
GEB 202: Molecular Biology	4
GEB 203: Animal Physiology	3
GEB 204: General Genetics and Genetic Analysis	4
GEB 301: Plant Physiology	3
GEB 302: Fundamentals of Genetic Engineering & Biotechnology	3
GEB 304: Immunology	4
GEB 305: General Virology	3
GEB 308: Separation Technologies and Analytical Methods	4
GEB 410 Current topics in Genetic Engineering and Biotechnology	3
GEB 402: Advances in Recombinant Gene Technology	4
GEB 403: Animal and Plant Tissue Culture	4
GEB 406: Genomics, Proteomics and Bioinformatics	3
GEB 407: Industrial Biotechnology of Microbial Systems	3
GEB 420: Biochemistry & Molecular Biology of Diseases	3
GEB 490 Research Proposal	3
Total	**68**

Section IV: Genetic Engineering and Biotechnology Elective Course (ELV001-ELV004).
(12 Credit Hours)

The following upper-level elective courses stress the rigorous analysis and design principles practiced in the sub-disciplines of Genetic Engineering and Biotechnology and related areas. GEB students have to choose a total four courses (ELV001 - ELV004) from these elective modules.

Course Number/Course title	Credit Hours
GEB 306: Environmental Biology	3
GEB 408: GMOs, Biosafety Regulations and Environmental Management	3
GEB 421: Methods in Enzymology	3
GEB 422: Developmental Biology	3
GEB 423: Human Molecular Genetics and Molecular Diagnostics	3
GEB 424: Microbial Genetics	3
GEB 425: Plant Development Biotechnology	3
GEB 426: Pharmaceutical Biotechnology	3
GEB 427: Stem Cells and Tissue Engineering	3
GEB 428: Forensic Biology	3
GEB 489: Industrial Training/Internship	3
GEB 499: Research Project	3
Total	**12**

Flowchart for the courses to be followed during the FOUR YEARS of the Undergraduate Program of Genetic Engineering & Biotechnology.

Semester	Year 1	Year 2	Year 3	Year 4
1st	GEB 101	GEB 201	GEB 301/ GEB 302	GEB 403/ GEB 406
	GEB 103	GEB 202/ GEB 203	GEB 305/ GEB 304	GEB 407 / GEB 420
	ENG 101/ ENG 099	PHY 108/ MAT 205	EBEc II/ GEN 239	GEB 410/ EGb IV
	CSE 108/ MAT 101/ EBEc I/ EGn I/	EBEc I/ EGn I/ GEN 226	EGb I	
2nd	GEB 104/ GEB 105	GEB 202/ GEB 203	GEB 304/ GEB 308	GEB 407 / GEB 420
	CHE 108	PHY 108/PHY 208	GEB 308/ GEB 402	GEB 410/ EGb IV
	ENG 102/ENG 101	MAT 205/ STA 208	EGb II	GEB 490
	MAT 101/ CSE 108/ EBEc I/ EGn I/	EBEc II/ EGn I/ GEN 226		
3rd	GEB 104/ GEB 105	GEB 204	GEB 308/GEB 402	
	CHE 208	GEB 301/ GEB 302	GEB 403/ GEB 406	
	ENG 102/ GEN 226	MAT 205/ STA 208	EGb III	
	MAT 101/ MAT 102/ EBEc I/ EGn I/	EBEc II/ GEN 239/		

Legends

EBEc	:	Elective for Business & Economics

EGb	:	Elective for GEB
EGn	:	Elective for GEN

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Ph.D. in Applied Bioscience
(Hokkaido University, Japan)
MS in Ecological Chemistry
(Hokkaido University, Japan)
M.Sc. (Ag) in Agricultural Chemistry
(Bangladesh Agricultural University)
B.Sc. Ag (Hon's)
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Mohammad Riazul Islam
Professor
Dept. of Biochemistry and Molecular Biology
University of Dhaka
JSPS Post doctoral Fellow (Japan)
Humboldt Post doctoral Fellow (Germany)
Ph.D. in Microbial Bitechnology
(Kyushu University, Japan)
MSc in Biochemistry and Molecular Biology
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B.Sc. in Biochemistry and Molecular Biology
(University of Dhaka)

Department of Civil Engineering

The Department of Civil Engineering (CE) at East West University offers four-year Bachelor of Science (B.Sc.) program in Civil Engineering (CE) with an ambition of developing competent work force for the continuous demands in this sector at both home and abroad. The curriculum of the degree is prepared with the intension to groom up the students to effectively contribute to all aspects of Civil Engineering. Therefore, the curriculum of the B.Sc. in Civil Engineering (CE) program focuses on (i) Structural Engineering, which involves the design of structures (Buildings, bridges, flyover, tunnel, tower, retaining walls, etc.) that should be safe for the users, be economical, and accomplish the desired functions. (ii) Geotechnical Engineering, which deals with soils, rocks, foundations of buildings and bridges, highways, sewers and underground water systems. (iii) Water Resources Engineering that concerns the management of quantity and quality of water in the underground and above ground water resources, such as rivers, lakes and streams. Geographical areas are analysed to forecast the amount of water that will flow into and out of a water source. Fields of hydrology, geology, and environmental science are included in this discipline of Civil Engineering, (iv) Environmental Engineering, which is related to the science of waste management of all types, purification of water, cleaning of contaminated areas, reduction of pollution, and industrial ecology and (v) Transportation Engineering, where technology and scientific principles are applied to the planning, functional design, operation and management of facilities for any mode of transportation in order to provide for the safe, efficient, rapid, comfortable, convenient, economical, and environmentally compatible movement of people and goods.

Job opportunity of Civil Engineering Graduates

Potential civil engineering graduates have a wide range of job opportunities at home and abroad. They are responsible for infrastructural development in both government and private sectors, so all important organizations and institutions have civil engineering section. Followings are few departments/sectors where civil engineering graduates can work.

a) Department of Public Health Engineering (DPHE);

b) Roads and Highways Department (R&HD)

c) Local Govt. Engineering Department (LGED)

d) Public Works Department (PWD)

e) Bangladesh Bridge Authority (BBA)

f) WASA Dhaka and Chittagong, DESA

g) Bangladesh Water Development Board (BWDB) and Power Development Board, REB, etc.

h) Bangladesh Railways

i) All City Corporations and Municipalities

k) Rajdhani Unnayan Kartipokkha (RAJUK), CDA, KDA and other development authorities and so on

Civil Engineers also have wide opportunities in the following international organizations-

Asian Development Bank (ADB), World Bank, JICA, World Health Organization (WHO), UNICEF, Water Aid

Civil Engineers have great opportunities in private sectors like Real Estate, Construction Sector, Cement Industries, Water Modeling Institutions, River Research Institute etc. Civil Engineers also have similar job opportunities abroad.

Academic Program

Bachelor of Science in Civil Engineering

Mission

The mission of Bachelor of Science in Civil Engineering program is to produce competent civil engineers who work with the infrastructural (Building, bridge, fly over, elevated expressway, roads, tunnel, dam, sluice gate, water front structures such as ship yard, hurbour, air port, constructions of lifeline network such as gas line, pipe line, transmission line, etc. .) development, water supply and sanitations, irrigation and drainage systems, environmental pollution, design and planning of traffic system, etc., of a country. Civil Engineering graduates are produced based on the mission of the program.

Objectives of the Program

Key objectives of the Civil Engineering program are as follows:

- to provide a solid foundation of basic science and mathematics

- to provide of basic understandings of drawing (Manual and computer based), estimate, practical surveying, building construction, etc.

- to provide strong base of analysis and design of Civil Engineering Structures

- to provide solid foundation of structural engineering, project management, water resource engineering, geotechnical engineering, environmental engineering and transportation engineering

- to provide basic understanding of general education, sociology, business and economics and their applications in practical life

Admission Requirements

Must meet general admission criteria of EWU for faculty of Sciences and Engineering.

Curriculum of Bachelor of Science (B. Sc.) in Civil Engineering (CE) Program: Courses

Minimum Credit Requirement: 156.5 Credits

Course Category	Credits
Compulsory General Education Courses	9
Optional General Education and Sociology Courses	6
Optional Business and Economics Courses	6
Basic Science Courses:	12
Mathematics and Statistics Courses	12
Core Civil Engineering Courses	87
Inter-Disciplinary Engineering Courses	7.5
Elective Civil Engineering Courses	11
Thesis/Project/Internship	6
Total	**156.5**

List of Courses

Course Title		Credits	Prerequisite
Compulsory General Education Courses: [Three Courses]		**9**	
ENG101	Basic English	3	ENG099 if needed
ENG102	Composition and Communication Skills	3	ENG101
GEN226	Emergence of Bangladesh	3	ENG102
Optional General Education and Sociology Courses: [Two courses] 6			
GEN201	Bangladesh Studies	3	
GEN204	Western Thought	3	
GEN205	Introduction to Psychology	3	ENG102
GEN207	Industrial Psychology	3	ENG102
GEN208	Introduction to Philosophy	3	
GEN210	International Relation	3	ENG102
GEN211	Concepts of Journalism and Media Studies	3	ENG102
GEN223	Contemporary Security Studies in Asia Pacific	3	ENG102, GEN210
GEN225	Demography and Economic Statistics	3	
GEN239	Professional Ethics	3	ENG102
SOC101	Introduction to Sociology	3	
SOC102	Introduction to Anthropology	3	
GEN209	Introduction to Social Psychology	3	ENG102
SOC209	Industrial Sociology	3	

Course Title		Credits	Prerequisite
SOC211	Eastern Culture and Heritage	3	
GEN203	Ecological System and Environment	3	
SOC213	Women in Development	3	ENG101
GEN214	Introduction to Development Studies	3	ENG102
SOC215	Principle of Social and Public Relations	3	ENG102, Soc101
SOC216	Globalization and Social Identity	3	ENG102, GEN210
SOC217	Religion, Ethnicity, Culture and Development in South Asia	3	ENG102, GEN206
Optional Business and Economics Courses [Two Courses]		**6**	
ACT101	Financial Accounting	3	
BUS321	Business for Engineering and Technology	3	ENG102
FIN101	Principles of Finance	3	ACT101, STA102, ECO101
FIN201	Business Finance	3	FIN101
FIN335	Financial Institutions and Markets	3	ECO102, FIN201
MGT101	Principles of Management	3	ENG101
MGT321	Industrial Management	3	ENG102
MGT337	Production Operations Management	3	STA102
MKT101	Principles of Marketing	3	
MKT201	Marketing Management	3	MKT101
ECO101	Principles of Microeconomics	3	
ECO102	Introduction to Macroeconomics	3	ECO101

Course Title		Credits	Prerequisite
ECO200	Agricultural Economics	3	ECO101
ECO260	Environmental and Natural Resource Economics	3	ECO101
ECO357	Mathematical Economics	3	ECO101
Basic Science Courses: [Three Courses]		**12**	
PHY107	Engineering Physics-I (Introductory Classical Physics)	3+1.5	
PHY209	Engineering Physics-II (Introductory Quantum Physics)	3	
CHE107	Engineering Chemistry-I	3+1.5	
Mathematics and Statistics Courses: [Four Courses]		**12**	
MAT101	Differential and Integral Calculus	3	
MAT102	Differential Equations and Special Functions	3	MAT101
MAT104	Coordinate Geometry and Vector Analysis	3	MAT101
STA102	Statistics and Probability	3	
Core Civil Engineering Courses			
Basic Civil Engineering: [Eleven Courses]		**33**	
CE100	Civil Engineering Drawing	0+1.5	
CE101	Analytic Mechanics	3	
CE102	Computer Aided Drafting	0+1.5	

Course Title		Credits	Prerequisite
CE103	Surveying and Introduction to GIS	3+1.5	
CE200	Details of Construction	0+1.5	
CE201	Engineering Materials	3+1.5	
CE203	Engineering Geology and Geomorphology	3	
CE211	Mechanics of Solids-I	3+1.5	CE101
CE213	Mechanics of Solids-II	3	CE211
CE261	Fluid Mechanics	3+1.5	
CE408	Quantity Surveying and Cost Analysis	0+1.5	
Civil Engineering Practice: [Two Courses]		**7.5**	
CE301	Professional Practices and Communication	3+1.5	
CE401	Project Planning and Construction Management	3	
Structural Engineering: [Five Courses]		**16.5**	
CE311	Structural Analysis and Design-I	3	CE213
CE315	Design of Concrete Structures-I	3+1.5	
CE319	Design of Steel Structures	3+1.5	
CE410	Concrete Structures Design Sessional	0+1.5	
CE411	Structural Analysis and Design-II	3	CE311
Environmental Engineering: [Two Courses]		**7.5**	

Course Title		Credits	Prerequisite
CE331	Environmental Engineering-I	3+1.5	
CE333	Environmental Engineering-II	3	
Geotechnical Engineering: [Two Courses]		**7.5**	
CE341	Principles of Soil Mechanics	3+1.5	CE203
CE441	Foundation Engineering	3	
Transportation Engineering: [Two Courses]		**7.5**	
CE451	Transportation Engineering-I:	3	
CE453	Transportation Engineering-II:	3+1.5	
Water Resources Engineering: [Two Courses]		**7.5**	
CE461	Open Channel Flow	3+1.5	
CE463	Hydrology, Irrigation and Flood Control	3	
Inter-Disciplinary Engineering Courses: [Two Courses]		**7.5**	
CSE227	Numerical Methods and Computer Programming	3+1.5	
EEE165	Basic Electrical Technology	3	
Elective Civil Engineering Courses:		**11**	
[Six courses: Two theoretical courses from the Major group + One compulsory sessional course from the major group + Two theoretical courses from the minor group + One compulsory sessional course from the minor group]			

Course Title		Credits	Prerequisite
Structural Engineering			
Theoretical Courses			
CE413	Introduction to Steel-Concrete Composite Structures	2	
CE415	Prestressed Concrete	2	
CE417	Design of Concrete Structures-II	2	
CE419	Introduction to Finite Element Method	2	
CE421	Dynamics of Structures	2	
CE423	Design of Concrete Structures-III	2	
Sessional Course			
CE412	Computer Aided Analysis and Design of Structures Sessional	0+1.5	
Environmental Engineering			
Theoretical Courses			
CE433	Solid and Hazardous Waste Management	2	
CE435	Environmental Pollution Management	2	
CE437	Environmental and Sustainable Management	2	
Sessional Course			
CE432	Design of Water Supply, Sanitation and Sewerage Systems Sessional	0+1.5	
Geotechnical Engineering			
Theoretical Courses			

Course Title		Credits	Prerequisite
CE443	Earth Retaining Structures	2	
CE445	Elementary Soil Dynamics	2	
CE447	Soil-Water Interaction	2	
Sessional Course			
CE442	Geotechnical Engineering Design Sessional	0+1.5	
Transportation Engineering			
Theoretical Courses			
CE455	Transportation Engineering-III: Traffic Engineering Design and Management	2	
CE457	Transportation Engineering-IV: Pavement Management, Drainage and Airport	2	
CE459	Transportation Engineering-V		
Sessional Course			
CE454	Transportation Engineering Sessional-II: Pavement Design and Traffic Studies	0+1.5	
Water Resources Engineering			
Theoretical Courses			
CE465	Flood Mitigation and Management	2	
CE467	Groundwater Engineering	2	
CE469	River Engineering	2	

Course Title		Credits	Prerequisite
CE471	Hydraulic Structures	2	
CE473	Coastal Engineering	2	
Sessional Course			
CE462	Water Resources Engineering Sessional	0+1.5	
Thesis/Project/Internship *[Either CE 498 or CE499 on Major Group]*		**6**	
CE498	Thesis/Project	6	
CE499	Internship	6	

Course Flow Chart

Abbreviations:
OGEN = Optional General Education Course
OBE = Optional Business and Economics Course
ECE = Elective Civil Engineering Course

Faculty Members of the Department of Civil Engineering

Assistant Professor and Chairperson

Md. Naimul Haque
Ph.D. in Bridge Aerodynamics
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Master of Engineering in Structural Engineering
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Assistant Professor

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(Environmental Engineering)
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B.Sc. in Civil Engineering
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Senior Lecturer

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B.Sc. in Civil Engineering
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(Study Leave)

Fuad Yasin Huda
M.Sc. in Transportation Planning and the Environment
(University of Leeds, UK)
B.Sc. in Civil Engineering
(Military Institute of Science and Technology, Bangladesh)

Department of Mathematical and Physical Sciences

The Department of Mathematical and Physical Sciences (MPS) at East West University is a very new department of the university and started its journey on 14 May 2017. The MPS department presently emphasizes the teaching and research in the following four broad fields: Mathematics, Statistics, Physics and Chemistry.

Mathematics is one of the oldest and most fundamental sciences and a demanding major worldwide. But even those who love the challenge of math need to make a living after they graduate. Mathematicians need to have good reasoning ability in order to identify, analyze, and apply basic logical principles to technical problems. This skill can be used in a large number of professional situations so those with a degree in mathematics are in demand for a great variety of occupations.

Statistics uses numerical evidence to draw valid conclusions. The field of statistics is the science of learning from data. Statistical knowledge helps you use the proper methods to collect the data, employ the correct analyses, and effectively present the results. Statistics is a crucial process behind how we make discoveries in science, make decisions based on data, and make predictions. Statistics allows you to understand a subject much more deeply. Statistics plays an important role in a great number of different fields, some of which you might not have expected. Here is a list of fields that use statistics: Business, Mathematics, Economics, Accounting, Banking, Management and Administration, Astronomy, Natural and Social Sciences and many more.

Physics is a science that is fundamental to all sciences and uses mathematics as its language. Because of the role that science plays in our technological society, it is necessary that students be trained in the sciences, with physics playing a core role. Teaching of Physics seeks to provide the necessary physics experiences via formal coursework, laboratory training, and research to give students the requisite skills of well-educated liberal arts major. The program articulates the mission of the university through emphasis on physics and related scientific areas.

Chemistry is everywhere in the world around us. It's in the food we eat, clothes we wear, water we drink, medicines, air, cleaners, etc. Chemistry sometimes is called the" central science "because it connects other sciences to each other, such as biology, physics, geology and environmental science. Chemistry helps us to understand the world around us. Chemistry helps us to understand current events ,including news about petroleum, product recalls, pollution, the environment and technological advances.

The MPS department has, at the moment, 21 faculty members and the list will increase soon. The department also has some competent adjunct faculty members from reputed public universities. Currently, the MPS department offers undergraduate and graduate programs in Applied Statistics. Starting the undergraduate program B.Sc. (Hons) in Mathematics is under process and the department is also planning to initiate some other undergraduate programs like, B.Sc. (Hons) in Physics, and B.Sc. (Hons) in Chemistry. Gradually, the MPS department will start M.S. programs in these basic sciences. The department currently supports the engineering programs and pharmacy program of the university by providing courses in Mathematics, Statistics and Physical Sciences (Physics and Chemistry). Presently, the department is housed on the second floor of the main building of the university.

Currently the MPS department offers the following courses for the different engineering programs of East West University:

Mathematics

MAT 101: Differential and Integral Calculus (3 Credits)

MAT 102: Differential Equations and Special Functions (3 Credits)

MAT 104: Coordinate Geometry and Vector Analysis (3 Credits)

MAT 205: Linear Algebra and Complex Variables (3 Credits)

Physics

PHY 100: Introductory Physics-I (3 Credits)

PHY 107: Physics for Civil Engineering – I (General Physics) (4.5 Credits)

PHY 108: Physics for Biologists – I (4 Credits)

PHY 109: Engineering Physics – I (Introductory Classical Physics) (4 Credits)

PHY 207: Physics for Civil Engineering – II (Electromagnetic Theory and Modern Physics) (3 Credits)

PHY 208: Physics for Biologists – II (4 Credits)

PHY 209: Engineering Physics – II (Introductory Quantum Physics) (3 credits)

Chemistry

CHE 101: Introduction to Chemistry (4 Credits)

CHE 107: Chemistry for Civil Engineering (4.5 Credits)

CHE 109: Engineering Chemistry – I (4 Credits)

Credit Distribution and Courses for BS. In Applied Statistics

A student must complete a minimum 127 credit hours, with a minimum of the indicated numbers of credit hours from sections I-III, in order to obtain the degree. The sections and the indicated required credit hours are given in the following table.

Section	Description	Credit Hours
I	Language and General Education requirements	**21**
II	Mathematics and Economics courses	**15**
III	Applied Statistics courses	**91**
Total		**127**

Section I. General Education Requirements (21 credit hours)

Section I A: Compulsory General Education Courses (Three courses: 9 credit hours)

Course Number/Course title	Credit Hours
ENG 101: Basic English	3
ENG 102:Composition & Communication Skills	3
GEN 226: Emergence of Bangladesh	3
Total9	

Section I B: Optional General Education courses (2 courses, OPT 001 and OPT 002).

For Applied Statistics, students should choose GEN 239 and one more course from the following list; a total of 3+3=6 credit hours.

Course Number/Course title	Credit Hours
GEN 201: Bangladesh Studies	3
GEN 202: Eastern Culture & Heritage	3
GEN 203: Ecological System & Environment	3
GEN 204: Western Thought	3
GEN205: Introduction to Psychology	3
GEN 206: Introduction to Sociology	3
GEN 207:Industrial Psychology	3
GEN 208: Introduction to Philosophy	3
GEN 209:Social Psychology	3
GEN 210: International Relations	3
GEN 211: Concepts of Journalism & Media Studies	3
GEN 239:Professional Ethics (compulsory)	**3**
GEN 2XX:Any other GEN course approve by the university	3
Total	**6**

Section I C: Optional courses from Business &relevant subjects (2 courses, OPT 003 and OPT 004). Applied Statistics students may choose any two courses: 3+3=6 credit hours).

Course Number/Course title	Credit Hours
ACT 101: Financial Accounting	3
BUS 101: Introduction to Business	3
BUS321: Business for Engineering & Technology	3

FIN 101: Principles of Finance	3
MGT 101: Principles of Management	3
MKT 101:Principles of Marketing	3
Total	**6**

Section II: Mathematics and Economics (15 credit hours)

These courses consists of the fundamental principles of mathematics and economics upon which the applied statistics subject is based. Applied statistics students must take the following 15 credit hours.

Course Number/Course title	Credit Hours
MAT101: Differential & Integral Calculus	3
MAT 102: Differential Equations & Special Functions	3
MAT 206: Basic Algebra and Linear Algebra	3
ECO101: Principles of Microeconomics	3
ECO102: Introduction to Macroeconomics	3
Total	**15**

Section III. Applied Statistics core courses (91 credit hours)

Course No.	Course Title	Credit Hours
AST- 101	Introduction to Statistics	3
AST- 102	Elements of Probability	3
AST- 201	Probability Distributions	3
AST- 202	Sampling Distributions	3
AST- 203	Statistical Inference I	3
AST- 204	Agricultural Statistics and Design of Experiments	3

AST- 205	Introduction to Demography	3
AST- 206	Introductory Sampling Methods	3
AST- 207	Applied Statistical Analysis with R (Lab)	3
AST- 301	Design and Analysis of Factorial Experiments	3
AST- 302	Advanced Sampling Techniques	3
AST- 303	Statistical Inference II	3
AST- 304	Applied Regression Analysis	3
AST- 305	Introduction to Epidemiology	3
AST- 306	Population Studies	3
AST- 307	Social Statistics and Social Development	3
AST- 308	Statistical Analysis Using SPSS and SAS (Lab)	3
AST- 309	Applied Nonparametric Statistics	3
AST- 310	Categorical Data Analysis	3
AST- 401	Advanced Probability and Stochastic Process	3
AST- 402	Research Methodology	4
AST- 403	Applied Multivariate Data Analysis	3
AST- 404	Survival Analysis	3
AST- 405	Industrial Statistics and Operation Research	3
AST- 406	Modeling Time Series Data	3
AST- 407	Introduction to Generalized Linear Models	3
AST- 408	Life Contingencies	3

AST- 409	Bayesian Inference and Decision Theory	3
AST- 410	Statistical Analysis using STATA (Lab)	3
AST- 499	Project Report and Seminar	3
	Total	**91**

Faculty Members of the Department of Mathematical and Physical Sciences

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M.Sc. in Physics
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Research Area: Theoretical Plasma Physics,
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MS in Physics
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BS in Physics
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Undergraduate Studies

Admission

Online application forms are available on the EWU website(http://admission.ewubd.edu//). Applicants can fill the admission forms online by paying Tk. 1, 000. A set of sample question and prospectus will be provided after the payment for admission form.

The fee of the admission form for the Foreign Students is $13.00, payable in International Money Order in favor of EWU. Admission form must be filled in properly. Signature of the applicant and his/her parent/guardian will be taken during admission (if qualified). Copies of Marks Certificates/Transcripts, Testimonials of SSC & HSC or "O" & "A" levels must be submitted during admission.

Candidates seeking admission at EWU must qualify in the admission test. The date of the test is announced in major daily newspapers. Students are tested on the English Language (structure, vocabulary, comprehension and composition) and Basic Mathematics. Those who want to study Computer Science and Engineering, Electrical and Electronic Engineering, Information and Communication Engineering/Electronic and Telecommunication Engineering are required to have competence in HSC-level Mathematics. Those who seek admission in BA (English, Law, SOC, ISLM) programs are exempted from the Math Test.

Admission Requirements

Minimum qualifications for admission to undergraduate programs are as follows:

1. Minimum GPA of 3.00 in both SSC and HSC Examinations (Minimum GPA 2.40 in Diploma in Engineering under Bangladesh Technical Education Board). Or, at least one first division, either in SSC or in HSC (no third division is allowed), or total GPA of 5.00 in both SSC and HSC examinations for children of freedom fighters; or
2. Candidates must have passed University of London and Cambridge GCE 'O' Level in at least five subjects and 'A' Level in at least two subjects. Only the best five subjects in 'O' Level and best two subjects in 'A' Level will be considered. Out of these seven subjects, a candidate must have at least 4 Bs or GPA of 4.00 in the four subjects and 3 Cs or GPA of 3.5 in the remaining three subjects. (in the scale of A=5, B=4, C=3, D=2 and E=1); or
3. American High School Diploma; and
4. Acceptable EWU Admission Test score (75% weightage will be counted on the marks obtained in the written test of undergraduate programs and 25% weightage will be counted on the results obtained in SSC and HSC (10% for SSC and 15% for HSC) examinations.
5. Candidates seeking admission in B.Phrm program at EWU must have a minimum aggregate GPA 6.50 in SSC/ "O" level or equivalent and HSC/ "A" level or equivalent examinations (in a total scale of 10); must pass SSC/ "O" level or recognized equivalents and HSC/ "A" level or recognized equivalents in Science Group and obtain a minimum GPA 3.0 (in a scale of 5) without any additional subject; must pass HSC/ "A" level or recognized equivalent examination with a minimum GPA 3.0 in Chemistry and Biology separately and a minimum GPA 2.0 in Mathematics (in a scale of 5); Candidates must pass HSC/ "A" level or recognized equivalent examination in current year or one previous year; Foreign students must have passed 12 education years and got same grades in equivalent examinations from foreign recognized institutions; Students must pass HSC/ "A" level or recognized equivalents with the following science subjects: Physics, Chemistry, Biology and Mathematics; However, Candidates having no Mathematics at the HSC/ "A" level or recognized equivalents may be admitted, but they need to take an extra 3 (three) credits course on Mathematics relevant to B. Pharm. curriculum; Admission should be based on competitive written test evaluations. In addition to written test, an oral test may be taken for further assessment.

   (Recognized equivalents mean Education Board, Madrasah Board and Bangladesh Technical Education Board)

   Results of the Admission Test are announced within 3 days of the test. A list of successful candidates is posted on the Bulletin Board of the university and also on the university website.

Verification of Documents

The university will do the verification of the students previous academic documents and at the same time, the university will keep the respective students informed that the university has started the verification process and it is the responsibility of the concerned students to pursue the matter to his/her respective degree awarding authority/institution, so that the results of the verification reach the Registrar's Office of EWU on time. Charges for verification of documents are as follows:

a) Fee for verification of each document provided by the students: Tk. 50.00. No fee will be charged for the first copy of each document.

b) No fee will be charged for verification of documents from students intending for higher studies in other universities.

Admission Test Waiver

The general requirement of admission test waiver is a minimum total score of 1000 in SAT (considering Critical Reading, Math and Writing). Candidates seeking admission to the Faculty of Sciences and Engineering must have a minimum GPA of 3.5 in Math and Physics separately in HSC/A level examinations in addition to the above-mentioned SAT score to get waiver from the admission test.

Students who have completed a two-year Bachelor's degree from a recognized university can apply for admission into the four-year undergraduate programs. However, EWU will consider applications for credit transfer only in cases where previous academic performance of the students meets EWU degree requirements.

Admission Requirements for Foreign Students

For foreign students, particularly those who come from other systems like the US High School Diploma, Indian/Nepalese system etc. (not from SSC/HSC or O/A Level etc. system), the admission eligibility will be as follows:

a) 12 years of schooling.

b) SAT score of 1000 or

c) Pass with at least upper 50% marks/grade in their own education system.

d) Foreign students fulfilling these admission eligibility criteria need not sit for the Admission Test.

e) An equivalence committee will assess and recommend satisfactory grades for applicants who seek admission to EWU with US High School Diploma or who come from other systems.

A committee will assess and recommend waiver of Admission Test, Scholarship etc. (if applicable) for foreign students and students from other systems.

Merit Scholarships/Financial Aid

EWU has generous merit scholarships/financial aid programs. Top scorers in the undergraduate admission test with a minimum score of 75% marks will get full tuition free Merit Scholarship in the first year for a maximum of one-forth of the total credit requirement of the program for undergraduate students subject to maintaining a minimum CGPA of 3.50 in each semester as a regular student. Five students from the Faculty of Business and Economics, four students from the Faculty of Sciences & Engineering and Two students from the Faculty of Liberal Arts and Social Sciences will get the scholarship.

a) Candidates scoring GPA 5.00 (excluding the 4th subject) in the most recent SSC & HSC examinations will be awarded 100% Tuition Free Merit Scholarship at entry level in Undergraduate Programs for 4 (four) years subject to qualifying in the admission test, maintenance of minimum GPA 3.50 in each semester as a regular student (All Undergraduate students must register at least 9 credits in a semester; this credit requirement is 12 credits in a semester for the students of B.Pharm. program) and abiding by the rules and regulations and University's Code of Conduct for students at all time;

b) Candidates scoring 7 (seven) A's in 'O' Level examination (at one sitting) and 3 (three) A's in 'A' Level Examination (in one year) will be awarded 100% Tuition Free Merit Scholarship at entry level in Undergraduate Programs for 4 (four) years subject to qualifying in the admission test, maintenance of minimum GPA 3.50 in each semester as a regular student (All Undergraduate students must register at least 9 credits in a semester; this credit requirement is 12 credits in a semester for the students of B.Pharm. Program) and abiding by the rules and regulations and University's Code of Conduct for students at all time;

c) Candidates scoring GPA 5.00 (including the 4th subject) in the immediate past SSC & HSC examinations, will be awarded 50% waiver of tuition fee as Merit Scholarship at entry level in Undergraduate Programs for the first 1 (one) year subject to fulfillment of the following requirements:
   1. Qualifying the EWU Admission Test.

2. Maintaining of minimum GPA of 3.50 in each semester as a regular student (All Undergraduate students must register at least 9 credits in a semester; this credit requirement is 12 credits in a semester for the students of B.Pharm. Program).
3. Abiding by the East West University Disciplinary Code for Students at all time;

Admission Form

Online application forms are available on the EWU website(http://admission.ewubd.edu//). Applicants can fill the admission forms online by paying Tk. 1, 000. A set of sample question and prospectus will be provided after the payment for admission form.

The fee of the admission form for the Foreign Students is $13.00, payable in International Money Order in favor of EWU. Admission form must be filled in properly. Signature of the applicant and his/her parent/guardian will be taken during admission (if qualified). Copies of Marks Certificates/Transcripts, Testimonials of SSC & HSC or "O" & "A" levels must be submitted during admission.

Learning Methodology

In order to produce graduates who can adapt their knowledge to changing circumstances, all the courses offered by different departments put great emphasis on applying concepts from classroom lectures and reading to solving problems.

The mode of education that East West University uses has been called "analytical learning" and it stresses understanding and problem-solving rather than memorizing. In this mode, our responsibility is to provide experiences from which students can construct an understanding of the subject area. It is student's responsibility to integrate the experiences into their mind, and to use the knowledge gained in different situations. The medium of instruction for all academic programs offered by East West University is English.

Lectures and Tutorials

Courses are organized to provide opportunities for students to learn the concepts and skills required in the field. Lectures are perhaps the most visible form of teaching. A course outline for each course is provided by faculty members in the first class of the semester with detailed course content along with assessments guideline and text/reference books used for the course. It is important for the student to realize that lecture materials are not intended for memorizing, but for understanding and emphasizing learning through interactive participation.

Tutorial classes are held regularly. These involve discussions between students and faculty members in areas that are challenging. Courses include assignments, which can help students learn concepts and skills. Usually, an assignment will include some general topics as well as parts that are designed to challenge the brighter students.

Courses also include in-course projects, which can create an impact through infusion of skills and concepts to know from real-life problem solving. In most cases, during project work students interact directly in the problem domain and thereby gain experience.

Course Assessment

Different course instructors use different ways to determine how well each student has mastered the materials presented. Semester final examinations along with two midterm examinations (held according to the semester academic calendar) are common besides class quizzes and assignments. The course information given by the faculty member in the first class of the semester illustrates the assessment strategy for respective course. All in-course assessment results are posted on the notice board.

Academic Advisory System

It provides an environment of continuous academic advisory support to students who require it, especially with respect to adapting into the EWU academic programme and selecting a programme of study. Each student is assigned an Advisor at the beginning of the academic year who assists the student in defining educational goals to be reached; gives information regarding curricula, and graduate programs; and discusses personal problems the student may have, especially those related to the student's academic progress and plans for subsequent pursuits. Students are expected to schedule appointments with their advisors during pre-registration and at other times throughout the semester as needed.

(1) It is the responsibility of the Advisor to provide advisory supports that ensure that the student will adapt well into his/her course of study and get the necessary advice with respect to programme of studies and other matters associated to it. Students must inform their advisors of any special needs or deficiencies, which might affect their academic performance, or selection of courses. Students are expected to know academic policies, procedures, and degree requirements, and must remain informed about their progress in meeting these requirements.

Students are encouraged to seek assistance as needed from advisors and take advantage of student support services provided by the university.

Attendance Requirement

For students to complete their studies successfully, it will be necessary to attend reasonable portion (not less than 80%) of the lectures, tutorials and practical classes for the respective course and to carry out the necessary reading, preparation and assignments set.

Non-Degree Students

Applicants who are currently enrolled in an undergraduate program in a recognized university may apply for admission at EWU as non-degree students. Non-degree students may obtain transcripts reflecting credits and grades for the course(s) attended. An admission fee of Tk. 5, 000 is applicable for Non-Degree students.

Change of Degree Programs

A student who wishes to change his/her major discipline of study must appear in the Admission Test and qualify for the department to which s/he wants to study. For appearing in the subsequent admission test, the applicant must inform the Registrar. Re-admission fee of TK. 15,000 is applicable in such cases.

The Current Fee Structure is as Follows:

1. Admission Fee: (one-time & non refundable) Tk.15, 000/-
2. Course Tuition Fees:

Name of Faculties	Name of Programs	Tuitions Fees per Credit with effect from Spring Semester 2020
Business and Economics	BBA	5, 500/-
	BSS in Economics	4, 000/-
Liberal Arts and Social Sciences	BA in English	4, 000/-
	BSS in Sociology	4, 000/-
	LL.B (Hon's)	4, 500/-
	BSS in ISLM	4, 000/-
Science and Engineering	B. Sc. in ETE	5, 500/-
	B. Sc. in ICE	5, 500/-
	B. Sc. in CSE	5, 500/-
	B. Sc. in EEE	5, 500/-
	B. Sc. in CE	5, 500/-

	B. Sc. in GEB	5, 500/-
	B. Pharm.	6, 000/-
	B. Sc.(Honors) in Mathematics	2, 500/-

3. Lab Fee: Tk. 2, 500/-(non refundable) per semester for CSE, ICE, ETE, EEE & GEB programs, and Tk. 1, 000/-(non refundable) per semester for BBA, ECO, ENG, SOC, LLB & ISLM programs.

   Lab fee for B. Sc. in Civil Engineering: Tk. 2, 650/-(non refundable) per semester

   Lab fee for Bachelor of Pharmacy: Tk. 3, 750/- (non refundable) per semester
4. Student's registration fee for Pharmacy Council: Tk. 300.00 (non refundable).
5. Student Activity Fee: student activities fee is Tk. 765/- (non refundable) per semester for B.Pharm and for all other departments Tk. 510/-(non refundable) per semester.
6. Document Verification Fee

Students will pay the document verification fee (if applicable) for the verification of their previous academic documents.

East West University reserves the right to revise its tuition and other fees. It may increase the tuition and fees at the discretion of the university.

Total Estimated Fees for Graduation will be as follows:

Program	BBA-123	ECO-123	ENG-123	SOC-123	LL.B-135	ISLM-123	CSE-140	ICE-140	ETE-140	EEE-140	B.Pharm-158	GEB-133	CE-156.5	Math-127
Charges for General Education Courses	168000	201000	168000	135000	102000	118500	90000	106500	106500	106500	90000	106500	106500	106500
Charges for Core, Concentration, Elective, Foundation etc. Courses	495000	336000	360000	384000	513000	396000	671000	654500	654500	654500	840000	616000	745250	265000
Admission Fee	15000	15000	15000	15000	15000	15000	15000	15000	15000	15000	15000	15000	15000	15000
Lab & Activities Fee	18120	18120	18120	18120	18120	18120	36120	36120	36120	36120	36120	36120	37920	36120
Total	696120	570120	561120	552120	648120	547620	812120	812120	812120	812120	981120	773620	904670	422620

The university also offers remedial (non-credit) courses in English, for which a fee of Tk 3, 163 for each is charged for one semester only. Remedial courses may be required for students on the basis of their score in the English part of the Admission Test. Passing these remedial courses is a prerequisite for continuing as a student. Remedial Biology is offered in Pharmacy Department with the same fee structure. If a student fails in the Remedial English course in the first attempt, he/she will have to pay regular course fees of Tk.12,000 for this course during subsequent registration.

Students must pay semester fees in full. Tuition and Fees must be paid within the time schedule mentioned in the Academic Calendar. A late registration fee of Tk. 500 to Tk.1, 000 is charged to students who register or pay their fees after the regular registration period. If tuition and fees are not paid within the scheduled time, the name of the concerned student will not appear in the Class List and ID of the respective students will be blocked.

In case of dropping a semester for students whose ID are blocked, Grade Report of those students will be printed by the Registrar's Office for processing the application of Semester Drop.

All dues are expected to be paid within the deadline.

Other Charges:

1. Provisional Certificate Fee: Tk. 500.00
2. Official Transcript Fee: Tk. 500.00 (For urgent: Tk. 700.00)
3. Migration Certificate Fee: Tk. 200.00
4. Studentship Certificate Fee: Tk. 200.00
5. Certificate on Medium of Instruction Fee:

   Tk. 200.00
6. Duplicate Copy of Degree Certificate Fee:

   Tk. 1, 000.00 (In case of Loss/Damage)
7. Fee for the Correction of Name: Tk. 300.00
8. Credit Transfer/waiver Fee: Tk. 500.00 per credit

STATUTE

THE EAST WEST UNIVERSITY DISCIPLINARY CODE FOR STUDENTS, 2011

STATUTE

THE EAST WEST UNIVERSITY DISCIPLINARY

CODE FOR STUDENTS, 2011

PREAMBLE

Whereas, the East West University is a public institution having special responsibility for providing higher education for advancing knowledge and for providing other related services to the community;

And, whereas, as a center of learning, the East West University also has obligation to maintain conditions conducive to freedom of inquiry and expression to the maximum degree with the orderly conduct of its functions;

And whereas, admission to the East West University carries with it the presumption that students will conduct themselves as responsible members of the Academic Community and as a condition of enrollment all students assume responsibility to observe standards of conduct that will contribute to the pursuit of academic goals and to the welfare of the academic community;

And whereas it is expedient to frame code of conduct for maintaining and upholding the standards of conduct of students of the East West University;

And, now therefore, under the strength of section 37 of the Private University Act, 2010 the East West University makes the following Statute:

1. TITLE

This statute shall be called "The East West University Disciplinary Code for Students, 2011".

2. DEFINITIONS

2.1 **'University'** means East West University.

2.2 **'Code'** means the East West University Disciplinary Code for Students, 2010.

2.3 **'Vice Chancellor'** means the Vice chancellor of East West University including Acting Vice Chancellor.

2.4 **'Registrar'** means the Registrar of East West University.

2.5 **'Proctor'** means the Proctor of East West University.

2.6 **'Prosecutor**' means an employee of the university appointed by the Proctor to conduct the case for and present the evidence on behalf of the university at the Student Disciplinary Committee.

2.7 **'Board of Trustees'** means the Board of Trustees of East West University.

2.8 **'Syndicate'** means the Syndicate of East West University.

2.9 **'Teacher'** includes any person of any grade or status providing teaching or is employed to teach by the university or under the authority of the university whether remunerated or not, and/or any other person who is recognised as teacher by the university.

2.10 **'Officer'** means any officer of the university.

2.11 **'Employee**' means a permanent or temporary employee of the university.

2.12 **'Student'** means any person, who at the time of the alleged misconduct is or was.

(i) registered for a qualification listed in the university's calendars, or

(ii) taught or evaluated on any university premises by an employee or someone contracted by the university for that purpose, or,

(iii) any other person who is deemed to be student of the University for the purpose of this Code as per notification of the university.

2.13 'Disciplinary Committee (DC)' means a committee of East West University constituted under Section-28 of the Private University Act, 2010, to adjudicate charges of misconduct relating to students.

2.14 'Disciplinary Appellate Authority' means the Syndicate to consider appeals from decisions of the Disciplinary Committee.

2.15 'University premises' includes any premises or building which is the property of the university or is controlled and/or occupied on rented basis or otherwise for hour(s) or day(s) by the university for university activities including regional offices, centers and examination venues.

2.16 **'Unfair or Illegal means'** includes

i) Communicating or attempting to communicate verbally or otherwise any information relating to an examination by a student to any other examinee or examinees in the examination hall.

ii) Possession of any written unauthorized chit/paper/ book(s)/materials/means and/or any unauthorised aid(s) related to the subject of examination, at anytime during the examination.

iii) Copying or attempting to copy from other examinee(s) or resorting to any other unfair means.

iv) Arrogant behaviour or use of insolent or indecent language to any person in the exam hall.

v) Unauthorized possession of or attempt to possess examination script or question(s) anytime before the specified time of a particular examination.

vi) Influencing or attempting to influence any person(s) involved with the examination to allow/give undue advantages or benefits to self or any other person(s).

vii) Taking the examination through a proxy or becoming a proxy for any examinee.

viii) Collecting or attempting to collect from outside, any exam related materials.

ix) Any use of cell-phone or any other unauthorized electronic device(s) or code/sign/symbol etc. related to the examination, anytime during the examination.

x) Intentionally or negligently assisting another student during the examination.

xi) The removal or attempted removal from an examination room of any examination book or writing paper supplied by the university for the purposes of answering an examination.

xii) The use of a false name, identity number or student number in an examination.

xiii) Commissioning of any other fraudulent or dishonest practice whereby a student, whilst being examined by the university, seeks to mislead or deceive the examiner or the examination officer.

xiv) Submission for examination as own work any matter that has been copied, reproduced or exacted in whole or in part from the work of another student or any other person, or which is substantially the same in whole or in part as the work of another student or any other person, or otherwise committing an act of plagiarism.

xv) Aiding, abetting or assisting any other student in 'adopting unfair means' in any examination.

2.17 **'Examination'** includes all assessments, whether written, oral or practical, unseen or assignment or research based, of a student's performance organized and/or conducted in the name of the university.

2.18 **'Duration of Examination'** means the time when the answer book or the question paper or the assignment whichever is earlier has been made available to the student till it is declared the end.

2.19 **'Sexual Harassment'** means sexual harassment as defined in para-4 of the High Court's Directives given against Writ Petition No.5916 of 2008 (Please see Annexure-A for the said Directives). These Directives, hereinafter, will be referred to as the High Court's Directives.

3. GENERAL PRINCIPLES AND RULES

3.1 The Student Disciplinary Code is aimed at

3.1.1 upholding the name and reputation of the university

3.1.2 maintaining order, discipline, safety and security at the university

3.1.3 ensuring the integrity of the academic processes of the university

3.1.4 assuring the quality of the assessment processes at the university

3.2 The general supervision and control of students' discipline at the university vests with the Proctor and are administered in terms of this Disciplinary Code of the university.

3.3 Applicability

This code will be applicable to conducts and discipline of the students of East West University provided that if a student is accused of 'sexual harassment', without prejudice to amenability of the said student to the High Court's Directive/enactment the said student shall, for the purpose of inflicting punishment under this code, be deemed to be guilty of misconduct under this code on being determined to have committed 'sexual harassment' under the High Court's Directives or any policy/guidelines/order for the time being in force or any law in this regard that may be in place.

4. MISCONDUCT

4.1 Misconduct: Any conduct of a student that contravenes the Disciplinary Code and/or negatively impacts on the goals of the code may be regarded as misconduct and subject to disciplinary measures.

4.2 A student is guilty of misconduct if she/he:

4.2.1 with specific regard to assessments, takes recourse to adopting illegal means as defined in para 2.16.

4.2.2 intentionally or negligently contravenes or subverts, or attempts to contravene or subvert, or assists, encourages or persuades any other person to contravene or subvert this code, any regulation or rule or instruction of the university;

4.2.3 refuses or fails to comply with a lawful instruction or request of an employee of the university authorized to give such instruction or make such request, or acts contrary to such instruction or request;

4.2.4 conducts in a manner that intentionally and substantially obstructs or disrupts teaching or freedom of movement or other lawful activities on university premises or in connection with any university- sponsored event or activity and is not constitutionally and/or legally protected.

4.2.5 commits any crime whilst on university premises (for the purpose of this clause no adjudication order of the court of law in respect of the alleged crime in question is required);

4.2.6 intentionally or negligently misuses, damages, defaces, destroys or alienates, or without authorization uses any space, building, furniture or equipment, computer, vehicle, notes, documents or any other thing owned or controlled by the university or by any employee of the university, or by any registered student of the university;

4.2.7 intentionally or negligently mismanages and/or misappropriates university funds;

4.2.8 brings intoxicating liquor or substance into the premises of the university and/or consumes or abuses intoxicating liquor or substance and/or is under the influence of such liquor while on university premises;

4.2.9 brings an illegal dependence-producing drug and/or controlled substances under the Narcotics Control Act, 1990 (Act No. XX of 1990) onto the premises of the university, or is found to be in exclusive possession of such illegal substance or is under the influence of such substance whilst on the premises of the university;

4.2.10 smokes anywhere within the university premises.

4.2.11 brings into or stores on university premises a firearm, other dangerous weapon of any kind, and/or any kind of harmful chemicals and/or explosives.

4.2.12 brings onto or stores on University premises any kind of fuel that cannot reasonably be shown to be required for the operation of a motor vehicle or any device allowed to bring by the university.

4.2.13 sexually (as defined in para-4 of the High Court's Directives shown in Annexure -A to this code) or otherwise harasses any person whilst on university premises.

4.2.14 commits any sexual and/or indecent activities, whether voluntarily or involuntarily, or whether forcible or nonforcible, or whether with consent or without consent of the counterpart, within the university premises.

4.2.15 commits any other act on University premises, which is indecent and/or racist and/or endangers or is likely to endanger health, welfare or safety of other person and/or prejudices or is likely to prejudice honour, dignity, rights, privileges or property of other members of the academic community, staff/employee of the university and visitors to the campus.

4.2.16 initiates or associates or assembles or engages in any student organization or living group, or, any pastime or amusement engaged in with respect to an organization or living group, that causes or is likely to cause bodily danger or physical harm, or serious mental or emotional harm, or humiliation by ritual act, or sleep deprivation, or forcible participation in any philosophical or religious or cultural or political activities, to any student or any other person attending the university, and/or that causes or is likely to cause voluntary participation in any political activities resulting in division in the unity, amity or tranquility of the academic community.

4.2.17 unlawfully expresses, publishes or disseminates in speech, writing, print or other medium on university premises any views, beliefs or ideology that would infringe upon the dignity or other human rights of any student or groups of students, or any employee of the university, or person invited by the university as a guest of the university.

4.2.18 commits any act(s) bullying other student(s).

4.2.19 without the written permission of the Vice Chancellor uses the name of the university, or uses or displays the logo of the university

4.2.20 convenes an assembly on university premises without obtaining the prior consent of the Vice Chancellor (or the person duly authorized by her/him) or the management of the regional center, or attends a gathering prohibited by the Principal and Vice Chancellor or the management of the regional center

4.2.21 knowingly makes a false statement about the university in any media or anywhere or otherwise intentionally provides materially false information to anyone in or outside the university about the university or any matter thereof

4.2.22 intentionally or negligently tenders or presents to any teacher/employee of the university any document, record or evidence which she/he knows or ought reasonably to know to be false or forged and which causes or has the potential to cause prejudice to the administrative, financial or academic interests of the university

4.2.23 accepts or offers a bribe from/to students, employees or any other official of the university

4.2.24 reproduces or transmits in any form or manner, whether electronically or mechanically (including photocopying and faxing), any study guide, book, thesis, dissertation, article, examination paper, lecture, printed tutorial matter or any other study aids in respect of which copyright exists, unless the copyright owner's permission for the reproduction or transmission is obtained

4.2.25 contravenes the provisions of the Copyright Infringement and Plagiarism Policy of the university

4.2.26 neglects or refuses to return library material borrowed from the university library

4.2.27 behaves in any way that leads or may lead to the consequences, which were or should reasonably have been foreseen at the time when such behavior occurred, impairing and/or prejudicing and/or impeding the good name and reputation of the university or the maintenance of order, discipline and security at the university or the process of tuition, research and administration and general university activities.

4.2.28 creates or causes to create any forged/false certificate or any other forged/false documents/papers and or possesses, use, deals with or submit the same with the university or resorts to any fraudulent means.

4.2.29 is convicted by any competent court of law for committing any criminal offence off-campus against the law of the People's Republic of Bangladesh, which in judgment of the university significantly affects the interest of the university.

4.2.30 commits or causes to commit physical or sexual harm/abuse or harassment or sexual/indecent assault to any student, staff or employee of the university outside university premises.

4.2.31 commits or causes to commit physical or sexual harm/abuse or harassment or sexual/indecent assault to any 3rd party while the said student is on tour or act as a representative of the university, whether in abroad or inside the country.

4.2.32 violates any instructions of any teacher, officer or employee under whose command the said student is sent on duty, assignment or tour for academic purpose or otherwise, in abroad or inside the country.

4.2.33 commits or causes to commit any private or public nuisance, disturbance or sound pollution, or raving, or raging within university premises including hostel(s) of the university.

5. COMPOSITION AND TERMS OF REFERENCE OF THE DISCIPLINARY COMMITTEE (DC)

5.1 **Composition:** As per section 28(1) of the Private University Act, 2010 there shall be a Disciplinary Committee comprising as follows:

a. **Chairperson:** One member of the Board of Trustees nominated by the Board

b. **Members:**

1. Vice Chancellor
2. All Deans
3. One Chairperson nominated by the Syndicate
4. Registrar
5. Proctor-Member-Secretary

5.2 Terms of Reference:

5.2.1 **Jurisdiction:** The Disciplinary Committee is authorized to deal with and adjudicate any offence(s) of misconduct under this code; but implementation of its disposal/recommendation is subject to the approval of the Syndicate.

5.2.2 **Assembly:** The Disciplinary Committee may assemble any time as and when required and be convened under para-9, but in exceptional circumstances to be recorded in writing, the Vice Chancellor may convene its meeting by a 6 hours notice.

5.2.3 **Quorum:** Presence of 5 (five) members of the Disciplinary Committee shall constitute the Quorum of a meeting of the Disciplinary Committee.

5.2.4 **Hearing:** The Disciplinary Committee will hear the case as per the General Procedure laid down in para- 12 of this code.

5.2.5 **Arriving at Decision/Disposal:** The Disciplinary Committee shall follow the steps laid down in para-11.5 of this code.

5.2.6 **Award of Punishment:** Where applicable the Disciplinary Committee is authorized to award any or combination of the punishments within the Scale of punishments mentioned in para-13 of this code.

5.3 Absence of Disciplinary Committee Members

5.3.1 If at any stage during the sitting of the Disciplinary Committee a member of the Committee is no longer able to participate in the proceedings or is absent for any reason, the hearing will continue, provided that the Committee has the quorum.

5.3.2 In all other cases, the hearing should be terminated and will commence de novo.

5.4 Chairperson to Determine Procedures

Subject to the provisions of this code, the procedure adopted at the Disciplinary Committee is determined by the Chairman of the Disciplinary Committee.

6. LODGING COMPLAINT

6.1 Any person may lodge a complaint against a student for committing misconduct/misconducts, with the Proctor within three months from the last date of commission of the said misconduct/misconducts or from the date of knowledge thereof, whichever is later.

6.2 In proper cases, the registrar may direct his subordinate to lodge a complaint with the Registrar in respect of a misconduct as to which the Registrar has information and in such case the Registrar may send the complaint to the Proctor for investigation and report.

6.3 The said person lodging complaint must state the facts as to misconduct(s) of the accused student with clarity enclosing therewith all documents available at the relevant time. Any document reasonably available at the relevant time shall not be accepted in the proceeding subsequent to lodging the said complaint.

6.4 After receiving a complaint the Proctor shall forthwith verbally report the matter to the Vice Chancellor and shall conduct an immediate investigation of the complaint except the offence(s) of sexual harassment, in the manner specified in para 7.1 and 7.2.

6.5 In case of Sexual Harassment the Proctor shall refer the complaint without investigation, to the Complaint Committee on Sexual Harassment for action under para-8 and 10 of the High Court's Directives (Copy enclosed as Annexure-A).

6.6 The Prosecutor

The Registrar in consultation with the Vice Chancellor shall appoint any assistant proctor or an officer as a prosecutor to present the case for the university before Disciplinary Committee.

7. PROCEDURE IN THE CASE OF A COMPLAINT OF MISCONDUCT NOT RELATED WITH SEXUAL HARASSMENT

7.1 Notification of the complaint

7.1.1 In case of any offence(s) other than that of sexual harassment the Proctor shall, by registered post, formally serve a written notice containing an accusation/complaint or allegation in the form of charge(s), to the accused student or a person authorized by her/him to receive such complaint asking for a written reply of the accused student within 10 days of the issue of the notice.

7.2 Investigation

7.2.1 The Proctor thereafter, shall conduct an investigation into the accusation, complaint or allegation.

7.2.2 For investigation purpose the Proctor will take the written evidence of all probable eye witnesses, take into consideration the documentary and circumstantial evidence as and when applicable and may also examine the witness(s) or relevant person(s) to elicit the truth.

7.2.3 After completion of the investigation the proctor must submit the investigation report to the Vice Chancellor within 21 days of the receipt of the complaint by the Proctor.

7.2.4 The report must contain the written statements of all the witnesses duly signed by each, the documentary and circumstantial evidence/proof followed by 'Findings' and Recommendations based thereon.

7.2.5 If the report finds anybody guilty the Proctor must submit with the report, a Charge Sheet against him/them briefly giving the particulars of offence(s) or act(s) of misconduct committed (alongwith the place, date and time of commission).

8. PROCEDURE IN CASE OF COMPLAINT RELATED WITH SEXUAL HARASSMENT

The 'Complaint Committee' will deal with and investigate any complaint related with Sexual Harassment in the manner described in para-8 and 10 of the High Court's Directives (enclosed as Annexure-A) and submit its report with specific recommendation(s) to the Vice Chancellor within the time stipulated in the directives.

9. SUBMISSION OF INVESTIGATION REPORT TO THE VICE CHANCELLOR AND ACTION BY THE VICE CHANCELLOR

After receiving the investigation report from the Proctor or the Complaint Committee on Sexual Harassment, as the case may be, the Vice Chancellor will endorse his remarks on it and send the same within 3 days of the receipt, to the Proctor for subsequent necessary action accordingly.

10. CONVENING OF THE MEETING OF THE DISCIPLINARY COMMITTEE

If the Vice Chancellor's endorsement is in favour of proceeding the case against the student(s), the Proctor (as Member Secretary), in consultation with Chair, Disciplinary Committee, shall convene meeting of the Disciplinary Committee for disposal of the case giving at least 7 days Notice generally.

11. NOTICE TO THE ACCUSED STUDENT(S)

11.1 When proceedings against a student/students are instituted in terms of 9 above, the Proctor on behalf of Disciplinary Committee will give the student concerned not less than 7 days notice in writing of the date, time and place of the hearing by the Disciplinary Committee along with full description of the charges and the provision of the code regarding misconduct for breach of which the proceeding has been initiated.

11.2 The Notice under this rule will inform the student:

11.2.1 that proceedings under the Disciplinary Code are to be instituted against her/him and that a copy of the code is available for inspection in the office of the Registrar,

11.2.2 of the rule that the student is alleged to have breached and/or the act(s) of misconduct that the student is alleged to have committed. The notice must set out the charge with sufficient particularity to enable the student to prepare for her/his defense,

11.2.3 of her/his right to answer the charge in writing before the hearing,

11.2.4 of her/his right to attend the hearing to present her/his case, or to be represented at the hearing by another student member or an employee of the university, and

11.2.5 of her/his right if she/he is a minor or insane, to be assisted by her/his parent or guardian or, at the discretion of the Disciplinary Committee, to be assisted by any other person appointed by such parent or guardian, provided that nothing contained in this rule renders the conduct of the Disciplinary Committee void if the student is not so assisted on the date set for the hearing.

11.3 Service of Notice

11.3.1 Service of any written notice and the furnishing of particulars in terms of this code will be by registered post to the residential address given either on the application form completed by the student for the purpose of admission or registration or on any later written notice submitted by the student to the university of a change of address.

11.4 Suspension

11.4.1 Generally, no student will be suspended from the university before a hearing is held. However, in appropriate cases, the Registrar in consultation with the Vice Chancellor, may, by service of notice to the student(s), prohibit such student from:

(i) entering into the premises of the university, or any part thereof, and/or

(ii) exercising a right or privilege resulting from her/his enrolment as a student.

11.4.2 A temporary suspension in terms of paragraph 6.6.1 remains in force until the disciplinary proceedings in terms of this code have been completed.

11.4.3 The suspended student may make written representations to the Vice Chancellor within five days of receipt of written notice of her/his suspension, advancing reasons why she/he should not be suspended.

11.4.3.1 The Vice Chancellor may at her/his discretion revoke a suspension at any time, provided that, notwithstanding such revocation, further steps may be taken to proceed with the disciplinary hearing on the charge of misconduct against the student.

11.4.3.2 The Vice Chancellor may, at her/his discretion, also confirm the suspension.

11.5 Decisions of the Disciplinary Committee

11.5.1 At the conclusion of the evidence, the committee decides, in light of all the evidence available, whether or not the student is guilty of the misconduct, as charged.

11.5.2 A finding of guilty will only be returned if:

11.5.2.1 The misconduct charged has, in the opinion of the committee, been proved on a balance of probabilities; or

11.5.2.2 The student has freely and voluntarily admitted guilt and the committee is satisfied that there is evidence from the accused or from another source to substantiate the admission. Should the committee not be satisfied with the evidence presented, it may of its own accord call for further evidence to be led in respect of the charge.

11.5.3 If the committee does not find the student guilty as provided for under para-11.5.1, the student is acquitted of the charge.

11.5.4 The decision of the Disciplinary Committee is determined by a majority vote of the members present.

11.5.5 In the event of an equality of votes, the Chairman of the Disciplinary Committee has a casting vote in addition to her/his ordinary vote.

11.6 Student's Absence from Hearing before the Disciplinary Committee

If a student charged with misconduct does not attend her/his disciplinary hearing before the Disciplinary Committee, such hearing proceeds in her/his absence and the proceedings of the Disciplinary Committee are not invalid as a result thereof.

11.7 Obstruction of Proceedings

If a student charged with misconduct interferes with or obstructs any proceedings of the Disciplinary Committee or refuses to carry out an instruction of the Chairperson of such committee, such student may be ordered by the Chairperson to withdraw from the proceedings, which may then continue in her/his absence.

11.8 Record of Proceedings

The Registrar appoints a person as a prosecutor to record, by means of tape recording or in writing, the proceedings of the Disciplinary Committee and all the evidence tendered. Such a person is not a member of the Disciplinary Committee.

11.9 Safekeeping of the Record of Proceedings

11.9.1 All documents and tape recordings, pertaining to a disciplinary matter, will be kept in safe custody by the Registrar. A student is, however, entitled to receive copies of such documents and tape recordings at her/his own expense.

11.9.2 Such documents and tape recordings will be held by the university for a period of three years after a matter has been finalized.

12. GENERAL PROCEDURES AT THE HEARING OF A CHARGE OF MISCONDUCT

12.1 In the interest of transparency, all hearings are open meetings unless the Chairperson of the Disciplinary Committee is persuaded by the circumstances of the case to direct that the hearing be closed to the university community/public.

12.2 The prosecutor leads evidence against the accused student and generally conducts the case for the university.

12.3 The Disciplinary Committee allows the student(s) or such person representing the student(s) a reasonable opportunity to present a defence and to answer the charges.

12.4 Both the prosecutor and the accused student(s) are allowed to adduce all relevant evidence and call witnesses and to examine and cross-examine witnesses, as appropriate.

12.5 The Disciplinary Committee may also ask the witnesses questions for clarity or eliciting the truth.

12.6 The Disciplinary Committee may further, of its own accord, call for evidence that it may deem relevant to a determination of the issue(s) before it.

12.7 The hearing of the Disciplinary Committee is conducted in an informal manner, according to the principles of natural justice and with due regard for the rights of the accused student. No accused student will be prejudiced by reason of a failure to comply with the rules of procedure or rules of evidence as applied in the ordinary courts.

12.8 If the student is a minor or insane, no disciplinary action(s) will be taken against that student before her/his parent or guardian has also been informed in writing of her/his alleged misconduct and has been given a proper opportunity to make a written statement and, if she/he so wishes, to appear before the Disciplinary Committee in person.

13. PUNISHMENT

13.1 If a student is found to be guilty of misconduct/misconducts, the Disciplinary Committee may, given consideration to the gravity of the misconduct/misconducts, award any or combination of punishments set out below:

(i) A written reprimand and/or warning;

(ii) Expulsion from the examination hall;

(iii) Expulsion from the examination of that course/paper/ subject concerned;

(iv) Expulsion from the examination hall and debarring from sitting in the examinations of the remaining papers/ courses/subjects;

(v) Cancellation of the examination of that paper/course/ subject;

(vi) Cancellation of examination(s) of all papers/courses/ subjects;

(vii) Expulsion from the university for a term from one semester to forever depending on the gravity of the offence committed;

(viii) Seizure of cell-phone or electronic devices concerned or unauthorized material;

(ix) Revocation of a degree, diploma or other qualification of a student(s) obtained from the university in an improper manner;

(x) Cancellation of admission or denial of a right or privilege resulting from enrolment as a student at the university;

(xi) A fine to the extent twice the tuition fee for three semesters of study of the qualification for which the student is registered;

(xii) Payment of compensation or requiring the accused student to repair the damage caused by her/his misconduct;

(xiii) Denial of the right or privilege to register for a particular study module or course or program offered by the university.

14. IMPLEMENTATION OF DECISION(S) OF THE DISCIPLINARY COMMITTEE

14.1 If the Disciplinary Committee finds an accused student:

14.1.1 guilty, the student is notified by the Registrar in writing of the finding and the punishment(s) imposed by the Disciplinary Committee. In the notice, the student is further informed of her/his right to appeal against the finding(s) and/or the punishment(s) imposed;

14.1.2 not guilty, the student is notified in writing of the finding of the Disciplinary Committee.

14.1.3 if the student is a minor or insane, no disciplinary measure(s) will be taken against that student before her/his parent or guardian has also been informed in writing of her/his alleged misconduct and has been given a proper opportunity to make a written statement and, if she/he so wishes, to appear before the Disciplinary Committee in person.

15. DISCIPLINARY APPEAL

15.1 If the accused student found guilty is aggrieved by the order of the Disciplinary Committee he may file appeal before the Syndicate against the finding of guilt or punishment or both.

15.2 If the victim of the accused student is aggrieved by the order of the Disciplinary Committee he may file appeal before the Syndicate against the order passed by Disciplinary Committee, for enhancement of punishment. The victim shall not have right to appeal against the order of acquittal of the accused student. The victim neither shall have right to appeal for securing expulsion of student from the university forever.

16. POWERS OF THE DISCIPLINARY APPELLATE AUTHORITY (SYNDICATE)

16.1 The Syndicate is responsible for the hearing of appeals in respect of the decisions of the Disciplinary Committee whether based on factual findings, matters relating to procedure and/or the sanctions imposed.

16.2 The Syndicate has the powers to approve, review, reverse, nullify or replace decisions of the Disciplinary Committee in all respects, and can also order that hearings be held de novo except expulsion of a student forever and reversing the order of acquittal.

16.3 Presence of 7 members of the Syndicate will form the Quorum of the Appellate authority.

17. RESTRICTIONS ON APPELLATE AUTHORITY

A member of the Disciplinary Committee shall not be eligible to sit on appeal before Syndicate against the order of the Disciplinary Committee in which the said member of the Disciplinary Committee was party either in favour of university or accused student(s).

18. PROCEDURE OF APPEAL

18.1 Initiation of Appeal

A person intending to file an appeal must submit a memorandum of appeal along with order of the Disciplinary Committee setting out the grounds upon which she/he challenges the order of the Disciplinary Committee. The said person shall submit the said memorandum of appeal with Registrar within seven days from the date of receipt of the order. On receipt of the memorandum of appeal the Registrar shall place it in the next meeting of the Syndicate.

18.2 Functioning

The relevant provisions of paragraph Nos. 5 to 7 shall apply mutatis mutandis to the Appellate Authority.

18.3 General Procedures

The provisions of paragraph No.12 shall apply mutatis mutandis to the Appellate Authority.

19. INVIGILATOR'S POWER TO TAKE ACTION FORTHWITH IN EXAMINATION HALL

If an invigilator finds or believes or has reasonable grounds to believe that a student has obtained unfair means or is likely to obtain unfair means in the examination hall, the Invigilator may, during the examination, expel the said student from the examination hall forthwith or may allow the said student to continue the examination on reporting the fact of unfair means adopted by the said student, to the Registrar at once. On being so reported, the Registrar in consultation with Vice Chancellor, shall expel/bar the said student promptly in writing and or initiate legal proceeding under this code. If the said student is expelled forthwith under this paragraph, a fresh examination on the said subject immediately be arranged for the said student on his acquittal, if any, by Disciplinary Committee. If the said student is allowed to continue the examination on spot, the result of the student shall be subject to the order of Disciplinary Committee or Syndicate, as the case may be.

20. EDUCATING THE STUDENTS ON THIS CODE

The university shall arrange an educational session for newcomers and fresh students to enlighten them on this code. On completion of such session, a declaration shall be obtained from the said student to the effect that she/he participated in the said session and understood the importance of the code in letter and spirit.

21. REPEAL AND SAVINGS

The East West University Disciplinary Code for Students, 2010 is hereby repealed. However, the proceeding initiated under the East West University Disciplinary Code for Students, 2010 shall continue, wherein this code shall apply so far it is applicable. Any order, instruction (specifically Annexure A of the East West University Disciplinary Code for Students, 2010), punishment or sanction passed under the East West University Disciplinary Code for Students, 2010 shall have force notwithstanding repeal of the East West University Disciplinary Code for Students, 2010.

22. COMMENCEMENT OF THIS CODE

This code comes into effect immediately after, under the strength of section 37 of the Private University Act, 2010 it is approved by the Chancellor of East West University.

ANNEXURE - A

In the Supreme Court of Bangladesh
High Court Division
(Special Original Jurisdiction)
Writ Petition No. 5916 of 2008.
In the matter of
An application under Article 102(2) (a) (ii) of the Constitution of
the People's Republic of Bangladesh.
And
In the matter of
Bangladesh National Women Lawyers
Association (BNWLA)
..... the petitioner
Versus
Government of Bangladesh and Others.
..... the respondents
Mrs. Fawzia Karim Firoze with Mrs. Seema Zahur, Ms. Rebeka Sultana and Ms. Sathi Shahjahan
..... for the petitioner.
Mr. Razik Al-Jail, DAG
.....for respondent No. 3.
Dr. Rafiqur Rahman
..... for respondent No. 7.
Mr. Mahmudul Islam
..... Amicus Curiae
Ms. Sara Hossain and Mr. Probir Neogi.
..... Intervenors

Present:

Mr. Justice Syed Mahmud Hossain

And

Mr. Justice Quamrul Islam Siddiqui

Heard on 16.10.2008, 13.11.2008, 9.3.2009, 11.3.2009. Judgment on 14.5.2009.

Directives in the form of Guidelines:

In the backdrop of our discussion and observations made above, and in view of the inadequacy of safeguards against sexual abuse and harassment of women at work places and educational institutions whereby noble pledges of our Constitution made in so many articles to build up a society free from gender discrimination and characterized by gender equality are being undermined everyday in every sphere of life, we are inclined to issue certain directives in the form of guidelines as detailed below to be followed and observed at all work places and educational institutions till adequate and effective legislation is made in this field. These directives are aimed at filling up the legislative vacuum in the nature of law declared by the High Court Division under the mandate and within the meaning of article 111 of the Constitution.

1. Extent. These guidelines shall apply to all work places and educational institutions in both public and private sectors within the territory of Bangladesh.

2. Aims and objectives.

The aims and objectives of these guidelines include-

(a) to create awareness about sexual harassments;

(b) to create awareness about the consequences of sexual offences;

(c) to create awareness that sexual harassment is punishable offence.

3. Duties of employers and authorities.

Since it is the duty of all citizens and public servants to observe the Constitution and the laws, and since the Constitution of the Republic in several articles ensures gender equality and the State's firm and consistent stand against all sorts of discrimination on the ground of sex, and since the Constitution ensures equal rights of women with men in all spheres of the State and public life and contemplates equality before law and right to equal protection of law, it shall be the duty of the employers and other responsible persons in work places, and the authorities of all educational institutions to maintain an effective mechanism to prevent or deter the commission of offences of sexual abuse and harassment, and to provide effective measures for prosecution of the offences of sexual harassment resorting to all available legal and possible institutional steps.

4. Definition.

i) Sexual Harassment includes-

a. Unwelcome sexually determined behaviour (whether directly or by implication) as physical contact and advances;

b. Attempts or efforts to establish physical relation having sexual implication by abuse of administrative, authoritative or professional powers;

c. Sexually coloured verbal representation;

d. Demand or request for sexual favours;

e. Showing pornography;

f. Sexually coloured remark or gesture;

g. Indecent gesture, teasing through abusive language, stalking, joking having sexual implication.

h. Insult through letters, telephone calls, cell phone calls, SMS, pottering, notice, cartoon, writing on bench, chair, table, notice boards, walls of office, factory, classroom, washroom having sexual implication.

i. Taking still or video photographs for the purpose of blackmailing and character assassination;

j. Preventing participation in sports, cultural, organizational and academic activities on the ground of sex and/or for the purpose of sexual harassment;

k. Making love proposal and exerting pressure or posing threats in case of refusal to love proposal;

l. Attempt to establish sexual relation by intimidation, deception or false assurance.

m. Stalking as defined below (Added vide High Court's Directive Number-2 given in the Writ Petition Case No.8769 of 2010).

Definition of Stalking:

A male individual stalks a female if the male engages in a course of conduct:

(a) with the intention of causing sexual harassment or of arousing apprehension of sexual harassment in the female and

(b) that includes any of the following:

(i) following the females;

(ii) contacting the female by post, telephone, fax, text message (SMS/MMS/blogging/twitting), email or other electronic communication or by any other means whatsoever;

(iii) causing an unauthorized computer function in a computer owned or used by the female or her family members;

(iv) entering or loitering outside or near the female's place of residence or place of business or work or any other place frequented by the female;

(v) keeping the female under surveillance;

(vi) acting in any other way that could reasonably be expected to arouse apprehension or fear in the female for her own safety or the safety of her family members.

Exceptions:

The following lawful acts are excluded from the above definition of stalking:

(a) the enforcement of the criminal law;

(b) the administration of any Act of Parliament;

(c) the enforcement of a law imposing a pecuniary penalty;

(d) the execution of warrant;

(e) the protection of the public revenue.

Such conduct mentioned in clauses (a) to (m) can be humiliating and may constitute a health and safety problem at workplaces or educational institutions; it is discriminatory when the woman has reasonable grounds to believe that her objection would disadvantage her in connection with her education or employment in various ways or when it creates a hostile environment at workplaces or educational institutions.

ii) **Concerned Authority** means an authority of any educational institution or work place in both public and private sectors, which is authorised under the relevant disciplinary rules to take action in case of misconduct.

iii) **Disciplinary Rules** mean rules prescribed by any Act or Ordinance or any other sub-ordinate legislations and include any rules framed for maintenance of discipline in any public or private institutions, organisations and work places.

5. Creating awareness and public opinion.

a. In order to deter and eliminate sexual harassment and torture, and to create a safe environment for work and education, the employers/ management of all workplaces and authorities of all educational institutions will attach prime importance to the publicity and publication against sexual harassment and gender discrimination. There must be sufficient orientation before the formal classes start for a new session in educational institutions, and monthly, half yearly orientation in all workplaces and institutions;

b. There must be arrangement for proper counselling for the concerned persons, if necessary;

c. Awareness of the rights of female students and employees guaranteed and conferred by the Constitution and the statutes should be created by notifying in simple words the relevant provisions of the Constitution and the statutes;

d. The educational institutions and the employers will maintain regular communication and effective consultation with the administrative authorities to create awareness among the personnel in law enforcing agencies in this regard;

e. To prepare and publish booklets containing these guidelines and provisions of the Constitution and statutes regarding gender equality and sexual offences;

f. To create awareness regarding fundamental rights guaranteed in the Constitution;

6. Preventive steps.

All employers and persons in charge of work places and authorities of all educational institutions shall take effective measures for prevention of sexual harassment. To discharge these obligations, they shall take, amongst others, the following steps:

a. Prohibition of sexual harassment and sexual torture as defined in clause 4 above should be notified, published and circulated widely and in an effective manner;

b. Constitutional and statutory provisions against gender discriminations and sexual harassment and punishment for the offences of sexual harassment and torture should be widely circulated;

c. To ensure that there is no hostile environment towards women at workplaces and educational institutions, and to engender confidence and trust in women workers and students that they are not placed in a disadvantaged position in comparison to their male colleagues and fellow students.

7. Disciplinary Action:

Appropriate disciplinary action must be initiated in case of any falling within the definition of sexual harassment and torture in clause 4 of these guidelines.

8. Complaints:

Where such acts do not constitute misconduct under the disciplinary rules, an appropriate and effective mechanism must be evolved at the workplaces, and educational institutions, in both public and private sectors for record and redress of the complaint made by the victim. The following measures must be included in the complaint mechanism.

(a) It must be ensured that the identity of the complainant and also that of the accused will not be disclosed until the allegation is proved;

(b) Security of complainant will be ensured by the Concerned Authority;

(c) Complaint can be lodged by the victim or through her relatives, friends or lawyers, and it can be sent by mail also;

(d) A complainant can file the complaint with a female member of the Complaint Committee separately;

(e) The complaint will be lodged with the Complaint Committee to be constituted as provided in clause 9 below.

9. Complaint Committee.

(a) In all work places and educational institutions in both public and private sectors, the Concerned Authority will constitute a Complaint Committee in order to receive complaints, and to conduct investigation and make recommendations.

(b) The Complaint Committee will have minimum five members and majority of the members will be women. The head of the Complaint Committee should be a woman, if available.

(c) The Complaint Committee should have at least two members from outside the organization concerned, preferably from organizations working on gender issues and sexual abuse.

(d) The Complaint Committees will submit annual reports to the Government on the compliance of these guidelines.

10. Procedure of the Complaint Committee. Normally the complaint has to be lodged with the Complaint Committee within 30 working days of the occurrence. To verify the complaint the Complaint Committee will:

i) In case of minor harassment, if it is possible, the Complaint Committee shall dispose of the complaint with the consent of the parties involved and shall report to the Concerned Authority of the educational institution or work place in public or private sector, as the case may be.

ii) In all other cases the Complaint Committee shall investigate the matter.

iii) The Complaint Committee will have the power to send registered notice by mail to the parties and the witnesses, conduct hearing, gather evidence, and examine all relevant papers. In this type of complaint, apart from oral evidence emphasis should be placed on circumstantial evidence. To conduct the work of the Complaint Committee effectively the related office of the educational institutions and workplaces in both public and private sectors will be bound to extend any cooperation which is requested from them. The Complaint Committee will keep the identities of the complainant/s confidential. While recording the testimony of the complainant/s any question or behaviour which is intentionally base, insulting or harassing should be avoided. The testimony must be recorded in camera. If the complainant wants to withdraw the complaint or stop the investigation then the reason behind this has to be investigated and mentioned in the report.

The Complaint Committee shall submit the investigation report with recommendation within 30 working days to the Concerned Authority of the educational institution or work place, as the case may be. The period of 30 days may be extended up to 60 days where it is found necessary.

If it is proved that a false complaint has been filed intentionally then a report will be submitted to the Concerned Authority recommending appropriate action for the complainant/s. The Complaint Committee will take decisions on the basis of the view expressed by the majority of its members.

11 Punishment:

The Concerned Authority may suspend temporarily the accused person (other than students) and in case of students, may prevent them from attending their classes on the receipt of the recommendation of the Complaint Committee. If the accused is found guilty of sexual harassment, the Concerned Authority shall treat it as misconduct and take proper action according to the disciplinary rules of all work places and the educational institutions in both public and private sectors within 30 (thirty) days and/or shall refer the matter to the appropriate Court or tribunal if the act complained of constitutes an offence under any penal law.

We direct that the above guidelines will be strictly followed and observed in all educational institutions and work places in both public and private sectors until adequate and appropriate legislation is made in this field.

In this judgment the expression, "woman" has been used to include a female of any age as defined in the Nari-O-Shisu Nirjaton Daman Ain, 2000.

In the result, the Rule and the supplementary Rule are made absolute with the directives in the form of guidelines described hereinbefore.

We would like to record our note of appreciation to Mr. Mahmudul Islam who assisted the Court as amicus curiae by rendering valuable assistance in the performance of the difficult task in public interest.

There is no order as to costs.

Quamrul Islam Siddiqui, J

I agree.

Facilities and Amenities

Information and Communication Services (ICS)

IT Services, Internet, Computing and Classroom/ Lab Facilities at East West University

University IT Services

The Information and Communications Services (ICS) has the responsibility of controlling and maintaining the total technological infrastructure of EWU. It is responsible for the Information and Communication Technology (ICT) infrastructures setup for users in the university campus. This includes responsibility for the laying and management of networks and internet connections that enable communication as well as the operation of the equipments used by students, faculty and staff members to pursue their education, research and office work.

The purpose of IT Services is to create a digital campus in which students and staff can be as creative and productive as possible as they learn, teach and undertake research.

The equipments that use ICT infrastructure vary from smartphones to notebooks or desktops and sophisticated measuring devices.

Internet and Computing Facilities

The Information and Communications Services (ICS) looks after the total technological infrastructure of EWU. The university's computer labs are equipped with an ever-growing selection of computer hardware, software and other technology-related resources to help students, faculty and staff members perform a vast array of tasks. ICS provides the kind of intensive technical support needed to run all active computers and multimedia projectors. ICS also conducts an efficient E-mail system for all members of the EWU family.

EWU has internet speed of 130 Mbps bandwidth covering both the LAN and Wi-Fi facilities of the university. ICS has deployed more than 66 high-end Wireless Access Points (WAPs) in indoor and outdoor common areas to establish a secure wireless network requiring access and password authentication. Almost all parts of the campus have their hot spots and a wireless network, available both indoors and outdoors.

Statistical Report

Total Computer System	1225 Computers
Multimedia Projectors	119 Multimedia projectors
Total number of Wi-Fi Access Points (APs)	66Wifi access point
Internet Bandwidth	512 Mbps Full Duplex Dedicated
Total IP Phone sets	400 IP Phone sets
Real IP	1024 Mbps
ICS Computer Labs	05 ICS Computer Labs

List of Facilities and Services provided by ICS

Data Center Facilities

Internet Services Available 512 Mbps

Web Services

E-Mail Services

Wi-Fi Services

Domain Controller Services

Printing Facilities

Audio Visual Classrooms

Software Development

Computer Labs Support

Network and Hardware Support

Multimedia Support (classroom, seminar, meeting and workshop)

IT- Related Support (students, faculty and administrative staff members)

IP Telephony System

Monitoring Total Server Systems and Networks of EWU 24x7

a) Internet Services

ICS provides and manages internet service of 512 Mbps bandwidth. Service details:

Bandwidth: 512 MbpsFull Duplex Dedicated (SEA-ME-WE-4)

Media: Fiber Optics

- Managing bandwidth for students, administration and faculty members
- Ensures virus and intrusion free browsing with endpoint security

b) Web Services

ICS maintains university web servers. Service details are as follows:

Updating and maintaining websites

EWU Official Website (http://www. ewubd.edu)

Online Grade Report Checking (http:// result.ewubd.edu)

Online Admission Website (http:// admission.ewubd.edu)

Online Tender Processing System (http:// etender.ewubd.edu)

File Tracking System (http://filetracker. ewubd.edu)

UMIS Webnet Service (http://webnet. ewubd.edu)

EWU maintains two separate domains: o ewubd.edu

☐ ewu.edu.bd

c) E-Mail Services

ICS maintains an email system of almost 10, 000 users. Two separate E-mail servers are used, one for Admin Staff and Faculty Members and the other for Students.

Email domain for Admin Staff and Faculty Members is @ewubd.edu

Email domain for Students is @ewu.edu.bd (student email integration to google mail hosting server new Email domain for student is @std.ewubd.edu)

ICS provides a reliable worldwide E-Mail service.

Google Email Service (Cloud based)

d) Domain Controller Services

Provides secure login and personalized settings with user ID and password.

Provides space in the server accessible from anywhere in the university.

e) Network and Hardware Support

ICS designs and maintains the campus network and provides hardware support to EWU. There are more than 1100 computers in the EWU LAN. ICS works in the following areas:

Maintaining the campus network

Troubleshooting computers, printers and scanners

Providing Data backup

Virus cleaning

Ensuring UPS related support

f) Computer Labs Support

Physical cleaning of computers

Ensuring regular workability of computers

Hardware troubleshooting and maintenance

Printing support

Software installation, maintenance and protection from intrusion and virus

g) Multimedia Support

Regular support for all multimedia classrooms

Multimedia support for meetings/ seminars/workshops

Multimedia projector maintenance and servicing

EWU Spirit Student Portal Systems

EWU Spirit Student Portal System is an important part of the whole system. It helps students and faculty members to manage crucial tasks such as the following.

Student Management System

Course Advising System

Financial Aid Management System

Faculty Evaluation Management System

Result Processing System

Admission Test Processing

ICS Computer Labs

ICS of EWU has 05 (Five) general computer labs and 260 high configuration computers and printers. Of the 05 labs, 04 are dedicated to classes of different departments while 01 is fully dedicated to student practice. Each lab has one designated ICS official attached to it to oversee overall operations on a daily basis. The programming languages, IDEs and package support provided include C/C++/ Java, Python, Fortran, Oracle, MatLab, PSpice, Visual Studio, MySQL, PHP, SPSS, AutoCAD and various other software.

University Data Centre Facilities

The University Data Centre is a vital part of the campus information and communication systems. The facilities provided by it ensures a secure, enterprise-grade reliable ICT infrastructure for the delivery of mission-critical university information systems. East West University Data Centre supports and runs the university's core IT services and at the same time ensures that it is secure, powerful, sustainable and scalable.

The Data Centre is highly adaptable to the changing needs of the university's administrative, academic and research environments. Data Centre features and benefits include a) Data Networking b) Service Monitoring c) Environmental Management d) Load Balancing e) Network Stability f) IP Telephony g) Server Virtualization.

File Tracker and Online File Processing System

The EWU File Tracking System (FTS) is a fully automated web-based process application which helps in tracking the movement of files and receipts for students, departments and administrative requisitions and applications. This application enables its users to maintain a consistent follow-up over the movement of various important documents in the process of decision-making.

This application enables fast retrieval of any file and makes File Movement & File Tracking smooth and reliable. FTS deals with 'Creation of Files to Completion of Files' through the embedded softcopy of files. The status of any file can be obtained thereby at any time. Currently, the following fields are available online:

1. HR & Logistics Department
   a) Requisition Form
   b) Service Request Form
   c) Leave Form
2. Information & Communication Services (ICS)
   a) IT Service Request Form
   b) Email Account Opening Form
   c) Multimedia Support Form
   d) Computer Lab Requisition Form
3. Engineering & Maintenance Department (EMD)
   Repair and Maintenance Form

Establishing Network Facilities in New Academic Buildings 1 and 2

Internet and network communications have been established in the two new academic buildings set up by EWU. In this regard all necessary tasks i.e. cable layout design and drilling, patch panel setup and cable testing in all floors have been completed successfully. Fiber optic based powerful internet backbone communication provides the necessary Internet and network traffic in these two buildings.

Lab Facilities

High Voltage/Machine Lab: This lab has state-of-the-art 'Lab-volt' electro-mechanical training systems that can be used to carry out experiments on DC machines, transformers, induction motors and synchronous machines. The laboratory also has inductor, capacitor and resistor banks, single and three phase variable AC power supplies and various types of measuring instruments to conduct experiments.

Electrical Circuit Lab: This laboratory has advanced facilities for investigating the behavior of AC & DC circuits. It is equipped with inductors, capacitors and resistor banks, DC power supplies, digital storage oscilloscopes, high frequency signal generators, and trainer boards for circuit layout design. The lab is also equipped with various types of measuring instruments to conduct experiments on both single phase and three phase electrical circuits. In addition, the lab also has a true RMS (AC+DC) multimeter, an LCR meter with a computer interface, and a universal microcontroller programmer to facilitate research.

Electronics Lab: Experiments related to the electronics and power electronics courses are conducted in this laboratory. It is equipped with modern digital storage oscilloscopes, analog and digital trainer boards, signal generators, DC power supplies, measuring instruments such as ammeters, voltmeters, digital multimeters, wattmeters etc. and various types of IC chips, small-signal MOSFETs, BJTs and other semiconductor devices.

Switchgear and Control Systems Lab: Experiments and project work on switchgear, control and data acquisition are carried out in this lab. It has five sets of Advantech data acquisition cards interfaced with computers to detect various types of electrical faults and to facilitate subsequent operations of relays on custom-made fault simulation boards. The lab also houses five sets of industry standard Siemens S7-1200 Programmable Logic Controllers (PLCs) with necessary input/ output modules and proprietary computer interface software tools. The PLC modules are used to train students in modern industrial control systems.

VLSI Lab: The VLSI lab is used to carry out design and simulation based experiments. It has more than 40 workstations and 2 servers running on both MS Windows and Linux platforms. A wide range of engineering and design software tools, including ADS, MAGIC, HSPICE, ANSOFT, MATLAB, PSPICE, etc. are available in this lab. ADS, MAGIC and HSPICE are advanced industry standard EDA tools used worldwide in design and research.

The lab also has SILVACO TCAD tools, which are proprietary software developed for simulation of electronic and photonic devices, and fabrication processes through a virtual clean room facility, and for investigating complex behavior of any electronic circuits composed of any arbitrary designed devices. Silvaco is an industry standard software used throughout the world for design and analysis of electronic and photonic devices. Major electronic companies such as Intel, IBM, IMEC, Samsung, TSMC etc. all use this software. Leading universities in USA, Europe and also those in India (for example, IITs) utilize this software to train their students in this field.

Wireless and Microwave Lab: The aim of the Wireless & Microwave lab is to focus on wireless communication and provide hands-on experience on wireless network. The Wireless & Microwave Lab is equipped with adequate number of Microwave Trainer Boards, Voice Over Internet Protocol (VOIP), Wireless Local Area Network (WLAN), a Mobile Phone Solution Trainer Board and a TCP/IP Solution Trainer Board. Microwave Trainer Boards acquaint users with the knowledge of the way microwaves behave in different situations. By using this instrument, a student can carry out different experiments related to polarization, reflection, diffraction and interference of microwaves. An accompanying simulation software facilitates the students in gaining insight in these topics.

The Mobile Phone Solution Trainer Board gives users detailed understanding of the communication system. Students learn about a functional mobile telephone system with full voice and text messaging capabilities. Wireless Local Area Network (WLAN) provides hands-on experience on build-up ad hoc network, peer-to-peer network, and configuration of wireless access point. Voice Over Internet Protocol (VoIP) is used to show the experience of real IP telephony system. The university is in the process of procuring De Lorenzo microwave trainer kit for the experiment of microwave power measurement and professional software like HFSS and CST studio for design and simulation of microwave waveguides.

Software Engineering Lab: The Software Engineering Lab is equipped with a server, 36 desktop computers, a printer, and a multimedia projector. All computers of the lab are networked and connected to the Internet. The lab provides a range of software to support lab class and research work in the broad field of software systems, including programming, software engineering, network security, and simulation and modeling.

Database Lab: The Database Lab is equipped with a server, 38 desktop computers, a printer, and a multimedia projector. All computers of the lab are networked and connected to the Internet. It provides a range of software to support lab classes, and research work in the field of database management and information system design.

Digital Systems and Microprocessor Lab: The Digital Systems and Microprocessor Lab is equipped with instruments such as oscilloscopes, digital trainer boards, microcontroller writer, microprocessor trainer boards, interfacing adapters, function generators, multi-level DC power supplies. It has 11 computers which are networked and connected to the Internet. It also provides software and hardware for FPGA-based design as well as embedded systems design.

Artificial Intelligence Lab: The Artificial Intelligence Lab is equipped with a server, 36 desktop computers, a printer and a multimedia projector. All computers of the lab are networked and connected to the internet. It provides a range of software to support lab classes and research work in the broad field of artificial intelligence, including programming, intelligent software development, simulation and modeling.

Mobile Games and Apps Development Lab: The Mobile Games and Apps Development Lab is equipped with a server, desktop computers, and game development equipment. All computers of the lab are networked and connected to the Internet. The lab provides a range of software to support lab classes and research work in the field of mobile games and apps development.

Telecommunication Lab: The purpose of the Telecommunication Lab is to offer hands-on experience to students for training and research by providing them with scope for practical demonstrations and enabling exercises for courses in communications. The TIMS equipment set constitutes an important part of this lab. This set consists of the TIMS-301 basic system, PC based virtual instruments, TIMS-Interactives for simulation, and Emona TIMS advanced modules. The lab also contains microwave trainers, DSP trainers, cellular mobile trainers, analog communication trainers, digital communication trainers andScientech optical fiber communication trainers. License for optical link design software Optisystem has already been purchased for the lab. The university is in the process of procuring professional software, HFSS and COMSOL Multiphysics for design and performance analysis of optical and RF

waveguides.The Telecommunication Lab also has a highly sophisticated Signal Generator (100 KHz-3 GHz), Digital Oscilloscope, and Spectrum Analyzer (9 KHz-26.5 GHz).

Networking Lab: This Lab represents key resources for ICT oriented academic issues in a real network environment and provides various networking topologies, design, implementation, management and administration. This Laboratory, based on topics such as Networking concepts, Networking media standards and features, Networking devices and their interconnections, has been designed to make use of its facilities and exploit its strengths. It is equipped with the practical implementation of LAN, MAN and WAN Technologies, Linux Server, Routing and Switching technologies with high configured Routers, Wireless Routers, Bridges, Switches and Cable connections, and Wireless Communication Technologies. The networking lab is also equipped with Cisco routers, Cisco switches, Network switches, PABX systems, Wireless Access Points, cable tester and 30 computers. All computers of the lab are networked and connected to the internet. The lab provides a range of software and hardware support for the lab classes as well as research work related to computer networks and communications. The scope of impelementation and simulation are served by this lab.

Physics Lab: The Physics Lab is designed to give a background in experimental techniques to students and aims to apply experimental methodology to investigate physical phenomena. It is equipped with modern instruments to demonstrate different aspects of mechanical, thermal, electrical, optical and modern Physics. Its dark room facilities help students carry out optical experiments using Spectrometer, Polarimeter, Discharge tube etc. Each experiment is designed to incorporate a new lesson on measurement, data recording, error calculation, graphical analysis etc, in addition to illustrating a physical principle of the companion courses.

Laboratory Facilities in the Department of Pharmacy

The Department of Pharmacy, East West University, has eight (8) laboratories, including an Advanced Research Laboratory. The laboratories are well equipped with modern and cutting-edge equipments for individual practical classes. These laboratories also provide necessary infrastructure for research for B. Pharm. and M. Pharm. Programs.

The Advanced Research Laboratory of the Department of Pharmacy is equipped with advanced research instruments to carry out analytical and molecular level research works. For analytical research, the laboratory has four (4) Rotary Evaporators with Chiller facilities, High Performance Liquid Chromatograph (HPLC) coupled with computer-controlled auto-sampler, PDA and RI detectors, computer controlled Ultraviolet and Visible Spectrometer, computer-controlled Fourier Transform Infrared (FTIR) Spectrometer, Gas Chromatograph with capillary column and Karl Fischer Titrator.

The laboratory has a collection of high-tech instruments, including -80°C freezer for storing biological samples, centrifuge, sonicator, thermocycler for the amplification of genes, an instrument for Sodium Dodecyl Sulfate Polyacrylamide Gel electrophoresis (SDS PAGE) for protein analysis.

The laboratory also has set-up for research in pharmaceutical fields, including a 12 (twelve) station fully automatic Tablet Compression Machine, and a laboratory scale tablet coater to design and formulate tablet dosage form for research purposes. For pharmaceutical product analysis, it is equipped with Dissolution apparatus, Disintegrator, Friability Tester etc. The lab has facilities for carrying out research on animal models. The department also has an animal room designed to maintain the growth of experimental animals for research purposes as per international guidelines. Different models are available in the Pharmacology laboratory to evaluate biological activities of various natural products. In order to carry out certain experiments, we also have an Operation Theatre (OT) to anesthetize research species and undertake surgical procedures.

In addition to these sophisticated instruments, some other major instruments in use are listed below:

Microplate photometer/ ELISA reader, Freeze Dryer, Incubator/CO2 Incubator for cell culture, Laminar air flow cabinet for microbiological assay, High speed centrifuge machine, UV-VIS spectrophotometer, Polarimeter, Refractometer, Karl Fischer Titrator, Rotary evaporator, Single punch tablet compression machine, Capsule filling machine, Distillation apparatus, Dissolution tester, Disintegrator, Sonicator, High resolution microscopes, Autoclaves and Fundamental chromatographic instruments as well as other supporting equipment. To evaluate pharmacological activities of different samples in animal models, the Department of Pharmacy is currently developing an animal house where experiments on animal models as well as breeding of different species will be carried out.

Laboratory Facilities in the Department of GEB

Laboratory experiments are indispensable in the Department of Genetic Engineering and Biotechnology. Four laboratories have been established so far to facilitate our students. These laboratories are well equipped with a handful number of modern instruments and tools such as Bio-safety cabinet (Level-ll), Thermo Cycler, Digital gel documentation system, Digital LED Microscope, Electroporator, Laminar Air Flow Cabinet, High speed and Refrigerated centrifuge, Microcentrifuge Machine, Ultra low temperature

(-80^{o}C) Refrigerator, UV-Spectrophotometer, Gel Electrophoresis system, UV light trans-illuminator, Agarose and Polyacrylamide Gel Electrophoresis Systems, Blotting Apparatus, White light trans-illuminator, Compound Light Microscopes, Digital balances, PH meter, Shaking and Static Incubator, Water bath, Water distillation system, Autoclave, Ice maker etc. The GEB laboratories also have a vast collection of necessary chemicals, reagents and solutions as well as different chemical apparatuses including glassware to conduct practical experiments.

Laboratory Facilities in the Department of Civil Engineering

The Department of Civil Engineering has already established the Civil Engineering Drawing, Computer Aided Drafting (AutoCAD), the Civil Engineering Survey, Engineering Materials, Strength of Materials and Fluid Mechanics Laboratories. Presently, three more laboratories namely, Environmental Engineering, Geotech Engineering and Transportation Engineering with modern instruments are being set up.

Civil Engineering Drawing Lab: It is said that drawing is the language of Civil Engineering. Therefore, the department has developed Civil Engineering Drawing Lab with specially designed state-of-the-art drawing tables. The Lab is furnished with all the necessary classroom facilities and sufficient number of drawing tables. Students are taught the basics of engineering drawing with an emphasis on building drawing through engineering drawing course. The Lab is located on the second floor of the Block-C, University Building Complex.

AutoCAD Lab: The AutoCad laboratory of the department of Civil Engineering possesses necessary classroom facilities along with sufficient number of computers to teach AutoCAD software. All the computers contain the latest licensed version of AutoCAD software. A total thirty five number of students can simultaneously attend the lectures. The Lab is situated on the fourth floor of Block-B, University Building Complex.

Survey Lab: Survey Lab is well equipped with the latest state-of-the-art instruments such as the Total Station, Theodolite, Level, GPS, chain, plane table etc., for performing various engineering survey works. Ancillary equipment such as tripod stands, ranging rods, compass, alidade, plumb bob and optical square are also available. The survey laboratory is situated on the second floor of the Block-D, University Building Complex.

Engineering Materials Lab: The department of Civil Engineering at East West University has a well equipped Engineering Materials Laboratory. The lab possesses large number of modern instruments such as compression testing machine, Los Angles abrasion testing machine, mortar mixer, concrete mixer, tensile testing machine, sieve shaker, oven, etc. The laboratory is situated on the lower basement of the University Building Complex.

Strength of Materials Lab: The purpose of the Strength of Materials laboratory is to observe and predict the behavior of engineering materials such as mild steel, cast iron, concrete, wood etc., in different loading conditions. The lab is furnished with a number of state-of-the-arts instruments such as Universal Testing Machine (UTM), Flexure Testing Machine, Hardness Testing Machine, Impact Testing Machine, Torsion Testing Machine, Spring Testing Machine, Buckling Testing Machine etc. The laboratory is situated in the lower basement of the University Building Complex.

Fluid Mechanics Lab: Fluid Mechanics lab at the Department of Civil Engineering, East West University is designed to run experiments regarding basic fluid mechanics theories, flow and friction loss measurement. This lab is equipped with all necessary modern instruments such as hydraulic bench, pipe friction apparatus, venturimeter, orifice, external mouthpiece, center of pressure and Bernoulli's theorem apparatus, V-notch, sharp crested weir, etc. The laboratory is situated in the lower basement of the University Building Complex.

Environmental Engineering Laboratory

The Environmental Engineering Laboratory at the Department of Civil Engineering, East West University is well-equipped with modern apparatus and reagents to smoothly perform all sorts of routine as well as specialized testing for determination of water quality. The notable water quality parameters those can be determined in the laboratory are pH, color, turbidity, total solids (TS), total dissolved solids (TDS), total suspended solids (TSS), chemical oxygen demand (COD), biochemical oxygen demand (BOD), carbon dioxide, alkalinity, hardness, chloride, iron, optimum coagulant dose, chlorine demand etc. The laboratory is suitable to use for undergraduate/postgraduate teaching and research purposes. It is located in the lower basement of the University Building Complex.

East West University Center for Research and Training (EWUCRT)

The East West University Center for Research and Training (EWUCRT) promotes academic and applied research for creation and dissemination of new knowledge. Though it is a research entity in character, it performs multifarious activities to achieve its objectives. EWUCRT is dedicated to developing research abilities of faculty members of East West University (EWU) by continually motivating and supporting them to undertake research and publish scholarly papers. It provides financial support to faculty members to conduct research.

The Center organizes international/national conferences, seminars, symposiums, and workshops to facilitate dissemination and cross fertilization of knowledge. For the purpose of sharing research results with academia, researchers and policy makers, EWUCRT publishes two academic journals in the fields of humanities and social sciences; business, and economics. The Center also designs and organizes short-term training programs on research methodology to enhance the research capabilities of young professionals working in universities, academic institutions, government, and non-government organizations. In the last eleven years (2007- May 2019), EWUCRT allocated approximately Taka nineteen million to support faculty research and training, publications of research reports and journals, and to sponsor conferences, seminars and workshops.

EWUCRT operates through a Research Committee comprising representatives from the Board of Trustees, Deans and Chairpersons of the academic departments. The Center is currently chaired by Dr. Rafiqul Huda Chaudhury, Member, Board of Trustees of the University. At present, Dr. Muhammed Shahriar Haque, Professor, Department of English, EWU and Dr. Farhana Ferdousi, Associate Professor, Department of Business Administration, EWU hold the positions of the Executive Director and Deputy Executive Director respectively. A Senior Research Officer, a Senior Departmental Officer and a Lab Officer assist the Center in carrying out its academic and administrative activities.

Research Facilities of EWUCRT:

East West University Center for Research and Training (EWUCRT) has various research and training infrastructure which are described below:

EWUCRT Research Hub

The Center has established a Research Hub, which is a fully functioning research facility. The Center has digitized its Research Hub with 19 state of the art computers, a multimedia projector, printer, photocopier and scanner. The Research Hub is well equipped to arrange various academic programs, training, and workshops. Moreover, there are nine research software to facilitate faculty research and data analysis.The Center has a small library of its own. It has numerous research related books, journals, reports and documents along with various data sets. It has also access to the university library, which is well-endowed with books, including e-books, journals, and various databases.

Research Software:

East West University Center for Research and Training (EWUCRT) acquired the turnitin software to help teachers and students of East West University detect plagiarism. The software can help faculty members to check plagiarism of their own paper/article and students' assignments, thesis, term papers and other documents. The Center also installed Endnote software for organizing bibliographies, references and citations of research reports, articles and other documents. Moreover, for data processing and analysis, 7 research software (ATLAS.ti, NVivo, STELLA, iThink, STATA, AMOS and SPSS) were installed in the computers of EWUCRT Research Hub, Room: 615, 5th floor of East West University.

EWUCRT Seminar Room

The EWUCRT Seminar Room is located on 4th floor, Block-C (Room No: 560), EWU. Generally, this room is used for hosting seminars, workshops and training.

English Department Seminar Room

The English Department Seminar Room is located on 1st floor, Block-C (Room No: 238), EWU. This

room organizes seminars, meetings, and training. EWUCRT furnished this Seminar Room.

The activities of EWUCRT are as follow:

Research Grant:

East West University Center for Research and Training (EWUCRT) regularly invites research proposals for funding. This research fund is a seed grant provided to researchers affiliated with academic Departments for conducting research activities in accordance with the University research policy. Such grants are aimed at nurturing and sustaining a vibrant research community at EWU by engaging academics and researchers from all faculties/fields.

Research Policy:

1. East West University Center for Research and Training (EWUCRT) calls for research proposal from faculty members once in a year. The center circulates a Research Proposal Guideline with the invitation of 'Call for Research Proposal'.
2. After receiving research proposal from faculty members, the Center sends the proposal to internal and external experts for review along with a Research Proposal Evaluation Guideline.
3. EWUCRT shares the comments with the respective author(s) for revising his/ her proposal based on the comments received from reviewers and requests the author(s) to resubmit the proposal after incorporating reviewers' comments. It may be noted here that if the Center receives negative comments from both internal and external experts, the research proposal will be rejected.
4. After the author(s) resubmit the revised proposal the Center sends the revised proposal to the reviewers again for cross checking whether their comments are duly incorporated or not.
5. Subsequently, the Center arranges a seminar on the research proposal, where the author(s) also receive comments from discussants, experts, faculty members and other participants. The author(s) of respective research proposal then incorporates all the comments received from seminar participants and resubmit the revised research proposal to EWUCRT office.
6. After following all these steps, the Center considers a research proposal for funding/grant. Releasing fund is contingent upon receipt of clearance of the research proposal by the university Ethics Committee.
7. Research grant makes no provision for honorarium to the principal or co-authors of the proposed research.
8. During the research the researcher(s) provide progress reports.
9. Upon completion of the research and submission of the draft research report, the Center sends the report to the respective reviewers for review and comments.
10. Again, the Center sends the reviewers' comments to the author(s) for incorporating comments and requests the author(s) to resubmit the revised research report to EWUCRT office.
11. Upon receipt of the revised research report, another seminar is arranged by EWUCRT. After the seminar, the author(s) resubmit a research report to EWUCRT incorporating necessary modification based on comments received from the seminar participants.
12. The Center also checks plagiarism in the research report to prevent academic dishonesty.
13. Thereafter, the Center sends a research report to an expert for English editing.
14. Finally, the Center publishes the research report as a Working Paper.
15. EWUCRT has the first right to publish the findings of its sponsored studies.
16. Author(s) can present paper, based on EWUCRT funded research studies, in any conference with due recognition that this is an ongoing research study under consideration of publication by EWUCRT.
17. Author(s) can publish papers, based on EWUCRT supported research studies, once the main findinings are published by EWUCRT in its Research Report series.

East West University Research Ethical Committee (EWUREC) and Policy & Procedures for Research Ethics Approval

East West University Research Ethical Committee (EWUREC) has been framed. Furthermore, Policy and Procedure for Research Ethics Approval and Plagiarism Policy has been developed.

All research work at EWU should adhere to the highest ethical standards; any research work carried out at EWU which has significant ethical implications will have to be submitted for independent ethical review. Such scrutiny is intended to assist in protecting research participants from harm, but a further important consideration is that the researcher is facilitated and supported in carrying out research which has the potential to be of benefit for society. In other words, the scrutiny must be carried out efficiently, and according to the highest possible professional and ethical standards.

Another and related ethical concern is to ensure originality and to prevent plagiarism in academic work. To these end, faculty members as well as students will have to familiarize themselves with the plagiarism policy of the university and learn how not to get involved in any kind of practice that makes them vulnerable to charges of academic dishonesty and misconduct.

Research projects that will need the approval of the East West Research Ethics Committee (EWUREC) include the following:

i) Research involving human participants, their personal data and tissues collected,

ii) Research that poses a reputation risk to the University or its researchers,

iii) Externally funded research that needs to meet the standards expected of funding agencies,

iv) Evaluation studies involving human participants,

v) Research which does not involve human participants but which is high risk, or which has the potential for negative effects on the environment or on society,

vi) Research that involves experimentation on animals,

vii) Research involving tissues from protected animals obtained from a third party who must ensure that the material was obtained legally and ethically before transferring any materials to EWU.

viii) Research involving pathogens and other microbes that may severely impact on nature or could be harmful for individuals.

ix) Research involving genetically engineered microorganisms that may affect the environment.

Ethical Review and Documentation in Cases of Plagiarism

Research projects will need to have requisite\documentation and acknowledgement when they involve:

i) Use of published or unpublished sources that need to be acknowledged,

ii) Use of copyright materials,

iii) Interaction with human participants from outside the university who have been interviewed and quoted, and whose ideas have been sought and used in the writing

Ethics of Student Research

Student research is expected to meet the same ethical standards as research conducted by staff members but is proportionate to the level of risk of the project.

Light Touch Reviews

i. "Light touch" reviews may be conducted when the potential of the research to cause harm to participants and others and to the environment are not deemed significant or high risk.

ii. Researches that do not involve direct participation of living human persons may also be eligible for light touch reviews, unless they significantly affect living persons or the environment.

Principles and Procedures for Obtaining Ethical Approval

For all research projects covered by this guideline, approval must be given by the EWU Ethics Committee before work commences. The primary task of the Research Ethics Committee lies in the ethical review of research proposals and their supporting documents, with special attention given to the nature of any intervention and its safety and protection for participants and researchers, to inform consent processes and documentations, and to the suitability and feasibility of the proposal.

A decision by the EWUREC to give ethical approval to a research project does not imply an expert assessment of all possible ethical issues, or of all possible dangers or risks involved; nor does it detract in any way from the ultimate responsibility which researchers must themselves have for all research which they carry out, and for its effects on human participants.

The committee will address information on ethical matters supplied by the researcher. Any information submitted is expected to be properly researched, full, truthful and accurate.

Any decision to change the University's policies or procedures for ethical review of research does not imply that previous policies or procedures were inappropriate and any such changes do not invalidate ethical approval that has been given.

Publication:

EWUCRT regularly publishes the following:

Journals:

EWUCRT annually publishes two journals ***East West Journal of Humanities*** and ***East West Journal of Business.*** Over the years, the reputation of these refereed journals has steadily increased.

Abstract of Published Papers : The Abstracts of Published Papers is an annual publication of EastWest University Center for Research and Training (EWUCRT) with an objective to keep an official log of academic publications of the faculty members of East West University. It includes the abstract of published research articles, book chapters, books, and conference papers of EWU faculty members. This publication is a collective effort of the faculty members of the university. Our scholars have enthusiastically and immensely contributed in areas of business, economics, social sciences, engineering, telecommunications, liberal arts and literature, population health, computer science, pharmacy, and technology.

Working Paper: Working Paper is a routine publication of EWUCRT. This is a preliminary research report published after its review by at least two experts in the field. Thereafter, it is circulated to a wider audience of readers including students, faculty and specialists in the field for comments.

Moreover, EWUCRT published EWUCRT brouchere which briefly describe the regular activities, publications , training programs and funding projects of EWUCRT and a Research policy flyer that describes the activities of the Center, its facilities, research policy and a flow chart for research funding.

Research Proposal Seminar:

In order to provide funding and promote research

and publication, EWUCRT organizes Research Seminars on regular basis.

Knowledge Sharing Seminar: To disseminate knowledge and generate academic discussions among faculty members, students, and researchers EWUCRT also arranges Knowledge Sharing seminars like “How to get Erasmus Mundas Scholarship”, “Knowledge sharing on US Grants and Scholarship”, and “How to make high impact publications” .

Workshop/Training Program: EWUCRT arranges hands-on training programs on regular basis which mainly focuses on research methodology, tools and technics of research, research software.These training programmes are conducted by internal and external experts of various academic fields.

Consulting and Policy Research:

The Center is open to the idea of carrying out applied and policy research in the areas of finance, corporate business, management, population and health, environment and ecology, and sustainable development in order to address the needs of multilateral, bilateral, and national organizations.

Software Development Center (SDC)

The mission of the Software Development Center (SDC) is to provide EWU students with real-world experience in designing and developing quality software for offices, banks, institutions and industries. The Software Development Center at EWU is a member of BASIS (Bangladesh Association for Software and Information Services) and incorporates industry expertise for true software innovation. It has the potential to use the resources of the World Wide Web. SDC believes in simplicity and efficiency. It intends to integrate object-oriented programming (OOP) concepts with the World Wide Web by providing unique software development services, along with training and mentoring programs of global IT standard.

East West University Library

East West University Library is one of the pioneer libraries in Bangladesh in terms of comprehensive collections, variety of services, up to date technology, professionally skilled manpower, user education, service marketing etc. It is backbone of the research and development activities of EWU. The library is an integral part of the university and designed to meet the information, research, and curriculum needs of its students, faculty and staff members. EWU library, located on its own premises, (Block-B: 5th floor) spread over 13,500 sq. ft. Beside this, EWU library has open space in Basement-1 spread over about 3000 sq. ft. for group study purpose.

Library Hours

Sunday to Thursday : 8:30 am – 10.00 pm
Friday : 08:30 am – 5:00 pm (1:00 pm-2:00 pm break)
Saturday : 5:00 pm – 10:00 pm
Services start after 15 minutes the library opens & stops 15 minutes before the library closes. The EWU Library remains closed on government holidays and as per academic calendar.

Library Sections and Facilities

Sections	Facilities
Acquisition Section	The Acquisitions Section is responsible for the acquisition of library materials. Online purchase suggestion has been developed to make procurement process easy.
Processing Section	Classification, cataloguing, digitizing and organizing of library materials are conducted in the processing section.
Circulation Section	Issuance of library materials; Membership; Support to user in resource discovery, reader service etc.
Reference Section	Reference materials such as dictionaries, encyclopedias, handbooks, Yearbooks etc. Different kind of reference service are available in this section.
Reserve Section	Users are not allowed to borrow books from this section, these books are preserved for use in library premise.
Newspaper and Journal Section	More than 100 local and foreign journals, magazines, yearbooks, bulletin etc. and 18 national newspapers are displayed in this section.
Liberation War Corner	Books, documentaries related with Liberation War of Bangladesh are available in this corner. More information are available at http://lib.ewubd.edu/liberation-war-corner
German Corner	German Corner is a part of East West University Library. Some collections related to Germany's history, culture and education are available in this corner. This corner is jointly established by EWU Library and Goethe-Institute Bangladesh. Users can borrow books from this corner.

Library Membership

Users can register online to get the library membership. Participation in Information Literacy program is mandatory to activate membership and need to register online for this program through library website. Membership need to be renewed in each semester by showing Pay Slip of tuition fees (current semester).

Technology used:

EWU Library uses widely used open source Integrated Library Management Software: Koha, Greenstone Digital Library Software, Institutional Repository Software: Dspace, Vufind discovery search tool, Citation Management Software, Content Management System: Drupal for its automation and digitization. Library collections and users are observed by Close Circuit Camera for security. Highlighted resources and their web addresses are mentioned below:

Library Website : http://lib.ewubd.edu/
Online Public Access Catalogue (OPAC) : http://opac.ewubd.edu
Digital library : http://gsdl.ewubd.edu/
Institutional Repository : http://dspace.ewubd.edu/

Library Collections

The strength Library collection consists of printed books, e-books, reference materials, online and printed journals, magazines, newspapers etc. are shown below:

Types	Quantity		Types	Quantity
Books	29,700+ Copies		**Report/Thesis**	2,424+ Titles
E-books (subscribed and registered)	1,00,000+ Titles		**CD/DVD-ROMs**	2,660+ Titles
Print Journals & Periodicals	500+ Copies		**E-journals**	41,000+ Titles (subscribed and registered)
Newspapers	18 Titles		**Maps (Large size)**	06 copies
Locally hosted E-books	2000+ Title			

E-Resources

EWU library subscribes world renowned E-resources and registered some selected free E-resources which are accessible from the university premise. Top rated resources are as followed:

Registered Online Resources

AGORA (Access to Global Online Research in Agriculture)
HINARI (Health Internetwork Access to Research Initiative
OARE (Online Access to Research in the Environment)
The Access to Research for Development and Innovation (ARDI)
GOALI (Global Online Access to Legal Information)

Resources through Direct Subscription from publisher:

Manupatra: Manupatra gives privileged access to its users and empowers them with in-depth legislative, regulatory and procedural information critical for decision making, without having to go to multiple sources. Manupatra has provided a single point source of accessing diverse Indian Legal and Business information that helps users make critical decisions.

Resources through UGC Digital Library Consortium: Through UGC Digital Library Consortium, EWU library has access to e-database which includes:

ACM Digital Library
Emerald
JSTOR
IEEE Explore Digital Library
Wiley Online Books

Resources through Library Consortium of Bangladesh (LiCoB): EWU library subscribes 28 resource databases through Library Consortium of Bangladesh which is coordinated by Bangladesh Academy of Sciences.

S/N	Database Name	S/N	Database Name
1	American Institute of Physics	15	IMF eLibrary
2	American Society of Agricultural and Biological Engineers (ASABE) Technical Library	16	International Forestry Review
3	Annual Reviews	17	IOP Publishing
4	APS - American Physical Society	18	Journal of the Acoustical Society of America (JASA)
5	ASCE - American Society of Civil Engineers	19	Mary Ann Liebert
6	BIR - British Institute of Radiology	20	Optical Society of America
7	Brill Online Journals	21	PNAS - Proceedings of the National Academy of Sciences of

			the United States of America
8	Cambridge University Press	22	Policy Press
9	Canadian Science Publishing	23	Project MUSE (Journals & eBooks)
10	Cochrane Library	24	Royal College of Physicians
11	De Gruyter Library & Information Science	25	SPIE Digital Library
12	EBSCO Host	26	Springer
13	Edinburgh University Press	27	The Royal Society
14	Geological Society	28	Wiley Online Library

E-BOOKS: EWU Library has access to the following E-book databases:

Source	No. of E-books
AGORA	1400+
HINARI	10,000+
OARE	1300+
ARDI	11, 000+
GOALI	1300+
De Gruyter LIS books	40+
Springer	13,330+
EBSCOHost Research Database	11,000+
Wiley Online E-books	3,500+
IMF e-library	3,013
Directory of Open Access Books	11685

EWU Library e-book Database

EWU Library developed a locally hosted E-book database linked with Online Public Access Catalogue (OPAC). EWU Library members can read their favorite books online from library website.

Remote Access Service to E-Resources

EWU Library subscribes MyAthens for providing access to e-resources remotely/off campus.
Registration to MyAthens :http://lib.ewubd.edu/form/my-athens-registration
Renew to MyAthens :http://lib.ewubd.edu/content/myathens-renew

Department Wise Resource Portal:

EWU Library developed "**Department Wise Resource Portal**" in its website to provide easier access to its resources. Under this initiative, EWU Library has developed separate home page for 14 departments where all kinds of resources i.e. hardcopy books, new arrivals, e-resources (e-journals and e-books), top magazines, conferences, valuable web resources etc. of the concerned departments have been organized systematically. As like as subject gateway, this portal helps users to discover their desired academic and research information in a quick and effective way. EWU Library has plan to develop this portal as fully subject gateway with resource categories up to course level.

Subscribed Print Journals Service

Users can browse and search the bibliographic details of print journals (http://lib.ewubd.edu/print-journal) as well as its' articles.

Virtual and Instant Reference Service

Patrons also get virtual reference service and Instant reference service. This service is available through, WhatsApp, Zoho, website and email.

Article Request Service

If EWU Library users are unable to get access to a certain full text article from any subscribed E-resource database, they may request us for their desired articles through online request form.

Online Purchase Suggestion:

East West University Library welcomes online purchase suggestions from faculty members, students, staff, or registered library users for the addition of library materials which support teaching, study, and research at the University community. Purchase Suggestion Link: http://opac.ewubd.edu/cgi-bin/koha/opac-suggestions.pl

Reference Management Service

EWU Library Team is always ready to assist its user managing research sources and generate references/bibliographies in specific citation styles through different software and tools through Mendeley, Cite This For Me and Zotero reference management.

Photocopy service

EWU Library provides photocopy service to its users five days in a week except Friday and Saturday from 8.45 AM to 4.45 PM.

WiFi Service

EWU library users can avail WiFi service within the library through their personal laptop, tab, mobile phone etc.

News clipping Service

News Clippings Service is very effective service to the EWU library users. It is provided to the users in the twenty seven (27) subject fields.

Information Literacy Program

EWU Library conducts IL program round the year for newly admitted students, existing students and faculty members. Users can register for this program through http://lib.ewubd.edu/node/86

Wi-fi Facility

EWU library has wi-fi facility for its users. Users can connect to internet for their information needs. To use Wi-Fi service in library, please collect your username and password from EWU ICS.

Social Network Window

Facebook page : facebook.com/ewulibrary96
Twitter page : twitter.com/library_ewu
Google Group :https://groups.google.com/forum/#!forum/ewu_library_members
Pinterest : https://www.pinterest.com/ewulibrary/
Youtube Channel : http://goo.gl/ffAekl

Corporate Membership

EWU Library has corporate membership with Archer K. Blood American Center Library and International Federation of Library Associations and Institutions (IFLA). Users may avail borrowing facilities and e-journal services of those institutions.

Workshop/Seminar/Consultancy

EWU library organizes workshops, training, seminar on contemporary issues and subjects related to library and information technology and services for the library professionals, health professionals and IT professional to cope with up-to-date technology and resources in library. EWU library provides support services to develop digital library in libraries of public and private sector.

DLNetSA and EWU Library

Digital Library Network of South Asia (DLNetSA), a regional consortium of South Asia an operational and sustainable digital library network with focus on providing support for integrated library system and digital library activities emphasizing the use of free and open source software for the user communities of South Asia. EWU library and DLNetSA jointly conduct various programs like workshops, seminars, consultations, surveys, knowledge sharing sessions etc. to spread sustainable digital libraries in this region on a regular basis.

Other Facilities of the University:

Other facilities of the university include:

Spacious air-conditioned classrooms

Free E-mail and Internet access

Medical Center

Prayer Room

Cafeteria

Study Rooms

Separate male and female common rooms with indoor game facilities and television.

Department of Students' Welfare

East West University's Department of Students' Welfare has two wings, namely, Career Counseling Center and EWU Clubs. At present, EWU consists of 18 clubs.

Career Counseling Center (CCC)

The Career Counseling Center (CCC) exists to aid and support students in reaching their full potential, which includes growth and development in social and intellectual areas. The Center is a meeting point for both career-seeking individuals and leading employers of the country, and uphold the spirit of East West University. The Center endeavors to carryout EWU's mission which not only to ensure excellence in education but also to help students find suitable careers.

The center liaises with prospective employers and arranges internships and jobs for students and graduates.

CCC helps students develop their goals and build their confidence by arranging and organizing different trainings, workshops, seminars, corporate presentations, on-campus recruitments and job fairs, on a regular basis, through which students get to learn about formal writing, etiquette and grooming, successful interviewing techniques, corporate networking and how to succeed in the work place.

Career Counseling Center of East West University takes pride in functioning efficiently and effectively. It takes a pride as well in seeing EWU graduates secure jobs in multinational and national business organizations, including Unilever, BATB, Nestlé, Coats, Bata, Marico, Reckitt Benckiser, DHL, Coca-Cola, Arla Foods, Avery Dennison, Bangladesh Edible Oil, Maersk, Li & Fung, Lafarge Surma, Berger Paints, BayerCrops, BASF, Novartis, Ericsson, Apex Footwear, Abdul Monem, ACI, Transcom, Square, BRAC, Beximco, PRAN-RFL, Rahimafrooz, Grameenphone, Robi, Banglalink, Airtel HSBC, Standard Chartered, Citibank N.A, Commercial Bank of Ceylon, IDLC, Eastern Bank, Prime Bank, Woori Bank, BRAC Bank, Bank Asia, UNDP, UNICEF, GIZ Bangladesh, Plan International, U.S Embassy Dhaka, British High Commission, Bangladesh, and the Embassy of the United Arab Emirates.

EWU Clubs

East West University (EWU) now has 18 clubs listed with the Department of Students' Welfare, which is responsible for supervising their activities. The names of these clubs are as follows:

1. Agro Industrialization Club
2. Business Club
3. Creative Marketing Club
4. Club for Performing Arts
5. Debating Club
6. Economics Club
7. Electronics, Programming and Robotics Club
8. English Conversation Club
9. Environmental & Social Club
10. Investment and Finance Club
11. IEEE Student Branch, EWU
12. Model United Nations Club
13. Photography Club
14. Rotaract Club

15. Science Club
16. Sociology Club
17. Sports Club
18. Telecommunications Club

These clubs are responsible for organizing cultural programs, arranging competitions, hosting sports events, initiating community volunteer projects, organizing seminars and workshops to prepare students for professional life, organizing fairs, study tours, research projects, computing activities within the university, and holding intra-university events. They function to connect students through program-specific activities for educational purposes and help create graduates equipped with interpersonal and social skills, and enable networking that will help students prepare for professional life and equip them with organizational and leadership skills. The idea is also to have students come together in activities that are enjoyable and that offer enough for everyone through a variety of clubs encouraged to flourish in the campus.

EWU Clubs, on the whole organize meaningful events in which students participate enthusiastically, and regularly carry out the activities they have been mandated to perform.

Institutional Quality Assurance Cell (IQAC)

East West University

Bangladesh has experienced a rapid change in higher education. The student number in tertiary education has doubled in the last four years. However, the quality of tertiary education and research could not match that growth. To achieve the target of quality education, Bangladesh government has taken many initiatives. As a consequence, East West University formed an Institutional Quality Assurance Cell (IQAC) in January 2016. That has been working to improve the teaching-learning practice and quality culture of the university.

IQAC has completed the external peer review process for the approved seven entities. Out of the seven entities, one was ranked excellent, five very good, and one good by the reviewers. All the entities completed their post improvement plans. The self-assessment reports, the external peer reviewers' reports and the improvement plans of the seven entities have been submitted to UGC.

IQAC has been working to ensure quality. Toward that goal IQAC organized workshops on "Time and Stress Management", ''Office Management" and "Sexual Harassment Policy Awareness" for the university's non-teaching officers. IQAC organized a workshop on ''Re-discovering Self: A Quest for Change" for students on probation. Workshops organized by IQAC for faculty members include "Self-Assessment Report writing", "Cooperative Learning & Classroom Management", ''Student Psychology" and ''Outcomes-Based Education (OBE) for Engineering Accreditation". Activities accomplished by the entities include Focus Group Discussion (FGD) with alumni, interaction meeting with industry advisory panel, surveys from different stakeholders, industry feedback on curriculum and final year design project, and workshop on sharing survey results, self-assessment report writing, post assessment improvement plan, compiling course learning outcomes and mapping with program outcomes, and assessment procedures in outcomes- based education.

Credit Transfer Policies

Credit Transfer Requirements

Students who intend to be admitted into EWU with credit transfer are considered for admission based on the result of the admission test and courses completed at public universities of Bangladesh, and other reputed private universities of Bangladesh. Credit is generally transferable, provided that course work has been successfully completed and is equivalent to that offered at East West University.

Faculty members evaluate courses already completed according to an established procedure. Courses taken at other university/institutions may satisfy the core curriculum requirements only if the courses are equivalent to EWU courses approved for the core curriculum and if a minimum (B-) grade was earned. Course equivalencies are determined on the basis of contents, prerequisites, writing requirements, and level. Some transfer students may be required to sit for placement examinations to determine eligibility for credit transfer.

Residency Requirements

A maximum of twenty five percent (25%) of credit hours for the intended undergraduate program may be accepted through credit transfer into EWU's academic program.

Important Guidelines

1. The award of credit transfer will be administered on a case-to-case basis.
2. Applicant must ensure that the following documents are submitted to apply for the credit transfer at the stipulated deadline:
   i. An Official Transcript (in sealed envelope) of the university/institution record to date.
   ii. Complete syllabus and Course Outline (duly attested) of the subjects that are applied to be credited.
   iii. An application for credit transfer.
3. A charge of Tk. 500/- (Five hundred) per credit for transfer/waiver has to be paid by the concerned student.

Course Registration

Course Registration Online

The Registrar's Office will notify newly accepted students about the time and place of their registration. Students are responsible for fulfilling all requirements of the degree program in which they have been admitted. They should consult their advisors on planning their course schedules and be familiar with EWU policies and procedures related to registration and graduation requirements for their degrees. Registration is incomplete until all fees are paid.

A student can not register after the scheduled date of registration mentioned in the academic calendar except by special permission of the Dean of Faculties. To avoid late fees (Tk. 500 to Tk. 1, 000), students must register during the scheduled registration period.

Registration for any session of the university is contingent upon eligibility for registration. Thus advance registration, including the payment of tuition and fees, are considered invalid if the student is later declared to be ineligible to register due to scholastic reasons. Detailed information about dates and procedures for advising and registration are shown in each semester's academic calendar of the university, which is available in the Registrar's Office/website/notice board of EWU.

Add/Drop/Withdraw

Students who seek to add or drop courses should consult their advisors first. They must also obtain signatures of instructors of relevant courses.

Students may add courses only within the date mentioned in the Academic Calendar, if space is available, with the approval of their academic advisors.

The last day for dropping a course with and without a record entry (i.e. "W") is mentioned in the semester Academic Calendar. The grade "Withdrawal" (W) is assigned when a student officially drops a course within the date mentioned in the Academic Calendar for the semester.

The instructor may drop students from a course if they fail to attend 80 percent of the scheduled classes. The student must keep the instructors informed regarding absences in classes.

Registration Guidelines

Students should also be familiar with the following general points about registration.

1. Registration for a semester is conducted under an Academic Calendar. Generally, Registration starts a week before the start of classes and late registration continues till the second week of classes. Student must know his/her advisor for the completion of the registration.
2. Mere attendance does not mean registration in a class, nor will attendance in a class for which a student is not registered be a basis for asking that a program change be approved permitting registration in that class. Students should complete the registration process before classes begin.
3. Tuition and fees are payable in advance.
4. Students cannot drop a course merely by stopping attendance.
5. An undergraduate student (except Pharmacy) must register for a minimum of 3 (three) courses (9 credits) every semester. Students of the B.Pharm. program must take 4 (four) courses (12 credits) every semester. Out of these three or four courses, as the case may be, a student may be allowed to withdraw from one course with a 'W' grade assigned.
6. The maximum number of courses a student can take in a semester is 5 (five). 6 (Six) courses for the students of B.Pharm in bi-semester system.
7. 20% penalty will not be applicable to those students (Undergraduate or Graduate Programs) who remain absent without advising and also take leave of absence within Last Date of Adding Courses/Last Day of Dropping Course(s) with 100% Refund.
8. A student (Undergraduate or Graduate Program) who was advised for courses in a semester but remained absent without authorization and without paying dues within last date of Adding Courses/Last Day of Dropping Course(s) with 100% Refund, will be required to pay semester tuition and fees as per normal rules of Academic Calendar together with Tk.1, 000/- additional fee.
9. A student (Undergraduate or Graduate Programs) who was advised for courses in a semester and have paid his dues, will be refunded as per the rules of Academic Calendar when dropping/withdrawing from a semester.
10. The students (Undergraduate or Graduate Programs) who are on probation and remained absent without permission may in some special cases be allowed leave by the Vice Chancellor for a maximum of one semester with 20% penalty of 9 credits tuition fees.

Late Registration

A student who seeks to register after the first day of the semester must have the permission of the respective Dean of Faculty. Those students who are given permission to register late must pay a late registration fee of Tk. 500 to Tk.1, 000.

Refund Policy

Applications for withdrawal from the university or from a course after the registration period is over must be made in writing to the Registrar. Merely notifying an instructor will not be sufficient. In cases of authorized withdrawals, and changes in schedule/registration (adds and drops), adjustment of semester tuition fees will be made as per provisions mentioned in the Academic Calendar.

No adjustment is authorized for the Admission Fee or other assessed fees. Financial assistance will be awarded on the same basis as the adjustment policy.

Grades, Rules and Regulations

Grading System

A student may earn five letter grades on the basis of his/her performance in a course. The letter grades A, B, C, and D are considered passing grades.The grade F is the failing grade. The numerical equivalents of the grades are as follows:

Numerical Scores	Letter Grade	Grade Point
97-100	A+	4.00
90 - below 97	A	4.00
87 - below 90	A-	3.70
83 - below 87	B+	3.30
80 - below 83	B	3.00
77 - below 80	B-	2.70
73 - below 77	C+	2.30
70 - below 73	C	2.00
67 - below 70	C-	1.70
63 - below 67	D+	1.30
60 - below 63	D	1.00
below 60	F	0.00
F* Failure	0.0	
U* Unsatisfactory	0.0	
I** Incomplete	0.0	
P*** Pass	0.0	
R** Repeat/Retake	0.0	
S*** Satisfactory	0.0	
W** Withdrawal	0.0	

*A 0 grade point in F Letter Grade is applied only for the calculation of the grade point average.

** Credits for courses with these grades do not apply towards graduation and are not used for the calculation of the grade point average.

*** Credits for courses with these grades are required for graduation but are not used for the calculation of the grade point average.

Re-Scrutiny of Scripts of Final Examinations

1. Re-evaluation of Scripts of Final Examinations is not allowed.
2. Re-Scrutiny (i.e. any possible error/omission in marking or counting) of Scripts of Final Examinations is only allowed.
3. If any change of grade is required that must be done by the faculty concerned within 7 (seven) days of the next semester through Department Chairperson and the Dean, to the Controller of Examinations.
4. If any faculty member is not available, Departmental Academic Committee will authorize one faculty member for re-scrutiny of Scripts and Change of Grades (if applicable).
5. Delayed Grade submission will require the Vice Chancellor's approval before it is entered into records.
6. A security deposit of Tk.200 will be charged on the students as Re-Scrutiny Fee for re-scrutiny of each Script of Final Examinations. If it is found that the error/omission was done by the faculty member concerned, the amount will be refunded to the concerned student.

Grade Report

Grade Reports are recorded and prepared by the Office of the Controller of Examinations and mailed to guardians soon after the end of each semester. Students are solely responsible for their academic progress and should contact their academic advisors as soon as possible if their performance is unsatisfactory. Failure to maintain satisfactory progress can lead to the cancellation of financial aid, academic probation, dismissal, or other equally serious consequences.

CGPA (Cumulative Grade Point Average)

EWU students are evaluated on CGPA (Cumulative Grade Point Average). Cumulative Grade Point Average earned by a student is the numerical value obtained by dividing the total grade points earned in a semester by the credits attempted for the semester. Only courses graded A+, A, A-, B+, B, B-, C+, C, C-, D+, D, and F are used to determine credits attempted.

In case students repeat courses, GPA and CGPA will be calculated on the basis of the grades obtained in the last attempt of the course(s) only. Grades obtained in all courses will be shown in the grade report.

Moreover, students who complete courses in addition to their normal credit requirements for graduation will inform the Registrar in writing about the courses, which s/he intends not to declare for consideration towards the requirements for the degree.

Additional courses are not counted in GPA and CGPA Calculation.

Probation and Dismissal

Student whose CGPA will be between 1 and 2 after the first two or any subsequent semesters, will be placed on probation for the next two semesters. Failure to raise their CGPA to at least 2 after the probation period (irrespective of whether s/he is a regular student or remains absent without authorization) will lead to dismissal from the university. If a student's CGPA falls below 2 subsequently, he/she will again be placed on probation. Student who are on probation or subject to dismissal are not allowed to drop a semester or to take leave of absence.

Academic Dismissal

A student whose CGPA falls below 1.0 after the first two or any subsequent semesters, will be automatically dismissed from the university. Students who fail to raise CGPA to satisfactory levels during the probation period will face dismissal from the university.

Remedial Course may be required for students on the basis of their score in the English part of the Admission test. Students who fail to pass in remedial courses in two attempts will be placed on probation.

A student dismissed on academic ground (s) may be allowed to be admitted in another program of this university on qualifying the Admission Test for that program.

Incomplete (I) Grade

The "Incomplete" (I) grade may be used in special circumstances. The "Incomplete" may be given only at the end of a semester to a student who has completed all other requirements except appearing in the final examination without further class attendance. The instructor must file with the Office of the Controller of Examinations an Incomplete Grade Form describing the work to be completed.

The student has the sole responsibility to take the initiative in making up the requirements for the Incomplete grade as specified by the instructor. If action is not taken within one week of the commencement of the next semester, the "I" grade will automatically be converted to "F", otherwise the "I" grade will revert to the tentative final grade (the final grade becomes an "F" if no tentative grade was assigned). In the event where the instructor from whom a student received an incomplete grade is not available, the disposition of the case involving an incomplete grade resides with the respective Dean of Faculty.

The concerned Instructor must submit the Incomplete (I) Grade within one week of the next semester through Department Chairperson and the Dean, to the Office of the Controller of Examinations.

Delayed Grade submission will require Vice Chancellor's approval before it is entered into records.

Usual submission of Grades by an Instructor shall be done as per Academic Calendar through proper channel.

Withdrawal (W) Grade

The grade "Withdrawal" (W) is assigned when a student officially drops a course within the date mentioned in the Academic Calendar for the semester.

Retake Policy

a. A student will be allowed to retake as many courses as he/she wants, but students will be allowed to retake a particular course only once with any grade he/she earned previously.

b. A student with 'F' Grade(s) in a course(s) may Retake the same any number of times to pass within the time limit allowed for Graduation. In case of repeating a course due to 'F' grade, the 'F' grade of previous attempt(s) will be converted to 'R' grade and the grade of last attempt will be counted in CGPA.

c. A student using the advantage of Retake Policy, shall not be eligible for getting Gold Medal/Award/ Distinction.

Students who wish to retake a course must obtain previous written permission of the Chairperson of the Department concerned. They will have to register for the course again and will be required to pay the usual tuition charges including lab (if applicable) and other fees.

Academic Honesty

There is a policy of zero tolerance on cheating. Any form of cheating such as copying any document or another person's work, seeking or providing help to other students during tests, or adopting any other form of unfair means during exams, will constitute grounds for disciplinary action. Instructors are expected to use reasonably practical means of preventing and detecting cheating. Any student found to be cheating will be reported to the Dean of concerned faculty by the relevant faculty member for disciplinary action.

Leave of Absence

Leave of absence or dropping a semester may be granted for up to three consecutive semesters/one academic year to a student in good academic standing (not to those on academic probation or subject to dismissal). A student applying for a leave of absence must give a definite semester for re-registration and must register in the following semester, immediately after the leave period. A leave of absence is granted through the Dean of Concerned Faculty.

However, if a student after completing the first semester of probation (1 out of 2 semesters), asks for leave/drop, on extreme compassionate ground he/she may be granted leave/drop for the 2nd semester of probation considering his/her improved result achieved in the first semester of probation. Attending and completing the first semester of probation is mandatory for any student whatever may be the case.

A student who does not return for re-registration at the specified semester will be classified as "Officially Withdrawn" and must apply for re-admission to the Registrar.

Students who are on probation and remain absent without prior permission, may, in some special cases, be allowed leave by the Vice Chancellor maximum for one semester with his discretion with 20% penalty of 9 credits tution fees.

Students, who are in good academic standing (CGPA 2.00 or above in Undergraduate Programs and CGPA 2.50 or above in Graduate programs), but remain absent without prior permission, may, on compassionate ground, be approved leave of absence by the Vice Chancellor with penalty as follows:

a. Leave of absence for one semester with penalty of 20% of the 9 credits tuition;

b. Leave of absence for two consecutive semesters with penalty of 30% of the 9 credits tuition; and

c. Leave of absence for three consecutive semesters with penalty of 40% of the 9 credits tuition;

If the span of the unauthorized absence exceeds three consecutive semesters/one academic year no permission shall be accorded and the student will be "Officially Withdrawn" from the university.

A newly admitted student, on compassionate ground, might be granted leave of absence for the first semester with a deferment fee of Tk.3, 000/- (or as fixed time to time) whether he/she has applied for leave, deferment or drop/withdrawal of the first semester. Such leave of absence for the first semester would be granted by the Pro-Vice Chancellor and if the student concerned does not continue from the 2nd semester his/her admission shall be cancelled and he/she shall be dismissed from the university. Application for deferred admission will be accepted upto the last day of dropping a course/semester with 85% refund.

Absence from Examinations

In case where a student has been absent from Mid Term examination of any subject due to special circumstances (Humanitarian, Death in the family, serious illness of the student etc.), the student must notify the respective faculty member within 48 hours of the conduct of the examinations on his/her initiative.

The make-up examination may be allowed in above circumstances by the concerned faculty members in consultations with respective chairperson. In case the reason of the absence is found unacceptable, the respective faculty member would follow the university guideline to assess the student's case and act accordingly.

In the case where a student has been absent from the final examination of any subject due to medical or humanitarian reasons, the student must notify the respective faculty member within 48 hours of the conduct of the examinations on his/her initiative. The faculty member may decide to record the grade as Incomplete (I) based on the support documents provided by the student along with the application for incomplete and take a supplementary examination within the stipulated time frame given by the university. In case the reason for the absence is found unacceptable, the respective faculty member would follow the university guideline to assess the student's case and act accordingly.

Scholarships and Financial Assistance

Since its inception, East West University has been awarding merit scholarships and need-based financial assistance to deserving students. Each year the university distributes at least 9% of its total earnings among 20% or more of its regular students. Such types of scholarships/financial aids, including family concession and freedom fighter scholarships are not available to those students who have already spent the regular study time required for the programs for which they are enrolled (e.g. Bachelor's degree program students are not eligible for any scholarship/financial aid beyond the four years that are required to complete the course as a regular student). Students, who have already completed required minimum total credits for a degree, will not be eligible for any scholarship/ financial aid. Students availing the advantage of retaking any course any time will not be eligible for any scholarship. No student of the university is entitled to benefit from more than one scholarship/financial aid scheme at any point of time.

According to the provision of the Private University Act, 2010, private universities are required to provide scholarships to 6 (six) percent of their enrolled students who are poor and meritorious (of which 3 percent is reserved for the wards of freedom fighters). Since its inception, the founders of East West University have adopted a policy of not paying any profit or dividend to themselves and of using a good proportion of its operating surplus towards nurturing merit and providing financial support to students in need. In the last twenty-one years, the scholarship and financial aid policy adopted by East West University has become a source of great encouragement to meritorious and financially constrained students. The academic world has enthusiastically greeted this policy pursued by East West University.

Benefits to students are awarded in the following ways:

1. Merit Scholarships

EWU has generous merit scholarships/financial aid programs. A sum of Taka 11,13,44,628 (Eleven core thirteen lac forty four thousand six hundred and twenty eight) was awarded to 1921 students in 2018-2019. Full-year tuition waiver merit scholarships (for a maximum of one-fourth of the total credit requirements of the program for undergraduate students) were awarded to:

(i) Top scorers in undergraduate admission tests with a minimum score of 75% marks: five (5) from the Faculty of Business and Economics, four (4) from the Faculty of Sciences and Engineering, and two (2) from the Faculty of Liberal Arts and Social Sciences.

Top scorers in graduate admission tests with a minimum score of 75% marks: one each in MBA and Telecommunication Engineering provided that at least 20 students get admitted to the program.

The continuation of this scholarship is contingent upon maintaining a minimum CGPA of 3.50 and abiding by the rules and regulations and the University's Code of Conduct for students at all time.

(ii) Candidates scoring GPA 5.00 (excluding the 4th subject) in the most recent SSC & HSC examinations will be awarded 100% Tuition Free Merit Scholarship at entry level in Undergraduate Programs for 4 (four) years subject to qualifying in the admission test, maintenance of minimum GPA 3.50 in each semester as a regular student (All Undergraduate students must register at least 9 credits in a semester; this credit requirement is 12 credits in a semester for the students of B.Pharm. Program) and abiding by the rules and regulations and University's Code of Conduct for students at all time;

(iii) Candidates securing 7 (seven) A's in 'O' Level examination (at one sitting) and 3 (three) A's in 'A' Level Examination (in one year) will be awarded 100% Tuition Free Merit Scholarship at entry level in Undergraduate Programs for 4 (four) years subject to qualifying in the admission test, maintenance of minimum GPA 3.50 in each semester as a regular student (All Undergraduate

students must register at least 9 credits in a semester; this credit requirement is 12 credits in a semester for the students of B.Pharm. Program) and abiding by the rules and regulations and University's Code of Conduct for students at all time;

(iv) District Quota: One poor and meritorious student from each district securing GPA 5.00 in the most recent SSC and HSC examination will be awarded a full-tuition free Merit Scholarship with lodging for four years of study in Undergraduate programs at EWU subject to qualifying in the admission test.

The continuation of this scholarship is contingent upon maintaining a minimum CGPA of 2.60 as a regular student and abiding by the rules and regulations and University's Code of Conduct for students at all time.

(v) Candidates scoring GPA 5.00 (including the 4th subject) in the immediate past SSC & HSC examinations, will be awarded 50% waiver of Tuition Fee as Merit Scholarship at entry level in Undergraduate Programs for the first 1 (one) year subject to fulfillment of the following requirements:

a. Qualifying the EWU Admission Test.

b. Maintaining of minimum GPA of 3.50 in each semester as a regular student (All Undergraduate students must register at least 9 credits in a semester; this credit requirement is 12 credits in a semester for the students of B.Pharm. Program).

c. Abiding by the East West University Disciplinary Code for Students at all time;

(vi) 100% Tuition Free Merit Scholarship to the students who receive Undergraduate degree from EWU with CGPA 4.00 for a maximum of two years of studies in Graduate programs at EWU subject to maintenance of CGPA 3.50 at all time as a regular student to continue the scholarship. EWU provides the same benefits under same terms and conditions to the students having first classes in both Honors and Masters from public Universities who get admission to Graduate programs on a case by case basis.

(vii) A committee has been formed to assess and recommend scholarship/financial aid to students who are from overseas and students who come from other educational backgrounds.

(viii) Top 10% students (10% of the actual number of students of each batch of each department enrolled during the immediate past year) who have completed at least one-fourth of the total credit requirement of the undergraduate program during the immediate past year with a CGPA of 3.90 and above will get full-tuition free Merit Scholarship for equal number of credits to be adjusted in the next three consecutive semesters.

On the basis of the above principles, students of Graduate programs also get Merit Scholarships but requirements of credit for the scholarships vary, depending on the total credits and the length of the program.

In case of a batch where 6 or less students fulfill the scholarship requirement (i.e., completed at least one-fourth of the degree requirement with a CGPA of 3.90 or above), only the top student will be entitled to receive one scholarship. The award will go to the best performer among students securing CGPA 3.90 or above. For calculation of the number of scholarships in each batch, the number will be rounded up if the fraction is 0.5 or above.

Merit Scholarships are extendable, subject to fulfillment of requirements (viii) above. To continue Merit Scholarships undergraduate students must register for at least three courses (9 credits) in each semester, for the students of B.Pharm. this requirement is at least four courses (12 credits), for the students of graduate programs this requirement is at least two courses (6 credits). The Merit Scholarship will be discontinued if any student of the Undergraduate or Graduate programs violates 'the East West University Disciplinary Code for Students' and/or if his/her CGPA falls below 3.50 calculated on the basis of the grades earned in the last three consecutive semesters/one year. To be eligible for Merit Scholarship/Financial Aid a student of Undergraduate Program must earn credits as mentioned in the table below in the last three consecutive semesters:

Undergraduate Programs	**Credits**
Bachelor of Business Administration	30
BSS in Economics	30

BA in English	30
BSS in Sociology	30
BSS in Information Studies & Library Management	30
Bachelor of Laws [LL. B. (Hons.)]	33
BS in Applied Statistics	31
B.Sc. in Electronic & Telecommunication Engineering	35
B.Sc. in Information & Communications Engineering	35
B.Sc. in Computer Science & Engineering	35
B.Sc. in Electrical & Electronic Engineering	35
Bachelor of Pharmacy	39
B.Sc. in Genetic Engineering & Biotechnology	33
B.Sc. in Civil Engineering	37

To be eligible for Merit Scholarship/Financial Aid, a student of Graduate Program must earn credits as mentioned in the table below in the last three/two consecutive semesters:

Graduate Programs	**Semester Completed**	**Credits**
MBA	3	29
EMBA	3	24
MBM	3	29
MDS	3	18
Master of Social Science in Economics	3	18
Master of Laws (LL.M)	2	18

Graduate Programs	Semester Completed	Credits
MA in English (45 credits Program)	3	24
MA in English (36 credits Program)	2	18
MA in English Language Teaching	2	21-33
MS in Applied Statistics	2	18
MS in CSE	2	18
Master of Science in Actuarial Science	2	18
MS in Telecommunications Engineering	2	18-20
Master of Population, Reproductive Health, Gender and Development (MPRHGD)	3	18
MS in Applied Physics and Electronics	2	18-20
Master of Pharmacy	2	18
Postgraduate Diploma in Population, Public Health & Disaster Management (PPDM)	1	9

2. Trustee's Scholarship

A Trustee member may award 300% tuition fee waiver to three students (100% each) or more than three students distributing this 300% at his/her discretion in each semester or a Trustee member may award a maximum of upto 27 credits tuition fee waiver in each semester or higher as per requirements under his/her discretionary quota. The unutilized credits of any semester can be carried forward to other semester(s) within the same academic calendar year.

3. Financial Assistance

(a) General

At the beginning of each semester, the university considers applications on prescribed forms for granting financial aids to deserving students on a need-cum-merit basis. Undergraduate applicants who have completed at least one-fourth of the total credit requirement of the program during the immediate past year with a minimum prescribed CGPA of 2.60 and with demonstrated financial need are offered financial assistance to cover part of the tuition fees. The actual amount depends on the number of applicants and the availability of funds. This is by far the largest component of the funding support both in terms of the amount of money as well as the number of recipients. Financial assistance is also extendable on fulfillment of the above requirements.

Similarly, applicants of graduate programs who have completed credits mentioned in the table above during the immediate past two/three semesters (whichever is applicable for which program) with a minimum prescribed CGPA of 2.80 and with demonstrated financial need are offered financial assistance to cover part of the tuition fees.

(b) Family Concession

When two siblings (sons and/or daughters of the same parents) and husband-wife study simultaneously at East West University, the second sibling/spouse is entitled to a half-tuition waiver. However, both must be admitted full-time into regular programs and both the sibling/husband-wife must study within the normal study time (the stipulated time for completing a degree) required for the programs in which they are enrolled. The benefit commences on the date of admission of the second sibling/spouse and ceases on the discontinuation of the study of any one of them in EWU, after his/her Graduation/Dismissal/ Suspension/Voluntary Withdrawal etc. or for any other reason. This benefit may extend up to the third sibling under the above-mentioned conditions.

If either of the siblings/spouses maintains a minimum CGPA of 2.60, while the other maintains a minimum passing CGPA (2.00 for Undergraduate Programs, 2.50 for Graduate Programs) the sibling/spouse benefit will be awarded and continued for the one who maintains the CGPA of 2.60. In case of the newly admitted students, if the first sibling/spouse can maintain the minimum CGPA of 2.60 the sibling/spouse benefit would be awarded to the second sibling/spouse provided the first sibling/spouse is not currently receiving any merit scholarship/ financial aid from EWU. When both the siblings/husband-wife (both are newly admitted students) are admitted in the first semester at a time, sibling/spouse benefit will be awarded to the second sibling/spouse without applying the credit and CGPA requirement for them in the first semester. Credit and CGPA requirements will be applicable for them from the second semester. Scholarship/Financial Aid/Sibling/Spouse benefit or any other financial benefits at EWU are not awarded simultaneously.

However, a winner of Merit Scholarship, may enjoy the Scholarship by surrendering the sibling/spouse or other benefits. i.e. any one out of two siblings/husband-wife will be entitled to get either merit scholarship (if eligible) or half tuition fee waiver or financial aid (if eligible) whichever they prefer. The benefit will be awarded at the time of registration of courses of both the siblings/husband-wife.

(c) Freedom Fighters' Scholarship

As a mark of respect to the valiant freedom fighters of the War of Liberation and Independence, the university reserves 3% admission quota for the wards of freedom fighters of all categories, subject to their fulfillments of the minimum admission requirements at East West University. The university also considers maximum 100% tuition waiver scholarship to the wards of wounded, deceased and financially needy freedom fighters, subject to the fulfillment of the following requirements:

The candidate must qualify in the EWU admission test; the candidate must provide proof that his/her parent was a freedom fighter. The tuition fee waiver as above will then be continued provided that the CGPA in each semester remains 2.60 or more.

To continue financial aid, undergraduate students must register for at least three courses (9 credits) in each semester, for the students of B.Pharm. this requirement is at least four courses (12 credits), for the students of graduate programs this requirement is at least two courses (6 credits). Financial aid is discontinued if any student of undergraduate or graduate program violates the East West University Disciplinary Code for Students and/or if his/her CGPA falls below 2.60 calculated on the basis of the grades earned in the last three consecutive semesters/one year.

4. Benefits for EWU Employees

If the children of the employees of EWU study at EWU, only one child of an employee will be granted 50% tuition fee waiver during the entire tenure of the employee's service at EWU subject to fulfillment of admission and all other criteria for study at EWU. Granting of this tuition fee waiver will be effective on admission of the student but its continuation will be subject to fulfillment of financial aid requirements.

Employees of EWU who study at EWU will be granted 50% tuition fee waiver but they have to maintain a minimum passing CGPA of the respective degree/program for continuation of the financial benefit which is provided by the university. Other academic and financial aid requirements which are applicable to the students will also be applicable to the employees of EWU. Like other students, employees of EWU who study at EWU have to register minimum course/credits in each semester. Financial benefit which is provided by the university to its employees for studying at EWU will continue until the respective employees remain in service at EWU.

5. The Medha Lalon Scholarship

In order to be able to extend further support towards nurturing merit, particularly to students from middle-class background, to female students, and to students from outside the metropolis, the Board of Directors of East West University set up in 2002 a scheme called the East West University Medha Lalon Fund with an initial endowment of Taka one and a half crore. The Board has also sanctioned an amount of Taka one crore thirty lakhs from the operating surplus of the university for the Fund. This is in addition to the disbursement each year of regular components such as the merit scholarships and financial assistance. Several philanthropic persons/organizations have contributed a combined amount of Taka twenty-seven and a half lakh to the Medha Lalon Fund. This

need-cum-merit based financial assistance is awarded from the annual earnings of the East West University Medha Lalon Fund deposited in a lucrative five-year interest earning Scholarship Deposit Account of Mercantile Bank Ltd.

The CGPA requirement for awarding Medha Lalon Scholarship is 3.50. To be eligible for Medha Lalon Scholarship a student of Undergraduate program must earn credits as mentioned in the table above, in the last one year. To be eligible for Medha Lalon Scholarship a student of Graduate program must also earn credits as mentioned in the table above in the last three/two consecutive semesters (whichever is applicable for whom).

For continuation of this Medha Lalon Scholarship, Undergraduate students must register for at least three courses (9 credits) in each semester, for the students of B.Pharm. this requirement is at least four courses (12 credits), for graduate students this requirement is at least two courses (6 credits). This scholarship is discontinued if any student of Undergraduate or Graduate program violates the East West University Disciplinary Code for students and/or if his/her CGPA falls below 2.70 calculated on the basis of the grades earned in the last three consecutive semesters/one year.

The following Medha Lalon Scholarships are currently being offered:

Sl.	Name of Scholarship	Name of Sponsors	Amount in Taka
1	Sujat Ali Mazumder Scholarship	Mr. Jalaluddin Ahmed (deceased)	Tk. 45, 000 a year
2	Anjuman Ara Begum Scholarship	Mr. Jalaluddin Ahmed (deceased)	Tk. 45, 000 a year
3	S.M. Sahiruddin Scholarship	Mr. S. M. Nousher Ali (deceased)	Tk. 45, 000 a year
4	Rowshan Ara Begum Scholarship	Mr. S. M. Nousher Ali (deceased)	Tk. 45, 000 a year
5	Sanuwar Bakht Chaudhury Scholarship	Mr. Farooque B. Chaudhury	Tk. 45, 000 a year
6	Sofia Khatun Scholarship	Mr. Farooque B. Chaudhury	Tk. 45, 000 a year
7	Lutful Bari Md. MunsurChaudhury Scholarship	Dr. Rafiqul Huda Chaudhury	Tk. 45, 000 a year
8	Shamsunnessa Begum Scholarship	Dr. Rafiqul Huda Chaudhury	Tk. 45, 000 a year
9	Sherifa Chowdhury Scholarship	Syed Manzur Elahi	Tk. 45, 000 a year
10	Sherifunnesa Begum Scholarship	Syed Manzur Elahi	Tk. 45, 000 a year
11	M. Mahtabuddin Scholarship	Dr. Mohammed Farashuddin	Tk. 45, 000 a year
12	Chamak Chand Scholarship	Dr. Mohammed Farashuddin	Tk. 45, 000 a year
13	M. Sujat Ali Scholarship	Mr. Mohammad Zahedul Haque, R.Ph	Tk. 45, 000 a year

14	Shakina Khatun Scholarship	Mr. Mohammad Zahedul Haque, R.Ph	Tk. 45, 000 a year
15	Mujibur Rahman Lasker Scholarship	Dr. Saidur Rahman Lasker	Tk. 45, 000 a year
16	Khodeza Abu Taher Scholarship	Dr. Saidur Rahman Lasker	Tk. 45, 000 a year
17	Moulvi Muhammad Shamsher Ali Scholarship	Dr. Muhammad A. Mannan	Tk. 45, 000 a year
18	Momena Khatun Scholarship	Dr. Muhammad A. Mannan	Tk. 45, 000 a year
19	Abu Ahmed Abdul Hafiz Scholarship	Mr. Shelley A. Mubdi	Tk. 45, 000 a year
20	Syeda Shaher Banu Chaudhurani Scholarship	Mr. Shelley A. Mubdi	Tk. 45, 000 a year
21	Abdul Kaher Scholarship	Mr. M. A. Mumin (deceased)	Tk. 45, 000 a year
22	Habiba Banu Scholarship	Mr. M. A. Mumin (deceased)	Tk. 45, 000 a year
23	AlhajjAbdur Rahman-Begum Walida Rahman Scholarship	Dr. Khalilur Rahman	Tk. 45, 000 a year
24	Justice Nurul Huda-Begum Sufia Huda Scholarship	Dr. KhalilurRahman	Tk. 45, 000 a year
25	M.A. Haque Scholarship	Mr. H. N. Ashequr Rahman MP	Tk. 45, 000 a year
26	Abdur Rahman Scholarship	Mr. H. N. Ashequr Rahman MP	Tk. 45, 000 a year
27	Abdul Jabbar Scholarship	Mrs. Razia Samad (deceased)	Tk. 45, 000 a year
28	Abdus Samad Scholarship	Mrs. Razia Samad (deceased)	Tk. 45, 000 a year
29	East West University Scholarship	East West University	Tk. 45, 000 a year
30	East West University Scholarship	East West University	Tk. 45, 000 a year
31	East West University Scholarship	East West University	Tk. 45, 000 a year
32	East West University Scholarship	East West University	Tk. 45, 000 a year
33	East West University Scholarship	East West University	Tk. 45, 000 a year

34	East West University Scholarship	East West University	Tk. 45, 000 a year
35	East West University Scholarship	East West University	Tk. 45, 000 a year
36	East West University Scholarship	East West University	Tk. 45, 000 a year
37	East West University Scholarship	East West University	Tk. 45, 000 a year
38	East West University Scholarship	East West University	Tk. 45, 000 a year
39	Dutch-Bangla Bank Ltd. Scholarship	Dutch-Bangla Bank Ltd.	Tk. 45, 000 a year
40	Dutch-Bangla Bank Ltd. Scholarship	Dutch-Bangla Bank Ltd.	Tk. 45, 000 a year
41	Dutch-Bangla Bank Ltd. Scholarship	Dutch-Bangla Bank Ltd.	Tk. 45, 000 a year
42	Suraiya Farashuddin Scholarship	Mrs. Suraiya Farashuddin	Tk. 45, 000 a year
43	Suraiya Farashuddin Scholarship	Mrs. Suraiya Farashuddin	Tk. 45, 000 a year
44	Standard Chartered Bank Scholarship	Standard Chartered Bank	Tk. 45, 000 a year
45	Standard Chartered Bank Scholarship	Standard Chartered Bank	Tk. 45, 000 a year
46	Eakub H. Chowdhury Scholarship	Samson H. Chowdhury (deceased)	Tk. 45, 000 a year
47	Eakub H. Chowdhury Scholarship	Samson H. Chowdhury (deceased)	Tk. 45, 000 a year
48	Mercantile Bank Limited Scholarship	Mercantile Bank Limited	Tk. 45, 000 a year
49	Mercantile Bank Limited Scholarship	Mercantile Bank Limited	Tk. 45, 000 a year
50	Naushaba-Kalim Sharafi Scholarship	Professor Naushaba Kalim Sharafi	Tk. 45, 000 a year
51	Mutual Trust Bank Ltd. Scholarship	Mutual Trust Bank Ltd.	Tk. 45, 000 a year
52	Mutual Trust Bank Ltd. Scholarship	Mutual Trust Bank Ltd.	Tk. 45, 000 a year
53	Prime Bank Ltd. Scholarship	Prime Bank Ltd.	Tk. 45, 000 a year
54	Prime Bank Ltd. Scholarship	Prime Bank Ltd.	Tk. 45, 000 a year

55	Eastern Bank Ltd. Scholarship	Eastern Bank Ltd.	Tk. 45, 000 a year
56	Eastern Bank Ltd. Scholarship	Eastern Bank Ltd.	Tk. 45, 000 a year
57	TM International Bangladesh Ltd. (AKTEL) Scholarship	TM International Bangladesh Ltd. (AKTEL)	Tk. 45, 000 a year
58	Rakibur Raza Education Scholarship	Dr. Ishfaqur Raza	Tk. 45, 000 a year
59	Dr. Ameerul Haque Scholarship	Mrs. Roshen Ara Haque	Tk. 45, 000 a year
60	Dr. Ameerul Haque Scholarship	Mrs. Roshen Ara Haque	Tk. 45, 000 a year
61	M.A. Mumin Scholarship	Mr. Mansoor Mumin	50% Tuition waiver in a semester

The East West University Medha Lalon Scholarship is administered by the Financial Aid Committee of the university. To acquire such aid, students must apply on a prescribed form. Applications are processed based on information provided by the applicants and according to the criteria set by the university and is subject to change at its discretion. Selection of scholars and financial aid beneficiaries is done through a computerized system that ensures full transparency.

The Financial Assistance Committee keeps Medha Lalon Scholarship donors inform about the operation of the funds on a regular basis. The Committee arranges meetings with East West University Medha Lalon Scholarship donors to apprise them of operating procedures, scholarship awards and performance of scholarship awardees as well as to seek guidance from them.

As is evident from the table below, the university policy is rather generous in nurturing merit since an increasing percentage of tuition revenue gets ploughed back and goes to deserving students. It is worth noting that the university, as a matter of policy, encourages enrolment of mofussil and rural students who are also, therefore, beneficiaries of the scholarship and financial aid awards. Furthermore, the university has also been consciously endeavoring to increase the proportion of female students who benefit from scholarship and financial aid programs.

The table below shows the number of recipients/beneficiaries of various scholarships, financial assistance programs and amount of scholarships/financial assistance distributed during the last five years.

Data in the table show a declining trend in terms of both the number of recipients and the amount of scholarship/financial assistance disbursed. This is mostly due to declining number of students meeting the criteria for such Scholarships and Financial Assistance. However, these figures (i.e. number of scholarship/ financial assistance recipients and amount of scholarship) have increased significantly from the academic year 2016-2017 with the introduction of 100% Scholarship for the wards of Freedom Fighters, relaxation of Merit Scholarship criteria and various other pro-scholarship schemes.

Various Scholarships and Financial Assistance Programs at EWU

Sl.	Name of Scholarship/ Financial Assistance	2014-2015		2015-2016		2016-2017		2017-2018		2018-2019	
		No. of Students	Amount (Tk.)	No. of Students	Amount (Tk.)	No. of Students	Amount (Tk.)	No. of Students	Amount (Tk.)	No. of Students	Amount (Tk.)
1	Merit Scholarship (Place Holders+ Merit Scholarship	366	21,480,189	346	23,291,116	384	28,602,914	410	34,425,145	464	37,004,695.00

	Awardees)										
2	Medha Lalon Fund*	106	3,463,610	230	7,155,390	462	15,779,000	762	26,103,149	814	40,784,665.00
3	Financial Aid	117	2,683,433	107	2,862,073	165	3,615,833	213	4,255,766	223	5,160,795.00
4	Half-Tution Family Assistance	140	4,667,859	160	5,395,035	182	6,370,894	191	7,440,396	174	7,323,936.00
5	Director's Quota	53	3,106,650	53	3,512,195	63	3,507,452	79	4,361,922	78	4,849,124.00
6	Special Assistance	29	441,076	20	399,457	12	291,420	11	193,149	14	321,735.00
7	Freedom Fighters' Scholarship	125	12,642,154	75	7,555,340	163	20,924,276	136	13,931,564	128	14,363,513.00
8	Divisional Quota	10	1,000,855	7	1,206,885	12	1,710,530	8	1,278,178	9	1,270,165.00
9	Medha Lalon Scholarship	0	0.00	0	0.00	0	0.00	0	0.00	17	266,000.00
Total		**946**	**49,485,826**	**998**	**51,377,491**	**1443**	**80,802,319**	**1810**	**91,989,269**	**1921**	**111,344,628.00**
	Percentage (%) on Tuition Fees	**4.77%**		**4.24%**		**5.59%**		**5.10%**		5.25%	

List of Courses

ACT 101: Financial Accounting

This course aims to disseminate accounting and reporting fundamentals to the beginners. Upon the completion of the course, the participants are expected to be expert in drafting financial statements independently with the style of reading financial statements and the regulatory (national and international) requirements. The course includes the chapters titled introduction, users and branches of accounting, conceptual framework of accounting, generally accepted accounting principle, institutional framework, financial statements, accounting cycle, measuring and recording business transaction, concept of adjusting and closing entries, worksheet, accounting for merchandising operations, accounting information systems, internal control and cash, accounting for receivables, and inventories, plant assets - natural resources and intangible assets and accounting for depreciation.

Credits: 3; Prerequisite: BUS 101

ACT 201: Management Accounting

This course provides an introduction to various management accounting concepts and techniques and also emphasizes the need of management accounting in the decision-making process. The course includes the following topics: Introduction to management accounting, managerial accounting and the business environment, cost terms, concepts and classification, job order costing, process costing, cost behavior analysis and use, cost-volume-profit relationships and break-even analysis, absorption costing and variable costing, profit planning, standard costing and the balance scorecard, flexible budgets and overhead analysis.

Credits: 3; Prerequisite: ACT 101

ACT 311: Taxation

Introduction and definitions of taxes, tax structure of Bangladesh, role of taxation, classification of taxes, introduction of income tax ordinance, 1984, classification of income, residential status, individual assessment, income from salary, income and from securities, income from house property, agricultural income, income from business and profession, capital gain, income from other sources, advance tax, set-off and carry forward of losses, return of income, recovery and appeal, income tax authority.

Credits:3; Prerequisite: ACT 201, BUS 231

ACT 411: Intermediate Accounting-I

The course aims to provide the students with an in-depth understanding of financial reporting analysis. This course will help students appraise theoretical and regulatory national frameworks as to prepare reports and financial statements of the companies. This course will mainly focus on the areas as Financial Accounting and Accounting Standards: Accounting information System, Income Statement and related information, Balance Sheet and Statement of Cash Flow, Accounting and Rectification of Errors, Cash and Accounting for Receivables, Valuation of inventories, Acquisition and Deposition of Property, Plant and Equipment, Equipment: Depreciation, Impairment and Depletion. In every chapter contents, focus will mainly be given on the rules provided by the international Accounting Standard (IAS), International Financial Reporting Committee (IFRS) and Bangladesh Accounting Standard (BAS)

Credits: 3; Prerequisites ACT 201, BUS 231

ACT 421: Intermediate Accounting-II

This course aims to provide the students with an in-depth understanding of financial reporting analysis. This course will help students appraise theoretical and regulatory national frameworks as well as to prepare reports and financial statements of the companies. This course intends to provide a strong foundation for advance courses in financial accounting with ability to apply these for the preparation of financial and related information to meet internal and external obligations. The course covers the following topics: accounting for intangible assets, current liabilities and contingencies, long term liabilities, stockholder' equity: contributed capital

shareholders' equity: retained earnings, dilative securities and earning per share, investments, statement of cash flows, full disclosure in financial reporting.

Credits: 3; Prerequisite: ACT411, BUS 231

ACT 427: Auditing

This course aims to provide the students with an in-depth understanding of the practice of auditing, theoretical and regulatory frameworks of auditing and the preparation of audit reports. The course covers the definition and origin of auditing, objectives and advantages of auditing, different types of audit, audit planning and control, internal check, internal control and internal audit, vouching of cash transactions, vouching of trading transactions, valuation and verification of assets and liabilities, audit under the companies act 1994, company auditor, liabilities of auditor, audit report, divisible profits, cost audit, International Standards on Auditing, accounting profession in Bangladesh, computerized auditing practice.

Credits: 3; Prerequisite: ACT 421, BUS 231

ACT 430: Accounting Information System

This course has been offered to show comprehensively and effectively the relationship between today's accounting information system and basic accounting concepts. The course would provide the student a background in system analysis and design, emphasizing the use of computer as a tool for accountants. The course includes the chapters titled: the study of accounting information system, the business environment and AIS, the technology of AIS, documenting AIS, data processing cycle, risk exposure and internal control structure, general control and application control, transaction processing cycle, processing information for management needs: DSS and ES, information system development.

Credits: 3; Prerequisite: ACT 201, MIS 305, BUS 231

ACT 441: Cost Accounting

This course aims to equip the students with different tools and techniques to control cost. To ensure competitive edge in the market there is no alternative of supplying quality products at a competitive price. Thus, the course combines cost and quality in one bundle. The course includes the chapters titled cost and its classification: high low method, regression analysis, accounting for material, accounting for labor, accounting for overhead, cost allocation: direct, step down and reciprocal methods, job order costing, process costing, accounting for joint product and by product, cost of quality, activity based costing, costing in 21st century.

Credits: 3; Prerequisite: ACT 201, BUS 231

ACT 456: Accounting Theory

This course is a study of theoretical framework, elements of financial statements along with their reporting and disclosure with emphasis on recent trends and developments in the agenda and pronouncement of the standard setting bodies (e.g. FASB and IASB). Topics include structure of accounting, their approaches to the formulation of accounting theory, conceptual framework for financial accounting, development of accounting, revenues, expenses, gains, losses, income, assets, liabilities, statement of changes in financial position and their disclosure. Students conduct independent research on financial accounting and reporting issues.

Credits: 3; Prerequisites: ACT 421, BUS 231

ACT 478: Advanced Accounting

This course aims to cater the advanced needs of students with concentration in accounting. Accounting standards in a multinational set up with different stream (UK GAAP, US GAAP and others) and convergence thereof is an important focus here. Standards development process and its impact on cross border complex business environment is blended into the course to make students confident and smart to serve the market. The course includes the chapters titled accounting and reporting environment, Legal, Regulatory and Institutional issues that affect reporting, Segment reporting, Interim financial reporting, SEC reporting, Accounting for foreign currency translation, Translation of foreign currency financial statements, Consolidated financial statements, financial statement of banks, insurance companies and other financial institutions, Forensic accounting, Accounting for human resources.

Credits: 3; Prerequisite: ACT 421, BUS 231

AST–101: Introduction to Statistics

Credit-3

Statistics and its origin

Definition, characteristics, uses & importance of statistics, population & sample, source of statistical data, parameter and statistic.

Summarizing Data

Meaning of data, level of measurement, variable and attribute, summarizing and presenting data, frequency distribution, formation of discrete and continuous frequency distribution, cumulative frequency distribution, presenting data by graphs and diagrams, presentation of qualitative data, presentation of quantitative data.

Measures of Central Tendency

Meaning of central tendency, measures of central tendency, arithmetic mean, median, quartiles, and percentiles, mode, geometric mean, harmonic mean, other measures of average, comparing the averages, properties of measures, effects of change in origin and scale, stem and leaf plot.

Measures of Dispersion

Meaning of dispersion, measures of dispersion, absolute measures of dispersion, relative measures of dispersion, empirical relations among measures of dispersion, comparing the measures, moments, central moments in terms of raw moments, effects of change in origin and scale on moments, Sheppard's correction for moments, shape characteristics of a distribution, Box and Whisker plots.

Correlation and Linear Regression

Correlation, measuring correlation, rank correlation. Regression, simple linear regression model, scatter diagram, least-square method, properties of regression coefficient, partitioning of the total variation in regression, coefficient of determination.

Prerequisite: No Prerequisite

References

Mostafa, M.G. (1989). *Methods of Statistics*. Dhaka : Karim Press & Publication

Daniel, W. (2009). *Biostatistics: Basic Concepts and Methodology for the Health Science*. 9th Edition. WSE

Hoel, P. G. (1984). *Introduction to Mathematical Statistics*.5th Edition. John Wiley, NY

Moore, P.G. (1976). *Principles of Statistical Techniques*. 3rd Edition. CambridgeUniversity Press, London

Yule, G.U. and Kendall, M.G. (1968). *An Introduction to the Theory of Statistics*. 14th Edition. Charles-Griffin, London

AST–102: Elements of Probability

Credit-3

Definition and Concept

Meaning, definition and scope of probability, Set theory, elements of set theory, sample space, axiomatic definition of probability, permutation and combinations, events, events space.

Conditional probability

Conditional probability and rules of probability for dependent and independence cases, Bayes theorem.

Random variables

Definition of random variables, probability mass function and probability density function, distribution function, joint probability functions, marginal and conditional distributions.

Mathematical expectations, expectations of sums and products of random variables, variance, conditional expectation and variance.

Inequalities

Cauchy-Schwartz, Markov and Chebyshev's inequalities, evaluation of probabilities (by calculation or by referring to tables as appropriate with the distributions).

Generating functions

Moment and cumulant generating functions, characteristic function, probability generating function (definitions and only for discrete distributions).

Prerequisite: No Prerequisite

References

Ross, S. (2012). *A First course in Probability*. 9th Edition. Pearson Prentice Hall, NJ

Roy M.K (2004), Fundamentals of Probability and Probability Distributions.Chittagong: Romax Publications.

Mood, A.M., Graybill, F.A. and Boes. D.C. (1974). *Introduction to the theory of Statistics*. 3rd Edition. McGraw-Hill.

Rohatgi, V.K. and Saleh, A.K.M. (2000). *An Introduction to Probability and Statistics*. 2nd Edition. A Wiley-Interscience Publication.

Meyer P.L. (1970). *Introductory Probability and Statistical Applications*. Addison-Wesley, USA.

Mosteller F., Rourke E.K.R. and Thomas G.B. (1970). *Probability with Statistical Applications*. 2nd Edition. Addison-Wesley, USA

Parzen, E. (1960). *Modern Probability Theory and its Applications*. John Wiley & Sons, Inc, NY .

AST–201: Probability Distributions Credit-3

Random Variables

Random variables; probability mass function, cumulative density function and probability density function. Review of Cauchy-Schwartz, Markov and Chebyshev's inequalities.

Discrete Probability Distributions

Bernoulli, binomial, Poisson, geometric, negative binomial, Hypergeometric and uniform distribution.

Continuous Probability Distributions

Uniform, exponential, gamma, beta, normal, log- normal, Cauchy, Pareto, and Weibull distributions.

Moments and Cumulants

Identification of moment and cumulant generating functions (MGF & CGF), characteristic function of discrete and continuous distributions. Showing moments from moment and cumulant generating functions; characteristic function, relationships between moments and cumulants, Inversion Theorem.

Distribution of a Function of Random Variables

Distribution of a function of random variables, determination of probability generating function (PGF) of discrete and integer-valued random variables. Application of PGF, MGF, and CGF the reasons. Joint, Marginal and conditional distributions. Law of large numbers; and the central limit theorem.

Prerequisite: AST-102, MAT 101

References

Ross, S. (2012). *A first course in Probability*. 9th Edition. Pearson Prentice Hall, NJ

Roy M.K (2004), Fundamentals of Probability and Probability Distributions.Chittagong: Romax Publications.

Mood, A.M., Graybill, F.A. and Boes. D.C. (1974). *Introduction to the theory of Statistics*. 3rd Edition. McGraw-Hill.

Rohatgi, V.K. and Saleh, A.K.M. (2000). *An Introduction to Probability and Statistics*. 2nd Edition. A Wiley-Inter science Publication.

AST–202: Sampling Distributions

Credit-3

Sampling Distributions

Sampling: basic concepts of random samples, inductive inference, populations and samples, distribution of samples, statistic and sample moments, sample means and their means and variances. Expectations of functions of random variables, expectation two ways, sums of random variables, product and quotient of random variables, independence of random variables, mean and variance of linear combinations of random variables. Deriving distributions of the linear combinations of random variables. Simulation and probability integral transformation.

Cumulative distribution function technique

Distribution of minimum and maximum, distribution of sum and difference of two random variables, distribution of product and quotient of random variables.

Moment generating function technique

Description, distribution of sums of independent random variables; transformation, and probability integral transformation; transformations for discrete and continuous random variables. Simulation.

Central limit theorem

Different versions of Central Limit Theorem, normal approximations to other distributions, continuity correction, law of large numbers.

Sampling from the normal distributions

Role of normal distribution in statistics, samples mean, Z-score, chi-square distribution, the F-distribution, Student's t-distribution.

Non-central distributions

Non-central chi-squared, t, and F distributions, definitions, derivations, properties.

Prerequisite: AST-101, AST-102

References

Ross, S. (2012). *A first course in Probability*.9th Edition. Pearson Prentice Hall, NJ

Mood, A.M., Graybill, F.A. and Boes. D.C. (1974). *Introduction to the theory of Statistics*. 3rd Edition. McGraw-Hill.

Hogg, R.V. and Craig, A.T. (2012). *Introduction to Mathematical Statistics.* 7th Edition. Pearson.

AST–203: Statistical Inference I

Credit-3

Review

Review of the concepts of parameters and statistics; sampling distribution; standard normal, t, F, and chi-square statistics; table values; and the central limit theorem.

Methods of Estimation

Likelihood functions and the maximum likelihood estimation. Other methods of finding estimators: methods of moments, least squares, and others.

Properties of point estimators

Closeness, unbiasedness, mean-squared error, consistency, efficiency, loss and risk functions, sufficient statistics, factorization criterion, minimal sufficient statistics. Completeness: complete sufficient statistics, exponential family of distributions. Large sample properties and procedures, empirical distribution function

Interval Estimation

Concepts of interval estimation, real life examples, Pivotal quantity method, confidence interval for the mean, variance, and proportions.

Introduction to test of hypothesis

Best critical region, most powerful tests, tests of hypothesis for the mean, variance, and proportions, and the concept of p-value.

Prerequisite: AST-101, AST-102, AST-201, AST-202

References

Mood, A.M., Graybill, F.A. and Boes. D.C. (1974). *Introduction to the theory of Statistics*. 3rd Edition. McGraw-Hill.

Bhuyan K.C (2010). Probability Distribution Theory And Statistical Inference, NCBA Publisher, New Delhi.

Johnson, N.L, Kotz, S. and Balakrishnan, N. (1994). *Continuous Univariate Distributions.* Vol. 1. 2nd Edition. John Wiley, New York

Johnson, N.L, Kotz, S. and Balakrishnan, N. (1995). *Continuous Univariate Distributions.* Vol. 2. 2nd Edition, John Wiley, New York.

Kendall, M., Stuart, A. and Ord, J.K. (1998). *Kendall's Advanced Theory of Statistics*, *Distribution Theory*. Vol 1. 6th Edition. OxfordUniversityPress, USA.

Kendall, M., Stuart, A. and Ord, J.K. (1999). *Kendall's Advanced Theory of Statistics, Classical Inference and the Linear Model.*Vol 2A. 6thEdition. OxfordUniversityPress, USA.

O'Hagan A. (1994). *Kendall's Advanced Theory of Statistics, Vol 2B: Bayesian Inference.* Edward Arnold.

Hogg, RV and Craig, AT (2012). *Introduction to Mathematical Statistics.* 7th Edition. Pearson.

AST–204: Agricultural Statistics and Design of Experiments

Credit-3

Agricultural statistics

Definition and application, basic and current agricultural statistics. Agricultural survey: estimation of mean yields, experiments, agricultural forecasting, livestock enumeration, Census of agriculture: objectives, scope, coverage, concepts and definitions. Statistics of selected agricultural products, index number and weighted indices.

Design of experiments

Real life examples of experimental design, basic principles, analysis of variance, analysis of fixed effect, random effects, and mixed effects model.

Single Factor Fixed Effect Model

Complete randomize design(CRD), estimation of model parameters, unbalanced data, model adequacy checking, compare with regression models, comparisons among treatment means, graphical comparisons of means, contrasts, orthogonal contrasts, multiple testing, Scheffe's method, comparing pairs of treatment means, comparing treatment means with a control, determining sample size, operating characteristic curve, least squares estimation of the model parameters, normality test.

Experiments with Blocks

Randomized blocks design (RBD) and Latin squares design (LSD), ANOVA, parameter estimation, model adequacy checking, estimating model parameters, Gareco-Latin square design. Balanced Incomplete Block Design (BIBD), statistical analysis of BIBD, least squares estimation of BIBD, examples of real life applications of these methods.

Prerequisite: AST-203

References

Montgomery, D C. (2012). *Design and Analysis of Experiments*. 8th edition. John Wiley and Sons Inc.

Kirk R.E. (2012).*Experimental Design.* 4thEdition.SAGE Publications, Inc.

Keppel G. and Wickens D. (2004). *Design and Analysis: A Researcher's Handbook*. 4th Edition. Pearson.

Rangaswamy R. (2000). *A Text Book of Agricultural Statistics.* New Age International.

Das M. N. and Giri N.C. (1986). *Design and analysis of Experiments*. 2nd Edition. Wiley Eastern, New Delhi.

Bhuyan M.R. (2007). *Fundamentals of Experimental Design*. 2nd Edition. Book World Publications, Dhaka.

AST-205: Introduction to Demography

Credit-3

Introduction

Basic concept of demography; Role and importance of demographic/population studies; Sources of demographic data: census, vital registration system, sample surveys, population registers and other sources especially in Bangladesh.

History

History of census taking and vital registration in the sub-continent, Uses of data from these sources; strength and weakness of data from them, Growth of population in Bangladesh since 1901.

Errors in demographic data

Types of errors and methods of testing the accuracy of demographic data, Quality checking and adjustment of population data. Post enumeration check (PEC) and detection of errors and deficiencies in data and the needed adjustments and corrections.

Fertility

Basic measures of fertility. Crude birth rate, age specific fertility rates (ASFR), general fertility rate (GFR), total fertility rate (TFR), gross reproduction rate (GRR) and net reproduction rate (NRR), child-woman ratio, Concept of fecundity and its relationship with fertility.

Demographic theory

Transition theory and the present situation in Bangladesh, Malthus' theory and its criticism. Mortality: Basic measures of mortality: crude death rate (CDR), age specific death rates (ASDR), infant mortality rate, child mortality rate, neo-natal mortality rate, Standardized death rate its need and use, Direct and indirect standardization of rates, Commonly used ratios: Sex ratio, child-woman ratio, dependency ratio, density of population.

Fertility and mortality in Bangladesh since 1951

Reduction in fertility and mortality in Bangladesh in recent years, Role of socio-economic development on fertility and mortality.

Nuptiality

Marriage, types of marriage, age of marriage, age at marriage and its effect on fertility, celibacy, widowhood, divorce and separation, their effect on fertility and population growth.

Migration

Definition, internal and international migration, Sources of migration data, Factors affecting both internal and international migration, laws of migration. Impact of migration on origin and destination, its effect on population growth, age and sex structure, labor supply, employment and unemployment, wage levels, and other socio-economic effects, Migration of Bangladeshis abroad and its impact on overall economic development of the country.

Prerequisite: AST-101

References

Shryock, H.S. and Siegel, J.S. and Larmon, A.E. (1975). *The Methods and Materials of Demography.* Vol-1 & 2. U.S. Department of Commerce Publication

Siegel, S.J. and Swanson, D.A. (2004). *The Methods and Materials of Demography.* 2nd Edition. Elsevier

Barclay, J. (1958). *Techniques of Population Analysis.* John Wiley & Sons, NY

Spiegelman (1968). *Introduction to Demography*. Revised Edition. Harvard University Press, Cambridge

Kpdekpo, G.M.K. (1982). *Essentials of Demographic analysis for Africa.* Heinemann International Literature & Textbooks

Chiang, C.L. (1984). *The Life Table and its Application*. John Wiley, NY

Bogue, D. (1969). *Principles of Demography*. John Wiley & Sons, NY

AST –206: Introductory Sampling Methods

Credit-3

Introduction

Uses of Sample Surveys and some review of sampling design of national surveys of Bangladesh, Preliminary Planning of a Sample Survey. Different types of errors associated with sampling and complete enumeration. Declining Coverage and Response Rates, Sampling Weights, questionnaire, Design effect with real life application, sample size determination.

The Population and the Sample

The Population, Elementary Units, Population Parameters, The Sample, Probability and Nonprobability Sampling, Sampling Frames, Sampling Units, and Enumeration Units, Characteristics of Estimates of Population Parameters, Bias, Mean Square Error, Validity, Reliability, and Accuracy.

Simple Random Sampling

How to Take and apply Simple Random Sample. Estimation of Population Characteristics and Standard Errors

Systematic Sampling

How to Take and apply Systematic Sampling, Estimation of Population Characteristics, Sampling Distribution of Estimates, Variance of Estimates, A Modification That Always Yields Unbiased Estimates.

Stratification and Stratified Random Sampling

How to Take and apply Stratified Random Sample , Population Parameters for Strata, Sample Statistics for Strata, Estimation of Population Parameters from Stratified Random Sampling, Estimation of Standard Errors, Allocation of Sample to Strata, Equal Allocation, Proportional Allocation: Self-Weighting Samples, Optimal Allocation, Stratification After Sampling.

Ratio Estimation and Regression Estimation

How to apply through Real life scenarios. Approximation to the Standard Error of the Ratio Estimated Total, Determination of Sample Size, Regression Estimation of Totals.

Cluster Sampling

Real life application of cluster sampling. Simple One-Stage Cluster Sampling, Two-Stage Cluster Sampling: Clusters Sampled with Equal Probability, Choosing the Optimal Cluster Size *n* Considering Costs, Cluster Sampling Unequal Probability: Probability Proportional to Size Sampling, the Horvitz–Thompson Estimator, the Hansen–Hurwitz Estimator.

Prerequisite: AST-203

References

Paul S. L. and Stanley L. (2008). *Sampling of Populations: Methods and Applications*. 4th Edition. John Wiley and Sons

Scheaffer, Mendenhall, Ott and Gerow (2011).*Elementary Survey Sampling*.7th Edition. Duxbury Press

Lohr, S L (1998). *Sampling: Design and Analysis*. 2nd Edition. Duxbury Press

Cochran, W.G. (1977). *Sampling Techniques*.3rd Edition. John Wiley and Sons Inc.

Des Raj (1968). *Sampling Theory*. McGraw-Hill Inc.

Kish, L. (1995). *Survey Sampling*. John Wiley and Sons Inc.

Som, R.K. (1996). *Practical Sampling Techniques*. 2nd Edition. Marcel Dekker, Inc.

AST-207: Applied Statistical Analysis with R

Credit-3

A first session in R

Scripting, getting help, packages, subsets, transforms.

Getting data into R

Flow control, classes and generic functions, loops and functions.

Basic data manipulation

Data entry, reading from different files, the data editor, interfacing to other programs.

Distribution fitting

Random sampling, probability calculations, discrete distributions, continuous distributions, the built-in distributions in R, densities, cumulative distribution functions, quantiles, random numbers.

Basic plotting

Graphical display of distributions, histograms, empirical cumulative distribution, Q–Q plots, boxplots, graphics for grouped data.

Basic stats

One-sample t test, Wilcoxon signed-rank test, two-sample t test, Z test, comparison of variances, paired t test, ANOVA and F test. Simple linear and logistic regression.

Survival Model

Essential concepts, survival objects, Kaplan–Meier estimates, log-rank test, Cox proportional hazards model.

Advanced data manipulation

Recoding variables, the cut function, manipulating factor levels, working with dates, recoding multiple variables.

Prerequisite: AST-203

References

Dalgaard, P. (2008). *Introductory Statistics with .*, 2nd Edition. Springer

Everitt, B. and Hothorn, T. (2006). *A Handbook of Statistical Analyses Using R*. Chapman & Hall/CRC

AST–301: Design and Analysis of Factorial Experiments

Credit-3

Introduction to Factorial Designs

Basic definition and principles; The advantage of factorials; The two-factor factorial design; statistical analysis of fixed effects model, model adequacy checking, estimating the model parameters, choice of sample size, the assumption of no interaction in a two-factor model, one observation per cell; The general factorial design; Fitting response curve and surfaces; Blocking in a factorial design.

Response Surface Methods

basic concept of response surface methodology.

Experiments with Random Factors

The two-factor factorial with random factors, The two-factor mixed model, Sample size determination with random effects, Rules for expected mean squares, Approximate F tests, Approximate confidence intervals on variance components, The modified large-sample method, Maximum likelihood estimation of variance components.

Nested and Split-Plot Designs

The two-stage nested designs; statistical analysis, diagnostic checking, variance components; General m-staged nested design; Designs with both nested and factorial factors, The split-plot design.

Analysis of Covariance

Description of the procedure, Factorial experiments with covariates.

Prerequisite: AST-204

References

Montogomery, D.C. (2012). *Design and Analysis of Experiment*. 8th Edition. John Wiley and Sons Inc

Kirk, R E (2013).*Experimental Design: Procedures for Behavioral Sciences*. 4th Edition. SAGE Publications, Inc.

Geoffrey Keppel and Wickens TD (2004).*Design and Analysis: A Researcher's Handbook.* 4th Edition. Pearson

Bailey, R (2008).*Design of Comparative Experiments. Cambridge*.3rd Edition. John Wiley & Sons, Inc.

Cochran, W.G. and Cox, G.M. (1992).*Experimental Design*. 2nd Edition. John Wiley & Sons, Inc.

Bhuyan, M.R. (2007). *Fundamentals of Experimental Design*. 2nd Edition. Book World Publications, Dhaka

AST–302: Advanced Sampling Techniques

Credit-3

Review

Sampling with real life application of unequal clusters with unequal probability with and without replacement different selection methods: PPS selection, Raj's, Murthy's and Rao-Hartley-Cochran methods of selection, Two-stage sampling with equal and unequal sized clusters-estimates and standard errors; estimation for proportions; stratified two-stage sampling.

Multistage sampling

Two and three stage sampling schemes with applications; the concept of self-weighting estimates; assumptions for self-weighting estimates.

Multiphase sampling

Real life application of multiphasesamplingtechnique, Two-phase or double sampling: ratio and regression estimators for double sampling and respective standard errors; double sampling for stratification. Repeated sampling: sampling from the same population on two occasions, more than two occasions. Interpenetrating sub sampling. Concept of base line survey and panel survey.

Special sampling schemes

Capture-recapture method; network sampling; snowball sampling; adaptive cluster sampling; rank set sampling with application.

Re-sampling methodologies

Bootstrap, Jackknife and Gibbs sampling.

Sampling and non-sampling errors

Sources and types of non-sampling error; non-sampling bias; non-response error; control of non-response; techniques for adjustments of non-response; Politz-Simon's technique; response bias and response variance.

Prerequisite: AST-206

References

Paul S. L. and Stanley L. (2008). *Sampling of Populations: Methods and Applications*. 4th Edition. John Wiley and Sons

Scheaffer, Mendenhall, Ott and Gerow (2012).*Elementary Survey Sampling*. 7th Edition. Duxbury Press

Lohr, SL (1998). *Sampling: Design and Analysis*. 2nd Edition. Duxbury Press

Cochran, W.G. (1977).*Sampling Techniques*. 3rd Edition. John Wiley and Sons Inc.

Des R. (1968).*Sampling Theory*. Mc Graw-Hill Inc.

Kish, L(1995).*Survey Sampling*. John Wiley and Sons Inc.

AST–303: Statistical Inference II

Credit-3

Review of finding point estimators

Review of likelihood functions and the maximum likelihood estimation, methods of moments, least squares, and others.

Introduction to test of hypothesis

Definitions, Type I and Type II errors, level of significance, power of the test, one tail vs two tail tests. Best critical region and the most powerful tests, simple vs. composite hypothesis.

Neyman Pearson Lemma and the Likelihood Ratio Tests

Finding BCR for tests for mean, variance and proportions; theory of confidence intervals and tests.Asymptotic distribution of LRTs and other large sample tests.

Properties of point estimators

Unbiasedness, efficiency, Rao-Cramer inequality, Exponential family of densities, sufficiency, minimal sufficient statistics, complete sufficient statistics, Rao Blackwell theorem, Lehman-Scheffe's theorem, Basu's theorem, sequential probability ratio test.

Test of independence and Goodness of fit tests

Chi-square tests, fitting binomial, Poisson, normal, and others common distributions, tests based on quasi-likelihood.

Introduction to Bayesian inference

Bayes theorem, prior distributions, likelihood, posterior distribution, Examples of Bayesian inference for discrete and continuous random variables.

Prerequisite: AST-203

References

Hogg, R. V., McKean, J. W. and Craig, A. T (2013). *Introduction to Mathematical Statistics*. 7th Edition, Pearson

Casella, G. and Berger, R. L. O (2002). *Statistical Inference*.2ndEdition.Duxbury, New York

Lehman, E. L. and Romano, J. P. (2005). *Testing Statistical Hypothesis*. 3rdEdition. Springer.

Kendall, M. G. and Stuart, A. (1979). *The Advanced Theory of Statistics*. 4th Edition. Volume 2, Charles Griffin, London

Gelman, A. Carlin, JB. Stern, HS. Dunson, DB. Vehtari, A. Rubin DB (2013). Bayesian Data Analysis, Third Edition, Chapman& Hall/CRC Texts in Statistical Science.

Silvey, S. D. (1975). *Statistical Inference*. Chapman and Hall, London.

Garthwaite, P. H., Jolliffe, I.T. and Jones, B. (2002). *Statistical Inference*. 2ndEdition.Oxford Science Publications.

AST–304: Applied Regression Analysis

Credit-3

Simple Linear Regression and Correlation

Correlation analysis, measures, simple linear regression model, scatter diagram, least-square method, properties of regression coefficient, estimation of variance.

Inferences for Simple Linear Model

Confidence intervals and t-test of the parameters, confidence interval estimate of the mean Y at a specific X, Prediction interval for a new Y, partitioning of the total variation in regression, coefficient of multiple determination.

Diagnostic procedures for aptness of model

Residual analyses, plots of residuals versus fits, residuals versus independent variables plots, tests for normality of residuals, Lack of Fit test, Pure Error, transformations as solution to model problems.

Multiple Regression Models and Estimation

Multiple Regression Model, Matrix Notations of Multiple Regression Model, Modelassumptions, estimates coefficient vector, Variance- Covariance matrix. Real life examples of extension to simple linear model, interaction models, basic estimation and inference for multiple regression, Generalized least- squares and Weighted least- squares, extra sum of squares principles and related tests.

Regression diagnostics

Multicollinearity and model diagnostics, autocorrelation, heteroschedasticity, selecting the best regression equations.

Prerequisite: AST-203, MAT206

References

Draper, N.R. and Smith, H. (1999). *Applied regression analysis*. 3rd Edition. Wiley

Kutner, M., Nachtsheim, C. and Neter, J. (2004). *Applied Linear Regression Models*. 4th Edition. McGraw Hill/Irwin Series

Chatterjee, S. and Hadi, A.S. (2012). *Regression Analysis by Example.* John Wiley, NY

Graybill, F.A.(1961). *An Introduction to Linear Statistical Models*. Vol-1. McGraw Hill, NY

Johnston, J (1972).*Econometric Methods*. 2nd Edition. McGraw Hill, NY

Montogomery, D.C, Peck, E. and Vining, G.G. (2007). *An Introduction to Linear Regression Analysis.* 4th Edition. John Wiley, NY

Weisberg, S. (1985). *Applied Linear Regression*. 2nd Edition. John Wiley & Sons, NY

AST-305: Introduction to Epidemiology

Credit-3

Concepts of epidemiology

Definitions of epidemiology and biostatistics, diseases and populations, health, and public health; Natural history of disease, causal concepts, epidemiologic variables, person, place, and time.

Methods of epidemiologic research

Types of study design with examples, ecological studies.

Measuring Disease Frequency

Incidence and prevalence, basic measures, rate and risks, estimation of risk, prevalence measures, mortality measures.

Measures of Association

Causal Relationships, Excess Risk, Covariate Measurement, Analysis of Epidemiologic and Clinical Data: Studying association between a diseases and a characteristic: (a) Types of studies in Epidemiology and Clinical Research (i) Prospective study (ii) Retrospective study (iii) Cross-sectional study; (b) Dichotomous Response and Dichotomous Risk Factors; (c) Expressing relationship between a risk factor and a diseases (d) Inference for relative risk and odds for 2X2 table.

Validity of Epidemiologic Research

Sensitivity, specificity and predictive values, Measurement Error, Bias and Confounding and their control, misclassification bias, effect modification and interaction, stratification; Matching, types and advantages.

Systematic Review and meta-analysis if epidemiologic studies, Logistic Regression and Cox proportional hazard models for analyzing health data.

Prerequisite: AST-203, AST-304

References

Leon Gordis (2009). *Epidemiology*, fourth edition; Saunders, Elsevier, Philadelphia, PA.

Devid G. Kleinbaum, Lawrence L. Kupper, Hal Morgenstern (1982).*Epidemiologic Research*, John Wiely& Sons, Inc.

Rothman Kenneth J. (2012).*Epidemiology An Introduction*; Second edition, Oxford.

MoysesSzklo, F. Javier Nieto. *Epidemiology Beyond the Basics*. Second Edition. Jones and Bartlett Publishers, Sudbury, Massachusetts.

Koepsell TD, Weiss NS (2003). *Epidemiologic Methods: Studying the Occurrence of Illness*. Oxford: Oxford University Press.

AST- 306: Population Studies

Credit-3

Adjustment of demographic data

Sources and types of errors and deficiencies in data; General methods of evaluation and detection of error and deficiencies in data; Methods of checking completeness and other types of errors in demographic data and their adjustment.

Graduation of data

Meaning and its need, techniques of graduation, graduation of age distribution.

Life table

Concept of Life table, structure and calculation, complete life table (life table by single year of age) and abridged life table, multiple decrement life tables, working life table, different life table functions and inter-relationships among them, use of life table, etc.

Force of mortality

Idea and definition calculation of life table with the help of force of mortality. Population growth, techniques to measure it, doubling time concept in demography. Population estimates and projections. Different techniques of population projection- component method, arithmetic/linear method, geometric method, exponential method, matrix method, etc., need of population projections.

Stable and stationary population, their characteristics and uses, Lotka's characteristics equation, intrinsic birth and death rates, effect of uniform drop in force of mortality on the growth rate, effects of changes in fertility and mortality on the age distribution of population. Model life tables, Coale and Demeney regional model life tables.

Population in Bangladesh

History of growth of population in Bangladesh; Implications of the growth of population in Bangladesh; Population policy in Bangladesh; Level, trends and determinants in fertility, mortality and migration in Bangladesh; Interrelationship between population and development; Future prospects of population and population control in Bangladesh; Aged and aging of population in Bangladesh;

Prerequisite: AST-205

References

KpedekpoGMK(1982). *Essentials of Demographic Analysis for Africa*, Heinemann

Shryock, H.S. and Siegel, J.S. and Larmon, A.E. (1975). *The Methods and Materials of Demography*. Vol-1 & 2. U.S. Department of Commerce Publication

Siegel, S.J. and Swanson, D.A. (2004). *The Methods and Materials of Demography*. 2nd Edition. Elsevier

Haupt Arthur and Thomas T. Kane. "Population handbook", 5th editions, 2004, internet version (Washington DC: Population Reference Bureau).

Cox Peter R. (1990). *Demography* (5th Edition). Cambridge University Press, London

James A. Palmore and Robert W. Gardner (1994). *Measuring Mortality, Fertility, and Natural Increase: A Self-Teaching Guide to Elementary Measures*. The East West Center, Honolulu.

Speigleman M. (1968). *Introduction to Demography*, Cambridge, University Press.

Bangladesh Demographic and Health Survey: 2014

AST- 307: Social Statistics and Social Development

Credit-3

National income

Concepts, Measurement and Problems; Social Accounting Matrix. Income Distribution and Wealth: Causes of Concentration; Meaning of Inequality; Measures of Inequality; Frequency of Income; Lorenz Curve of Income; Gini coefficient; Atkinson's index, etc.

Poverty

Conceptual issues of Poverty; Measurement of Different Poverty Indices.

Introduction to Psychometrics

Measurement in Psychology and Education; Intelligent and Achievement tests; Test scores; Equivalence of Scores; Z-score and T-score; Intelligent Quotient.

Definition, Nature and Importance of Anthropology; Role and Functions of Family

Social inequality: Inequality by Sex, Age, Rank, Caste, Race, Class, Power, Rule and Social Connections.

Social Sector Development Policies

Development in Agriculture, Industry (a) Growth Performance, Outlay and Yield (b) Agrarian Structure and Its changes (c) Plan Outlay; Rural Development; Human Development; Women and Youth Development; Land Reforms in Bangladesh; Infrastructure Development; ADP allocation to social sectors; Fiscal Policies for Development.

Prerequisite: AST-205

References

Blalock, H M. (1972). *Social Statistics*. McGraw-Hill

Garrett, H E. (2006). *Statistics in Psychology and Education*. Cosmo (Publications, India)

Atkinson, A (1978). *The Economics of Inequality*.2nd Edition.Oxford, Clarendon Press

AST- 308: Statistical Analysis using SPSS and SAS

Credit-3

SPSS

Brief knowledge in SPSS, Creating a data file in SPSS, Data Manipulation: Inserting variables, Inserting case, Merging files, case selection, selecting a random sample, aggregate data, splitting file, weight cases, Data Transformation, Categorize variables, Frequency distribution table, Measures of central tendency, measures of dispersion, Creating graphs and cross tables, Test of hypothesis, Correlation and regression, Logistic Regression.

SAS Programming

Introduction to SAS, SAS Syntax, SAS Datasets, Reading SAS Datasets, Reading Delimited Raw Data, Manipulating Data, Validating and Cleaning Data, Combining SAS Data Sets, Compilation and Execution of the Data Step, Producing Summary Reports, Enhancing Reports, Basics of ODS, Processing Data Iteratively, Transforming variables, Basic Statistics Using SAS, Univariate Description and Inference, ProcUnivariateAnalysis of Variance, Categorical Data Analysis, Linear Regression, Logistic Regression

Prerequisite: AST-203, AST-204, AST-304

References

Landau, S. and Everitt, Everitt, B (2004). A Handbook of Statistical Analyses using SPSS. New York: Chapman & Hall/CRC.

Field., A. (2009). Discovering Statistics Using SPSS, 3rd Edition, SAGE.

Der, G. and Everitt, B.S. (2002). *A Handbook of Statistical Analysis Using SAS*. 2nd Edition. Chapman & Hall/CRC.

AST- 309: Applied Nonparametric Statistics

Credit-3

Review

Review of elementary probability contents, Foundational comparison of parametric and nonparametric approaches, Dichotomous data problem, General connection between confidence sets and hypothesis tests, General connection between point estimates and hypothesis tests

Goodness-of-fit Tests

Chi-square, Kolmogorov-Smirnov two-sample test for general differences,

Nonparametric Procedures

Run test, Tests for a single location parameter, Test for several location parameters, Tests for scale parameters, Distribution tests, Measures of Association, Tests for Randomness trends, Nonparametric regression, Sign test and associated interval and point estimates for one-sample data, Signed rank test, interval and point estimates for one-sample data, Rank Correlation, Wilcoxon signed rank test, Wilcoxon sum rank test, Mann-Whitney U test, Kruskal-Wallis test

Asymptotic relative efficiency comparisons, Rank sum test, interval and point estimates for two-sample data, One-Way Layout: tests and multiple comparison procedures, Two-Way Layout: tests and multiple comparison procedures, Kendall's tau procedures for independence of two random variables Smoothing techniques, Kernel density estimation, spline and natural cubic spline.

Prerequisite: AST-303

References

Hollander, M and Wolfe, D A (2014). *Nonparametric Statistical Methods*. Third Edition. Wiley.

Sprent, P. and Smeeton, N.C. (2001). *Applied Nonparametric Statistical Methods*.3rd Edition. Chapman & Hall/CRC.

Siegel, S. and N. John Castellan, JR (1988). Nonparametric Statistics for the Behavioral Sciences, 2nd Ed, McGraw-Hill, Inc., New York.

Paul H. Kvam. PH., and Vidakovic, B. (2007). Nonparametric Statistics with Applications to Science and Engineering, John Wiley & Sons, Inc., Hoboken, New Jersey.

Gibbons, JD., and Chakraborti, S. (2003). Nonparametric Statistical Inference, 4th Ed., Marcel Dekker, Inc. New York.

AST- 310: Categorical Data Analysis

Credit-3

Introduction: Distributions and Inference for Categorical Data

Categorical Response Data, Distributions for Categorical Data, Statistical Inference for Categorical Data.

Describing Contingency Tables

Probability Structure for Contingency Tables, Comparing Two Proportions, Partial Association in Stratified 2×2 Tables, Extensions for $I \times J$ Tables.

Inference for Contingency Tables

Confidence Intervals for Association Parameters, Testing Independence in Two-Way Contingency Tables, Following-Up Chi-Square Tests, Two-Way Tables with Ordered Classifications.

Introduction to Generalized Linear Models

Generalized Linear Models for Binary Data and counts, Moments and Likelihood for Generalized Linear Models, Inference for Generalized Linear Models, Fitting Generalized Linear Models, Quasi-likelihood and Generalized Linear Models.

Logistic Regression

Inference and Interpreting Parameters in Logistic Regression, Logit Models with Categorical Predictors, Fitting Logistic Regression Models.

Prerequisite: AST-303

References

Agresti, A. (2007). *An Introduction to Categorical Data Analysis*.2ndEdition, Wiley.

D.W. Hosmer, S. Lemeshow (2000). *Applied Logistic Regression*, 3rd Edition, Wiley.

AST- 401: Advanced Probability and Stochastic Process

Credit-3

Modern probability

Probability as a set function; Borelfield and extension of probability measure, Probability measure notion of random variables, probability space; distribution function; expectations and moments, Convergence of random variables, Laplace transformation.

Markov Chains

Introduction, transition probability matrices of a Markov chain, First step analysis, some special Markov chains, Regular transition probability matrices, classification of states, basic limit theorem of Markov chain, Reducible Markov chains

Poisson process

The Poisson distribution, counting and Poisson process, the law of rare events, real life examples. The connection between Poisson process and the Poisson distribution, Poisson process as the distribution of waiting between events, the distribution of process increments, the behavior of the process over an infinitesimal time interval

Birth and Death Process

Continuous time Markov chains: pure birth processes; pure death processes; birth and death processes, Limiting behavior of birth and death processes; birth and death process with absorbing states; finite state continuous time Markov chains.

Renewal theory and its applications

Introduction, Definition andRelated Concepts, limit theorems and their applications, Renewal reward process regenerative process, The Poisson Process viewed as a RenewalProcess

Queuing Processes

Poisson Arrivals, Exponential Service Times, General Service Time Distributions, Variations and Extensions, Open Acyclic Queuing Networks

Prerequisite: AST-201, MAT206, MAT102

References

Ross, S. (2003). *Introduction to Probability Models.* 8th Edition. Elsevier

Grimmett, G. and Stirzaker, D. (2001). *Probability and random processes*.3rd Edition. OxfordUniversityPress, USA.

Karlin S. and Taylor H.M. (1975). *A First Course in Stochastic Processes*. 2nd Edition. Academic Press.

Taylor, H.M. and Karlin, S. (1998). *An Introduction to Stochastic Modeling*. 3rd Edition. Academic Press.

Bailey, N.T.J. (1964). *The Elements of Stochastic Processes with Applications to the Natural Sciences.* John Wiley.

Bartlett, M.S. (1978). *An Introduction to Stochastic Processes*. 3rd Edition. CambridgeUniversity Press. Cambridge.

AST- 402: Research Methodology

Credit-4

Introduction to Research

Concept, aims and objectives of research, types of research, steps involved in research, selection and formulation of research problems, proposal writing, examining the designs of some known researches.

Questionnaire

Questionnaire, checklists, guidelines, preparation of manuals for interviewer, enumerators training, monitoring and supervision for controlling the quality of data, how to avoid non-response.

Report writing

Report writing, content and organizations of the report, heading and subheadings, techniques of writing conclusion, summary, recommendations, footnotes references, appendix, Examining some local and international reports.

The concept of monitoring and evaluation (M & E)

Objectives, usefulness and scope of M & E. Performance monitoring versus performance evaluation, Timing and type of M & E: baseline, ongoing and end line evaluation, impact evaluation, M & E of ongoing programs (activities, inputs, outputs, effect), follow-up for remedies, and post program evaluation.

M& E data sources

Identification of indicators and characteristics of ideal indicators, factors influencing indicator selection.

Quantitative and Qualitative Research

Design of Quantitative Surveys, observational and experimental studies, Data Analysis tool-kit and Theory in Qualitative Research Articles.

Missing Data Analysis

Sources and types, mechanism, imputation, Maximum likelihood method, E-M algorithms.

Reliability and Validity in Measurements

Initiation of model building, Measurement error, Test for sound measurement, Reliability and its measurements, Validity and its types, Measurements of validity, stability of the model over the population, Construction of measurements scales.

Field trip, report writing and presentation on selected topic.

Prerequisite: AST-302, AST-306

References

John W. Creswell (2013). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*.4th Edition. SAGE Publications Inc.

C.R. Kothari (2004). *Research Methodology*, New Age International Pvt. Ltd.

Cochran W G (1977).*Sampling Techniques*. 3rd Edition. John Wiley, NY

AST- 403: Applied Multivariate Data Analysis

Credit-3

Preliminaries of multivariate analysis

Applications of multivariate techniques, organization of data, data display and pictorial representations, distance.

Random vectors and random sampling

Some basic of matrix and vector algebra, positive definite matrices, a square-root matrix, random vectors and matrices, mean vectors and covariance matrices, matrix inequalities and maximization.

The multivariate normal distribution

The multivariate normal density and its properties, the multivariate marginal, conditional and joint probability distributions,

assessing the assumption of normality, detecting outliers and data cleaning; transformation to near normality.

Inferences about a mean vector

The plausibility of mean vector as a value for a normal population mean, Hotelling T and likelihood ratio tests, confidence regions and simultaneous comparisons of component means.

Large sample inference about a population mean vector, inferences about mean vectors when some observations are missing; time dependence in multivariate data.

Comparisons of several multivariate means

Paired comparisons and a repeated measures design; comparing mean vectors from two populations

Principal components

Introduction and concepts of principal components, application.

Factor analysis

Introduction, the orthogonal factor model and methods of estimation, application.

Canonical correlation analysis

Introduction and basic concepts.

Discrimination and Classification

Introduction, separation and classification for two populations; profiles analysis, repeated measures designs and growth curves.

Prerequisite: AST-201, AST-303, MAT206, MAT101.

References

Johnson, R. A. and Wichern, D.W. (1999). *Applied Multivariate Statistical Analysis.* 4thEdition. Prentice-Hall.

Srivastava, M.S. (2002). *Methods of Multivariate Statistics*. Wiley

Hogg, R.V. & Craig, A.T. (2012). *Introduction to Mathematical Statistics*. 7th Edition. Pearson

AST- 404: Survival Analysis

Credit-3

Basic Concepts & Models

Introduction, lifetime distribution, continuous model, discrete model, hazard function, exponential distribution, Weibull distribution, log-normal distribution, log-logistic distribution, gamma distribution, regression models.

Observation schemes, Censoring & Likelihood

Types of censoring and maximum likelihood, Truncation.

Some Nonparametric & Graphical Procedures

Nonparametric estimation of a survivor function and quantiles, Non parametric methods for estimating survival function and variance of the estimator viz. Acturial and Kaplan- Meier methods product limit estimate, Nelson-Aalen estimate, plots involving survivor or cumulative hazard function, estimation of hazard or density function, methods for truncated and interval censored data, life tables.

Inference Procedure for Parametric Models

Inference procedure for exponential distribution, for gamma distribution, models with polynomial based hazard function, grouped, interval censored or truncated data.

Parametric regression models

Log-location scale regression model, proportional hazard regression model.

Prerequisite: AST-201, MAT101

References

Lawless, J.F. (2002). *Statistical Models and Methods for Lifetime Data*. 2nd Edition. Wiley

Elisa T. Lee, John WenyuWang(2003). *Statistical methods for survival data analysis*.3rd ed. Wiley

AST- 405: Industrial Statistics and Operations Research

Credit-3

Industrial Statistics

Fundamental concepts of industrial statistics, its purposes and real life application; industrial quality control. Total quality control; statistical quality control; chance and assignable causes of variation; statistical process control.

Control chart

Concept of control chart, necessary steps for constructing control charts, types of control charts, p-chart, d-chart, c-chart, u-chart, R and S charts (control charts with standard given and control charts with no standard given).

Basic concepts of acceptance sampling, OC curve and its uses, types of OC curves, properties of OC curves.Basic concepts of single sampling plan for attributes, constructed of type A and type B OC curves under the single sampling plan for attributes, specific points on the OC curve (AQL, LTPD), rectifying inspection, AOQ, AOQL, ATI, ASN, designing a single sampling plan. Basic concepts of double sampling plan, introduction to multiple sampling plan and sequential sampling analysis.

Operations Research

Nature and impact of OR approach, phases of OR. Concept of linear programming problem (LPP), construction of LPP, Solution of LPP: graphical and the simplex method, revised simplex method, Big-M method, two phase method, concept of convergence, degeneracy and cycling.

Duality

Dual primal relationship and formulation of dual problems. Sensitivity analysis: introduction to sensitivity analysis.

Game theory

Finite and infinite games, zero sum games, two person zero sum games, pay off matrix, maximum and minimum criterion of optimal solution of a game, dominance property.

Prerequisite: AST-203, AST-206, MAT206

References

Montogomery, DC. (2004*) Introduction to Statistical Quality Control*. Wiley.

Hiller, F.S. and Lieberman, G.J. (2001) *Introduction to operations Research*. 7th Edition. Mcgraw-Hill.

Taha, HA (2006). *Operations Research an Introduction*. 8th Edition. Prentice-Hall.

Balakrishnan, N (2002).*Handbook of Applied and Industrial Statistics*. 1st Edition. CRC.

AST- 406: Modeling Time Series Data

Credit-3

Introduction

Examples of time series, Objectives, Types of variation, Stationarity, Trends and Seasonal Components, No Seasonal Component, Trend and Seasonality, time plot.

The autocovariance of a stationary time series

Strict stationarity, applied to stationary time series, drawbacks of shift operator, backwards difference, the spectral density, Time series models, Box-Jenkins Model, concept of a filter, root characteristic equation of time series.

Estimation of the mean and the autocovariance

Estimation of Mean, Estimation autocovariance, Prediction, A short course in inference, Prediction of random variables, Prediction for stationary time series.

Wold's decomposition and Partial correlation

Partial autocorrelation, AR process, MA process, ARMA processes, Calculation of the ACVF, Prediction of an ARMA Process, cointegrated time series, ARIMA time series.

Random Walk

Concept and properties of discrete random walks and random walks with normally distributed increments, both with and without drift.

Multivariate Autoregressive Model Concept and examples.

Spectral analysis

The spectral distribution, Spectral representation of a time series, Prediction in the frequency domain, Interpolation and detection, Estimation of the spectral density, the periodogram, Smoothing the periodogram, Linear filters.

Forecasting

Introduction, univariate procedures, multivariate procedures, comparative review of forecasting procedures, prediction theory.

Identification, Estimation and Diagnosis of a time series

Criteria for choosing between models, diagnostic tests applied to residuals.

Prerequisite: AST-303, AST-304

References

Hamilton, JD. (1994).Time Series Analysis, New Jersey : Princeton University Press.

Makridakis, S., Wheelwright, C. and Hyndman, R.J. (1997). *Forecasting Methods and Application*, 3rd Edition. Wiley

Chatfield, C. (2003). *The Analysis of Time Series.* 6th Edition. Chapman & Hall.

Montgomery, DC. Jennings, CL. Kulahci, M. (2011). Introduction to time series analysis and forecasting, 2nd Edition. New Jersey : John Wiley & Sons. Inc.

AST- 407: Introduction to Generalized Linear Models

Credit-3

Generalized linear models

Exponential family of distributions, Properties of distributions in Exponential family, Component of GLM, Random systematic link function.

Estimation

Method of maximum likelihood, method of least- squares, estimation of generalized linear models.

Inference

Sampling distribution for scores, sampling distribution for maximum likelihood estimators, Confidence intervals for model parameters, adequacy of a model, sampling distribution for log-likelihood statistic, log-likelihood ratio statistic (deviance), assessing goodness of fit, hypothesis testing.

Multiple Regression

Maximum likelihood estimation, log-likelihood ratio statistic.

Models for binary responses

Probability distributions, generalized linear models, general logistic regression, maximum likelihood estimation and log-likelihood ratio statistic, other criteria for goodness of fit, least-square methods, Multinomial distributions, Nominal logistic regression models, Ordinal logistic regression models.

Models for Count Data

Probability distributions, log-linear models, maximum likelihood estimation,

Hypothesis testing and goodness of fit.

Prerequisite: AST-303, AST-304

References

Dobson, A. (2001). *An Introduction to generalized linear models*. 2nd Edition. Chapman & Hall

McCulloch, C. and Searle, S. (2001). *Generalized, linear and mixed models*. Wiley Lindsey, J. (1997). *Applying Generalized Linear Models.* Springer-Verlag.

Myers, RH., Montgomery, DC. and Vining GG. (2002). Generalized linear Models with Applications in Engineering and the Sciences. New York: John Wiley &Sons, Inc.

AST- 408: Life Contingencies

Credits-3

Introduction to Life insurance

Life insurance and annuity contracts, pension benefits, mutual and proprietary insurers

Survival Models

Actuarial notation, future lifetime random variable, force of mortality, future lifetime

Life tables and Selection

Life tables, fractional age assumptions, national life tables, survival models for life insurance policy holders, mortality trends

Insurance Benefits

assumptions, valuation of insurance benefits

Annuities

Annual annuities, annuities payable continuously, increasing annuities, evaluating annuity functions

Premiums

Preliminaries, assumptions, future loss random variable, the equivalence principle

Policy Values

Policy with annual cash flows, policy with continuous cash flows, policy alterations

Multiple State Models

Alive Dead Model, Permanent disability model, the disability income insurance model, Markov multiple state models in discrete time,

Joint Life and last Survivor benefits

Joint life and last survivor benefits, a multiple state model for independent future lifetimes, a model with dependent future lifetimes, the common shock model.

Prerequisite: AST-201, AST-303, AST-306

References

1. Dickson, D.C.M., Hardy, M.R. and Waters, H.R. (2013). *Actuarial mathematics for life contingent risks.* 2nd Edition. CambridgeUniversity Press

2. Benjamin, B and Pollard, J.H. (1993). *The Analysis of Mortality and other Actuarial Statistics.* 3rd Edition. Institute and Faculty of Actuaries

3. Jordan, C.W. (1975). *Life Contingencies.* 2nd Edition. Chicago: Society of Actuaries.

AST- 409: Bayesian Inference and Decision Theory

Credit-3

Bayesian Inference

Bayes theorem, prior, likelihood, posterior distributions, examples, Bayesian inference for discrete random variable, Bayes theorem for binomial distribution with discrete prior. Bayesian inference for continuous random variable, Bayesian inference for normal mean, Bayesian inference for difference between means, comparing Bayesian and frequentist inference for proportion, for mean. Bayes estimates in real life situations. Gibbs sampler, Markov Chain Mote Carlo (MCMC) simulation and Metropolis Hastings algorithms.

Decision Theory

Fundamental concept of decision theory, action space, Bayes decision rule and related examples, Role of sufficient statistics, James-Stein estimator, Minimax rule.

Robust statistics

The meaning of robustness, deviations from parametric models and estimation theory, Influence function (IF), gross-error sensitivity, local-shift sensitivity, rejection point, asymptotic variance, breakdown point, identification of outliers, Definitions of M-, L-, and R-estimators.

Prerequisite: AST-303, AST-304

References

Bolstad, W.M. (2007). *Introduction to Bayesian Statistics*.2nd Edition. Wiley. ISBN: 978-0-470-14115-1

Lee, P .M (2004). *Bayesian Statistics: An Introduction*.3rd Edition. Wiley

Casella, G. and Berger, R.L.O. (2002). *Statistical Inference*. 2nd Edition. Duxbury, New York.

AST- 410: Statistical Analysis using STATA

Credit-3

The Basics of Working with STATA

Starting a Sample STATA Session, Different Type of Files in Stata, Useful Commands in STATA, Overview of STATA Syntax

Importing and Exporting Data in STATA

Using and Saving STATA Data Files, Inputting Raw Data, Inputting Data from Spreadsheets, Inputting Data from Other Statistical Programs, Inputting Data from Fixed-Format Text Files

Basic Data Management in STATA

Labeling Data, Variables and Values, Creating and Recoding Variables, Subsets of Variables and Observations, Collapsing Data Across Observations, Working Across Variables, Combining STATA Data Files : Append and Merge, Reshaping Data from Wide to Long, Reshaping Data from Long to Wide

Graphics

Introduction to Graphics, Overview of Graph Two-way Plots, Two-way Scatter plots, Combining Two-way Scatter plots, Common Graph Options

Summary Statistics and Tables

Summary Statistics for Measurement Variables, Frequency Tables and Two-Way Cross-Tabulations, Multiple Tables and Multi-Way Cross-Tabulations, Tables of Means, Medians, and Other Summary Statistics

ANOVA and Other Comparison Methods

One-Sample Tests, Two-Sample Tests, Analysis of Variance (ANOVA)

Linear Regression Models

Correlation and Regression, Multiple Linear Regression, Predicted Values and Residuals, Basic Graphs for Regression, Hypothesis Tests, Dummy Variables, Automatic Categorical Variable Indicators and Interactions, Diagnostic Plots

Models for Binary and Categorical Outcomes

Logistic Regression, Probit Regression

Count Models: Poisson Regression, Negative Binomial Regression

Principal Components, Factor, and Cluster Analysis

Principal Components, Factor Analysis, Cluster Analysis

Time-series with STATA

Smoothing, Time Plot, Lag, Leads, Differences, Correlograms, Introductory Time Series Models

Structural Equation Modeling

Introduction to SEMs, Major types of SEMs, General SEM in STATA.

Prerequisite: AST-303, AST-304

References

Lawrence C. Hamilton (2013).*Statistics with **STATA***. Version 12, 8th Edition.

Alan C. Acock (2012).*A Gentle Introduction to Stata*. Revised 3rd Edition. Taylor & Francis.

Sopha R. Hesketh and Brian Everitt (2007).*A Handbook of Statistical Analyses using Stata*. 4th Edition. Chapman & Hall/CRC.

AST- 499: Project and Seminar

Credit-3

Each student will be required to prepare a project report and present the report in a seminar. For the project work, each student will be assigned to a teacher at the beginning of the academic year. Submission and evaluation should be made before the commencement of final examination. Fifty percent weight of the course will be allotted to project works and the remaining fifty percent for seminar presentation.

The internal members of the examination committee will evaluate the performance in the seminars and the report will be evaluated by one internal examiner and one external examiner nominated by the examination committee.

Prerequisite: Completion of at least 100 credit hours.

BUS 101: Introduction to Business

This is a compulsory general education course for students of all degree programs of EWU. It aims to provide a comprehensive introduction to the basic concepts and issues related to business operations and developments.

It acts as a general basis and foundation level course on which more focused and concentrated studies can be applied. Topics include: Business and its importance, forms of business ownership, business environment and globalization, ethics, international business, fundamentals of management, human resources management, motivation, marketing, financial management and investment, and fundamentals of accounting.

Credits: 3; Prerequisite: None

BUS 231: Business Communication

Study of communication as a tool of administration and management, practice in writing a wide variety of types and forms of communication, and inclusion of oral and visual components to provide and integrate approach. This course aims at teaching the basic principles and applications of business communication. It equips students with major communication tools. Enhancement of students' written and oral skills is one of the most important aspects of this course. It helps students to improve their ability to communicate more effectively and efficiently. The knowledge of writing and presenting business documents prepares students for the challenges of the new millennium. It certainly will provide students with a competitive edge in this fast growing business world.

Credits: 3; Prerequisite: ENG 102

BUS 301: Business Ethic

This course is designed to provide an analysis and examination of significant contemporary ethical issues and challenges existing in the business arena. Emphasis will be placed upon the manager's social and environmental responsibilities to a wide variety of stakeholders, including employees, customers and the public. Ethical dilemmas and dilemmas and decision-making frameworks at the personal, organizational and societal levels will be explored. Student engagement through debates and discussions on in real-world situations is a critical portion of the course.

Credits : 3; Prerequisites: ENG 102, BUS 231

BUS 321: Business for Engineering & Technology

Credits: 3; Prerequisite: None

This course should be taught with emphasis on engineering technological dimensions and practical examples drawn from engineering organizations and practices. Topics to be covered: Business Environment (Types of Business, Entrepreneurship skills, the external environment of business, SWOT and PEST Analysis, Steps in setting up a new business). General Management (Managerial Roles and Organization Structure, Typical Structure of a manufacturing organization, Managerial tools for Decision making, Leadership, Motivation models, Strategic planning). Operational Management (Product and Services, product design and process selection, Faculty location and layout, Operational planning and scheduling, quality management, inventory and material management, productivity measurement and improvement). Financial Management (Basic accounting and financial concepts, Introduction to Financial Statement, Financial Statement Analysis).

BUS 361: Legal Environment of Business

This subject is designed and taught to give the students and an appreciation of legal environment in relation to business activities. The student will undertake studies in some of the core law paper essential for business. The course examines the principles of law of contract and different legal regimes regulating special types of contracts such as law of agencies, law of sale of goods, law of company and partnership etc. Then the course examines some legal regimes having application for international business transaction in particular laws concerning international sale of goods: CIF and FOB contract, laws concerning international carries of goods by sea and laws concerning financing of trade are reviewed under this course. In addition, labors laws and alternative ways of dispute solution are also considered in this course. Other than making the students familiar with basic laws concerning business affairs, efforts are being made to allow them to appreciate the application of those laws in real business practice. Students are being asked to solve some commercial disputes (specially designed to suit the course) and, secondly, students are introduce with the basic court structure of the country and the dispute settlement procedure.

Credits: 3; Prerequisites: BUS-231, MGT-101

BUS 498: Project Work

The coordinating instructor must assign a specific topic to an individual student. The student must submit a proposal at least a semester before he/she actually starts working on this project report. Students completing 105 credits may be allowed to enroll in this course with the permission of the chairperson and course instructor.

Credits: 3

BUS 499: Internship

This working experience enables students to apply the principles and practices of business in the local setting. This will provide students with the opportunity to get real life exposure in the contemporary business environment of Bangladesh. Students completing 105 credits with a minimum CGPA of 2.5 may be allowed to enroll into this course with the permission of the chairperson and course instructor.

CE100 Civil Engineering Drawing

Credits: 0+1.5

Lines and lettering; plane geometry: drawing of linear and curved geometric figures, e.g. pentagon, hexagon, octagon, ellipse, parabola, hyperbola; solid geometry: concept of isometric view and oblique view, theory of projections; drawing of isometric view of 3D objects such as cube, prism, pyramid, cone and cylinder; projections of cube, prism, cone, cylinder; developments of cube, pyramid, cone, cylinder; plan, elevations and sections of one storied buildings and bridges.

Text Books:

Civil Engineering Drawing by - Gurcharan Singh & Subash Chandra

Prathomic Engineering Drawing by - Hamonto Kumar Bhottacharjo

Engineering Drawing by Basant Agrawal and C M Agrawal

CE101 Analytic Mechanics

Credits: 3

Coplanar and non-coplanar force systems; moments; analyses of two-dimensional frames and trusses; friction; flexible chords; centroids of lines, areas and volumes; moments of inertia of areas and masses; plane motion; liner momentum and impulse; angular momentum and impulse; internal forces and friction; introduction to space frames.

Text Books:

Title: Analytic Mechanics –Third edition. Author: Virgil Moring Faires & Sherman Daniel Chambers.

Engineering Mechanics: by William F. Riley, Leroy D. Sturges.

Analytic Mechanics by – Faires & Chambers (3rd Edition)

Engineering Mechanics by – Singer

Engineering Mechanics: Statics, 13th Ed., Hibbeler

Engineering Mechanics: Dynamics, 13th Ed., Hibbeler

Fundamentals of Physics:, 9th Ed., Halliday, Resnick and Walker.

CE102 Computer Aided Drafting

Credits: 0+1.5

Introduction to computer usage; introduction to CAD packages and computer aided drafting: drawing editing and dimensioning of simple objects; plan, elevations and sections of multi-storied buildings; reinforcement details of beams, slabs, stairs etc; plan and section of septic tank; detailed drawings of roof trusses; plans, elevations and sections of culverts, bridges and other hydraulic structures; drawings of building services.

Text Books:

Engineering Drawing by M.B. Shah & B.C. Rana

Engineering drawing: with an introduction to AutoCAD by Dhananjay A Jolhe

Fundamentals of engineering drawing by Cecil Jensen & Jay D. Helsel

Fundamentals of AutoCAD by Steven B. Combs & Jay H. Zirbel.

CE103 Surveying and Introduction to GIS

Credits: 3+1.5

History of surveying, introduction to surveying, orientation with survey equipments and instruments, reconnaissance survey/project survey, linear measurements, traverse survey, triangulation, levelling, contouring, calculation of area and volumes, house setting, problems of heights and distances, curve and curve ranging. transition curves, super-elevation and vertical curves, tachometry: introduction, principles and problems of tachometry, some basic concepts & definition of spherical trigonometry of astronomical survey, map: definition, types, scale & measurements of map, map & map projections, standardization of projection, acoustic measurements and investigations; hydrographic operations.

GIS: some basic concepts, location & spatial data, GIS data source (vector & raster data), use of GIS and application of GIS, features of arc GIS, natural resource management by GIS, GIS in flood management, GIS in project management, GIS in urban planning and other civil engineering aspects.

Introduction to remote sensing, use and application of remote sensing, features of ERDAS imagine, introduction to photogrammetric survey, features of virtual globe map and geographical information program, GPS: an overview, application of GPS.

Text Books:

Theory

Surveying Volume 1, 2, 3 – Dr. B.C. Punmia

Surveying – M.A Aziz

Surveying &Leveling (Part-1) – S.V. Kulkarni & T.P. Kanitkar

Surveying- Volume I, II, III by- Dr. B.C. Punmia (SI Units)

A Text book of Surveying by- M.A. Aziz & Shahjahan

Schaum's Outline of Introductory Surveying by Roy Wirshing and James Wirshing

Construction Surveying and Layout: A Step-By-Step Field Engineering Methods by Wesley G. Crawford

Basic Surveying (4th edition) by Raymond Paul and Walter Whyte

Concepts and Techniques of Geographic Information System by – C.P. Lo Albert and K.W. Yeung

Principles of Geographical Information System by – Peter A. Burrough and Rachel A. McDonnel.

Geographical Information System and Computer Cartography by - Christopher Jones

ArcGIS 9.3.1 Tutorial by – Wilpen L. Gorr, Kristen S. Kurland.

Practical Surveying

Surveying- Volume I, II, III by- Dr. B.C. Punmia (SI Units)

A Text book of Surveying by- M.A. Aziz &Shahjahan

Schaum's Outline of Introductory Surveying by Roy Wirshing and James Wirshing

Construction Surveying and Layout: A Step-By-Step Field Engineering Methods by Wesley G. Crawford

Basic Surveying (4th edition) by Raymond Paul and Walter Whyte

CE200: Details of Construction

Credits: 0+1.5

Types of building, components of a building, design loads, framed structure and load bearing wall structure; foundations: shallow and deep foundation, site exploration, bearing capacity of soil, standard penetration test; brick masonry: types of brick, bonds in brickwork, supervision of brickwork, defects and strength on brick masonry, typical structures in brickwork, load bearing and non-load bearing walls, cavity walls, partition walls; lintels and arches: different types of lintels and arches, loading on lintels, construction of arches; stairs: different types of stairs, floors: ground floors and upper floors; roofs and roof coverings; shoring; underpinning; scaffolding and formwork; plastering, pointing, painting; distempering and white washing; cement concrete construction; sound insulation: acoustics; thermal insulation; house plumbing: water supply and wastewater drainage; thunder arrestor.

Text Books:

Concrete and Formwork by T W Love

Building Construction by W.B. McKay (V. 1)

BDA Guide to Successful Brickwork by the Brick Development Association.

Concrete Construction, by Ken Nolan

Building Construction by – Sushil Kumar

Formwork for Concrete by M.K. Hurd, Fifth Edition.

New Scaffolding Guidance TG20:08 – Guide to Good Practice for Scaffolding with Tube and Fittings NASC (National Access and Scaffolding Confederation), UK

Plumbing a House: For Pros by Pros by Peter Hemp

Building Construction by – Dr. B.C. Punmia

Building Construction Engineering by – Gurcharan Singh

Construction Drawings and Details for Interiors: Basic Skills, 2nd Edition by Rosemary Kilmer and W. Otie Kilmer

Sound Insulation by Carl Hopkins

Popular Mechanics Complete Home How-to by Albert Jackson, David Day

PWD manual on house construction and plumbing

CE201: Engineering Materials

Credits: 3+1.5

Properties and uses of aggregates, brick, cement; sand, lime, mortars; concrete; concrete mix design; admixtures; wood structures and properties; shrinkage and seasoning; treatment and durability; mechanical properties; wood products; basic property of FRP composites and available FRP composite products; steel; aluminum; introduction to geo-textiles; definition of stress and strain; plane stress and strain condition; identification of strain components of elastic, elasto¬-plastic and elasto-visco-plastic materials; time dependent strain response of these materials due to different types of loadings; mathematical and simple rheological modeling for prediction of creep behavior; ferro-cement: advantages and uses; corrosion and prevention of steel in RC structures; offshore structures; material for ground improvement; application of nano technology in cement and concrete; introduction to high performance material (ie., green building materials, ECC etc).

Text Books:

Theory

Building Materials by – Gurcharan Singh

Engineering Materials by - M.A. Aziz

A Text book of Engineering Materials by – G.J. Kulkarni (6th Edition)

Engineering Materials Technology: Structures, Processing, Properties, and Selection (5th Edition) by James A. Jacobs and Thomas Kilduff.

Sessional

Building Materials by – Gurcharan Singh

Engineering Materials by - M.A. Aziz

Laboratory manual

CE203 Engineering Geology and Geomorphology

Credits: 3

Minerals; identification of minerals, common rock forming minerals; physical properties of minerals; mineraloids rocks; types of rocks, cycle of rock change; earthquake and seismic map of Bangladesh. Structural geology; faults; types of faults; fold and fold type; domes; basins; erosional process; quantitative analysis of erosional land forms. Channel development; channel widening; valley shape; stream terraces; alluvial flood plains; deltas and alluvial fans; channel morphology; channel patterns and the river basin; geology and geomorphology of Bangladesh.

Text Books:

A Geology for Engineers by – F.G.H. Blyth (Low priced text book)

A Geology for Engineers by – Blyth &Freitas (7th Edition)

Physical Geology by – Leet, L Don, Judson, Sheldon (2nd Edition)

Principles of Geomorphology by – William D. Thornbury (2nd Edition)

CE211 Mechanics of Solids-I

Credits: 3+1.5

Prerequisite: CE101

Concepts of stress and strain, constitutive relationships; deformations due to tension, compression and temperature change; beam statics: reactions, axial force, shear force and bending moments; axial force, shear force and bending moment diagrams using method of section and summation approach; elastic analysis of circular shafts, solid non-circular and thin walled tubular members subjected to torsion; flexural and shear stresses in beams; shear centre; thin walled pressure vessels.

Text Books:

Theory

Engineering Mechanics of Solids by - Popov

Theory and Problems of Strength of Materials by -William A Nash

Strength of Materials by – Andrew Pytel, Ferdinand L. Singer (4th Edition)

Sessional

Engineering Mechanics of Solids by – Popov

Theory and Problems of Strength of Materials by -William A Nash

Laboratory Manual by Bear and Johnson

CE213 Mechanics of Solids-II

Credits: 3

Prerequisite: CE211

Symmetric and unsymmetric bending of beams; stress transformation, failure criteria; beam deflection by direct integration and moment area method; buckling of columns; elastic strain energy and external work; cable and cable supported structures; bolted, riveted and welded joints.

Text Books:

Engineering Mechanics of Solids by – Popov

Advanced Strength and Applied Elasticity, 5th Edition, by A C Uguraland S K Fenster

Theory and Problems of Strength of Materials by -William A Nash

Strength of Materials by – Andrew Pytel, Ferdinand L. Singer (4th Edition)

Mechanics of Materials by – Laurson & Cox

Strength of Materials by – R.S. Khurmi

CE261 Fluid Mechanics

Credits: 3+1.5

Fluid properties; fluid statics; kinematics of fluid flows; fluid flow concepts and basic equations- continuity equation, Bernoulli's equation, energy equation, momentum equation and forces in fluid flow; steady incompressible flow in pressure conduits, laminar and turbulent flow, general equation for fluid friction; empirical equations for pipe flow; minor losses in pipe flow; pipe flow problems- pipes in series and parallel, branching pipes, pipe networks.

Text Books:

Theory

Fundamentals of Fluid Mechanics by Munson, Young, Okiishi, Huebsch, Sixth Edition, Publisher: Wiley, ISBN-978-0470-26284-9

Engineering Fluid Mechanics, by Crowe, Elger Williams, and Roberson, Ninth Edition, Publisher: Wiley, ISBN 978-0-470-25977-1

Fluid Mechanics with Engineering Applications, Franzini and Finnemore, most recent edition, Publisher: McGraw Hills, ISBN-13: 978-0072432022

Fluid Mechanics with Engineering Application by – Franzini

Fluid Mechanics by – Streeter & Wylie

Fluid Mechanics by – Frank M.White.

Sessional

Fluid Mechanics with Engineering Application by – Franzini

Fluid Mechanics by – Streeter & Wylie

Laboratory Manual.

CE408 Quantity Surveying and Cost Analysis

Credits: 0+1.5

Earthwork excavation for roadway, earthwork computation from spot levels; estimation for residential building: estimation of slab, beam, column, footing; analysis of rates, specifications, costing of residential building; estimation and costing of septic tank; estimation and costing of underground water reservoir; estimation and costing of retaining wall; estimation and costing of slab culvert; estimation and costing of bridges; highways construction; estimation of steel truss; computer aided quantity estimation; construction site survey and estimation.

Text Books:

Following texts will be used as reference books and students are encouraged to buy at least two of them as professional reference books.

Building Construction – by: Sushil Kumar

How to Build a Nice Home – by: Engr. Md. Ibrahim.

Estimating – Abul Faraz Khan

Estimating Costing and Valuation – by: S.C. Rangwala.

Estimating by – Abul Faraz Khan.

Quantity Surveying: A Practical Guide for the Contractor's QS by Donald Towey.

CE301 Professional Practices and Communication

Credits: 3+1.5

Project: characteristic feature, types and life cycle; type of contracts and estimates; procurement regulations and law; documents for procurement of works, goods, services and their application; tender procedure with the light of PPR; claims, disputes and arbitration procedure.

Communication: concepts, methods and strategies for effective speaking and inter-personal communication; business and engineering reports, proposals and messages; conducting meetings; an introduction to the code of ethics for engineers; introduction to MOI (Method of Instruction).

Text Books:

Theory

Project Management - Planning and Control by – Albert Lester.

The Process of Management by – William H. Newman.

Project Management by S Choudhury

Business correspondence and Report Writing- A practical approach to business and technical communication by R C Sharma and Krisna Mohan

PPR 2008, Bangladesh.

DPP preparation guide book published by planning commission

Sessional

Business correspondence and Report Writing- A practical approach to business and technical communication by R C Sharma and Krisna Mohan.

Project Management - Planning and control by Albert Lester

PPR 2008, Bangladesh.

DPP preparation guide book published by planning commission

CE401 Project Planning and Construction Management

Credits: 3

Project planning and evaluation; feasibility reports; cash flows, payback period, internal rate of return; benefit-cost ratio; cost-benefit analysis case studies; Planning and scheduling, PERT, CPM; resource scheduling; linear programming and application. Principles of management; construction management: principles, project organization, methods and practices, technology, management of materials and equipments, site management, contracts and specifications, inspection and quality control, safety, economy.

Conflict management; psychology in administration: human factors in management; human resource management. Demand forecasting; inventory control; stores management; procurement; legal issues in construction; environmental regulations. Construction safety.

Text Books:

Project Planning and Control by -Lester

The Process of Management by – William H. Newman

Introduction to Operational Research by – Hiller &Liberman.

Project Management Techniques by – A.O. Awani

Construction Planning, Equipment and Methods by – Peurifoy

Material Management & Inventory Control by – A.K. Datta

Project Management by – S. Chowdhury.

CE311 Structural Analysis and Design-I

Credits: 3

Prerequisite: CE213

Stability and determinacy of structures; analysis of statically determinate trusses and arches; influence lines; moving loads on beams, frames and trusses; analysis of suspension bridge.

Wind and earthquake loads; approximate analysis of statically indeterminate structures: braced trusses, portal method, cantilever method and vertical load analysis of multi storied building frames; deflection of beams, trusses and frames by energy method (strain energy, principles of virtual work, Castigliano's theorem).

Text Books:

Theory of Simple Structures by – T.C. Shedd and J.Vawter (2nd Edition)

Elementary Structural Analysis by – Utku, Norris & Wilber (4th Edition)

Advanced Strength and Applied Elasticity, 5th Edition, by A C Ugural and S K Fenster

Structural Analysis by Aslam Kassimali (3rd Edition)

CE315 Design of Concrete Structures-I

Credits: 3+1.5

Fundamental behavior of reinforced concrete; introduction to strength design and alternate design methods; flexural design of beams (singly reinforced, doubly reinforced, T-beam) using strength design method; shear, diagonal tension and torsion of beams; bond and anchorage; design of one way slabs; design of two-way edge supported slabs: using strip and alternate methods.

Text Books:

Theory

Reinforced Concrete: Mechanics and Design (6th Edi) by James Wight and James MacGregor

Design of Concrete Structures by – Nilson (12th Edition)

Design of Concrete Structures by – Nilson, David & Dolan (14th Edition).

Sessional

Design of Concrete Structures by Nilson (10th, 12th and 14th Edition)

Bangladesh National Building Code (BNBC) - 2012

AASHTO LRFD Bridge: Design Specifications 2012.

CE319 Design of Steel Structures

Credits: 3+1.5

Behavioral principles and design of structural steel; design of tension members, bolted and welded connections; compression members; residual stress, local buckling, effective length; flexural members; lateral torsional buckling; design of beam-columns; connection design, moment connections, column bases; detailing of steel structures, introduction to steel-concrete composite structures, advantages of composite construction.

Text Books:

Theory

Steel Structures: Design and Behavior by Salmon, Johnson and Malhas (5th Edi)

Design of Steel Structures by – Gaylord, Gaylord

Limit States Design in Structural Steel by G L Kulak and G Y Grondin

AISC Manuals for Steel Constructions (13th Edition-2005)

Sessional

Steel Structures: Design and Behavior by Salmon, Johnson and Malhas (5th Edi)

Limit States Design in Structural Steel by G L Kulak and G Y Grondin

AASHTO LRFD Bridge: Design Specifications 2012

CE410 Concrete Structures Design Sessional

Credits: 0+1.5

Analysis the behavior of pre-stress (pre-tension and post-tension) beams through experiment; analysis and design of multistoried RCC residential building and pre-stress concrete (PC) girder bridge (hand calculation with finite element software).

Text Books:

Design of Concrete Structures by – Winter & Nilson (10th Edition)

Design of Concrete Structures by – Nilson (12th and 14th Edition)

AASHTO LRFD Bridge: Design Specifications 2012

Bangladesh National Building Code (BNBC)-2012.

CE411 Structural Analysis and Design-II

Credits: 3

Prerequisite: CE311

Analysis of statically indeterminate beams and frames by moment distribution, consistent deformation/flexibility and stiffness methods; algorithms for implementing direct stiffness method using computer; influence lines of statically indeterminate beams and frames.

Text Books:

Elementary Structural Analysis by – Utku, Norris & Wilber (4th Edition)

Matrix Methods of Structural Analysis by C K Wang

Structural Analysis by Aslam Kassimali (3rd Edition).

Bangladesh National Building Code (BNBC)-2012

CE331 Environmental Engineering-I

Credits: 3+1.5

Introduction to Environmental Engineering: water, health and sanitation, ecology and environment; climate change; biodiversity; contemporary environmental issues. Water Supply Engineering: Water requirement in urban (water demand, population prediction, water demand for street fire hydrant and interior fire protection) and rural communities; the hydrologic cycle and water availability; water supply sources; ground water exploration: aquifer properties and ground water flow, well hydraulics, water well design, drilling, construction and maintenance; shallow hand tubewells, deep tubewells, deep set pumps, pond sand filter, rain water harvesting system and alternative water supplies for problem areas. Surface water collection and transportation; pumps and pumping machineries; water distribution systems; analysis and design of distribution network; fire hydrants; water meters; water loss control (auditing, unaccounted for water, leak detection and water conservation). Water quality requirements; water treatment: plain sedimentation, coagulation, flocculation, filtration, disinfection; miscellaneous treatment methods; low cost treatment methods (arsenic/iron removal plants etc.) for rural communities; water safety plans

Text Books:

Theory

A Textbook of Water Supply Engineering by – M.A. Aziz

Environmental Engineering by – Peavy, Rowe & Tchobanoglous

Water Supply and Sanitation by – Ahmed and Rahman.

Sessional

A Textbook of Water Supply Engineering by – M.A. Aziz

Water Supply and Sanitation by – Ahmed and Rahman

Laboratory Manual

CE333 Environmental Engineering-II

Credits: 3

Wastewater Engineering: introduction; estimation of wastewater; wastewater collection systems; hydraulics of sewer; design, construction and maintenance of sanitary sewer and storm drainage system; sewer appurtenances; plumbing system. Microbiology of wastewater; wastewater characteristics; wastewater treatment and disposal; treatment and disposal of industrial effluents; sludge treatment and disposal; economical sanitation technologies / system for urban and rural communities (conventional system, pit latrine, pour-flush latrine, small bore sewerage system, septic tank system and ecological sanitation). Sustainability of water and sanitation services; participatory development approach in water and sanitation sector; community management of water and sanitation services. Introduction to solid and hazardous waste management; environmental impact assessment: risk analysis in environmental assessment; socioeconomic impact assessment; introduction to environmental pollution (water pollution, air pollution, noise pollution). Introduction to food sanitation. Introduction of EIA.

Text Books:

Environmental Engineering by – Peavy, Rowe &Tchobanoglous

Water Supply and Sanitation by – Ahmed and Rahman

Wastewater Engineering by – Metcalf & Eddy (4th Edition)

Water supply & Sewerage by – McGhee

CE341 Principles of Soil Mechanics

Credits: 3+1.5

Prerequisite: CE203

Introduction to geotechnical engineering; formation, type and identification of soils; soil composition; soil structure and fabric; index properties of soils; weight volume relationship; engineering classification of soils; soil compaction; principles of total and effective stresses; permeability and seepage; stress-strain-strength characteristics of soils; compressibility and settlement behavior of soils; lateral earth pressure; stress distribution.

Text Books:

Theory

An Introduction to Geotechnical Engineering (2nd Edition) by Robert D. Holtz and William D. Kovacs

Text book of Geotechnical Engineering (2011) by Braja M. Das

Geotechnical Engineering - A Practical Problem Solving Approach (2010) by N. Sivakugan and Braja M. Das

Craigs Soil Mechanics by R.F.Craig, R.F.Pink

Engineering soil mechanics" by Jan J. Tuma, M. Abdel-Hady

Elements of Soil Mechanics by Geoffrey Nesbitt Smith

Introduction to Soil Mechanics by Braja M. Das.

Principles of Geotechnical Engineering, 8th Edition (2013), by Braja M. Das, Khaled Sobhan.

Foundation engineering by – Peck, Hanson, Thornburn.

Sessional

Introduction to Soil Mechanics by – Braja M. Das

Foundation engineering by – Peck, Hanson, Thornburn

Soil Testing for Engineers by – Lambe

CE441 Foundation Engineering

Credits: 3

Soil investigation techniques; types of foundations; bearing capacity of shallow and deep foundations; settlement and distortion of foundations; design and construction of footings, rafts and piles; slope stability analyses.

Text Books:

Foundation Analysis and design by – Joseph E. Bowles

Foundation Design by Wayne C. Teng

Foundation engineering by – Peck, Hanson, Thornburn

Principles Foundation Engineering by – B.M. Das

Theory And Practice of Foundation Engineering by – Sam

Geotechnical Engineering - A Practical Problem Solving Approach (2010) by N. Sivakugan and Braja M. Das

Geotechnical Engineering- Soil Mechanics by John N. Cernica

Smith's Elements of Soil Mechanics by Ian Smith.

Bangladesh National Building Code (BNBC)'93.

CE451 Transportation Engineering-I: Transportation Planning and Traffic Engineering

Credits: 3

Transportation engineering, transportation functions; transportation systems, functional components, factors in transportation development, transportation modes, public transportation, emerging modes; intelligent transportation system: components and applications; transport planning: concepts, scope and hierarchy, process, goals and objectives, inventories, socio-economic activities, land use-transport interaction, travel demand forecasting, traffic impact assessment; road safety and accident analysis. Geometric design of highways: design controls and criteria, cross sectional elements, alignment, sight distance, intersection and interchange layouts, planning and design of bicycle and pedestrian facilities; traffic engineering: fundamentals of traffic engineering, vehicle and traffic characteristics, traffic control devices and systems, introduction to signal optimization tools, traffic studies, planning and design of parking facilities, roadway lighting; transportation in Bangladesh: transportation modes and networks, constraints and challenges, transport demand and modal share, road classification and design standards.

Text Books:

Highway Engineering by – Paul H. Wright (6th Edition)

Transportation Engineering and Transport Planning by – L.R. Kadiyali

Transportation Planning and Traffic Engineering by – O'Flaherty

CE453 Transportation Engineering-II: Pavement Design and Railway Engineering

Credits: 3+1.5

Pavement materials: bituminous binders, cement, aggregates, embankment material, soil stabilization; mix design methods; low cost roads; flexible and rigid pavement: pavement components and functions, pavement design and construction, road maintenance; Rail traffic management and signalling; transportation demand, supply and equilibrium; road traffic assignment, network equilibrium, system optimality; traffic flow theory, shockwaves, deterministic and stochastic queuing analysis.

Text Books:

Theory

Highway Engineering by – Paul H. Wright (6th Edition)

Transportation Engineering and Transport Planning by – L.R. Kadiyali

Principles of Pavement design by – E.J. Yoder

Railway Engineering by – Rangwal

Railway Engineering by – Agarwal (Student Edition)

Sessional

Highway Engineering by – Paul H. Wright (6th Edition)

Laboratory Manual

CE461 Open Channel Flow

Credits: 3+1.5

Open channel flow and its classification; velocity and pressure distributions; energy equation, specific energy and transition problems; critical flow and control; concept of uniform flow, Chezy and Manning equations, estimation of resistance coefficients and computation of uniform flow; momentum equation and specific momentum; hydraulic jump theory and analysis of gradually varied flow; computation of flow profiles; design of channels.

Text Books:

Theory

Open Channel Hydraulics by – Chow

Open Channel Hydraulics by – French

Flow Through Open channels by – Rang Raju

Flow in Open channel by – Subramanya

Sessional

Open Channel Hydraulics by – Chow

Laboratory Manual

CE463 Hydrology, Irrigation and Flood Control

Credits: 3

Hydrologic cycle; Weather and hydrology; Precipitation, Evaporation and transpiration; Infiltration; Stream flow; Application of telemetry and remote sensing in hydrologic data acquisition; Rainfall-runoff relations; Hydrographs, unit hydrographs; Hydrologic routing; Statistical methods in hydrology. Plant-soil-water relationship; consumptive use and estimation of irrigation water requirements; canal layout in irrigation; methods of irrigation; quality of irrigation water; problems of irrigated land.

Text Books:

Applied hydrology by Chow, Maidment and Mays

Engineering Hydrology by K Subramanya (2nd ed)

Hydrology and Hydraulic Systems by Ram S Gupta (2nd ed)

Handbook of Hydrology by Maidment (1st ed)

CE413 Introduction to Steel-Concrete Composite Structures

Credits: 2

Introduction to steel-concrete composite structures; advantages of composite construction; interaction between steel and concrete, shear connectors, elastic analysis of composite beams, beam-column connections, behavior of different types of composite columns, axial load capacity and interaction diagrams for composite columns

Text Books:

Steel Structures: Design and Behavior by Salmon, Johnson and Malhas (5th Edi)

Limit States Design in Structural Steel by G L Kulak and G Y Grondin

AISC design guide

CE415 Prestressed Concrete

Credits: 2

Prestressed Concrete: concepts of prestressing; materials; anchorage systems; loss of prestress; analysis of sections for flexure, shear, bond and bearing; analysis of end block and composite sections; beam deflections; cable layout; partial prestress.

Design of prestressed concrete beams for simple and continuous spans; ideas about use of AASHTO – PCI sections for standard spans; design considerations for prestressed concrete pipes, piles, poles and railway sleepers.

Text Books:

Design of Prestressed Concrete Structure by – T.Y. Lin, Ned H. Burns (3rd Edition)

CE417 Design of Concrete Structures-II

Credits: 2

Introduction to floor systems and design of column supported slabs (flat plates, detailing of flat plate, direct design method); design of columns under uniaxial and biaxial loading, introduction to slender column; ; seismic detailing; structural design of footings, pile caps; design of RCC shear wall. Prestressed Concrete: concepts of prestressing; materials; anchorage systems; analysis of sections for flexure and shear; design of prestressed concrete beam.

Text Books:

Design of Concrete Structures by Nilson (14th Edition)

Reinforced Concrete: Mechanics and Design (6th Edi) by James Wight and James MacGregor

Prestressed Concrete Structures by Michael P Collins.

CE419 Introduction to Finite Element Method

Credits: 2

Introduction to finite element method as applied to stress analysis problems; basic equations in elasticity, matrix displacement formulation, element shapes, nodes, nodal unknowns and coordinate system, shape functions, strain displacement matrix, methods for assembling stiffness equations e.g. direct approach, Galerkin's method, virtual work method, principle of minimum potential energy; introduction to isoparametric formulation; discritization of a structure and mesh refinement, one dimensional stress-deformation and two dimensional plane stress and plane strain analysis of stress-deformation problems; numerical integration and computer application.

Text Books:

Introduction to Solid Mechanics and Finite Element Analysis by Samer Adeeb.

An Introduction to the Finite Element Method by J N Reddy.

A First Course in Finite Elements by Jacob Fish and Ted Belytschko.

CE421 Dynamics of Structures

Credits: 2

Single degree of freedom system, formulation of equation of motion; free vibration response; response to harmonic, impulse and general dynamic loading; vibration analysis by Rayleigh's method; response spectra; two degrees of freedom system

Text Books:

Dynamics of Structures by Anil K. Chopra (4th Edition)

Dynamics of Structures by Ray W. Clougs and J. Penzien.

CE423 Design of Concrete Structures-III

Credits: 2

Analysis and design for torsion; design of one way and two way joist slabs with or without beam on the column line; slender columns; strut-and-tie models (design of deep beam), design of reinforcement at joints; design and detailing of lateral load resisting components.

Textbooks:

AISC Seismic Provisions for Structural Steel Buildings, ANSI/AISC 341-10

Structural Seismic Design Optimization and Earthquake Engineering: Formulation and Applications by Vagelis Plevris, Chara Ch. Mitropoulou, Nikos D Lagaros, 2012.

Computational Methods in Earthquake Engineering by Papadrakakis, Fragiadakis and Lagaros, 2011.

Journal of Structural Safety by Elsevier (for case studies).

CE412 Computer Aided Analysis and Design of Structures Sessional

Credits: 0+1.5

Structural idealization, computer modeling of frame structures, computer aided analysis and design of various reinforced concrete and steel structures, e.g. high-rise building, modular bridge, water tower etc.

Text Books:

Bangladesh National Building Code (BNBC)-2012

AASHTO LRFD Bridge: Design Specifications 2012

CE433 Solid and Hazardous Waste Management

Credits: 2

Solid Waste Management: sources and types of solid wastes; physical and chemical properties of solid wastes; solid waste generation (Separation at source); on-site handling, storage and processing; collection of solid wastes; transfer stations and transport; resources and energy recovery and recycling (Reduction, Re-used & Recycling- 3R concept); decomposition of solid waste: anaerobic treatment/biogasification, aerobic treatment/composting; thermal treatment, land disposal. Hazardous Waste Management: identification, sources and characteristics of hazardous wastes; different types of hazardous waste, hazardous waste management plant; methods of treatment (physical, chemical, biological and thermal treatment; fixation/stabilization) and disposal(landfill and ocean dumping) of hazardous waste. Healthcare waste management, categories of healthcare waste, treatment methods of healthcare waste. Integrated solid waste management and live cycle inventory analysis.

Text Books:

Handbook of Solid Waste Management, Second Edition, by: George Tchobanoglous, Frank Kreith.

Solid and Hazardous Waste Management, written by Pro Vice-Chancellor of BUET, Professor Dr. M. Habibur Rahman and Assistant Professor of AUST, Dr. Abdullah Al-Muyeed.

CE435 Environmental Pollution Management

Credits: 2

Solid Waste Management: sources and types of solid wastes; physical and chemical properties of solid wastes; solid waste generation (Separation at source); on-site handling, storage and processing; collection of solid wastes; transfer stations and transport; resources and energy recovery and recycling (Reduction, Re-used & Recycling- 3R concept); decomposition of solid waste: anaerobic treatment/biogasification, aerobic treatment/composting; thermal treatment, land disposal.

Hazardous Waste Management: identification, sources and characteristics of hazardous wastes; different types of hazardous waste, hazardous waste management plant; methods of treatment (physical, chemical, biological and thermal treatment; fixation/stabilization) and disposal(landfill and ocean dumping) of hazardous waste. Healthcare waste management, categories of healthcare waste, treatment methods of healthcare waste. Integrated solid waste management and live cycle inventory analysis.

Textbooks:

Environmental Pollution and Waste Management, H.D. Kumar, M.D. Publications Pvt. Ltd., Jan 1, 1998.

Understanding Environmental Pollution, Marquita K. Hill, ISBN: 9780521736695, May 2010

Managing Environmental Pollution, Andrew Farmer, Dec 1997, ISBN-13: 978-0415145152 Edition: 1st

CE437 Environmental and Sustainable Management

Credits: 2

Environment and development projects: environment and sustainable development; environmental policies and legislation; environmental implication of sectoral development; environmental quality standards; environmental issues and priorities; environmental impact assessment of development schemes-baseline. studies, assessment methodologies; economics of environmental management; contemporary issues; case studies.

Textbooks:

Environmental Management, Sustainable Development and Human Health, Eddie N. Laboy-Nieves, Fred C. Schaffner, Ahmed Abdelhadi, Mattheus F.A. Goosen, October 22, 2008 by CRC Press, ISBN 9780415469630 - CAT# K00082

Environmental Management for Sustainable Development, Chris Barrow, ISBN-13: 978-0415365352 ISBN-10: 041536535X Edn: 2nd

Handbook of Sustainability Management, Edited by: Christian N Madu (Pace University, USA), Chu-HuaKuei (Pace University, USA)

CE432 Design of Water Supply, Sanitation and Sewerage Systems

Credits: 0+1.5

Design of water supply and sewerage system: estimation of industrial, domestic and fire demands, designing deep tubewell and water distribution network; estimation of industrial, domestic and commercial wastewater generation, wastewater network design; household plumbing system design; design of water and wastewater treatment plant; computer application in environmental engineering; field visits and reporting.

Textbooks:

Design of Water Supply Pipe Networks, Prabhata K. Swamee, Ashok K. Sharma, 2007ISBN: 9780470178522, John Wiley & Sons, Inc.

Gravity Sanitary Sewer Design and Construction, Paul Bizier, Second Edition, American Society of Civil Engineers, Jan 1, 2007.

CE443 Earth Retaining Structures

Credits: 2

Foundation of structures subjected to lateral loads; rigid and flexible earth retaining structures; methods of construction: dewatering and slurry-wall construction, braced excavation, sheet piles, cofferdams, caissons.

Text Books:

Earth Pressure and Earth-Retaining Structures, (Third Edition) by - Chris R.I. Clayton, Rick I. Woods, Andrew J. Bond, Jarbas Milititsky

Foundations and Earth Retaining Structures by Muni Budhu.

Foundations, Retaining and Earth Structures: The Art of Design and Construction and Its Scientific Basis in Soil Mechanics by Gregory Porphyriewitch Tschebotarioff

Foundation Analysis and desig by – Joseph E. Bowles

Foundation Design by Wayne C. Teng

Principles Foundation Engineering by – B.M. Das.

CE445 Elementary Soil Dynamics

Credits: 2

Elementary vibrations; dynamic properties of soil; seismic response of soils: site effects, site amplification, liquefaction problems, remedial measures and earthquake hazards.

Text Books:

Principles of Soil Dynamics by Braja M Das and Ramana.

Soil Dynamics with Applications in Vibration and Earthquake Protection by Christos Vrettos.

An Introduction to Soil Dynamics (Theory and Applications of Transport in Porous Media)" by Arnold Verruijt.

Practical Soil Dynamics: Case Studies in Earthquake and Geotechnical Engineering (Geotechnical, Geological and Earthquake Engineering) by MilutinSrbulov.

CE447 Soil-Water Interaction

Credits: 2

Introduction to soil-water interaction problems: permeability, seepage, capillarity and soil suction; slopes subjected to water current, wave action etc; theories of filters and revetment design; geotechnical design of landfills; stability of slopes subjected to seepage.

Text Books:

Seepage, Drainage, and Flow Nets by Harry R. Cedergren

Earth and earth-rock dams: engineering problems of design and construction by James L. Sherard.

Advanced Soil Mechanics (Third edition or later) by Braja M. Das.

Soil Mechanics and Foundations by Parcher and Means

BWDB Design Manual- May 2010.

CE442 Geotechnical Engineering Design Sessional

Credits: 0+1.5

Interpretation of soil test results, design of foundations: shallow and deep foundation; introduction to computer aided design of foundations; footing, pile, raft/mat foundations; retaining structures; reinforced soils.

Text Books:

Foundation Analysis and design by – Joseph E. Bowles

Foundation Design by Wayne C. Teng

Foundation engineering by – Peck, Hanson, Thornburn

Principles Foundation Engineering by – B.M. Das

Geotechnical Engineering - A Practical Problem Solving Approach (2010) by N. Sivakugan and Braja M. Das

Bangladesh National Building Code (BNBC)'93.

CE455 Transportation Engineering-III:

Traffic Engineering Design and Management

Credits: 2

Advanced concepts of traffic management, management strategies; analysis of traffic flow characteristics; traffic control devises; intersection control and design; grade separation and interchanges; computer application in traffic system analysis; introduction to micro simulation and ITS; NMT issues and road safety.

Text Books:

Highway Engineering by - Paul H Wright

Traffic Engineering and Transport Planning by – L.R. Kadiyali

Highways – The Location, Design, Construction by – Flaherty

Principles of Transportation Engineering by – Das

Transportation Engineering Handbook by – Geulias

Traffic and Highway Engineering by – Garber

CE457 Transportation Engineering-IV:

Pavement Management, Drainage and Airport

Credits: 2

Pavement management systems; evaluation and strengthening of pavements; drainage: highway drainage and drainage structures; airports: importance, advantages and trends in air transportation, planning and design of airports, aircraft characteristics related to airport design, types and elements of airport planning studies, airport configuration, geometric design of the landing area, terminal area, heliports, design of airport pavements, lighting, marking and signing, airport drainage, introduction to airside planning, design and operations software.

Text Books:

Principles of Pavement Design by – E.J. Yoder

Traffic Engineering and Transport Planning by – L.R. Kadiyali

Highways – The Location, Design, Construction by – Flaherty

CE459 Transportation Engineering-V:

Urban Transportation Planning and Management

Credits: 2

The urban transport problems and trends; road network planning; characteristics and operation of different transit and para-transit modes, planning transit network; estimating system costs and benefits, pricing and financing, evaluation, transit users attitude, policies and strategies for transit development in metropolitan cities; freight traffic planning and management; selected transport case studies, congestion management; safety management; environmental issues and sustainable transport.

Text Books:

Traffic Engineering and Transport Planning by – L.R. Kadiyali

Transportation Engineering Handbook by – Geulias

Traffic and Highway Engineering by – Garber

CE454 Transportation Engineering Sessional-II: Pavement Design and Traffic Studies

Credits: 0+1.5

Design of flexible and rigid pavement and air field pavements; geometric design; road intersection design and interchanges; traffic studies; computer models and application packages.

Text Books:

Highway Engineering by - Paul H Wright

Principles of Pavement Design by – E.J. Yoder

Traffic Engineering and Transport Planning by – L.R. Kadiyali

Laboratory Handbook

CE465 Flood Mitigation and Management

Credits: 2

Flood and its causes; methods of flood management: structural and non structural measures such as reservoirs, levees and flood walls, channel improvement, interior drainage, floodways, land management, flood proofing, flood zoning, flood hazard mapping, flood forecasting and warning. Economic aspects of flood management: flood risk and vulnerability analysis, direct and indirect losses of flood, flood damage assessment, flood damage in urban and rural areas.

CE467 Groundwater Engineering

Credits: 2

Groundwater in hydrologic cycle and its occurrence. Physical properties and principles of groundwater movement. Groundwater and well hydraulics. Groundwater resource evaluation. Groundwater levels and environmental influences. Water mining and land subsidence. Groundwater pollution and contaminant transport. Recharge of groundwater. Saline water intrusion in aquifers. Groundwater management.

Text Books:

Groundwater Hydrology by – Rushton.

Groundwater Engineering by – Toad.

CE469 River Engineering

Credits: 2

Behavior of alluvial rivers; river channel pattern and fluvial processes; aggradations and degradation, local scours, river training and bank protection works; navigation and dredging sediment movement in river channels, bed form and flow regimes.

Text Books:

Principles of River Engineering by – Chang

Principles of River Engineering by – Garg

River Engineering by – Peterson.

Sediment Transport Technology (Water & Sediment Dynamics) by – Daryl B. Simons & Fuat Sentirk.

CE471 Hydraulic Structures

Credits: 2

Principles of design hydraulic structures, types of hydraulic structures; design of dams, barrages, weirs, spillways, energy dissipators and spillway gates; cross drainage works.

Text Books:

Hydraulic Structures by – Garg.

Open Channel Hydraulics by – V. T. Chow.

CE473 Coastal Engineering

Credits: 2

Coast and coastal features; tides and currents; tidal flow measurement; waves and storm surges; docks and harbors; forces of waves and tides in the design of coastal and harbor structures; coastal sedimentation processes; deltas and estuaries; shore protection works; dredging and dredgers. **CE462 Water Resources Engineering Sessional**

Credits: 0+1.5

Design of hydraulic structures, river training works.

Text Books:

Hydraulic Structures by – Garg

Open Channel Hydraulics by – Chow

Principles of River Engineering by – Garg

Principles of River Engineering by – Chang

Principles of Water Resources Planning by – Dr. Aynon Nishat (BUET).

CE498 Thesis/Project

Credits: 6

Students will be assigned a thesis or a project topic from student's major group under the supervision of a faculty member.

CE499 Internship

Credits: 6

Students will be placed for internship of one semester duration in an organization doing technical works in the field of student's major group. The student will be assigned a faculty supervisor to monitor the progress of the internship work.

CHE 101: Introduction to Chemistry

Atomic Properties and Binding Forces: Atoms, molecules and forces between them, Forces in solids and bindings, Ionic bond, Covalent bond, Metallic bond, Hydrogen bond and Vander Wall's force; properties of gases.

Oxidation and Reduction: Oxidation and reduction, Oxidation number, Analytic reagents.

Acid and Bases: Strong and weak acids and bases, pH, Buffer solutions, Neutralization curves, Indicators for acid-base titrations.

Chemical Equilibrium & Thermodynamics: Chemical equilibrium; concepts of chemical thermodynamics and thermochemistry; electrolysis, Galvanic cells, electrodes and electrode reactions, reduction potential, the chemical series, standard hydrogen electrode, Measurement of pH.

Chemical Solutions: Different types of solutions and their colligative properties.

Selective Organic Compounds: Aliphatic and aromatic organic compounds with their derivatives.

Basics of Biochemistry: Amino acids, Peptides and proteins, Hemoglobin as an allosteric model, Enzymes, Cofactors, Bioenergetics, Membrane transport, Metabolism of proteins, Carbohydrates, Lipids, Nucleic acids.

The course includes lab work based on theory taught.

Credits: 4; Prerequisite: None.

CHE 107: Chemistry for Civil Engineering

Atomic Properties and Binding Forces: Atoms, molecules and forces between them, Forces in solids and bindings, Ionic bond, Covalent bond, Metallic bond, Hydrogen bond and Vander Wall's force; properties of gases.

Oxidation and Reduction: Oxidation and reduction, Oxidation number, Analytic reagents.

Acid and Bases: Strong and weak acids and bases, pH, Buffer solutions, Neutralization curves, Indicators for acid-base titrations.

Chemical Equilibrium & Thermodynamics: Chemical equilibrium; concepts of chemical thermodynamics and thermochemistry; electrolysis, Galvanic cells, electrodes and electrode reactions, reduction potential, the chemical series, standard hydrogen electrode, Measurement of pH.

Chemical Solutions: Different types of solutions and their colligative properties.

Selective Organic Compounds: Aliphatic and aromatic organic compounds with their derivatives.

The course includes lab work based on theory taught.

Credits: 3(Theory)+1.5(Lab)=4.5; Pre-requisites: None.

Recommended Textbook: 1. Chemistry: Ed. By Steven S. Zumdahl and Susan A. Zumdahl, Houghton

Mifflin Company, Boston, New York.

Chemistry: Chang.

Organic Chemistry: T.W.G. Solomons, John Wiley & Sons, New York.

Reference Book: Any suitable books on Physical Chemistry, Inorganic Chemistry, Organic Chemistry and Biochemistry.

CHE 108: Chemistry for Biologists - I

Credits: 3 + 1 = 4; Prerequisite: None

This course aims to introduce different important topics on inorganic, physical and organic chemistry. The topics will include: Atomic Models, Periodic Properties of Atom, Different types of bonds, Concepts of orbitals, Coordination complexes, Role of inorganic elements in biological systems, Concepts of molarity and normality, Acid-Base, pH scale, Colligative properties, Vapor pressure, Simple gas laws, buffer solution, etc. In organic chemistry, the topics are: Nucleophiles-Electrophiles, Different types of organic reactions; Stereochemistry; Aliphatic hydrocarbons; alcohols; Aldehydes and ketones; Acids and their derivative. These topics will help the students to understand advanced courses on biochemistry and other related subjects.

CHE 109: Engineering Chemistry – I

Atomic Properties and Binding Forces: Atoms, molecules and forces between them, Forces in solids and bindings, Ionic bond, Covalent bond, Metallic bond, Hydrogen bond and Vander Wall's force; properties of gases.

Oxidation and Reduction: Oxidation and reduction, Oxidation number, Analytic reagents.

Acid and Bases: Strong and weak acids and bases, pH, Buffer solutions, Neutralization curves, Indicators for acid-base titrations.

Chemical Equilibrium & Thermodynamics: Chemical equilibrium; concepts of chemical thermodynamics and thermochemistry; electrolysis, Galvanic cells, electrodes and electrode reactions, reduction potential, the chemical series, standard hydrogen electrode, Measurement of pH.

Chemical Solutions: Different types of solutions and their colligative properties.

Selective Organic Compounds: Aliphatic and aromatic organic compounds with their derivatives.

Basics of Biochemistry: Amino acids, Peptides and proteins, Hemoglobin as an allosteric model, Enzymes, Cofactors, Bioenergetics, Membrane transport, Metabolism of proteins, Carbohydrates, Lipids, Nucleic acids.

The course includes lab work based on theory taught.

Credits: 3(Theory)+1(Lab)=4; Pre-requisites: None.

Recommended Textbook: 1. Chemistry: Ed. By Steven S. Zumdahl and Susan A. Zumdahl, Houghton

Mifflin Company, Boston, New York.

Chemistry: Chang.

Organic Chemistry: T.W.G. Solomons, John Wiley & Sons, New York.

Reference Book: Any suitable books on Physical Chemistry, Inorganic Chemistry, Organic Chemistry and Biochemistry.

CHE 208: Chemistry for Biologists - II

Credits: 3 + 1 = 4; Prerequisite: CHE 108

The objective of this course is to build upon on the knowledge gained during the previous chemistry course. Topics related to thermodynamics, Reaction spontaneity, Chemical Equilibrium, Chemical kinetics, Enzyme kinetics, Quantum theory, and photochemistry, will be taught during the course. In organic chemistry, students will be introduced to aromatic compounds, the reactions of benzene derivatives, differences between the aliphatic and aromatic compounds, amines and diazonium salts, etc. Basic knowledge of drugs and polymers will also be discussed. After completing the course, students will have a good preparation to study advanced courses of the curriculum.

CSE 101: Introduction to Computers I

Introduction to skills and concepts for effective use of Information and Communications Technology. Skills include standard applications such as email, word processing, spreadsheet analysis, PowerPoint presentation, database management, HTML, e-commerce, networking, internet, and web browsing. Concepts include digital representation of information, computer basics, introduction to operating systems, and introductory programming. The course is mostly a lab based course.

Credits: 3; Pre-requisite: None. [This course is for BA, ECO, and ENG students]

CSE 102: Introduction to Computers II

Fundamental of Information Systems, Operating Systems, Programming Languages, Database Systems, Computer Networks, Computer Graphics, HTML, Java script, ASP, Web Design, E-Commerce, Multimedia and other recent developments in computing fields. The course is mostly a lab based course.

Credits: 3; Pre-requisite: CSE 101. [This course is for BA, ECO, and ENG students]

CSE103: Structured Programming

Credit and Teaching Scheme:

	Theory	Laboratory	Total
Credits	3	1.5	4.5

Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week	3 Hours/Week for 13 Weeks	6 Hours/Week for 13 Weeks + Final Exam in the 14th week

Prerequisite: None

Course Objectives:

The purpose of this course is to introduce the students to computer programming using structured language. The students will be able to enhance their analyzing and problem-solving skills and use the same for writing programs using C language. Knowledge of this course will be needed as prerequisite knowledge for future courses such as CSE106 Discrete Mathematics, CSE110 Object Oriented Programming, CSE207 Data Structures, CSE326 Algorithms, CSE302 Database Systems, CSE366 Artificial Intelligence, CSE405 Computer Networks and many others.

Course Outcomes (COs):

After completion of this course students will be able to:

CO1	**Describe** and **use** basic structure of C programming language, assignment statements, decision making and looping structure for writing C programs.
CO2	**Compare** and **apply** arrays and functions to solve computational problems.
CO3	**Apply** structures, pointers, unions, user defined data types, and dynamic memory to solve computational problems.
CO4	**Compare** and **apply** language constructs and data structures; p**erform** and **demonstrate** skills and **write** report to design, build, and test moderately complex computational problems.

Course Topics:

Introduction to computers and programming languages, data representation in computer, flowchart construction for problem solving, basics of C Programming (input, output, variables, data types, operators, expressions, assignments). Conditional control statements (if, if-else, nested if-else, switch), Loop statement (while, for and do…while), Nested loop statement, break and continue statements. Introduction to arrays (arrays, declaring arrays, manipulating arrays), Multidimensional array, Characters and strings (various types of string manipulation). Introduction to functions (function definitions, function prototypes and argument, header files), Solving complex problems in modular fashion using user defined function, recursive function and solving problem using recursive function. Pointers (pointer variable declarations, pointer operators, passing arguments to functions by reference with pointers, pointer expressions and pointer arithmetic, arrays of pointers, and function pointers), dynamic memory allocation and linked lists. Structures (structure definitions and initialization, accessing structure members, structure with function and pointer). File management (files and streams, creating a file, reading data from file, writing data to file, and updating files), Lab exercises, Mini project.

CSE106: Discrete Mathematics

Credit and Teaching Scheme:

	Theory	Laboratory	Total
Credits	3	0	3
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th Week	0	3 Hours/Week for 13 Weeks + Final Exam in the 14th Week

Prerequisite: CSE103Structured Programming

Course Objectives:

This course builds up the students' ability to think and express logically and mathematically. The course will address mathematical reasoning, combinatorial analysis, algorithmic thinking, and discrete structures. Knowledge of this course will be needed as prerequisite knowledge for future courses such as CSE 110 Objected Oriented Programming, CSE207 Data Structures, CSE326 Algorithms, CSE302 Database Systems, CSE366 Artificial Intelligence, CSE405 Computer Networks, and CSE471 Compiler Design.

Course Outcomes (COs):

After completion of this course students will be able to:

CO1	**Interpret** and **apply** propositional logic, predicate logic, and theorem proving for mathematical reasoning.
CO2	**Interpret** and **apply** counting, permutations, and combinations for combinatorial analysis.
CO3	**Interpret** and **apply** the growth of functions, complexity analysis of algorithms, and integer algorithms for algorithmic thinking; **demonstrate** this knowledge and **write** report for realistic problem solving.
CO4	**Interpret** and **apply** discrete structures such as sets, functions, relations, graphs, and trees for modeling discrete objects; **demonstrate** this knowledge and **write** report for realistic problem solving.

Course Topics:

Propositional Logic, Propositional Equivalences, Predicates and Quantifiers, Nested Quantifiers. Rules of Inference, Introduction to Proofs, Mathematical Induction. Sets, Set Operations, Functions, Recursive Functions, Relations and Their Properties. The Basics of Counting, The Pigeonhole Principle. Algorithms, The Growth of Functions, Complexity of Algorithms. The Integers and Division, Primes, Greatest Common Divisor, Least Common Multiplier. Graphs, Graph Terminologies and Special Types of Graphs, Representing Graphs and Graphs Isomorphism, Introduction to Trees.Programming assignments.

CSE110: Object Oriented Programming

Credit Hours and Teaching Scheme:

	Theory	Laboratory	Total
Credits	3.0	1.5	4.5

Contact Hours	3 Hours/Week for 13 Weeks	3 Hours/Week for 13 Weeks	6 Hours/Week for 13 Weeks

Prerequisite: CSE106 Discrete Mathematics

Course Objectives:

This course presents a conceptual and practical introduction to object-oriented programming (OOP). The course will cover general principles of programming in object-oriented frameworks to enhance transferable skills, such as programming, designing, and problem-solving skills. This course introduces object-oriented concepts and develops OOP programs which provides solutions to real-world object-oriented problems. Java is primarily chosen as the programming language in this course. Knowledge of this course will be needed as prerequisite knowledge for CSE207 Data Structures.

Course Outcomes (COs):

After completion of this course students will be able to:

CO1	**Understand** and **apply** the basics of elementary programming in the target languageand concepts related to the definition, creation and usage of classes and objects for writing object-oriented programs.
CO2	**Use** the principles of inheritance and polymorphism and design abstract classes and interfaces for implementing object-oriented programs.
CO3	**Apply** object-oriented programming concepts, exception handling, file handling, graphical user interface (GUI), multi-threaded programming and generics for solving object-oriented problems.
CO4	**Choose** appropriate tools, **perform** and **demonstrate** skills and **write** report to design, build, and test realistic object-oriented applications.

Course Topics:

Principles of Object-Oriented Programming and Basics of Elementary Programming in Java (conditional branching, looping, methods and arrays), Introduction to Classes and Objects, instance variables, instance methods and Constructors, Inheritance and Polymorphism in OOP including concepts of super class, sub class, multiple-level inheritance, late binding, Abstract Class and Interfaces and their applicability and implementation, Exception Handling in OOP and File handling using Text and Binary I/O, Implementation of Generics and GUI, Multi-threaded Programming, JDBC and other advanced topics. Lab exercises. Mini project.

CSE200: Computer-Aided Engineering Drawing

Credit Hours and Teaching Scheme:

	Theory	Laboratory	Total
Credit Hours	0	1	1
Contact Hours	0	2 Hours/Week for 13 Weeks	2 Hours/Week for 13 Weeks

Prerequisite: None

Course Objectives:

This course introduces students to the standards and conventions of engineering drawing. This course emphasizes on the use of CAD software to generate computer models and technical drawings. The fundamental principles of orthogonal projections as well as isometric projections and views are also covered in this course.

Course Outcomes (COs):

After completion of this course students will be able to:

CO1	**Understand** and **use** drawing instruments and geometric constructions in creating engineering drawings.
CO2	**Apply** and **examine** orthographic sketching techniques, orthographic projections of lines, planes and solids.
CO3	**Apply** and **examine** isometric sketching techniques, isometric projections and conversion of views.
CO4	**Use** AutoCAD to draw sectional views and multi-view projections, **perform** and **demonstrate** these skills and **write** report on a complete design.

Course Topic:

Introduction to drawing instruments, Lines, Lettering and Dimensioning. Scales: Plain, Diagonal and Vernier Scale. Curves used in engineering practice: ellipse, parabola, hyperbola. Orthographic Projection, First and Third angle projection methods. Projection of Lines: Oblique Lines, Traces. Applications of Projection of Lines. Projection of Planes: Polygonal Lamina, Circular Lamina.Projection of Solids: Cube, Prism, Pyramid, Cylinder, Cone. Suspended Solids.

Isometric Projections: Isometric Lines, Planes and Scale. Conversion of given 2D views to Isometric Projection/View. Conversion of given 3D View to 2D representation. Auto CAD Drafting: Drafting Basics, Drawing Commands, Modify Commands. Auto CAD Drafting: 2D and Isometric drawing, 3D geometric, surface and solid modeling.

CSE207: Data Structures

Credit and Teaching Scheme:

	Theory	Laboratory	Total
Credits	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks

Prerequisite: CSE110 Object Oriented Programming

Course Objectives:

The course develops students' skills for designing and analyzing linear and non-linear data structures. It strengthens students' ability to identify and apply the suitable data structure for solving real world problems. Knowledge of this course will be needed as prerequisite knowledge for future courses such as CSE326 Algorithms, CSE366 Artificial Intelligence, CSE405 Computer Networks, and CSE 471 Compiler Design.

Course Outcomes (COs):

After completion of this course students will be able to:

CO1	**Understand** and **apply** ordered lists for developing effective problem solutions.
CO2	**Interpret** and **apply** different trees for manipulating hierarchical data.
CO3	**Interpret** and **apply** graphs and hashing techniques for solving computational problems.
CO4	**Compute** the efficiency of data structures for complex problem-solving algorithms; **perform** and **demonstrate** this knowledge and **write** report for realistic problem solving.

Course Topics:

Data Types, Pointer, Structure, Dynamic Memory Allocation, Abstract Data Types, Linked List Stack, Queue, Recursion, Tree, Binary Tree, Binary Search Tree, AVL tree, Binary Heap , Priority queue, Graph, Hashing Technique.Lab exercises. Mini project.

CSE209: Electrical Circuits

Credit and Teaching Scheme:

	Theory	Laboratory	Total
Credits	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks + Final exam in the 14th week	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks + Final exam in the 14th week

Prerequisite: None

Course Objectives:

This course provides the students with fundamental knowledge of analyzing electrical circuits. This course also provides hands-on experience in building and testing electrical circuits. Knowledge of this course will be needed as prerequisite knowledge for future courses such as CSE251 Electronic Circuits, CSE 345 Digital Logic Design, CSE 350 Data Communications, CSE 360 Computer Architecture, CSE 442 Microprocessor and Microcontroller, and CSE 490 VLSI design.

Course Outcomes (COs):

After completion of this course students will be able to:

CO1	**Discuss** and **use** the concepts of electrical circuit elements, circuit variables, circuit laws, and circuit combinations for analysis and design of DC circuits.
CO2	**Discuss** and **use** circuit analysis techniques and circuit theorems for DC circuits.
CO3	**Discuss** and **use** basic concepts**,** circuit laws, circuit combinations, circuit analysis techniques and circuit theorems for AC circuits.
CO4	**Use** software and equipment, **perform** and **demonstrate** skills and **write** report to design, build and test electrical circuits.

Course Topics:

Basic Concepts of DC circuit, charge and current, voltage, power and energy, Circuit elements. Ohm's Law, Kirchhoff's Voltage Law, Kirchhoff's Current Law, Series-Parallel connections, Voltage and Current Division, Wye-delta Transformations. Circuit Analysis: Nodal method (including independent and dependent sources, Super-node analysis). Circuit Analysis: Mesh method (including independent and dependent sources, Super-mesh analysis). Linearity and Superposition, Source Transformation, Thevenin and Norton's equivalents, Maximum power transfer. Basic Concepts of AC circuit, Sinusoids, Phasors, Phasor relationships for Circuit Elements, Impedance and admittance. Kirchhoff's laws in Frequency domain, Impedance Combinations. Superposition, Source Transformation, Thevenin and Norton equivalents, Nodal and Mesh Analysis. Instantaneous and average power; Maximum average power transfer, Effective or RMS value, apparent power and power factor, Complex power. Lab exercises. Mini project.

CSE225: Numerical Methods

Credit and Teaching Scheme:

	Theory	Laboratory	Total
Credits	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks

Prerequisite: CSE103 Structured Programming

Course Objectives:

This course will emphasize the development of numerical algorithms to provide solutions to common problems formulated in science and engineering. The primary objective of the course is to develop the basic understanding of the construction of numerical algorithms, and perhaps more importantly, the applicability and limits of their appropriate use. Knowledge of this course will be needed as prerequisite knowledge for future course such as CSE366 Artificial Intelligence.

Course Outcomes (COs):

After completion of this course students will be able to:

CO1	**Understand** and **use** error estimation and root finding algorithms for solving scientific and engineering problems.
CO2	**Understand** and **use** direct and iterative methods of systems of linear equations for solving scientific and engineering problems.
CO3	**Understand** and **use** numerical techniques of interpolation, differential and integral equations for solving scientific and engineering problems.
CO4	**Interpret** and **apply** numerical techniques; **demonstrate** this knowledge and **write** report for realistic solution of complex scientific and engineering problems.

Course Topics:

Numerical methods used for problem solving. Steps in solving a problem with a computer. Mathematical modelling and Error estimation, Root Finding Algorithms (Open and bracketing methods), Introduction to system of linear equations, Analytical and

Iterative methods for linear equations, LU decomposition, Curve fitting, Interpolation and Extrapolation, Numerical solution of differential and Integral equations. Lab exercises. Mini project.

CSE326: Algorithms

Credit and Teaching Scheme:

	Theory	Laboratory	Total
Credits	3	1.5	4.5
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week	3 Hours/Week for 13 Weeks	6 Hours/Week for 13 Weeks + Final Exam in the 14th week

Prerequisite:CSE207 Data Structures

Course Objective

This course introduces students to the general tools and techniques for analyzing and designing computer algorithms. Initially necessary mathematical preliminaries required for analyzing and designing computer algorithms are taught. Then this course familiarizes students with several algorithmic approaches and corresponding problems. Knowledge of this course will be needed as prerequisite knowledge for future courses such as CSE221Operating Systems, CSE366 Artificial Intelligence, and CSE405 Computer Networks.

Course Outcomes (COs)

After completion of this course students will be able to:

CO1	**Describe** and **analyze** different graph traversing method and **apply** them to solve real life problem.
CO2	**Discuss** and **apply** different algorithms regarding sorting, finding shortest path, divide and conquer and greedy approach.
CO3	**Discuss** and **apply** different optimization problem, number theory problem and pattern matching problem.
CO4	**Choose** and **examine** different algorithms; **perform** and **demonstrate** skills and **write** report to design, build, and test complex computational problems.

Course Topics

Introduction to algorithms, complexity analysis, asymptotic notations, typical running time functions, classifying functions by their asymptotic growth rates etc. Graphs, graph-based algorithm - breadth-first search (BFS), depth-first search (DFS), edge identification. Modification of DFS to find the Topological sort, strongly connected component, articulation points, bridges and bi-connected components. Sorting algorithms: selection sort, bubble sort, insertion sort, merge sort, quick sort, heap sort. Minimal spanning tree: basic terminology, applications and algorithms Single source shortest path algorithms: Dijkstra's algorithm, Bellman-Ford algorithm, shortest path in DAG. Floyd-Warshall algorithm, Transitive closure. Algorithm strategy, structure and problem types. Divide and Conquer algorithms: Binary search, Closest pair of points, Counting inversion. Greedy algorithms: Coin changing, fractional Knapsack, Huffman codes, Optimal codes, Activity selection. Suitability of all these algorithms in greedy approach. Dynamic programming (DP) and Memorized algorithms: Longest increasing subsequence (LIS), 0-1 Knapsack, Longest common subsequence (LCS), Rock climbing. Network Flow, Max Flow, Min-Cut, Residual Network, Augmenting paths, Ford-Fulkerson and Edmonds-Karp algorithms. Euclid's algorithm for GCD, Extended Euclid's algorithm and Number theoretic algorithms. Recurrence relation.

Iteration, Substitution, Recursion tree and Master methods. Pattern matching and String-matching algorithms (Rabin-Karp algorithm). Computing the transition function and diagram for Strings. P and NP classes, algorithm completeness, discussion on other complex techniques of algorithm design and analysis. Lab Exercises. Mini Project

CSE251: Electronic Circuits

Credit and Teaching Scheme:

	Theory	Laboratory	Total
Credits	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th Week	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks + Final Exam in the 14th Week

Prerequisite: CSE209 Electrical Circuits

Course Objectives:

This course aims to provide students with an understanding and capability to use the basic electrical and electronic abstractions to analysis and designof circuits and systems built with lumped and electronic circuit elements. This course provides fundamental knowledge of how complex devices such as semiconductor diodes, operational amplifiers (op-amp), bipolar and field effect transistors are modeled and used in the design and analysis of useful circuits. Besides, this course also emphasizes practical implementation of building, testing and performance analysis of electronic circuits. Knowledge of this course will be needed as prerequisite knowledge for future courses such as CSE345 Digital Logic Design, CSE350 Data Communications, CSE360 Computer Architecture, CSE442 Microprocessor and Microcontrollers and CSE491 VLSI Design.

Course Outcomes (COs):

After completion of this course students will be able to:

CO1	**Understand** and **use** diode and bipolar junction transistor (BJT) for designing electronic circuits.
CO2	**Understand** and **use** operational amplifier (Op amp) for designing electronic circuits.
CO3	**Understand** and **use** MOSFET for designing electronic circuits.
CO4	**Choose** software and circuit tools, **perform** and **demonstrate** skills, and **write** report to design, build and test electronic circuits.

Course Topics:

Operation and characteristics of semiconductor diode, Load-line analysis, Applications of Diode: Rectifier circuits, Logic gates, Clipper and Clamper, Zener Diode. Device Structure and Physical Operation of BJT, Modes of Operation, Current-Voltage Characteristics, BJT as an amplifiers and switch, BJT circuits at DC, Biasing in BJT amplifier circuits. Operation and Characteristics of ideal Op amp, Comparator circuits, Application of Op amp: Inverting and non-inverting, Voltage follower, Adder and Difference amplifiers, Integrator and Differentiator, Design of different amplifier and instrumentation circuits. Device Structure and Physical Operation of MOSFET, Modes of Operation, Current-Voltage Characteristics, Channel Length Modulation Effect, MOSFET as an Amplifier and Switch, DC biasing and small signal operations of MOSFET, Small signal equivalent models of MOSFET, Designing different circuit parameters of MOSFET, Logic circuit using n-MOS and p-MOS. Lab exercises. Mini project.

CSE302: Database Systems

Credit and Teaching Scheme:

	Theory	Laboratory	Total
Credits	3	1.5	4.5
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th Week	3 Hours/Week for 13 Weeks	6 Hours/Week for 13 Weeks

Prerequisite: CSE 106 Discrete Mathematics

Course Objectives:

This course introduces the fundamental concepts and practices of designing and implementing database system. It also enables the student to design and perform complex query operations on relational databases. It builds the capability of optimizing the databases efficiently by applying different techniques. Knowledge of this course will be needed as prerequisite knowledge for future courses such as CSE 412 Software Engineering, CSE 430 Software Testing and Quality Assurance, CSE464 Advanced Database System, CSE479Web Programming.

Course Outcomes (COs):

After completion of this course students will be able to:

CO1	**Understand** basic concepts of relational database, **construct** and **interpret** algebraic expressions to represent relations.
CO2	**Perform** and **organize** different query operations for data manipulation.
CO3	**Use** and **examine** different models and optimization techniques to design efficient relational database system.
CO4	**Choose** appropriate tools, **demonstrate** skills and **write** report to design, build and test real life database.

Course Topics:

Introduction to Database Management Systems, Introduction to the Relational Model, Writing Basic and DDL and DML Queries using SQL (Structured Query Language), Writing Basic Relational Algebra, Intermediate and Advanced SQL Queries (SELECT-PROJECT-JOIN, SET OPERATIONS, AGGREGATE etc.), Writing advanced Relational Algebra Expressions, Designing a Database using E-R Model, Database Normalization based on Functional Dependency, Boyce-Codd Normal Form, Database Indexing and Hashing Techniques, Transaction Management, Concurrency Control Protocols. Lab exercises. Mini project.

CSE303: Statistics for Data Science

Credit Hours and Teaching Scheme:

	Theory	Laboratory	Total

Credits	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks

Prerequisite: STA102 Statistics and Probability

Course Objectives:

The objective of the course is to introduce the statistical methods, techniques and tools that are essential for Data science domain. The course focuses on examining descriptive and inferential statistics and analyzing the output of these methods. The course also emphasizes techniques for result estimation and anomaly detection. Statistical machine learning methods that "learn" from data will be also introduced.

Course Outcomes (COs):

After completion of this course students will be able to:

CO1	**Apply** various techniques of exploratory data analysis and inferential statistics for understanding the dataset and **analyze** the outcomes to explore hidden characteristics of the dataset.
CO2	**Apply** regression and other statistical methods to determine outliers for smoothing and cleaning the dataset.
CO3	**Apply** different statistical learning models for classification and clustering of datasets to solve real-life problems and **analyze** and **compare** their performance.
CO4	**Choose** and **justify** appropriate algorithms and tools for exploratory data analysis; **perform** and **demonstrate** skills and **write** report to design and implement statistical learning models using realistic data sets.

Course Topics:

Data and Sampling Distributions. Statistical Significance Testing. Regression and Outlier Detection. Logistic Regression and other classification methods. Performance Evaluation of classification methods. Statistical Machine Learning: Bagging and Boosting. Unsupervised Learning. Lab exercises. Mini project.

CSE313: Theory of Computation

Credit Hours and Teaching Scheme:

	Theory	Laboratory	Total
Credit Hours	3	0	3
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week	0	3 Hours/Week for 13 Weeks + Final Exam in the 14th week

Prerequisite: CSE326 Algorithms

Course Objectives

This is an elective course and builds up the students' theoretical understanding of different models of computation and their limitations. The course will address Finite Automata and Regular Expressions, Context-Free Grammars and Pushdown Automata, Turing Machines and Undecidability, and Complexity Theory. Knowledge of this course will be needed as prerequisite knowledge for CSE471 Compiler Design course.

Course Outcomes (COs):

After completion of this course students will be able to:

CO1	**Demonstrate** and **use** Finite Automata and Regular Expressions as model of computation; **use** these knowledge and **write** report in real-life problem.
CO2	**Demonstrate** and **use** Context-Free Grammar and Pushdown Automata as model of computation; **use** these knowledge and **write** report in real-life problem.
CO3	**Demonstrate**, **use**, and **characterize** Turing Machines and Undecidability as model of real world computation and its limitation; **use** these knowledge and **write** report in real-life problem.
CO4	**Demonstrate** and **use** Complexity Theory to determine resources required by an algorithm; **use** these knowledge and **write** report in real-life problem.

Course Topic:

Finite Automata. Regular Expressions. Nondeterminism. Properties of Regular Languages. Context-Free Grammars. Pushdown Automata. Grammars and Equivalences. Properties of Context-Free Languages. Turing Machines. Variations of Turing Machines. Decidable Problems. Undecidability. Time Complexity. Space Complexity. NP-Completeness.

CSE221: Operating Systems

Credit and Teaching Scheme:

	Theory	Laboratory	Total
Credits	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks

Prerequisite: CSE 207 Data Structures

Course Objective

This course introduces the principles and techniques for the design and implementation of operating systems. This course also emphasizes the implementation of various techniques required for management, scheduling, allocation and communication of resources used in operating system. Knowledge of this course will be needed as prerequisite knowledge for future courses such as CSE360 Computer Architecture and CSE452 Distributed Systems and Algorithms.

Course Outcomes (COs):

After completion of this course students will be able to:

CO1	**Interpret** and **use** different components of modern operating system for understanding their design goals.
CO2	**Interpret** and **use** different process management techniques for effective operating system design.
CO3	**Interpret**and **use** different memory and I/O management strategies for desirable resource utilization.
CO4	**Implement** *different operating system techniques* ,**perform** and **demonstrate**these knowledge and **write** report for realistic system design.

Course Topics

Operating System Components, Process and Thread, Scheduling Algorithms for Multi-tasking, Inter Process Communication (IPC) and Synchronization, Deadlock Handling, Memory Management, File, I/O and Disk Management**.** Lab exercises. Mini project.

CSE345: Digital Logic Design

Credit and Teaching Scheme:

	Theory	Laboratory	Total
Credits	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks +Final Exam in the 14th week	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks +Final Exam in the 14th week

Prerequisite: CSE251 Electronic Circuits

Course Objectives:

This course introduces the fundamental concepts and practices of gate-level and MSI-level design of digital circuits. This course also emphasizes computer-aided design of digital circuits using Verilog Hardware Description Language (HDL). Knowledge of this course will be needed as prerequisite knowledge for future courses such as CSE360 Computer Architecture and CSE442 Microprocessors and Microcontrollers.

Course Outcomes (COs):

After completion of this course students will be able to:

CO1	**Interpret** and **apply** binary number system and Boolean algebra for design and analysis of combinational and sequential circuits.
CO2	**Apply** and **examine** techniques for combinational circuit design and analysis.
CO3	**Apply** and **examine** techniques for sequential circuit design and analysis.

CO4	**Choose** software and hardware tools, p**erform** and **demonstrate** skills, and **write** report to design, build, and test digital circuits.

Course Topics:

Binary number system, binary arithmetic, and Binary codes. Boolean algebra, Logic gates, Minimization of Boolean functions using K-map. Design and analysis of combinational circuit using Boolean algebraic technique. Design and use of MSI-level combinational circuits: parallel adder and subtractor; encoder and decoder; multiplexer and demultiplexer. Design of Combinational circuits using Verilog HDL. Flip-Flops, Representation and analysis of sequential circuits, Design of sequential circuit using state transition techniques. Design of MSI-level sequential circuits: registers, counters. Design of sequential circuits using Verilog HDL.Lab exercises.Mini project.

CSE347: Information System Analysis and Design

Credit Hours and Teaching Scheme:

	Theory	Laboratory	Total
Credit Hours	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks + Final Exam in the 14th week

Prerequisite: CSE302 Database Systems

Course Objectives

This course introduces the knowledge and skills required to analyze and design information system. This course will focus on analysis, design, development, and implementation of organizational information systems. Knowledge of this course will be needed as prerequisite knowledge for future courses such as CSE412 Software Engineering, CSE423 Software Architecture, CSE428 Human Computer Interactions, and CSE430 Software Testing and Quality Assurance.

Course Outcomes (COs):

After completion of this course students will be able to:

CO1	**Understand** project management and system development life cycle.
CO2	**Analyze** feasibility and **construct** application architecture and modeling.C3C4
CO3	**Design** and **examine** information systems.
CO4	**Choose** and **examine** software and hardware tools, **perform** and **demonstrate** skills, and **write** report to design, build, and test information systems.

Course Topic:

Introduction to Information System Analysis and Design. Project management. System development life cycle. Requirements analysis, sampling and investigating data. Modeling system requirements. Feasibility Analysis. Application Architecture and Modeling. Input-Output design and prototyping. User Interface design. Object Oriented Design and Modeling. Lab exercises. Mini project.

CSE 350: Data Communications

Credit Hours and Teaching Scheme:

	Theory	Laboratory	Total
Credits	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks

Prerequisite: CSE 251 Electronic Circuits

Course Objectives

This course includes the evolution trend of computer networks and the procedure of transmitting data over the network by resolving the conflicting issues arising in the course of transmission. The key aspects of transmission, interfacing, link control, and multiplexing are examined.

Course Outcomes (COs):

After completion of this course students will be able to:

CO1	**Interpret** data communication concepts, backbone, protocols and architecture.
CO2	**Apply** and **analyze** data transmission mechanisms.
CO3	**Apply** and **analyze** different aspects of reliability in data communication; **demonstrate** skills and **write** report on data communication problems.
CO4	**Apply** and **examine** data transformation techniques for effective data communication; d**emonstrate** skills and **write** report on data communication problems.

Course Topic:

Data communication model, communication tasks. Introduction to network standard and protocols, Protocol Architecture: OSI standard protocol, TCP/IP protocol suite. Analog and Digital Transmission. Transmission impairments, Channel Capacity: Nyquist, Shannons. Guided transmission media, Wireless transmission media, wireless propagation. Signal encoding techniques. Synchronous Transmission, Asynchronous Transmission. Interfacing. Types of errors, Error detection: parity check, CRC, checksum. Error correction: Hamming code. Flow control techniques– stop-and-wait, sliding window, HDLC. ARQ techniques– stop-and-wait ARQ, go-back-n ARQ, selective reject. Multiplexing – FDM, TDM, WDM. Lab exercises. Mini project.

CSE355: Digital System Design

Credit Hours & Teaching Scheme:

	Theory	Laboratory	Total

Credits	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks

Prerequisite: CSE345 Digital Logic Design

Course Objectives

This course is an elective course and builds up the students' ability to understand advanced features of digital (combinational and sequential) circuits and design and synthesize digital circuits using computer-aided techniques. The course will address advanced features of digital circuits, designing and synthesizing digital circuits using Verilog Hardware Description Language (HDL), and designing and synthesizing application specific integrated circuits using Programmable Logic Devices (PLDs).

Course Outcomes (COs):

After completion of this course students will be able to:

CO1	**Interpret** and **apply** advanced features of digital (combinational and sequential) circuits as the pre-design concepts for computer-aided design of digital circuits.
CO2	**Examine**, **choose**, and **develop** Verilog HDL modeling techniques; p**erform** and **demonstrate** skills, and **write** report to design and test digital circuits.
CO3	**Examine**, **choose**, and **develop** Verilog HDL techniques; perform and **demonstrate** skills, and **write** report to synthesize digital circuits.
CO4	**Examine** and **choose** Programmable Logic Devices (PLDs) and **design** digital circuits using PLDs as Application Specific Integrated Circuits (ASICs).

Course Topic:

Hazards in Combinational circuits. Busses and three-state devices. Mealy and Moor type finite state machines (sequential circuits). Register Transfer Logic (RTL) design, Algorithmic State Machines (ASM). Structural Verilog modeling of combinational circuits. Logic simulation, design verification, and test methodology in Verilog-based designs. Behavioral Verilog modeling of combinational circuits. Verilog-based design of datapath elements and datapath controllers. Logic synthesis using Verilog. RTL synthesis using Verilog. High-level synthesis using Verilog. Verilog-based synthesis of datapath elements and datapath controllers. Programmable Logic Array (PLA), Verilog modeling of PLA. Programmable Array Logic (PAL), Verilog modeling of PAL. Field-Programmable Gate Array (FPGA), Verilog-based design for FPGA. ASIC synthesis with FPGA. Lab exercises. Mini project.

CSE360: Computer Architecture

Teaching Scheme:

	Theory	Laboratory	Total
Credit Hours	3	0	3
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week	0	3 Hours/Week for 13 Weeks + Final Exam in the 14th week

Prerequisite: CSE221 Operating Systems

Course Objectives:

The objective of this course is to study the structure, behaviour, and characteristics of computer systems. This course will exhibit the design of the various functional units of digital computers, discuss different types of memories and their properties, and introduce basics of parallel computer architecture. Knowledge of this course will be needed as prerequisite knowledge for future course, such as CSE442 Microprocessors and Microcontrollers.

Course Outcomes (COs):

After completion of this course, students will have:

CO1	**Understand** the structure, function, and characteristics of digital computers.
CO2	**Understand**, **determine** and **analyze** performance of memory and I/O subsystems.
CO3	**Understand, implement**, **examine**, and **justify** instruction set design for performance improvement, **execute** and **demonstrate** this knowledge, and **write** report for problem solving.
CO4	**Implement**, **examine**, and **justify** processor and control unit design, **execute** and demonstrate this knowledge, and **write** report to synthesize functional units of digital computers.

Course Topics:

Function and structure of a computer, Functional components of a computer, Interconnection of components, Performance analysis of a computer, Hardware architecture. Bus Interconnection, Scalar Data Types, Fixed and Floating-point numbers, Signed numbers, Integer Arithmetic, 2's Complement method for multiplication, Booths Algorithm, Floating point representations, IEEE standards, Floating point arithmetic. Characteristics of memory systems, Internal and External Memory, Types of memories: ROM: PROM, EPROM, EEPROM, RAM: SRAM, DRAM, SDRAM, RDRAM, High-Speed Memories: Cache Memory, elements of cache design, Pentium 4 cache, Organization and Mapping Techniques, Replacement Algorithms, Cache Coherence, Secondary Storage: Magnetic Disk, Tape, DAT, RAID, Optical memory, CDROM, DVD, Error correction memories, Interleaved memories, Hardware support of memory management. External Devices, I/O modules, Programmed I/O, Interrupt-driven I/O, Direct memory access, I/O channels and processors, external interface. Machine instruction, operands, operations, and assembly language, addressing, and instruction format. processor and registers organization, instruction cycle and instruction pipelining, Reduced Instruction Set Computers (RISC), superscalar processors, parallel processing, Micro programmed control unit.

CSE366: Artificial Intelligence

Credit and Teaching Scheme

	Theory	Laboratory	Total
Credits	3	1	4
Contact Hours	3 Hours/Weeks for 13 Weeks + Final Exam in the 14th Week	2 Hours/Weeks for 13 Weeks	5 Hours/Weeks for 13 Weeks + Final Exam in the 14th Week

Prerequisite: CSE326 Algorithms

Course Objective

This course introduces the basic concepts, methods, practices and applications of artificial intelligence (AI) to the students from a computer science perspective. The course emphasizes on the necessary algorithms for designing intelligent systems. The course covers some AI programming languages useful for implementing AI systems. The knowledge of this course is needed as prerequisite knowledge for several courses such as CSE474 Pattern Recognition, CSE475 Machine Learning, CSE477 Data Mining and CSE492 Robotics.

Course Outcomes (COs)

After completion of this course students will have be able to:

CO1	**Interpret** and **apply** the key components and classical search algorithms of Artificial Intelligence (AI) for solving real-life problems.
CO2	**Understand** and **apply** non-classical search algorithms such as metaheuristics, adversarial search and constraint satisfaction algorithms for solving complex problems.
CO3	**Interpret**, **apply**, and **examine** knowledge-based and learning-based AI systems for solving complex problems.
CO4	**Use** AI concepts and techniques; **perform** and **demonstrate** skills and **write** report for solving complex real-life problems.

Course Topics

Overview of Artificial Intelligence (AI): definition, history, applications. AI agents: definition of rational agent, agent environment, agent structure. Classical search techniques: uninformed search strategies (BFS, DFS, UCS, DLS, IDS, bidirectional), informed search strategies (greedy best first, A*, IDA*). Metaheuristic algorithms: hill climbing, simulated annealing, local beam search, genetic algorithm. Adversarial search: games vs. single-agent environment, game tree, minimax algorithm, alpha-beta pruning. Constraint satisfaction problem: problem formulation, CSP algorithms (constraint propagation, backtracking search). Knowledge-based agents: propositional logic representation, reasoning techniques, first-order logic. Uncertainty: probability notations and rules, independence and conditional independence, Bayes' rule, naive bayes model. Learning from observations: regression algorithms, classification algorithms, underfitting and overfitting, model selection, learning curve, feature engineering. Lab exercises. Mini project.

CSE400: Capstone Project

Credit Hours and Teaching Scheme:

	Theory	Laboratory	Total
Credit Hours	0	1 in the 1st semester (X grade) 2 in the 2nd semester (X grade) 3 in the 3rd semester (grade on total 6 credits)	6
Contact Hours	0	2 Hours/Week for 13 Weeks in the 1st semester 4 Hours/Week for 13 Weeks in the 2nd semester 6 Hours/Week for 13 Weeks in the 3rd semester	156 Hours in a year

Prerequisite: Students must complete at least 105 credits

Course Objectives

Capstone is a metaphor used to describe a final achievement that builds upon previous works and encapsulates them. This course is intended to provide a culminating experience that allows a student to demonstrate proficiency in several of the learning outcomes that are set forth by students' degree program. Capstone project will integrate multidisciplinary subjects and professional skills that are difficult to impart in a traditional lectured course.

Course Outcomes (COs):

After completion of this course students will be able to:

CO1	**Identify** and **examine** various problem domains (literature review); **justify** and **finalize** problem statement; **write** project proposal for the capstone project.
CO2	**Perform** and **complete** requirement analysis; **outline**, **justify**, and **finalize** design methodologies for the finalized project.
CO3	**Design** hardware and/or software for the finalized project incorporating societal, environmental, and ethical considerations; **build** the proposed system incorporating project management and financial principles and **justify** (test) the deliverable system.
CO4	**Use** different visualization tools and **write** and **present** (oral and/or poster) technical report incorporating different evaluation matrices including efficiency, cost; and ethical, societal, economic, and environmental impacts.

The capstone project will consists of the work on the topic finalized for the project. The project must be done in a group of **three to four students**.

Course Topic:

Finalization of problem statement. Design methodology. Designing and building of deliverable system. Technical report and presentation.

CSE405: Computer Networks

Credit and Teaching Scheme:

	Theory	Laboratory	Total
Credits	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks

Prerequisite: CSE326 Algorithms

Course Objectives:

This course explores the field of computer networking and communication, emphasizing network architecture and software issues. Student will learn the basic performance and engineering trade-offs in the design and implementation of computer networks. Knowledge of this course will be needed as prerequisite knowledge for future courses such as CSE406 Internet of Things, CSE453 Wireless Networks, and CSE457 Cellular Networks.

Course Outcomes (COs):

After completion of this course students will be able to:

CO1	**Understand** and **use** transmission mechanism and medium access control method for designing computer networks.
CO2	**Understand** and **use** network configuration and routing mechanisms for designing computer networks.
CO3	**Understand** and **use** transmission control and application protocols for designing computer networks.
CO4	**Choose** software tools, **perform** and **demonstrate** skills, and **write** report for designing, testing, and evaluating complex computer networks.

Course Topics:

Introduction to computer networks, layers, transmission media. Data link layer design issues, framing. Protocol verification: finite state machine & petri-net models. MAC, Channel allocation problem, CSMA/CD, Contention period, BEB CSMA. Collision-free protocols: bit-map, binary countdown, limited contention. Introduction to network layer, Distance vector routing, count-to-infinity problem. Link state routing, Hierarchical routing, Broadcast & Multicast routing. Internet Protocol (IP), IPv4 header, IP address and Subnets. Network address translation (NAT), ICMP, ARP, RARP, BOOTP, DHCP. Congestion and congestion control algorithms in network layer, QoS, leaky bucket algorithm, token bucket algorithms, RSVP. Internetworking, tunneling, fragmentation. Transport service, primitives, connection establishment, data transfer & connection release, TCP header, Congestion control in Transport layer. DNS, WWW, Client side and server side, Server farm. Lab exercises. Mini project.

CSE406: Internet of Things

Credit Hours and Teaching Scheme:

	Theory	Laboratory	Total
Credits	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks

Prerequisite: CSE405 Computer Networks

Course Objectives:

This course will cover the building blocks of Internet of Things (IoT) and their characteristics. Domain specific IoT and their real-world applications will be developed here. This course also will introduce the programming aspects of IoT with a view towards rapid prototyping of complex IoT applications.

Course Outcomes (COs):

After completion of this course students will be able to:

CO1	**Understand** the building blocks of IoT and their characteristics with real-world applications.
CO2	**Understand**, **apply**, and **examine** different architectures for different levels of complex IoT

	applications.
CO3	**Examine** IoT data analytics and **justify** various tools for IoT; **perform** and **demonstrate** skills, and **write** report on realistic data analytics.
CO4	**Choose** and **justify** software and hardware tools, **develop** source code for various IoT domains, **perform** and **demonstrate** skills, and **write** report on realistic IoT development.

Course Topic:

Introduction to IoT. Basics of Networking. Communication Protocols. Sensor Networks: Machine-to-Machine Communications. Interoperability in IoT: Integration of Sensors and Actuators. Implementation of IoT with programmable devices. *Software Defined Networking* (SDN) for IoT: Data Handling and Analytics. Cloud Computing. Fog Computing: Smart Cities and Smart Homes. Connected Vehicles: Smart Grid. Industrial IoT: Agriculture, Healthcare, Activity Monitoring and related case studies. Lab exercises. Mini project.

CSE407: Green Computing

Credit Hours and Teaching Scheme:

	Theory	Laboratory	Total
Credit Hours	3	0	3
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week	0	3 Hours/Week for 13 Weeks + Final Exam in the 14th week

Prerequisite: CSE405 Computer Networks

Course Objectives

This course introduces students to the exciting area of "Green Computing" aiming to help students acquire the knowledge and skills needed to do research in this space, as it is critical to manage consumption of societal energy usagemore efficiently for long term sustainability. This course is organizationally divided into two tracks. The first track is "Energy-Efficient Computing" and the second track is "Applying Computing towards Sustainability".

Course Outcomes (COs):

After completion of this course students will be able to:

CO1	**Explain** the state-of-the-art techniques for improving the energy efficiency of mobile devices, to laptop and desktop class computers and finally to data centers.
CO2	**Compute** energy efficiency across the hardware/software stack, starting from the individual components like processors and radio interfaces to system level architectures and optimizations.
CO3	**Apply** leverage computing to reduce the energy footprint of our society; **demonstrate** this knowledge and **write** report for realistic problem solving.
CO4	**Build** Smart Buildings and the Smart Grid, such as sensing, modelling and controlling the energy usage of buildings, as well as new operating systems and software stacks for the smart

	infrastructure; **demonstrate** this knowledge and **write** report for realistic problem solving.

Course Topic:

Logistics, Introduction to Green Computing and Background. Energy Management in Embedded Systems and Sensor Networks. Energy Management in Mobile Systems and Smart phones. Greening Desktop and Laptop PCs. Energy Efficient Networking and Communication. Greening Data Centers and Servers. IT Enabled Smart Buildings. Sensing within Buildings (Occupancy)

Sensing within Buildings (Energy and Water). Managing the Data Deluge and "App Platforms" for Smart Buildings. Energy Management in Smart Homes. Modeling, Prediction and Control for Smart Buildings. Security and Privacy.

CSE 412: Software Engineering

Credit Hours and Teaching Scheme:

	Theory	Laboratory	Total
Credits	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks+ Final Exam in the 14th Week	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks

Prerequisite: CSE347 Information System Analysis and Design

Course Objectives:

The objective of this course is to learn different principles and practices of modern software engineering. It also builds the understanding of the challenges faced in the industry and their resolutions. This course enhances the skills of using different modern tools and languages to analyze, design and evaluate a real-life complex software system. This software engineering knowledge will be needed in CSE430 Software Testing and Quality Assurance course.

Course Outcomes (COs):

After completion of this course students will be able to:

CO1	**Prepare** software requirements and **use** appropriate software development models for developing software projects.
CO2	**Construct** software models for developing software projects.
CO3	**Use** and **examine** different software testing techniques and cost estimation for project evaluation.
CO4	**Select** and **use** different software tools; **demonstrate** skills and **write** report to design, build, and test software for complex real-life applications.

Course Topics:

Introduction to Software Engineering, review of Software development lifecycle (SDLC), Software requirements, Requirement analysis, Iterative process models, Incremental software development, Agile Software Development, Agile – UX and Lean - UX, Extreme programming, SCRUM, Software modeling, UML diagrams, Behavioral modeling: Use case diagram, class diagram, Interaction diagrams: Sequence and activity diagram, Code complexity analysis: Cyclomatic complexity, Halstead's complexity, Project cost estimation techniques, Functional Point Analysis, FP counting method for determining software cost, Software Testing Basics- white box & black box testing, UAT, Integration and System Testing.Lab exercises. Mini project.

CSE420: Computer Graphics

Credit and Teaching Scheme:

	Theory	Laboratory	Total
Credits	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks+ Final Exam in the 14th Week	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks

Prerequisite:CSE326 Algorithms

Course Objectives:

The course focuses on all aspects of fundamental computer graphics, including 2D/3D object representations, transformations, modeling and rendering algorithms. The course also aims to provide a good foundation for OpenGL programming, which is a widely accepted standard for developing graphics applications. The course will assume a good background in programming in C or C++ and a background in mathematics including familiarity with the theory and use of coordinate geometry and of linear algebra such as matrix multiplication.

Course Outcomes (COs):

After completion of this course students will be able to:

CO1	**Understand** computer graphics system and **implement** different graphics primitives, different clipping techniques for drawing a graphics scene.
CO2	**Understand**, **apply** two dimensional transformations, and three-dimensional transformations for manipulating complex graphics scenario using OpenGL.
CO3	**Understand** and **apply** different 3D viewing techniques and color perception models for creating realistic model.
CO4	**Apply** and **analyze** different modeling, rendering, shading and animation techniques for creating 3D objects using OpenGL.

Course Topics:

Efficient implementation of primitives (line, circle, ellipse); Efficient clipping; Polygonal fill; Geometric transformations (2D & 3D); Homogeneous coordinates; Concatenation; Current transformation and matrix stacks; Window to viewport transformation; Input and Interaction in OpenGL; Color perception, color models (RGB, CMY, HLS), color transformations; Color in OpenGL, RGB and indexed color; Hidden surface removal techniques; Curve and surface representation; Image rendering by ray tracing; Generating realistic 3D color object using OpenGL. Lab exercises. Mini project.

CSE422: Simulation and Modeling

Credit Hours and Teaching Scheme:

	Theory	Laboratory	Total
Credits	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks+ Final Exam in the 14th Week	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks

Prerequisite: CSE326 Algorithms

Course Objectives:

The course is an elective course and aims at giving the students the knowledge of the basic concepts in the area of modeling and simulation. The course will focus on modeling and simulation of discrete and continuous system. The course will address the modeling and analyzing input and output for a simulation model and generating random numbers for simulation experiments. Simulation tools will be used to conduct experiments.

Course Outcomes (COs):

After completion of this course students will be able to:

CO1	**Understand** and **use** fundamental concepts of computer simulation and its role in engineering problem solving.
CO2	**Understand** random number variates and **apply** them to develop simulation models.
CO3	**Compute** and **analyze** the output from a terminating simulation of an engineering problem. C3, C4
CO4	**Choose** and **examine** software tools, **perform** and **demonstrate** skills, and **write** report to model and build a simulation model with basic operations and statistical analysis of output.

Course Topic:

Introduction to simulation modeling. Review of basic probability and statistics. Selecting input probability distributions. Random Number Generators. Generating Random Variates. Output Data Analysis for a Single System. Verification/Validation. Assignments & Mini Projects with reports and presentations. Lab exercises. Mini project.

CSE423: Software Architecture

Credit Hours and Teaching Scheme

	Theory	Laboratory	Total
Credits	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks+ Final Exam in the 14th Week	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks

Prerequisite: CSE412 Software Engineering

Course Objectives:

The objective of this course is to familiarize the students with the fundamental concepts of software architecture, the proprieties and applicability of the different architecture styles. Student will also learn popular design patterns, software components, reusable architectures and the relations of all these concepts with the software reuse.

Course Outcomes (COs):

After completion of this course students will be able to:

CO1	**Understand** and **use** the various architecture styles for software systems.
CO2	**Choose** and e**valuate** alternative architectures in terms of design and reuse to solve

	various complex software engineering problems.
CO3	**Apply**, **examine**, and **justify** design patterns, and methods and techniques of software reuse.
CO4	**Choose**, **examine**, and **justify** software tools, **perform** and **demonstrate** skills, and **write** report to build a software system following a architecture specification, selecting and applying design patterns and using a component-based development method.

Course Topic:

Introduction to fundamentals of software design, concepts, and principles. Micro and macro architectures: design patterns, frameworks and production lines. Types of software patterns: architecture patterns, design patterns, idiomatic structures. Architecture styles, reference models and architectures: pipes and filters, data abstraction, object-orientation, even-based systems, layered systems, repositories, interpreters, process-control systems. Design, evaluation and refinement of software architectures. Representation and Documentation of software architectures. Reuse of software architectures: production lines, frameworks, software components. Case Study: Simple and complex technological architectures with report. Lab exercises. Mini project.

CSE428: Human Computer Interactions

Credit Hours and Teaching Scheme:

	Theory	Laboratory	Total
Credits	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks+ Final Exam in the 14th Week	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks

Prerequisite: CSE412 Software Engineering

Course Objectives:

This course builds up the students' ability to design user interfaces based on the capabilities of computer technology and the needs of human factors. They will learn to evaluate and design usable and appropriate software based on the psychological, social, and technical analysis. They will become familiar with the variety of design and evaluation methods used in interaction design and will get experience with these techniques.

Course Outcomes (COs):

After completion of this course students will be able to:

CO1	**Explain**, choose and **distinguish** the capabilities of both humans and computers from the viewpoint of human information processing.
CO2	**Analyze** and **identify** user models, user support, socio-organizational issues, and stakeholder requirements of HCI systems.
CO3	**Choose**, **analyze**, and **justify** the HCI design principles, standards, and guidelines for designing HCI systems.

CO4	**Apply**, **examine**, **select**, and **design** advanced HCI methodologies and technologies for realistic problem solving; **perform** and **demonstrate** skills and **write** report on realistic interaction design.

Course Topic:

Foundations of Human–Computer Interaction: Human Capabilities, The Computer, The Interaction, Paradigms. HCI Design Process: Interaction Design Basics, HCI in the Software Process, Design Rules, Universal Design. Implementation Support: Implementation Tools. Users Models: Cognitive Models, Socio-organizational Issues and Stakeholder Requirements. Evaluation and User Support: Evaluation, User Support. Task Models and Dialogs: Analyzing Tasks, Dialog Notations and Design. Augmented Reality, Hypertext and Multimedia: Groupware and Computer-supported Collaborative Work, Ubiquitous Computing, Virtual Reality and Augmented Reality, Hypertext, Multimedia and the World Wide Web. Lab exercises. Mini project.

CSE430: Software Testing and Quality Assurance

Credit and Teaching Scheme:

	Theory	Laboratory	Total
Credits	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks+ Final Exam in the 14th Week	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks

Prerequisite: CSE 412 Software Engineering

Course Objectives:

This course is designed to enable a clear understanding and knowledge of the software testing and quality control. IT explores different SQA components, techniques, and standards participated as a part of software project management in the industry. Beside the concepts, it will build the capacity of reviewing, planning and designing the test cases based on system requirements. It will develop the ability to use different testing techniques (black box and white box) and available tools used in the real-life software projects.

Course Outcomes (COs):

After completion of this course students will be able to:

CO1	**Understand** different software quality assurance and quality control activities and standards for software projects.
CO2	**Formulate** appropriate test plan and test cases based on system specifications for writing test cases for real-life software projects.
CO3	**Apply** appropriate testing for real-life complex software projects.
CO4	**Choose** automated testing tools, **perform** and **demonstrate** skills, and **write** report on various test plans and test cases for real-life software projects.

Course Topics:

Software Quality, Quality Assurance & Quality Control, Quality Assurance Activities, Quality standards, Quality factors, The components of the SQA, Review and inspections, Formal technical reviews, Cost estimations of review tasks, Test

plan format, Decision Table, Boundary Value Analysis, Path Testing using Cyclomatic Complexity Analysis, pairwise testing: AllPair testing, Software testing- strategies, objectives, Software test classifications, White box testing, Black box testing, Automated testing, Unit testing: NUNIT, Selenium, Integration Testing, Product metrics, Analyzing the Software Quality Activities, Evaluating cost of software quality (COQ) and quality level. Lab exercises. Mini project.

CSE432: Digital Signal Processing

Teaching Scheme:

	Theory	Laboratory	Total
Credits	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks

Prerequisite: CSE326 Algorithms

Course Objectives:

The subject aims to provide the details about the basic digital signal processing operations including sampling/reconstruction of discrete time signals. This course covers the analysis and representation of discrete-time signal systems, including discrete-time convolution, difference equations, finite and infinite impulse response along with the explanation of discrete transformations for designing digital filters. Besides, this course emphasizes the practical implementation of building, testing, and performance analysis. Knowledge of this course will be needed as a prerequisite for future courses, such as CSE350 Data Communications andCSE438 Digital Image Processing.

Course Outcomes (COs):

After completion of this course students will be able to:

CO1	**Understand** and **use** the fundamental concepts of digital signal processing.
CO2	**Understand** and **use** the discrete transformations for designing digital filters.
CO3	**Understand and use** the FIR and IIR techniques for designing digital filters.
CO4	**Choose** software, **perform** and **demonstrate** skills, and **write** report to design, build and test digital filters.

Course Topics:

Discrete-time signals and systems, analog to digital conversion, impulse response, finite impulse response (FIR) and infinite impulse response (IIR) of discrete-time systems, difference equation, convolution, transient and steady state response. Discrete Fourier series, discrete-time Fourier series, discrete Fourier transform (DFT) and properties, fast Fourier transform (FFT), inverse fast Fourier transform, z-transformation - properties, transfer function, poles and zeros and inverse z-transform. Correlation: circular convolution, auto-correlation and cross correlation. FIR filters- linear phase filters, specifications, design using window, optimal and frequency sampling methods; IIR filters- specifications, design using impulse invariant, bi-linear z-transformation, least-square methods and finite precision effects. Lab exercises. Mini project.

CSE438: Digital Image Processing

Credit Hours and Teaching Scheme:

	Theory	Laboratory	Total
Credits	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks+ Final Exam in the 14th Week	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks

Prerequisite: CSE326 Algorithms

Course Objective: This course is an introduction to digital image processing and image analysis techniques and concepts. Topics include intensity transformations for image enhancement, two-dimensional discrete Fourier transform, spatial and frequency domain linear image filtering, nonlinear image filtering, binary image processing, edge detection, image segmentation, and digital video processing basics. This course makes extensive use of MATLAB as an analysis, design, and visualization tool.

Course Outcomes (COs):

After completion of this course students will be able to:

CO1	**Understand** the digital image fundamentals and **apply** different image enhancement techniques for improving the quality of the image.
CO2	**Understand** the basics of color model and **apply** them for smoothing, sharpening and/or segmenting color image.
CO3	**Understand, choose, examine**, and **devaluate** different image segmentation and morphological operation and image compression techniques; **perform** and **demonstrate** these skills and **write** report for better representation and/or better storage of the image.
CO4	**Choose**, **compare**, and **justify** appropriate object detection and techniques for understanding complex real life images; **perform** and **demonstrate** these skills and **write** report for realistic problem solving.

Course Topic:

Digital Image Fundamentals: Elements of Visual Perception, Light and the Electromagnetic Spectrum, Image Sensing and Acquisition, Image Sampling and Quantization, Some Basic Relationships between Pixels, Linear and Nonlinear Operations. Image Enhancement in the Spatial Domain: Basic Gray Level Transformations, Histogram Processing, Basics of Spatial Filtering, Smoothing Spatial Filters, Sharpening Spatial Filters. Color Image Processing: Color Fundamentals, Color Models, Pseudocolor Image Processing, Basics of Full-Color Image Processing, Color Transformations, Smoothing and Sharpening, Color Segmentation. Image Segmentation: Detection of Discontinuities, Edge Linking and Boundary Detection, Thresholding, Region-Based Segmentation, Segmentation by Morphological Watersheds. Morphological Image Processing: Dilation and Erosion, Opening and Closing, Extensions to Gray-Scale Images. Image, Video compression: Lossless compression vs. Lossy compression, Image coding JPEG, Video coding and MPEG. Object Recognition: Representation, Learning, Recognition, BagofWordsmodel. Lab exercises. Mini project.

CSE442: Microprocessors and Microcontrollers

Credit and Teaching Scheme:

	Theory	Laboratory	Total
Credits	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th Week	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks + Final Exam in the 14th week

Prerequisite: CSE360 Computer Architecture

Course Objectives

This course provides basic concept of architecture of microprocessor, instruction sets, addressing modes, interfacing of bus and memory with microprocessor, and handling of interrupts. The course also addresses interfacing of microcontroller with peripheral devices. Knowledge of this course will be needed as prerequisite knowledge for CSE494 Embedded Systems.

Course Outcomes (COs)

After completion of this course students will be able to:

CO1	**Understand** and **use** microprocessor architecture and instruction sets for building microprocessor-based system
CO2	**Interpret** and **use** peripheral interfacing for building microprocessor-based system
CO3	**Understand** and **use** microcontroller architecture, instruction sets and interfacing for building microcontroller-based system
CO4	**Interpret** and **use** different hardware and software tools; **demonstrate** *skills, and* **write** *report to design, build, and test microprocessor and microcontroller based systems*.

Course Topics:

Introduction to Microprocessors, Memory and I/O system, Architecture of Microprocessor (Registers, addressing modes and hardware specifications), Memory and I/O Interfacing, Interrupt and DMA Controller, Microcontroller's Architecture and instruction set, Microcontroller's interfacing. Lab exercises. Mini project.

CSE445: Computer Vision

Credit and Teaching Scheme:

	Theory	Laboratory	Total
Credits	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks

Prerequisite: CSE326 Algorithms

Course Objectives:

This course provides an introduction to computer vision including fundamentals of image formation, camera imaging geometry, feature detection and matching, stereo, motion estimation and tracking, image classification and scene understanding. The focus of the course is to develop the intuitions and mathematics of the methods in lecture, and then to learn about the difference between theory and practice in the projects.

Course Outcomes (COs):

After completion of this course students will be able to:

CO1	**Describe** and **analyze** different image formation and image analysis techniques and **Understand** the basics of 2D and 3D Computer Vision.
CO2	**Compare** and **choose** between various methods used for registration, alignment, and matching in images.
CO3	**Describe** and **analyze** advanced concepts leading to object and scene categorization from images using deep learning techniques.
CO4	**Compare** and **apply** different computer vision algorithms; **Perform** and **demonstrate** skills and **write** report to design, build, and test moderately complex computer vision applications.

Course Topics:

Introduction to computer vision, Image Formation and Filtering, Cameras and Optics, Light and Color and Image Filtering, Thinking in Frequency, Interest points and corners, Local image features, Model fitting, Hough Transform, RANSAC and transformations, Stereo intro and Camera Calibration, Epipolar Geometry and Structure from Motion, Stereo Correspondence and Optical Flow, Machine learning and recognition overview, Recognition and Bag of Words, Spatial Verification, TF-IDF, Query Expansion, feature encoding, Large-scale category recognition and advanced feature encoding, Viola Jones detection, Dalal Triggs and Pascal VOC, Big Data, Crowdsourcing and Human Computation, Neural networks Basics and Convolutional Networks, Object Detectors Emerge in Deep Scene CNNs and Deeper Deep Architectures, Structured Output from Deep Networks, “Unsupervised” Learning and Colorization, Lab exercises. Mini project.

CSE446: ASIC Design Using FPGA

Teaching Scheme:

	Theory	Laboratory	Total
Credits	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks

Prerequisite: CSE345 Digital Logic Design

Course Objectives:

This course builds up the students’ ability to design application-specific hardware implementations of algorithm for ASICs and FPGAs. The course will address differences between hardware description language for synthesis and simulation, behavioral synthesis, gate-level design, register transfer level design, design methodologies, finite state machines, design reuse and intellectual property cores, and optimization. Knowledge of this course will be needed as prerequisite knowledge for future course CSE491 VLSI Design.

Course Outcomes (COs):

After completion of this course students will be able to:

CO1	**Interpret** and **apply** the overview of computer aided design tool flow for ASIC and FPGA design.
CO2	**Interpret** the synthesis from hardware description language (Verilog) and creation of finite state machines.
CO3	**Interpret** the differences between FPGA and ASIC design flows.
CO4	**Choose** software, **perform** and **demonstrate** skills, and **write** report to design, build and test the ASIC/ FPGA prototype.

Course Topics:

Introduction to Verilog, CAD Tools and Design Methodology, Design Units in Verilog, Timing and Simulation, Basic Elements in Verilog, Behavioral Modeling, Structural Modeling, Verilog Synthesis Techniques and Recommendations, Advanced Concepts in Verilog, Xilinx FPGA Architecture, Actel Anti-fuse FPGA Architecture, Introduction to ASIC Design Methodology, ASIC versus FPGA Coding Style, System on a Chip (SoC), Design Constraints and Optimization Techniques. Lab exercises. Mini project.

CSE452: Distributed Systems and Algorithms

Credit Hours and Teaching Scheme:

	Theory	Laboratory	Total
Credit Hours	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks + Final Exam in the 14th week

Prerequisite: CSE221 Operating Systems

Course Objectives:

This course focuses on the principles, techniques, and practices relevant to the design and implementation of distributed systems. Students will study major algorithms and theoretical results and explore them in modern applications like cloud computing, pervasive computing, Google file system, peer-to-peer systems and etc.

Course Outcomes (COs):

After completion of this course students will be able to:

CO1	**Interpret**, **apply**, and **examine** different theories, models and concepts for the design and implementation of distributed systems.
CO2	**Describe**, **apply**, and **analyze** common problems and their solving algorithms for modern distributed applications.

CO3	**Identify**, and **analyze** fundamental limitations and impossibility results for distributed systems to avoid them during realistic problem solving.
CO4	**Apply** different distributed algorithms for real-world distributed computing platforms; **demonstrate** this knowledge and **write** report for real-world distributed computing platforms.

Course Topic:

Introduction to distributed systems and models of distributed computation. Time, clocks, and synchronization. Distributed objects and components. Distributed file system. Remote invocation and indirect communication. Global state and snapshot recording algorithms. Distributed mutual exclusion algorithms. Deadlock detection in distributed systems. Check pointing and rollback recover. Consensus and agreement algorithms. Lab exercises. Mini project.

CSE453: Wireless Networks

Credit Hours and Teaching Scheme:

	Theory	Laboratory	Total
Credit Hours	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks + Final Exam in the 14th week

Prerequisite: CSE405 Computer Networks

Course Objectives:

The objective of this course is to give an introduction to the fundamentals of the wireless communications systems, the wireless network architectures, protocols, and applications. This course will address topics of wireless communications and mobile computing systems, signal propagation characteristics of wireless channels, wireless channel modeling, frequency reuse/cellular/microcellular concepts, spread-spectrum modulation for wireless systems, multiple access techniques, and wireless networking standards.

Course Outcomes (COs):

After completion of this course students will be able to:

CO1	**Comprehend**, **use**, and **characterize** fundamentals of the wireless communications systems.
CO2	**Apply** and **characterize** wireless network architecture's protocols.
CO3	**Understand**, **use**, and **examine** wireless communications and mobile computing systems, signals propagation characteristics of wireless channels and frequency reuse concepts; **implement** these skills and **write** report.
CO4	**Understand**, **apply**, and **examine** satellite communications and wireless networking standards; **implement** these skills and **write** report.

Course Topic:

Overview of Wireless Communication Networking and Mobile Computing. Historical perspectives, first and second generation cellular systems, land mobile vs. satellite vs. indoor wireless systems. Adaptation and mobility in wireless information systems, challenges of mobile computing, mathematical preliminaries. Wireless Channel Modelling: Path-loss and shadow fading models. Rayleigh and Rician fading. Coherence time, coherence bandwidth, frequency flat and selective fading. Frequency reuse/cellular/microcellular concepts including sectorization and cell splitting. Tracking and localization. Multiple Access Techniques: TDMA, FDMA, CDMA, ALOHA, Slotted-ALOHA, CSMA/CA, MACA, reservation protocols, 3G systems, wireless LAN standards (IEEE 802.11). WiMAX standards (IEEE 802.16), WPAN standards (IEEE 802.15). Satellite communications. Hidden node problem, exposed node problem, Request to send (RTS), Clear to send (CTS), Network allocation vector (NAV). Lab exercises. Mini project.

CSE457: Cellular Networks

Credit Hours and Teaching Scheme:

	Theory	Laboratory	Total
Credit Hours	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks + Final Exam in the 14th week

Prerequisite: CSE405 Computer Networks

Course Objective: The objective of this course is to give an introduction to the fundamentals of the cellular concept and communications systems. This course will also address system design fundamentals by introducing frequency reuse and channel assignment and handoff strategies. Besides, co-channel interference and system capacity, trunking and improving coverage and capacity will be its within coverage topic.

Course Outcomes (COs):

After completion of this course students will be able to:

CO1	**Comprehend** fundamentals of the cellular communications systems.
CO2	**Interpret**, **apply**, and **examine** cellular architectures and protocols.
CO3	**Interpret**, **apply**, and **examine** cellular geometry to improve cellular capacity and coverage.
CO4	**Apply** the learnt knowledge; **demonstrate** this knowledge and **write** report for solving real-life problems.

Course Topic:

Overview of wireless communication networking and mobile computing. Overview of cellular communications. Cellular architectures, channels allocations, and assignment strategies. Channel planning and interference. Power control for reducing interference. Trunking and grade of service. Cell geometry. Cell splitting, sectoring. Repeaters for range extension. Microcell zone concept. Lab exercises. Mini project.

CSE460: Cryptography

Credit and Teaching Scheme:

	Theory	Laboratory	Total

Credits	3	0	3
Contact Hours	3 Hours/Week for 13 Weeks	0	5 Hours/Week for 13 Weeks

Prerequisite: CSE326 Algorithms

Course Objectives:

This course introduces basic concepts in cryptography and computer security and discusses both their theoretical foundations and practical applications. Various threats, attacks and countermeasures including cryptosystems, cryptographic protocols and secure systems/networks will be addressed. The course will cover: brief history of cryptography, encryption (conventional and public key), digital signatures, hash functions, message authentication codes, randomness, unconditional and computational security, zero-knowledge protocols, secure e-commerce, group communication security, anonymity, key escrow. A few popular security mechanisms (e.g., Secure IP, SSL, PGP) will also be discussed.

Course Outcomes (COs):

After completion of this course students will be able to:

CO1	**Understand** and **describe** basics of Cryptography and Network Security and **implement** various algorithms to secure a message over insecure channel.
CO2	**Implement** and **analyze** various techniques for maintaining the Confidentiality, Integrity and availability of a data
CO3	**Evaluate** the authentication and hash algorithm and apply them in practical scenarios.
CO4	**Implement** the intrusion detection and its solutions to overcome the attacks and understand the concepts of system level security

Course Topics:

Basics of Security and Cryptography, focusing on Various Issues of Security, Classical Encryption Techniques, Block Ciphers and the Data Encryption Standard, Advanced Encryption Standard (AES), Contemporary Symmetric Ciphers, Confidentiality Using Symmetric Encryption, Public Key Cryptography, Key Management and Other PKCs, Message Authentication and Hash Functions, Digital Signatures and Authentication Protocols, IP Security.

CSE464: Advanced Database Systems

Credit Hours and Teaching Scheme:

	Theory	Laboratory	Total
Credits	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks+ Final Exam in the 14th Week	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks

Prerequisite: CSE302 Database Systems

Course Objectives:

This course presents advanced topics in relational database management systems and other database systems. It will expand upon what you have learned in CSE 302 (Database Systems) and introduce various other advanced topics, including query processing and optimization, concurrency control protocols, data warehouses, information retrieval, object-relational database and distributed database. This course will help you to expand your knowledge base so that you have a better understanding of the database field and state-of-art technologies.

Course Outcomes (COs):

After completion of this course students will be able to:

CO1	**Apply** and **analyze** different indexing, query processing, query evaluation and optimization techniques for efficient query execution.
CO2	**Explain** and **compare** the principles and practices of transaction manager and concurrency control protocols for managing simultaneous transactions.
CO3	**Apply** and **analyze** query structure and development methods in Object-Relational Databases for real-life application development.
CO4	**Compare** and **evaluate** methods and technologies in developing data warehouses, distributed databases and no SQL databases for addressing different types of information system.

Course Topics:

Overview of the course and Reviewing Relational Algebra and Basics of SQL, indexing methods, Query Processing for selection and join operations, Query Optimization Techniques, Concurrency control protocols, Data Warehousing, Introduction to Object-Relational Database, Object-Oriented Oracle, Concepts of Distributed Database, Design of Distributed Database: Horizontal and Vertical fragmentation, Principles and structure of noSQL database.Programming Assignments on Object-oriented Oracle. Lab exercises. Mini project.

CSE471: Compiler Design

Credit and Teaching Scheme:

	Theory	Laboratory	Total
Credits	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks

Prerequisite: CSE326 Algorithms

Course Objectives:

The objective of this course is to learn basic principles and advanced techniques of compiler design. The initial part of the course will focus on the classic techniques of lexical analysis and scanning/screening, syntactic analysis like bottom-up and top-down parsing techniques, semantic analysis, type-checking, abstract syntax tree and code generation. The latter part will focus on intermediate representations and simple optimizations like register allocation and instruction scheduling. Students will be exposed to compiler design tools and they will develop a compiler of limited scope.

Course Outcomes (COs):

After completion of this course students will be able to:

CO1	**Understand** and **use** Lexical Analyzer, Regular expression, and Finite Automata in Lexical Analysis.
CO2	**Understand**, **use**, and **examine** various parsing techniques including both Top Down and Bottom UP approaches in Compiler Design.
CO3	**Understand** and **examine** Syntax and Semantic Analysis, and **Develop** concept of Intermediate Code Generation and Code Optimization.
CO4	**Interpret and apply** syntax and semantic analysis techniques for developing parser for a compiler, **perform** and **demonstrate** this knowledge and **write** report to Design and Build a parser for a simple language.

Course Topics:

Various phases of a Compiler, Lexical Analyzer, Regular Expression, Transition Diagram, Finite Automata, NFA, Regular Expression to NFA, NFA to DFA (Subset Construction), DFA state minimization, Context Free Grammar, Handling of Ambiguity in Grammar and Left Recursion, Top Down Parsing, Construction of Recursive Decent Predictive parser, Bottom Up Parsing, Construction of Shift-educe predictive parsers: LR(1), SLR, LALR parser, Semantic Analysis, Syntax Directed Translation, Annotated parse Tree, Type Checking, Intermediate Code Generation and Code Optimization, Target Code Generation, Tree Rewriting Scheme. Lab exercises. Mini project.

CSE472: Advanced Network Services and Management

Teaching Scheme:

	Theory	Laboratory	Total
Credits	3	1	4
Contact Hours	3 Hrs/Week for 13 Weeks	2 Hrs/Week for 13 Weeks	5 Hrs/Week for 13 Weeks

Prerequisite: CSE405 Computer Networks

Course Objectives:

Network management encompasses the tasks associated with planning, deploying, configuring, operating, monitoring, tuning, repairing, and changing the telecommunications and data networks. This course explores the four functional areas of network management: fault management, configuration management, accounting management, performance management. Advanced topics such as fault diagnosis and isolation, event correlation, MIB architecture, scripting for task automation, performance monitoring, service level agreements (SLA) conformance are also discussed. The course provides a balance of theories (SNMP, Netconf, and IPFIX) and practices (hands-on lab exercises), and students can apply the knowledge to effectively manage a production network in both enterprise and service provider environments. Knowledge of this course will be needed as prerequisite knowledge for job field in future.

Course Outcomes (COs):

After completion of this course students will be able to:

CO1	**Understand** and use the requirements of network management protocols and discuss the strengths and weaknesses of the commonly used Simple Network Management Protocol
CO2	**Understand** and **use** system log and simple network management protocol trap to do fault and performance management
CO3	**Understand** and **use** a script language to automate network management tasks, network flow analysis and performance management
CO4	**Choose** software tools, **perform** and **demonstrate** skills, and **write** report for designing, testing, and evaluating management task, flow analysis and performance.

Course Topics:

Network Management Functions and Architecture. Simple Network Management Protocol (SNMP). Management Information Base and Data model. Network Flow Analysis and Performance Management. Fault Management and Syslog. Network Task Automation. Autonomous Network Management. Lab exercises. Mini project.

CSE473: Network Security and Systems

Teaching Scheme:

	Theory	Laboratory	Total
Credits	3	1	4
Contact Hours	3 Hrs/Week for 13 Weeks	2 Hrs/Week for 13 Weeks	5 Hrs/Week for 13 Weeks

Prerequisite: CSE405 Computer Networks

Course Objectives:

In this course, student will learn the fundamental principles of computer and network security by studying attacks on computer systems, network, and the Web. Students will learn how those attacks work and how to prevent and detect them. The course emphasizes “learning by doing”, and requires students to conduct a series of lab exercises. Through these labs, students can enhance their understanding of the principles, and be able to apply those principles to solve real problems.

Course Outcomes (COs):

After completion of this course students will be able to:

CO1	**Understand** security principles and evaluate risks faced by computer systems
CO2	**Understand** how various attacks work, how various security mechanisms work, and correlate these security mechanisms with security principles and apply security principles to solve problems

CO3	**Understand** various software vulnerabilities; analyze and evaluate software systems for its security properties
CO4	**Choose** software tools, **perform** and **demonstrate** skills, and **write** report for designing, testing, and evaluating.

Course Topic:

An Overview of Computer Security. Privileged programs (Set-UID programs) and vulnerabilities; Buffer Overflow vulnerability and attack. Race Condition vulnerability and attack. Format String vulnerability and attack. Shellshock attack. Cross-Site Scripting Attack. Cross-Site Request Forgerty Attack. Web Tracking, Web Proxy and Firewall. Lab exercises. Mini project.

CSE474: Pattern Recognition

Credit Hours and Teaching Scheme:

	Theory	Laboratory	Total
Credits	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks+ Final Exam in the 14th Week	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks

Prerequisite: CSE 366 Artificial Intelligence

Course Objective: This course builds up the students' ability to think and express logically and mathematically. The selection of topics has been made to provide the student with both a fair sampling and an in-depth, useful know-how of the big field of pattern recognition. This course will introduce real-world problems of pattern recognition both in terms of the mathematical theory as well as the algorithmic and programming aspects.

Course Outcomes (COs):

After completion of this course students will be able to:

CO1	**Design** and **construct** pattern recognition system.
CO2	**Interpret** and **apply** the major approaches in statistical and syntactic pattern recognition.
CO3	**Interpret** and a**pply** theoretical issues involved in pattern recognition system design such as the curse of dimensionality; **demonstrate** this knowledge and **write** report for realistic problem solving.
CO4	**Interpret** and **apply** working knowledge of implementing pattern recognition techniques; **demonstrate** this knowledge and **write** report for realistic problem solving.

Course Topics:

Introduction to pattern recognition. General pattern recognition concepts. Statistical pattern recognition. Supervised learning using parametric and non-parametric approaches. Linear discriminate functions and the discrete and binary feature cases. Unsupervised learning and clustering. Syntactic Pattern Recognition: Syntactic recognition via parsing and other grammars, graphical approach to syntactic pattern recognition, learning via grammatical inference. Neural Pattern Recognition: Neural pattern associators and matrix approaches, unsupervised learning in neural pattern recognition. Lab exercises. Mini project.

CSE475: Machine Learning

Credit Hours and Teaching Scheme:

	Theory	Laboratory	Total
Credits	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks+ Final Exam in the 14th Week	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks

Prerequisite: CSE366 Artificial Intelligence

Course Objective: This course will introduce the field of Machine Learning, in particular focusing on the core concepts of supervised and unsupervised learning. Students will learn the algorithms which underpin many popular Machine Learning techniques, as well as developing an understanding of the theoretical relationships between these algorithms. The hands-on exercise will concern the application of machine learning to a range of real-world problems.

Course Outcomes (COs):

After completion of this course students will be able to:

CO1	**Formulate** and **use** machine learning problems corresponding to different applications.
CO2	**Understand** and **use** a range of machine learning algorithms, both supervised and unsupervised along with their strengths and weaknesses.
CO3	**Understand**, **use**, and **determine** appropriate machine learning methods/algorithms suitable for different types of learning problems, i.e. know about their most important weaknesses and advantages.
CO4	**Examine** and **analyze** appropriate software tools to implement algorithms in a range of real-world applications; **implement** and **write** report to represent the analysis results.

Course Topic:

Introduction to Machine Learning. Supervised Learning Setup. Linear Prediction: Regression. Classification: Decision Tree, Logistic Regression. Probabilistic Modeling: Bayesian Method, Naïve Bias. Unsupervised Learning: Clustering, Apriori. Principal component analysis. Clustering: Partitioning, Hierarchical. Artificial Neural Networks: perception, MLPs, back propagation, introduction to Deep Learning. Support Vector Machines. Reinforcement learning and control. Lab exercises. Mini project.

CSE477: Data Mining

Credit Hours & Teaching Scheme:

	Theory	Laboratory	Total
Credits	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks+ Final Exam in the 14th Week	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks

Prerequisite: CSE366 Artificial Intelligence

Course Objectives

The objective of the course is to introduce the basic concepts of Data Mining techniques to students. The course focuses on examining the type of data to be mined and applying preprocessing methods to raw data. The course emphasizes on discovering interesting patterns, analyzing supervised and unsupervised models and estimating the accuracy of the algorithms. The students will also be introduced various Data Mining tools.

Course Outcomes (COs)

After completion of this course students will be able to:

CO1	**Apply** pattern mining algorithms for data mining tasks after processing raw input data and **analyze** the performance of these algorithms.
CO2	**Apply** and **analyze** different supervised learning algorithms for building data mining models.
CO3	**Use** appropriate unsupervised data-mining algorithms for different types of datasets and **interpret** the output appropriately.
CO4	**Choose** and **justify** appropriate algorithms and tools for data mining; **perform** and **demonstrate** skills and **write** report to design and implement Data-mining applications using realistic data sets.

Course Topics:

Introduction to Data Mining and Exploratory Data Analysis using Statistical Measures. Data Preprocessing: Data cleaning, Data transformation, Data reduction. Frequent Pattern miningusing different algorithms, Correlation analysis. Various Supervised learning algorithms and Decision Tree, Bayes' theorem, Naïve Bayesian classification theorem, Metrics for evaluating classification performance. Unsupervised learning algorithms (clustering), Basic issues in clustering, partition and hierarchical based methods, Density-based clustering methods and Advanced topics on Probabilistic Models, Text mining and Web mining. Lab exercises. Mini project.

CSE479: Web Programming

Credit Hours and Teaching Scheme:

	Theory	Laboratory	Total
Credits	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks+ Final Exam in the 14th Week	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks

Prerequisite: CSE302 Database Systems

Course Objectives:

The objective of the course is to introduces the fundamental concepts and practices of designing and implementing a website using the database. It also analyzes website requirements and determines the entities involved in the system and their relationship to one another. The main outcome of this course is the construction of actual information system by following the software and database lifecycle from the requirement analysis, specification, modeling and design phases.

Course Outcomes (COs):

After completion of this course students will be able to:

CO1	**Apply** and **examine** basic webpage designing concepts such as HTML, CSS, Bootstrap, and JavaScript for designing frontend of webpages.
CO2	**Design** and **develop** the web pages using PHP, MySQL and MongoDB for designing backend of a dynamic web application.
CO3	**Apply** and **interpret** concepts of Cookies, Sessions, Authentication ,Data Security, Web services, MVC Architecture while developing a website through a web development framework.
CO4	**Choose** appropriate tools, **perform** and **demonstrate** skills and **write** report to design, build, and test realistic and useful web-based database applications.

Course Topics:

Introducing basic concepts on web technology, Basic and Advanced HTML and CSS, Client-side scripting using JavaScript, JSON and XML representation of data, Basic and advanced PHP programming and Integrating PHP and MySQL database to build a dynamic Website, Introducing Object-oriented PHP and MongoDB for NoSQL database, Introducing MVC architecture for building Web Services and Web Development Framework, Working with Sessions, Cookies, Authentication and Data Security. Lab exercises. Mini project.

CSE481: Nature-Inspired Computing

Credit Hours and Teaching Scheme

	Theory	Laboratory	Total
Credits	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks+ Final Exam in the 14th Week	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks

Prerequisite: CSE326 Algorithms

Course Objectives:

This interdisciplinary course provides an introduction to some interesting concepts, principles, and applications of computing, which are inspired by processes and phenomena found in nature, such as biological evolution, interactions (e.g., cooperation and competition) in ecosystems, and behavior in living organisms. It offers students the opportunities to appreciate those concepts, develop new insights and methods, and turns them into practical problem-solving and modeling applications.

Course Outcomes (COs)

After completion of this course students will be able to:

CO1	**Describe** the needs for present and future computing paradigm changes with examples found in the real world
CO2	**Describe** the underlying nature inspired principles, as well as the basic formulations and implementation of nature inspired computing (NIC) approaches in the contexts of problem-solving and modeling.
CO3	**Explain** the nature and characteristics of case study problems or applications, as well as the key ideas and steps in applying NIC methods.
CO4	**Design**, **implement**, and **evaluate** suitable NIC methods to solve problems and model systems in the real-world contexts; **demonstrate** knowledge of this course for real-life problem solving

	and **write** reports.

Course Topic:

Nature Inspired Computing for Problem-Solving (Artificial neural networks, Artificial immune systems, Swarm intelligence, Evolutionary algorithms, Ant colony optimization, Particle swarm optimization, Diffusion search). Nature Inspired Computing for Modeling (Artificial lifelike forms and behavior, Creative evolutionary art, Foraging and satisficing, Autonomous self-organizing systems, Competition and cooperation, Collective/crowd behavior, Social trend and consensus). Introduction to NIC Computers (Cellular automata, Biological computers, Quantum computers). Case Studies and Applications. Lab exercises. Mini project.

CSE483: Graph Theory

Credit Hours and Teaching Scheme:

	Theory	Laboratory	Total
Credit Hours	3	0	3
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week	0	3 Hours/Week for 13 Weeks + Final Exam in the 14th week

Prerequisite: CSE326 Algorithms

Course Objectives:

This course is an elective course and will help the students to gain basic knowledge of the structure of graphs and the techniques used to analyze problems in graph theory and discrete structures. The course will cover fundamental concepts, such as graphs, cycle, path, circuit, trees, matching and factors, connectivity and coloring, and network.

Course Outcomes (COs):

After completion of this course students will be able to:

CO1	**Understand** fundamentals of graphs and analyze different properties of Eulerian and Hamiltonian graphs.
CO2	**Explain**, and **apply** different theorem related to spanning tree, maximum matching, and maximum coverage problems.
CO3	**Explain, apply** and **examine** different theorem related to cuts and connectivity, networks flow problem.
CO4	**Explain, apply** and **examine** different graph coloring theorems; **perform** and **demonstrate** skill and write report on graph coloring theorems.

Course Topic:

Basic definitions, isomorphisms, walks, cycles and bipartite graphs. Components, cut-edges, Eulerian graphs, vertex degrees and degree sequences, directed graphs. Eulerian digraphs, trees and distance. Counting spanning trees and the matrix tree theorem, minimal spanning trees and shortest paths. Matchings, Hall's theorem and coverings, maximum matchings, factors. Cuts and connectivity. Network flow problems, max-flow min-cut theorem. Vertex colorings, bounds on chromatic numbers and Mycielski's

construction. Chromatic polynomials, chordal graphs, planar graphs. Euler's formula and Kuratowski's theorem, five and four color theorems.

CSE484: Computational Geometry

Credit Hours and Teaching Scheme

	Theory	Laboratory	Total
Credit Hours	3	0	3
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week	0	3 Hours/Week for 13 Weeks + Final Exam in the 14th week

Prerequisite: CSE326 Algorithms

Course Objectives:

This course introduces concepts, data structures and techniques of computational geometry, and enhances the students' ability to mathematically analyze real-life geometric problems. The course covers properties of geometric objects, algorithms, complexity analysis and correctness of algorithms, and real-life applications of algorithms.

Course Outcomes (COs):

After completion of this course students will be able to:

CO1	**Understand**, **apply**, and **analyze** polygon triangulations, orthogonal range searching, and point location algorithms.
CO2	**Interpret**, **apply**, and **analyze** voronoi diagrams, arrangements and duality, and delaunay triangulations.
CO3	**Interpret**, **apply**, and **analyz**e linear programming, randomized algorithms, and graph drawing.
CO4	**Apply** the learnt knowledge for solving real-life problems; **demonstrate** this knowledge and **write** reports.

Course Topic:

Introducing geometric objects, overview of computational geometric algorithms, polygon triangulations. Convex hull: algorithms, complexity and correctness, real-life applications (both in 2-d and 3-d spaces). Polygon triangulations and art gallery theorem. Orthogonal range searching: data structures and algorithms. Point location algorithms. Voronoi diagram: definitions and properties, algorithms. Arrangements and duality: supersampling in ray tracing. Delaunay triangulations. Linear programming. Randomized algorithms. Graph drawing.

CSE486: Bioinformatics Algorithms

Credit Hours and Teaching Scheme

	Theory	Laboratory	Total
Credits	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks+ Final Exam in the 14th Week	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks

Prerequisite: CSE326 Algorithms

Course Objectives:

This is an interdisciplinary course that introduces computational techniques for solving biological problems. The course also emphasizes understanding of biological problems, computational algorithms to solve these problems, and do some mathematics for the analysis of these algorithms.

Course Outcomes (COs)

After completion of this course students will be able to:

CO1	**Interpret**, **apply**, and **examine** different searching and clustering techniques on biological data for answering biological queries.
CO2	**Interpret**, **apply**, and **examine** sequence alignment techniques for understanding protein families, and the emerging field of phylogenomics.
CO3	**Interpret**, **apply**, and **examine** protein structure prediction, classification and analysis techniques for learning the functionalities of proteins.
CO4	**Interpret**, **apply**, **examine**, and **justify** biological network for learning relationships within such networks; **demonstrate** knowledge of this course for real-life problem solving and **write** reports.

Course Topic:

Introduction to biology, bioinformatics, and biological database. Biological database searching, clustering and evolutionary tree algorithms. Sequence alignment algorithms: pairwise, MSA, BLAST and FASTA. Protein folding and protein structure modeling, alignment and prediction. Gene regulatory network analysis. Protein networks: montecarlo sampling and randomized graph walk. Lab exercises. Mini project.

CSE487: Cyber Security, Ethics and Law

Credit and Teaching Scheme:

	Theory	Laboratory	Total
Credits	3	0	3
Contact Hours	3 Hours/Week for 13 Weeks	0 Hours/Week for 13 Weeks	3 Hours/Week for 13 Weeks

Prerequisite: CSE405 Computer Networks

Course Objectives:

This course provides an introduction to the concepts of security, law and ethics in the modern cyber world. The objectives of the course include the fundamentals of security in a networked system, as well as attacks and prevention mechanisms. The course also provides an overview of applicable legislation for developing complex systems and demonstrates how to comply with them. Furthermore, the course provides an overview of the ethical frameworks and professional codes of conduct for IT professionals; as well as provides guidance for making ethical choices in a professional setting. Knowledge, skills and manners from this course would be helpful in future in the professional life.

Course Outcomes (COs):

After completion of this course students will be able to:

CO1	**Understand** and **apply** the concepts of cryptography, computer security and vulnerabilities of classical and modern networked systems.
CO2	**Identify** the vulnerabilities and attacks on networked systems and **select** and **configure** preventive and defense measures for modern networked systems.
CO3	**Identify**, **apply** and **comply** with the applicable (local and global) legislation related to ICT and Computer Science and Engineering for developing computer systems.
CO4	**Understand**, **apply** and **appreciate** the professional codes of conduct and ethical frameworks as an ICT professional.

Course Topics:

Fundamental concepts of computer security, Cryptography and classical cryptosystems, Authentication protocols and Public Key Infrastructure (PKI), Well-known attack types and vulnerabilities, Social engineering attacks, Security models and policy issues; Attacks and Defense: Attack classification, Security evaluation of networked systems, Intrusion Detection, Prevention, Response, Containment (Digital forensic evidence) and Disaster Recovery; Network defense tools: Firewalls, VPNs, Intrusion Detection Systems,

Regulatory Legislation: Privacy and Information Security: GDPR and other Data Protection Acts, Computer Misuse Act, Impact of the Computer Misuse Act, Children Online Privacy Protection Act (COPPA), Copyright, Designs and Patents Act, Open Source License, Software protection techniques, Digital marketing, Terms of Service (ToS), Service Level Agreement (SLA), End User License Agreement (EULA), Cookie Usage Policy,

Bangladesh: Digital Security Act of 2018, Copyright Act of 2000, Telecommunication Regulatory Act of 2001, Pornography Act 2012

Cyber Ethics: Computer and Information Ethics, ACM Code of Ethics and Professional Conduct

Software Engineering Code of Ethics and Professional Practice, Decision making in Web 2.0; Applications of Ethical Frameworks: Deontological Ethics (Duty-based ethics), Utilitarian ethics (Outcome-based ethics), Aristotelian ethics (Virtue ethics)

CSE488: Big Data Analytics

Credit Hours and Teaching Scheme:

	Theory	Laboratory	Total
Credits	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks+ Final Exam in the 14th Week	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks

Prerequisite: CSE302 Database Systems

Course Objectives:

This course builds up the student's ability to understand the key aspects of big data platform, problems, and applications. The course will emphasize on identification and analysis on large-scale machine learning methods as well as modern tool, such as Hadoop in the context of big data analysis.

Course Outcomes (COs):

After completion of this course students will be able to:

CO1	**Describe** the landscape and the V's of Big Data for real world Big Data problems.
CO2	**Apply** and **examine** different tools and techniques for storing, managing, and analyzing big data; a**dapt** the skills and **write** report to use the necessary tools for handling a variety of big data analytics.
CO3	**Apply** and **examine** the core concepts of machine learning techniques in the context of big data for realistic problem solving; a**dapt** the skills and **write** report to use the necessary tools for handling a variety of big data analytics.
CO4	**Understand**, **apply**, **examine**, and **justify** the relationship among big data components; a**dapt** the skills and **write** report to use the necessary tools for handling a variety of big data analytics.

Course Topic:

Introduction to Big Data, Big Data Skills and Sources of Big Data. Characteristics of Big Data - The Four V's. Key aspects of a Big Data Platform, Storage and Analytics, Governance for Big Data. Data and Data Science; Relational Databases and SQL. Data Cleansing and Preparation. Data Summarization and Visualization; Descriptive Statistics and Correlation. Association Analysis and Cluster Analysis. Linear Regression, Principles of Classification; Decision Trees; and Linear Classifiers. Neural Networks and R. Introduction to Hadoop, Hadoop components (MapReduce/Pig/Hive/HBase). Cloud and Big Data. Lab exercises. Mini project.

CSE489: Mobile Programming

Credit Hours and Teaching Scheme:

	Theory	Laboratory	Total
Credits	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks+ Final Exam in the 14th Week	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks

Prerequisite: CSE326Algorithms

Course Objectives:

This course introduces students to programming technologies, design and development related to mobile applications. Students are introduced to the survey of current mobile platforms, mobile application development environments, mobile device input methods, as well as developing applications for different mobile platforms. Students will design and build variety of applications throughout the course to reinforce learning and to develop real competency.

Course Outcomes (COs):

After completion of this course students will be able to:

CO1	**Describe** *and* **apply** *different mobile application models and patterns for developing mobile software application.*
CO2	**Describe**, **apply**, and **examine** mobile development framework to the development of a mobile application for realistic application creation.

CO3	**Use, analyze**, and **justify** *advanced programming competency for developing a maintainable and efficient cloud based mobile application.*
CO4	**Choose** software tools, **design** software for mobile programming; **demonstrate** these skills, and **write** report to design, build, and test software for mobile programming.

Course Topic:

Mobile Phones and Network Technologies. Android Programming, Android Application Frame works. Building a Simple User Interface. Activities and Intents, Services. Broadcast Receivers. Data Persistence. Processes and Threads. Asynchronous Tasks. Internet Resources. Apps Publishing and Business Models. iOS platform, Objective-C, Application development in iOS. Lab exercises. Mini project.

CSE491: VLSI Design

Credit Hours and Teaching Scheme:

	Theory	Laboratory	Total
Credits	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks

Prerequisite: CSE345 Digital Logic Design

Course Objectives:

The course is designed to provide the students with basic theories and techniques of VLSI design in CMOS technology. This course covers the fundamental concepts and structure of designing VLSI systems including CMOS devices and circuits, standard CMOS fabrication processes, CMOS design rules, static and dynamic logic structures, CMOS chip layout, low power techniques and structural design methods of VLSI architecture. This course also emphasizes computer-aided design and synthesis of complex digital circuits using Verilog and physical layout tools.

Course Outcomes (COs):

After completion of this course students will be able to:

CO1	**Interpret** the characteristics of CMOS circuit construction and the comparison between different state-of-the-art CMOS technologies and processes.
CO2	**Interpret** and **apply** CMOS technology-specific layout rules in the placement and routing of logic components and their interconnect, and **examine** the functionality, timing, power and parasitic effects.
CO3	**Apply** and **examine** hardware modeling techniques for combinational and sequential circuit design.
CO4	**Use**, **examine**, and **justify** Verilog hardware description language and physical layout tools, **perform** and **demonstrate** skills and **write** report to design, test and synthesize complex

	digital circuits.

Course Topic:

Introduction to VLSI and digital IC. CMOS transistor theory and non-ideal transistor characteristics. Circuits, fabrication and layout. DC and transient response. Logical effort, interconnecting engineering and parasitic. Combinational and sequential circuit design. Arithmetic circuits in CMOS VLSI. Data path functional units. Memories and programmable logic. VLSI clocking/low power. Lab exercises. Mini project.

CSE492: Robotics

Credit Hours and Teaching Scheme:

	Theory	Laboratory	Total
Credits	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks+ Final Exam in the 14th Week	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks

Prerequisite: CSE 366Artificial Intelligence.

Course Objectives:

The objective of this course is to introduce students to the field of Robotics and stimulate their interests through a variety of multidisciplinary topics necessary to understand the fundamentals of designing, building, and programming robots. The course will address fundamental mathematical modeling of robots-kinematics, inverse kinematics, sensors and sensor processing algorithms, different control architectures, their management and programming strategies.

Course Outcomes (COs):

After completion of this course students will be able to:

CO1	**Learn** fundamental mathematical and computational models; and **solve** and **analyze** kinematic problems involving robot manipulators and mobile robots.
CO2	**Familiarize** with robot sensors, sensor processing algorithms and navigation planning approaches; **use** them and **examine** their engineering trade-offs.
CO3	**Understand** robot actuator movements and controlling managements; and **explore** the computational challenges within robotic tasks.
CO4	**Use**, **examine**, and **justify** control programming strategies *of industrial systems* ,**demonstrate** these knowledge and **write** report to develop simple mobile robot.

Course Topic:

Introduction of Robotics and Robot Mechanical Structure. Kinematics and inverse kinematic problems. Actuators and Sensors. Trajectory Planning. Motion Planning. Control Architecture.

Motion Control. Force Control. Visual Servoing. Lab exercises. Mini project.

CSE494: Embedded Systems

Credit Hours and Teaching Scheme:

	Theory	Laboratory	Total
Credits	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks+ Final Exam in the 14th Week	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks

Prerequisite: CSE442 Microprocessors and Microcontrollers

Course Objectives:

This course is an elective course and build up students' ability to understand fundamental concepts of embedded systems, techniques and tools for integrating hardware and software components in embedded system design. The course will also emphasize on testing and debugging approaches for verification of embedded systems.

Course Outcomes (COs):

After completion of this course students will be able to:

CO1	**Understand** characteristics and internal architecture of embedded systems.
CO2	**Apply** and **examine** programming, testing and debugging approaches and tools to develop and verify embedded systems.
CO3	**Apply** and **examine** the concepts of real time operating systems to design embedded systems.
CO4	**Choose** software and hardware tools, **perform** and **demonstrate** skills, and **write** report to develop embedded systems.

Course Topic:

Introduction to embedded systems, Major components and applications of Embedded system.

Architecture of processors in embedded system, memory organization and real-world interfacing. Device Drivers and interrupt service mechanism. Develop embedded systems using assembly and high-level languages. Sequential and Data Flow graph modeling for program analysis. State machine modeling for program analysis. Concurrent process modeling for program analysis. Testing, Simulation and Debugging techniques and tools to design and verify embedded systems. Task scheduling algorithms in real time operating system environment. Design procedure of embedded system using real time operating system concepts. Case studies: Embedded system design for automobile, smart card, digital camera, and home electronics using real time operating system concepts. Lab exercises. Mini project.

CSE495: IT Project Management and Entrepreneurship

Credit and Teaching Scheme:

	Theory	Laboratory	Total
Credits	3	0	3
Contact Hours	3 Hours/Week for 13 Weeks	0	3 Hours/Week for 13 Weeks

Prerequisite: CSE 347 Information System Analysis and Design

Course Objectives:

This course provides an introduction to the concepts of Project Management and Entrepreneurship in the field of Information Technology. The primary objectives of the course are to provide an overview of engineering teamwork from concepts to reality, including the internal processes from planning, research, funding, business development and growth, patents and IP protection. Knowledge of this course will be useful for the professional life as a team player as well as a team leader, towards becoming a successful entrepreneur.

Course Outcomes (COs):

After completion of this course students will be able to:

CO1	**Understand** the constraints and **apply** systematic approaches for planning, resource allocation, risk assessment, execution and improvement of IT/Engineering projects with proper documentation and presentation (**using** modern tools).
CO2	**Generate** and **pitch** innovative new venture ideas in IT, and **evaluate** the feasibility by identifying market demands and analyzing the competitors.
CO3	**Design** and **compare** business models and business plans, iterating based on feedback and test results and **demonstrate** knowledge on attracting/arranging finances for a new IT enterprise problems.
CO4	**Demonstrate** knowledge about growth and **develop/adapt** strategies for competitive advantage, exit models, venture capitals, and corporate valuation in different growth stages of an IT enterprise.

Course Topics:

IT Project Management Introduction, Triple Constraint in Project Management, Process methodology, Project Network Scheduling and Crashing, Resource management, Risk Management, Agile Project Management, Quality Improvement, Entrepreneurship, ideation, Opportunity recognition, Screening Opportunities, section differentiation, Idea evaluation, Startup methodology, Business Model, Business planning, Bootstrapping, Venture, Venture capitals, International growth, Adaptation, Branding, Innovation.

ECO 101: Principles of Microeconomics

Introduction to Economic theory: The concept of scarcity and choice; Production Possibility Frontier; Economic Systems;Theory of demand and supply; importance of market price. Consumer behavior: Theory of Utility. Production: Theories related to production; costs of production. Market Structure: Perfect Competition and Monopoly, and an introduction to Monopolistic Competition and Oligopoly. Factor market: Introduction to the labor market; Rent theory.

Credits 3; Prerequisite: None

ECO 102: Introduction to Macroeconomics

The coursedeals with the concepts and measurement of national income, inflation, unemployment, and explores how government policies (fiscal, monetary and supply side) can influence macro- economic variables such as national income, unemployment, inflation etc. The course also introduces macroeconomic models using graphical approach such as, consumption function, investment theory, equilibrium and disequilibrium models of macro economy (classical and Keynesian theories). Students will be provided with examples from the context of Bangladesh and rest of the world.

Credits 3; Prerequisite: ECO 101

ECO104: Statistics for Business and Economics I – Introduction to basic concepts in statistics including the presentation of data, descriptive statistics, probability theory, discrete and continuous distributions, sampling distributionand index number. The approach of the class includes both learning the concepts behind basic statistics and also how to apply these concepts in real-life situations. Students will also be introduced to Microsoft Excel for applications of the various statistical concepts to business and economic data.

Pre-requisite: MAT100

ECO 200: Agricultural Economics

Introduction of agriculture as an industry; economics of agricultural production, farm management, land economics, rural organization, agricultural credit and finance, agricultural law, agricultural marketing, agrarian reform, agricultural policy, agricultural prices, structure and scope of Bangladesh agricultural sector.

Credits 3; Prerequisite: ECO 101

ECO204: Statistics for Business and Economics II – Continuation of ECO104. This course introduces point and interval estimation, hypothesis testing, statistical inferences, goodness of fit and related concepts required for conducing regression analysis. Students will be introduced to basic linear and multiple regressions, their applications in Microsoft Excel and how to interpret regression results. A practical project is assigned to extend student skills set in linear regression and time series techniques.

Pre-requisite: ECO101, ECO104

ECO 220: Behavioral Economics

The course aims to provide students with a grounding in the main areas of behavioral economics, by focusing on behavioral implications of theoretical models and on experimental evidence ineconomics. These main areas include bounded rationality, decision-making under risk and uncertainty, other regarding preferences, intertemporal decision-making, behavioral game theory, emotions and libertarian paternalism. For each area, the focus will be on three points: (i) review of standard economic models and evidence that indicates that such models do not capturesome important behavioral aspects or anomalies; (ii) study of the behavioral models that havebeen developed to capture these aspects; (iii) application of these models to different economicfields, especially with respect to more recent contributions.

Credits: 3; Prerequisites: ECO 101, ECO102

ECO 260: Environmental & Natural Resource Economics

This course aims at exploring and examining human relationship with environment with special emphasis on Bangladesh. The course surveys the economic, cultural, social, and political aspects of human population dynamics, food resources and hunger, mineral and energy resources, air, land and water pollution, wilderness and wildlife resources, urban and rural land usage, and toxic waste management from environmental and conservation viewpoints. The course makes recommendations and probes possible solutions to contemporary resource and environmental problems of Bangladesh. Topical issues related to the environment are discussed in class projects.

Credits 3; Prerequisite: ECO 101

ECO 301: Intermediate Microeconomic Theory I

Theory of choice and its application to consumer and producer behavior, theory of production and cost, output and input markets and their structure, equilibrium and efficiency, introduction to general equilibrium analysis, special emphasis on perfect & imperfect competition.

Credits 3; Prerequisite: ECO 101, MAT 110

ECO 302: Intermediate Macroeconomic Theory I

This course introduces the mainstream models in modern macroeconomics: Classical models, Keynesian model of consumption and investment analysis; IS-LM models of closed and open economics and resultant effects on output and interest rates; Analysis of monetary and fiscal policies, and their impact on national income, output employment & growth.

Credits 3; Prerequisite: ECO 102, ECO301

ECO 304: Economics of Health

This course introduces the application of economic concepts and analytical tools to the health service system (with an emphasis on Bangladesh and the South-Asian neighborhood). Review of empirical studies of demandd and supply of health services, behavior of providers in selected developing and developed countries, and relationship of health services to population health levels. Discussion of policy issues relating to financing and resource allocation to the health sector.

Credit 3; Prerequisite: ECO 102, ECO301

ECO 310: Money and Banking

The structure and activity of the financial sector of the economy; role of money in the economy especially its impact on output, employment, and prices; types of financial assets and their uses; interest rates; role played by financial intermediaries; interest-free and new concepts in banking; review of the financial sector of Bangladesh;Patterns of financial crisis and recent examples.

Credits: 03; Prerequisite: ECO 302

ECO 312: Industrial Organization

This course deals with how markets work (and why they sometimes fail to work) in the short, medium and long run. The focus is on how firms select their strategies to maximize profits. Although both the theoretical models and the empirical applications deal with firms and product markets, the underlying ideas are applicable to a wide range of economic situations.

Credits: 03; Prerequisite: ECO 301

ECO 314: Public Sector Economics

The course examines a number of issues in public expenditure theory and taxation. Topics on the expenditure side include the economic rationale for government, provision of public goods and corrective policies to deal with externalities. On the taxation side, topics include tax incidence, efficiency of taxation and optimal taxation.

Credits 3; Prerequisite:ECO301, ECO 302

ECO 315: Public Finance

This course focuses on the expenditure and financing activities of the government. Topics include fiscal functions; public sector in the economic accounts; normative theory of government (the level and allocation of government expenditures; taxation; optimum structure of major taxes; fiscal policy and stabilization; development finance); positive theory of government (direct democracy; representative democracy; bureaucracy; voter behavior; rent seeking); government and markets; efficiency aspects of public enterprises; interest-free public finance.

Credits 3; Prerequisite: ECO 302

ECO 328: International Trade and Finance

Review and analysis of international trade models, theories and tools of analysis-classical, neo-classical and alternative theories; international monetary system, its role, importance, structure and future performance; foreign exchange market, balance of payments adjustments.

Credits 3; Prerequisite: ECO301, ECO302

ECO 329: Contemporary Issues in International Economics

In depth analysis of selected current issues and policy problems of the international economy including (but not restricted to) the following: new approaches to the theory of international trade, reform of the international monetary systems, role of the General Agreement on Tariffs and Trade and the United Nations Conference on Trade and Development. Problems of stabilization of international commodity markets, and balance of payments problems of Bangladesh and other selected countries.

Credits 3; Prerequisite: ECO 328

ECO 349: Economics of Development

This course is based on the role of public policy in economic development and the political context in which policy decisions are taken. Core topics are the nature of underdevelopment, growth theories, dualism, center periphery models & poverty of LDC countries, the international dimensions of development; macroeconomic stabilization; financial systems; agriculture and the microeconomics of rural organizations; labor markets and human resource development; Process of cumulative causation, population and development, development and environment, foreign assistance, debt, trade are also widely discussed.

Credits 3; Prerequisite: ECO301, ECO302

ECO 353: Economics of Development in South Asia

This course examines the background and detailed analysis of policy crafting and implementation in achieving economic development in South Asia. Case studies are included on respective countries of South Asia to examine their economic trends & prospects.

Credits 3; Prerequisite: ECO 349

ECO 354: Environmental & Natural Resource Economics II

This course examines resource availability, environmental pollution and limit to growth, theory of optimal use and depletion of renewable, non-renewable and recyclable resources in the context of water, forest fisheries, and mineral resources. It also looks into theory of property rights regimes such as public, private and common property ownership to oversee resource management. Additional topics include Market failure; externality and economics of pollution control;Economics of regional and global pollution; pollution control policies and their implications for efficiency, equity and growth.

Credits: 3; Prerequisite: ECO260, MAT211, ECO 301

ECO 355: Blue Economics

The course begins with an overview of the physical forces that drive the distribution of nutrients in the ocean. The content are: Consumer Resource Ecological Model; Predator-prey model; other ecosystem model; Concept of primary production, habitat, Growth, competition and predation influence biological populations; Human behavior and market systems; Economic effects of specific policies in areas such as ocean recreation, shipping, offshore oil and gas production, aquaculture, and coral reef protection.

Credits: 3; Prerequisites: ECO 349, ECO 360

ECO 357: Mathematical Economics

Economic models and equilibrium analysis, linear models and matrix algebra, differentiation and comparative statics, comparative statics of general function models, optimization and equilibrium, exponential and logarithmic functions, multi variable optimization, optimization with equality constraints, economic dynamics and integral calculus.

Credits 3; Prerequisite: ECO 302, MAT 211

ECO 360: Socio-Economic Profiles of Bangladesh

This course studies of the macroeconomic performance of the economy of Bangladesh within the context of the sociopolitical reality; sectoral development and analysis in a general equilibrium framework; foreign trade and foreign aid; financial institutions and monetary management, fiscal policy, human resource development and the long term performance of Bangladesh economy.

Credits 3; Prerequisite: ECO 302

ECO 375: Foundations in Financial Economics

The last several decades have brought forth rapid and profound changes to the investment industry, including an almost exponential growth of newly designed securities and trading strategies. Yet many basic principles of financial economics remain important to understanding the fundamentals of financial markets. Interest rates and rates of return affect our lives on a daily basis, now as they have in the past. For example, when you take out a student loan or invest in the stock or bond markets, those rates determine the rate at which wealth accumulates and is made available for future investment. A key element of how much financial return is earned is the riskiness of assets such as stocks, bonds and loans. What is risk and how is it related to the concept of efficient markets? How does the riskiness of an asset influence rates of return and portfolio allocation, and the decision of *which* assets investors buy? How are equities and bonds valued in an efficient market? How are derivative assets priced? In this course, you will have the opportunity to explore what financial economics has to say about these questions. The focus of this course will be on investment analysis and asset pricing, with the aim of conveying the practical applications of investment theory.

Credits: 3; Prerequisites: ECO 301, ECO302

ECO 382: Economic Valuation of the Environment

The principles of benefit cost analysis, shadow pricing, sustainability constraints, time, risk; techniques for non-market evaluation incorporating contingent valuation, contingent ranking, travel cost method, discrete choice, production function approach behavior, hedonic wage and property price models; modified national income accounting.

Credits 3; Prerequisite: ECO260, ECO 301

ECO 406: International Economic Theory

This course offers advanced treatment of trade models covered in ECO 328 and incorporates new developments in international trade theory. Topics include neo-classical trade theory, industrial- organization based trade models, protection theory, regional integration and economic growth. Special attention is placed on export promotion & import substitution policies of the developing economics.
Credits 3; Prerequisite: ECO328

ECO 414: Trade Policy Analysis

This course applies the theory of international economics to the problems of policy design for export promotion, import substitution, exchange rate choice and management, foreign indebtedness, capital flow and balance of payments management.

Credits 3; Prerequisite: ECO328

ECO 433: Gender & Development

This course examines gender discrimination & gender equality as it relates to economic development. Topics include: success and failures of NGO activities that directly address women's participation in development, feminization of poverty in under developed countries.

Credits 3; Prerequisite: ECO 360

ECO 443: Social Mobilization, Rural Banking and Community Organization

This course evaluates the role that grass root organizations and NGOs play in the development process. Their activities and achievements in microcredit, education and awareness building are discussed. Field trips are an integral part of this course.

Credits 3; Prerequisite: ECO 360

ECO 447: Applied Economics

This course analyses some selected issues in regulation and government intervention in the economy and their resultant impacts. Advanced topics on macro & micro economics related issues are included as case studies.

Credits 3; Prerequisite: ECO 467, ECO 477

ECO 449: Economics of information

This course includes topics such as, moral hazard and adverse selection; various game theory basedmodels; individual and social choices under incomplete and imperfect information.

Credits 3; Prerequisite: ECO467

ECO 450: Labor Economics

This course coversa number of topics in labor economics such as, rising participation rate of woman in the labor force, the effects of legislation i.e. minimum wages and overtime regulation on employment, the factors influencing wage rate differential in the labor market, simple competitive model versus other models of wage determination, the economics of education, discrimination in the labor market.

Credits 3; Prerequisite: ECO 301

ECO 453: Game Theory and Applications

This course deals with the strategic interaction of economic agents. It focuses on economic modeling of strategic choices in a variety of situations such as firms in an oligopolistic industry choosing price or quality, collusive agreements and the incentive to cheat, inflation and unemployment tradeoff, tariffs and international competition etc. Topics include zero sum games, variable sum games, solution concepts, Nash equilibrium, pure and mixed strategies, repeated games, dominant strategies, sequential games, sub game perfection, and games with incomplete information.

Credits: 3; Prerequisite: ECO467

ECO 455: Asian and Emerging Economies

This course is designed to cover many of the most important emerging markets in the world. Asia receives specific focus given its size and pivotal role in the world economy, but markets in Latin America, Africa, Eastern Europe and Middle East also receive coverage. For the purposes of this course, “Asia” consists of China, India South Korea, Taiwan, Hong Kong, and the nations of Southeast Asia belonging to the Association of Southeast Asian Nations (ASEAN). China’s and India’s emergence as major players in the global economy has far-reaching implications for Bangladesh and the rest of the world. Students develop an informed perspective on the economic policies and institutional changes that have shaped China’s and India’s economic emergence. In this sense, the course is very much a selected topics course with a broad range of topics covered. An important emphasis of the course is to help students develop critical thinking and rigorous analytical expertise, as well as your skills in presentation, writing, and collegial team work.

Credits: 3; Prerequisites: ECO 301, ECO 302, ECO 328

ECO 460: Managerial Economics

This course covers topics such as, scope and nature of managerial optimization, optimization techniques, risk analysis, estimation techniques, demand theory, demand estimation, demand forecasting, production theory and estimation, linear programming, market structure and pricing practice, long run investment decisions, capital budgeting, cost benefit analysis, public sector management.

Credits 3; Prerequisite: ECO302, ECO 204

ECO 461: Competition Law and Economics

This course aims to provide students with an understanding of the increasingly important role that economics plays in competition law and an understanding of when economic analysis is relevant to a particular competition law case. The focus of this course will be on Antitrust Law that primarily regulates three areas of conduct. These areas of conduct are: i) anticompetitive agreements (e.g. a cartel of firms engaged in price-fixing); ii) conduct directed at excluding a competitor from the market (e.g. a firm engaging at predatory pricing); and iii) the regulation of mergers that, if consummated, would lead to a significant reduction in competition. While other areas exist, this course will focus on these broad types of conduct.

Credits: 3; Prerequisites: ECO 301

ECO 465: Basic Econometrics

This course focuses on OLS estimation including: two-variable regression, functional form, multiple regression, rnulticollinearity, heterosecedasticity and autocorrelation, specification errors, dummy variables, lagged variables, identification and systems estimation.

Credits 3; Prerequisite: MAT 211, ECO204, ECO 302

ECO 467: Intermediate Microeconomic Theory II

This course deals with advanced treatment of microeconomic concepts. Traditional concepts of theories about production and consumer choice are discussed with mathematical rigor and special emphasis is given on market structure, strategic behavior and game theory.

Credits: 3; Prerequisite: ECO 301, MAT211

ECO 474: Mathematical Economics II

Dynamic analysis and its application in economic models: Harrod model, Domar model, Samuelson's multiplier accelerator interaction model. Dynamic Optimization: nature of dynamic optimization. Calculus of Variation: Fundamental problem of the calculus of variations-Euler Equation, some special cases & applications of second order conditions, infinite planning horizon, constrained optimization problems, optimal control theory: The maximum principle, infinite horizon problem, optimal control with constraints

Credits 3; Prerequisite: ECO 357, ECO467

ECO 475: History of Economic Thought

Various topics covered in this course include the origin of political economy, laissez faire revolution of Adam Smith, Ricardo to Mill, socialist thought and Marx, neoclassical synthesis; theory of general equilibrium, welfare economics, Keynesian revolution & Marshall's contribution to the economic discipline.

Credits 3; Prerequisite: ECO301, ECO302

ECO 477: Intermediate Macroeconomic Theory II

A review of macroeconomic issues, policies and tools. Different schools of macroeconomic thought, long run economic growth, neoclassical and new growth theories. Short run economic fluctuation, modern theories of business cycle, inflation and unemployment. Sectoral analysis, consumption and investment, open economy macroeconomics, macroeconomic issues and problems stemming from Monetarist Counter revolution & Modigliani's life cycle hypothesis.

Credits 3; Prerequisite: ECO 302, MAT 211.

ECO 480: Urban Economics

Aspects of urban management, location and growth of cities; system of cities & urban hierarchy, economics of urban management; management of urban environment; urban waste management. The structure of the urban government, its fiscal base and linkages with the external sectors : policy issues such as - determination and collection of local taxes, urban enterprise zones, urban land and housing policies, anti-poverty policies and social cost & benefit of externalities.

Credits 3; Prerequisite: ECO 301

ECO 484: Project Analysis and Evaluation

This course deals with project choice, institutional framework, cost-benefit analysis. It also covers measuring the profitability of a project under different goals - framework of project proposal - logical framework analysis - project monitoring with special reference to project proposal system used in Bangladesh.

Credits 3; Prerequisite: ECO 301, ECO 349

ECO 485: Cost Benefit Analysis

Cost Benefit Analysis is the principal tool for project and policy evaluation in the public sector. Given government regulations, cost benefit evaluations are critical for many private sector activities. Real estate developers, manufacturing firms, employers of all types are required to provide evaluations of environmental impacts and of urban impacts for their proposed projects. They too must engage in cost benefit analysis, in the valuation of social benefits and costs. Government analysts, consultants, and private firms regularly carry out cost benefit analyses for major investments - bridges, roads, transit systems, convention centers, dams - as well as for regulatory activities. Topics include: conceptualization of Costs and Benefits of social projects, identifying costs and benefits, issues related to prices, shadow prices, exchange rate/shadow exchange rate, valuing environmental externalities, cost-effectiveness analysis, risk and sensitivity analysis. Monti-Carlo simulation of risks. Examples include economic valuation of social sector projects like education, transportation, etc.

Credits 3; Prerequisite: ECO301, ECO349

ECO 486: Energy Economics and Policy

Dimensions of the energy problems, static and dynamic criteria for efficient energy resource allocation; OPEC countries; environmental issues in energy development; price control; optimum regulation structure; national security dilemma; conservation; future policy directions.

Credits 3; Prerequisite: ECO302, ECO 260, ECO 349

ECO 487: Applied Econometrics

This course discusses the classical linear regression model and its extensions including generalized least squares and the theory and application of F tests. The maximum likelihood principle is introduced, as are alternative approaches to testing, e.g. LR and Wald tests. Additional topics may be included at the instructor’s discretion. It covers the fundamental econometric technique of regression analysis and a variety of model specification issues. A central goal is to provide students with the necessary skills and knowledge to use and to correctly interpret the output from econometrics software packages such as TSP, SPSS, SHAZAM, STATA.

Credits 3; Prerequisite: ECO 465, ECO 349

ECO 489: Forecasting Methods in Business and Economics

Forecasting is constantly made in business, finance, economics, government, and many other fields, and they guide many important decisions. Another simple reason for studying forecasting is that all economic decisions are forward looking. This course will cover

basic problems, issues and limitations in forecasting. Following a discussion on basic forecasting and filtering tools, the course will introduce various concepts of time series forecasting methods including both univariate and multivariate methods.

Credits: 3; Prerequisites: ECO465, ECO 360

ECO 490: Research Methodology – This course introduces students to develop a complete research proposal for their undergraduate research project. Students are expected to develop a research concept note for their research and defend it through a seminar presentation. The course will also introduces students of different types of research, research problem, research hypothesis, how to develop credible evidence to prove research hypothesis - research methods, data collection methods – primary data and secondary data – survey, KII, FGD, experiment methods, data analysis – qualitative and quantitative analysis of data method – content, graphical, statistical, qualitative, and econometric tools; and writing and referencing tools for writing research reports.
Pre-requisite- ECO465

ECO 491: Welfare Economics

Topics include the distinction between normative and positive economics; the first and second fundamental theorem of welfare economics; Hicks-Kaldor-Scitovosky compensation criteria; consumer and product surplus for measuring welfare change; market failure; theory of second best and its implications for policy reforms; importance of property rights and Coase theorem; poverty and distribution of income; relationship between entitlement and welfare; the extent of inequality in Bangladesh.
Credits 3; Prerequisite: ECO467.

ECO 492: Law and Economics

Applications of economic theory to problems and issues in both civil and criminal law and the effect of legal rules on the allocation of resources. It includes property rights, liability and negligence assignment, the use of administrative and common law to mitigate market failure, and the logic of private versus public law enforcement.
Credits 3; Prerequisite: ECO 301, ECO 349

ECO 495: Supervised Research Paper

In this course, each student writes a research monograph on a topic of choice. Student is supervised by a faculty member. It is expected that in this research the student would be able to synthesize a research problem.
Credits 3; Prerequisite: ECO 490, ECO 465

EEE 101: Electrical Circuits I

Credits: 3+1=4, Pre-requisites: None

Course Content

Introduction to circuit variables and circuit elements, Ohm's law, Kirchhoff's current and voltage laws, voltage and current division, series and parallel combination of resistances and sources, Wye-Delta transformation. Nodal and mesh analysis. Circuit theorems, superposition, source transformation, Thevenin's, Norton's and maximum power transfer theorems. Fundamental properties of capacitors and inductors, natural and step response of RC and RL circuits.

The course includes lab work including open-ended lab based on theory taught.

Course rationale

Electrical circuit analysis covers the fundamental methods and principles required for the design and analysis of electrical engineering devices and systems. This course forms the backbone of most other advanced EEE courses. This course arms the students with the fundamentals and prepares them for the exciting world of electrical engineering.

Course objectives

The objectives of the course are to

1. Enable the students understand the concepts of various circuit variables and elements

2. Develop capability to solve direct current resistive circuit problems using different analysis techniques and circuit theorems
3. Enable the students to analyze natural and step responses of RC and RL circuits
4. Develop capability of the students to build basic electrical circuits and operate circuit lab equipment
5. Develop capability of the students to solve DC circuits using computer aided design (CAD) tools

Course outcomes

At the end of the course, the students are expected to

1. Explain concepts of voltage, current, power, energy, sources, resistance, energy storage elements and circuit configurations
2. Apply different analysis techniques and circuit theorems for solution of DC resistive circuits
3. Analyze natural and step responses of RL and RC circuits
4. Build basic electrical circuits and operate fundamental circuit lab equipment
5. Use computer aided design (CAD) tool to simulate DC circuits

Mapping of course outcomes (COs) into the program outcomes (POs)

CO	PO	Taxonomy domain/level	Assessment tool
Explain concepts of voltage, current, power energy, sources, resistance, energy storage elements and circuit configurations	PO1	Cognitive/Understand	Mid Term exams, Final exam
Apply different analysis techniques and circuit theorems for solution of DC resistive circuits	PO1	Cognitive/Apply	Mid Term exams, Final exam
Analyze natural and step responses of RL and RC circuits	PO1	Cognitive/Analysis	Mid Term exams, Final exam
Build basic electrical circuits and operate fundamental circuit lab equipment	PO5	Psychomotor/ Precision	Lab performance, lab tests
Use computer aided design (CAD) tool to simulate DC circuits	PO5	Psychomotor/ Precision	Lab performance, lab tests

EEE 102: Electronic Circuits-I

Credits: 3+1=4,Pre-requisite:EEE 201

Course content

Diode: physical operation, terminal characteristics, circuit analysis, and applications. Zener diode: physical operation, terminal characteristics, and application as voltage regulator. BJT: physical operation, terminal characteristics, biasing, small and large signal models. MOSFET: physical operation, terminal characteristics, threshold voltage, body effect, early effect, biasing and Q-point analysis, small signal models, amplification and amplifier configurations.

The course includes lab work based on theory taught including open ended labs.

Course rationale

One of the core requirements for students studying electrical engineering is to develop an in-depth understanding of basic electronic circuits that include electronic devices such as diodes, BJTs, and MOSFETs. The course aims to develop students' skills for analysis of such circuits.

Course objectives

The objectives of the course are to

1. Explain the working principle and terminal behavior of basic semiconductor devices: diodes, BJTs, and MOSFETs.
2. Perform DC analysis of the circuits containing semiconductor devices and passive elements.
3. Perform analysis of diode rectifier and voltage regulator circuits.
4. Perform analysis of the biasing circuits of BJT and MOSFET amplifiers.
5. Analyze the BJT and MOSFET amplifier circuits to find gain and input and output impedances.

Course outcomes

At the end of the course, the students are expected to

1. Explain the operation and terminal characteristics of diodes, BJTs, and MOSFETs.
2. Analyze the diode, BJT, and MOSFET circuits with DC only or DC and AC sources.
3. Analyze the BJT and MOSFET amplifier circuits to evaluate amplifiers' performance parameters.
4. Build and simulate electronic circuits and perform measurements using electronic equipment.

Mapping of course outcomes (COs) into the program outcomes (POs)

CO	PO	Taxonomy domain/ level	Assessment tool
Explain the operation and terminal characteristics of diodes, BJTs, and MOSFETs	PO1	Cognitive/Understand	Mid Term exams, Final exam
Analyze the diode, BJT, and MOSFET circuits with DC only or DC and AC sources	PO1	Cognitive/Analyze	Mid Term exams, Final exam
Analyze the BJT and MOSFET amplifier circuits to evaluate amplifiers' performance parameters	PO1	Cognitive/Analysis	Mid Term exams, Final exam
Build and simulate electronic circuits and perform measurements using electronic equipment	PO5	Psychomotor/Precision	Lab performance, lab tests

EEE105: Computer Programming

Credits: 3+1 = 4, Pre-requisite: None

Course content

Introduction to computers and programming languages, data representation in computer, algorithms and flowchart construction for problem solving. Introduction to programming (input, output, variables, data types, operators, expressions, assignments). Conditional, control statements, and loops (if, if-else, switch, while, for etc.). Introduction to arrays (declaring and manipulating arrays of numbers and characters, strings) and multi-dimensional arrays. Introduction to functions (definitions, prototypes, argument, header files). Application of user defined functions. Pointers: variable declarations, operators, passing arguments to functions, pointer arithmetic and function pointers. Object oriented programming: introduction, class, object and method.

The course includes lab works for implementation of the concepts learned.

Course rationale

Programming skills are necessary in many areas of electrical & electronic engineering, such as – numerical analysis, signal processing, control systems analysis and design, microprocessor-based systems design, embedded systems design etc. Therefore, programming has become an inextricable part of electrical & electronic engineering. This course introduces students to the fundamental concepts of programming, algorithm development and problem solving, data types, control structures, functions, arrays etc., as well as program testing, and debugging.

Course objectives

The objectives of the course are to:

1. Develop the ability to write pseudo codes, flow charts effectively to solve problems
2. Enable the students to use appropriate conditionals, iteration constructs, control structures, and functions to solve programming tasks
3. Enable the students to use memory addressing techniques and data structures in programming
4. Develop the ability to write and debug programs to solve practical problems
5. Enable students to use object-oriented programming techniques to solve problems

Course outcomes

A student successfully completing this course will be able to:

1. Develop algorithms, pseudo codes, and flowcharts in a logical manner to solve problems
2. Implement appropriate conditionals, iteration constructs, control structures, and functions to solve programming tasks
3. Apply data structures and memory addressing techniques in programming
4. Write and debug programs to solve practical problems

Mapping of course outcomes (COs) into the program outcomes (POs)

CO	PO	Taxonomy domain/level	Assessment tools
Develop algorithms, pseudo codes, and flowcharts in a logical manner to solve problems	PO1	Cognitive/ Apply	Mid Term exams, Final exam
Implement appropriate conditionals, iteration constructs, control structures, and functions to solve programming tasks	PO1	Cognitive/ Apply	Mid Term exams, Final exam, Assignment and/or Project
Apply data structures and memory addressing techniques in programming	PO1	Cognitive/Apply	Mid Term exams, Final exam, Assignment and/or Project

Write and debug programs to solve practical problems	PO1	Cognitive/Apply	Assignment, Lab reports and Lab tests

EEE 201: Electrical Circuits-II

Credits: 3+1=4,Pre-requisite:EEE 101

Course content

Basic characteristics of sinusoidal functions. Forced response of first order circuits to sinusoidal excitation. Instantaneous, average and reactive power due to sinusoidal excitation, effective values and power factor. Complex exponential forcing functions, phasors, impedance and admittance. Basic circuit laws for AC circuits. Nodal and mesh analysis, network theorems for AC circuits. Balanced and unbalanced three phase circuits, power calculation. Laplace transform and inverse transform, concept of poles, basic theorems for Laplace transform, introduction to circuit analysis in S-domain. Series and parallel resonance. First order passive filters. Magnetically coupled circuits.

The course includes lab work based on theory taught.

Course rationale

One of the core requirements for students studying electrical engineering is to develop the skill for analyzing AC circuits using different techniques. The course aims to develop students' skills for analysis of AC circuits.

Course objectives

The objectives of the course are to

1. Explain voltage, current, and impedance in phasor domains.
2. Calculate equivalent impedance of an electrical network with series, parallel, and Y-Δ connections and apply basic circuit laws to the network.
3. Apply techniques such as node, mesh, and network theorems to solve AC circuits in phasor domain.
4. Understand the three phase connection topology and analyze the three phase circuits.
5. Calculate AC power of single and three phase circuits.
6. Calculate capacitance for power factor improvement of single and three phase circuits.
7. Identify the frequency response of passive filters and resonant circuits.
8. Solve circuits in Laplace domain with different types of time varying sources.
9. Solve magnetically coupled circuits and calculate the stored energy in magnetically coupled inductors.
10. Build and simulate AC circuits and perform measurements using electronic equipment.

Course outcomes

On completion of the course, the student will be able to

1. Explain voltage, current, impedance, power, and magnetic coupling both in time and phasor domains.
2. Apply different techniques to solve AC circuits in phasor domain.
3. Apply Laplace and frequency domain analysis in AC circuits.
4. Build and simulate AC circuits and perform measurements using electronic equipment.

Mapping of course outcomes (COs) into the program outcomes (POs)

CO	PO	Taxonomy domain/level	Assessment Tools
Explain voltage, current, impedance, power, and magnetic coupling both in time and phasor domains	PO1	Cognitive/ Understand	Mid Term exams, Final exam
Apply different techniques to solve AC circuits in phasor domain	PO1	Cognitive/ Apply	Mid Term exams, Final exam
Apply Laplace and frequency domain analysis in AC circuits	PO1	Cognitive/ Apply	Mid Term exams, Final exam
Build and simulate AC circuits and perform measurements using electronic equipment	PO5	Psychomotor/ Manipulation	Lab performance, Lab tests

EEE 202: Electronic Circuits II

Credits: 3+1=4,Pre-requisite: EEE 102

Course content

Integrated circuits: Low and high frequency analysis of MOS amplifiers; current sources, current mirrors and advanced mirror circuits; MOS amplifiers with active loads, Introduction to multistage and cascade amplifier circuits. MOS differential amplifier: large and small signal equivalent circuit, high frequency response and CMRR. Feedback: concept, properties of negative feedback, shunt and series topologies, and stability. Signal Generators: application of positive feedback, sinusoidal oscillators, Wien bridge, and LC-crystal oscillator. Op-Amp: ideal op-amp, inverter, non-inverter, difference amplifier, integrator, differentiator, and weighted summer. Open and closed loop gain and frequency response of Op-Amps. Filters: transmission function, Butterworth, Chebychev, 1st and 2nd order filter. Introduction to active filters.

The course includes lab work based on theory taught including open ended labs.

Course rationale

Electronics is a dimension of the modern technology which is providing enormous momentum to the other branches of science, thus working as one of the transformational tool for the current era. The objective of this course is to introduce the students to one of the major branches of electronics i.e. metal-oxide-semiconductor field effect transistor (MOSFET). This course will also focus on designing electronic circuits, their biasing, frequency responses, feedback topologies, cascade topologies, electronic filters etc. The aim of this course is to provide the students with the foundation for designing and analyzing electronic circuits.

Course objectives

The objectives of this course are to

1. Understand frequency dependence of MOS amplifiers/circuits and analyze simple linear amplifier circuits to obtain their gain and bandwidth
2. Understand single/multistage MOS amplifiers and analyze amplifier response.
3. Perform signal conditioning using analogue filters.
4. Understand the properties of op amps and the analysis and design of simple circuits using them.

5. Design amplifier circuit for a given specification
6. Achieve hands-on experience of basic amplifier circuit
7. Use CAD tools for amplifier circuit simulation

Course outcomes

At the end of the course, the students are expected to

1. Analyze amplifier response using the concept of current steering, active loads, cascaded & differential configurations and feedback theories.
2. Explain signal conditioning using analogue filters
3. Analyze and design simple op-amp circuits
4. Design amplifier circuits that meet required specifications
5. Build and simulate amplifier circuits

Mapping of course outcomes (COs) into the program outcomes (POs)

CO	PO	Taxonomy domain/level	Assessment tools
Analyze amplifier response using the concepts of current steering, active loads, cascaded & differential configurations, and feedback	PO1	Cognitive/ Analyze	Mid Term exams, Final exam
Explain signal conditioning using analogue filters	PO1	Cognitive/Understand	Mid Term exams, Final exam
Analyze and design simple op-amp circuits	PO1	Cognitive/Analyze	Mid Term exams, Final exam
Design amplifier circuits that meet required specifications	PO3	Cognitive/Create	Assignment/project
Build and simulate amplifier circuits	PO5	Psychomotor/Precision	Lab performance, Lab tests

EEE 204: Numerical Analysis for Electrical Engineering

Credits: 3+1=4, Pre-requisite: EEE 105

Course content

Introduction to numerical methods: root finding using bisection, regula-falsi, Newton-Raphson's method, Secant method and Jacobi. Interpolation: Lagrange's polynomial, Newton's polynomial and Spline. Curve fitting: Least squares. Differential and Integration: numerical Integration-trapezoidal rule, Simpson's rule, recursive/Rhomberg integration and quadrature. Finite Difference: forward, backward and center difference, error analysis, and Richardson's extrapolation. Applications: system solution using ordinary and partial differential equations and eigen-analysis.

The concepts in the course will be implemented to analyze engineering problems using appropriate numerical tool.

Course rationale

To explore complex systems in electrical engineering, one requires computational methods since real life mathematical models can rarely be solved analytically. Such methods include techniques for solution of a complex function, function optimization, integration of function, interpolation from known value to unknown value, and computer algorithm to solve systems of equations or differential equations. This course aims to develop necessary skills required by the students for numerical solution of complex engineering problems.

Course objectives

The objectives of the course are to

1. Perform error analysis for various numerical methods
2. Apply different numerical techniques to find solution of a function and the area under the function
3. Optimize a function using appropriate numerical method.
4. Interpolate a function from known to unknown.
5. Solve systems of equations using numerical techniques
6. Solve eigenvalue problems using numerical techniques

Course outcomes

On completion of this course, the student will be able to

1. Apply numerical techniques to solve engineering problems
2. Compare different numerical techniques based on prescribed criteria
3. Explain the effects of approximations in numerical analysis
4. Apply computational tools to analyze and design engineering problems

Mapping of course outcomes (COs) into the program outcomes (POs)

CO	PO	Taxonomy domain/level	Assessment Tools
Apply numerical techniques to solve engineering problems	PO1	Cognitive/ Apply	Mid Term exams, Final exam
Compare different numerical techniques based on prescribed criteria	PO2	Cognitive/ Evaluate	Mid Term exams, Final exam
Explain the effects of approximations in numerical analysis	PO1	Cognitive/ Understand	Mid Term exams, Final exam
Apply computational tools to analyze and design engineering problems	PO1	Cognitive / Apply	Assignment and/or Project

EEE 205: Digital Logic Design

Credits: 3+1=4, Pre-requisites: EEE102, EEE105

Course content

Review of Boolean algebra and simplification of Boolean functions, Logic gates. Combinational logic synthesis as AND-OR, OR-AND, NAND-NAND, NOR-NOR, and AND-EXOR circuits. Arithmetic and comparator circuits. Encoders and decoders, Multiplexers and demultiplexers, Flip-flops, Sequential logic synthesis: Registers and counters, High level hardware descriptive language: Introduction, Applications in combinational and sequential logic.

The course includes lab work based on theory taught including open-ended labs.

Course rationale

To understand the modern digital system, one needs to know the basic digital logic components, such as, logic gates and to use the gates to synthesize combinational and sequential logic circuits. This course aims to develop students' knowledge and skills on such logic gates and their applications so that they can solve, analyze and design digital circuits and systems.

Course objectives

The objectives of the course are to

1. Introduce the concept of digital and binary systems
2. Enable the students to analyze and design combinational logic circuits
3. Enable the students to analyze and design sequential logic circuits
4. Develop student capability to design combinational or sequential circuits using high-level hardware description languages (VHDL or Verilog).

Course outcomes

At the end of the course, the students are expected to

1. Analyze digital logic circuits using Boolean logic
2. Analyze the construction and behavior of various types of digital logic circuits using combinational and sequential logic techniques
3. Design practical logic circuits using combinational and sequential logic
4. Build and simulate digital logic circuits

Mapping of course outcomes (COs) into the program outcomes (POs)

CO	PO	Taxonomy domain/level	Assessment Tools
Analyze digital logic circuits using Boolean logic	PO1	Cognitive/ Apply	Mid Term Exams, Final Exam
Analyze the construction and behavior of various types of digital logic circuits using combinational and sequential Logic technique	PO1	Cognitive/ Analyze	Mid Term Exams, Final Exam
Design practical logic circuits using combinational and sequential logic	PO3	Cognitive/ Design	Assignment/Project
Build and simulate digital logic circuits	PO5	Psychomotor/ Precision	Lab performance, lab tests

EEE 300: Electrical Services Design

Credits: 3+0=3, Pre-requisites: EEE201

Course content

Electrical wiring system design, drafting and estimation. Electrical service system design: substation, grounding and lightning protection, HVAC, vertical transportation systems, communication systems, safety and security systems. Codes and standards for electrical wiring and service systems. Safety and health issues in design of building electrical wiring and service systems. Issues for designing multistoried buildings.

Course rationale

Modern building design now integrates electrical wiring system with new services. Functional, safe and green designs done in compliance with standards and codes play key role in proper urban and industrial development. This course will prepare the students to design effective building services systems.

Course objectives

The objectives of the course are to introduce to students how to

1. Design building electrical wiring systems
2. Carry out basic calculations associated with the electric power demand and distribution in a building.
3. Use the applicable Standards and codes in the process of designing electrical building services.
4. Prepare basic technical documentation of a building services system.
5. Take into account safety and health issues in building wiring and service systems.

Course outcomes

At the end of the course, the students are expected to

1. Analyze electrical power demand in a building based on customer needs
2. Design electrical wiring complete layout including fitting, fixture, switchboard and distribution board subject to specifications and constraints considering applicable standards and codes.
3. Design electrical building service systems subject to specifications and constraints considering applicable standards and codes.
4. Prepare and present basic technical documentation of a building services system
5. Consider safety and societal issues in design of electrical service systems for buildings

Mapping of course outcomes (COs) into the program outcomes (POs)

CO	PO	Taxonomy domain/level	Assessment tool
Analyze electrical power demand in a building based on customer needs	PO2	Cognitive/Analyze	Mid Term exams, Final exam
Design electrical wiring complete layout including fitting, fixture, switchboard and distribution board subject to specifications and constraints considering applicable standards and codes	PO3	Cognitive/Create	Project, Mid Term exams, Final exam
Design electrical building service systems	PO3	Cognitive/Create	Project, Mid Term

subject to specifications and constraints considering applicable standards and codes			exams, Final exam
Prepare and present basic technical documentation of a building services system	PO10	Psychomotor/Precision	Project Report and Presentation
Consider safety and health issues in design of electrical wiring and service systems	PO6	Cognitive/Apply	Project, Mid Term exams, Final exam

EEE 301: Electrical Machines

Credits: 3+1=4, Pre-requisites: EEE 201

Course content

Review of electromechanical Fundamentals: Faraday's law of electromagnetic induction, Fleming's rule and Lenz's law. Ideal transformer: principle of transformer action, polarity, no-load, under load, transformer ratio. Practical transformer: construction, equivalent circuit, voltage regulation, losses and efficiency, auto transformer, transformer tests. Three phase induction motor: operating principle, rotating magnetic field, slip and speed, classifications and types, equivalent circuit, power flow, losses and efficiency, mechanical power and developed torque, torque-speed characteristics, induction motor applications. Synchronous Generator: operating principle; construction type and exciter systems; equivalent circuit; vector diagram at different loads; voltage regulation; torque and power; synchronizing; parallel operations and load sharing. Synchronous Motor: operating principle; types; construction; equivalent circuit; torque and power; starting methods; effect of changing load and excitation; V curves; synchronous condenser. DC motor: operating principle, classification, equivalent circuit, back EMF, starting and speed control, torque-speed characteristics, DC motor applications. Special Motors: single phase induction motor; split phase induction motor; reluctance motor; switched reluctance motor; brushless DC motor; permanent magnet DC motor; stepper motor.

The course includes lab work based on theory taught.

Course rationale

This course covers common electrical machines such as motors, generators and transformers, which find widespread applications in electric power generation, transmission, distribution and energy conversion. This course will teach the students about construction, working principle, application and design aspects of electrical machines.

Course objectives

The objectives of the course are to

1. Describe the aspects of construction, principles of operations and applications of electrical machines.
2. Enable the students to execute performance analysis of electrical machines.
3. Enable the students to design electrical machines subject to specific requirements.
4. Develop students' capability to conduct experiments on single and three phase electric machines.

Course outcomes

At the end of the course, the students are expected to

1. Explain the aspects of construction, principles of operations and applications of electrical machines.
2. Execute performance analysis of electrical machines.
3. Design electrical machines subject to specific requirements.
4. Conduct experiments for analysis of single and three phase electric machine performance.

Mapping of course outcomes (COs) into the program outcomes (POs)

CO	PO	Taxonomy domain/level	Assessment tool
Explain the aspects of construction, principles of operations and applications of electrical machines	PO1	Cognitive/Understand	Mid Terms, Final, Project
Execute performance analysis of electrical machines	PO1	Cognitive/Apply	Mid Terms, Final, Project
Design electrical machines subject to specific requirements	PO3	Cognitive/Create	Project
Conduct experiments for analysis of single and three phase electric machine performance	PO5	Psychomotor/Precision	Lab experiment, lab report, lab test and/or viva

EEE 302: Microprocessors and Interfacing

Credits: 3+1=4, Pre-requisites: EEE205

Course content

Different types of microprocessors. Intel 8086/8088 microprocessor: Architecture, instruction sets, hardware organization, addressing modes, assembly language programming, system design and interrupt. Programmable peripheral interface, programmable timer, serial communication interface, programmable interrupt controller, direct memory access, keyboard and display interface: programmable keyboard and display controller. Micro-controllers: Introduction, applications.

The course includes lab work based on theory taught. The lab also includes open-ended design.

Course rationale

The course presents real-time interfacing of microcontrollers, microprocessors, and microcomputers to the external world, including interfacing of I/O devices with minimum hardware and software, data acquisition with microprocessors, data communications, transmission and logging with embedded computers.

Course objectives

The objectives of the course are to

1. Illustrate the internal organization, addressing modes and operatingprinciple of Intel 8086/8088 microprocessor
2. Introduce simulation tool for example, emu 8086 for simulation based works
3. Interpret assembly language program by executing 8086 Instruction sets and addressing modes
4. Demonstrate the concepts of interfacing the microprocessor with other peripheral devices
5. Evaluate microprocessor based system design for specific requirements.

Course outcomes

At the end of the course, the students are expected to

1. Explain the architecture, instruction set, memory and input/output interface for 8086/8088 microprocessor
2. Relatemicroprocessor working principle, instruction execution and peripheral connection for specific applications
3. Program in assembly language for executing microprocessor instructions
4. Investigatemicroprocessor based systems by designing and conducting experiments
5. Design a microprocessor based system that meets specified requirements

Mapping of course outcomes (COs) into the program outcomes (POs)

CO	PO	Taxonomy domain/level	Assessment tools
Explain the architecture, instruction set, memory and input/output interface for 8086/8088 microprocessor	PO 1	Cognitive/Understand	Mid Term exams, Final exam
Relatemicroprocessor working principle, instruction execution and peripheral connection for specific applications	PO 1	Cognitive/Apply	Mid Term exams, Final exam
Program in assembly language for executing microprocessor instructions	PO 5	Psychomotor/ Precision	Lab performance, Lab test.
Investigatemicroprocessor based systems by designing and conducting experiments	PO 4	Cognitive/Evaluate	Lab performance, Lab report and/or Viva
Design a microprocessor based system that meets specified requirements	PO 3	Cognitive/Create	Project and/or assignment

EEE 303: Signals and Linear Systems

Credits: 3+0=3, Pre-requisites: EEE 201, MAT 205

Course content

Introduction to signals, Transformation of independent variable and elementary signals, Classification of continuous-time systems, Convolution integral, Properties of LTI systems and systems described by differential equations, State variable representation, Orthogonal representation of signals and exponential Fourier series, properties of Fourier series, Continuous time Fourier transformation and Properties of Fourier transformation, Application of Fourier transformation in system analysis and response of LTI systems for periodic inputs. Applications of Laplace transformations to study the response and stability of LTI system.

Course rationale

This course is an introduction to analog signal processing. Signal processing forms an integral part of engineering systems in many diverse areas, including communications, speech processing, image processing. Analysis of continuous-time signals and systems in both time and frequency domains is covered in this course. That is important in many electrical and electronic engineering applications.

Course objectives

The objectives of this course are to

1. Introduce the concept of signals and systems in time, frequency and Laplace domain.
2. Introduce different types and properties of systems and signals.
3. Illustrate the applications of analog signal processing.
4. Enable students to analyze stability and responses of LTI systems for different excitations.

Course outcomes

At the end of the course, the students are expected to

1. Explain different properties of systems and signals.
2. Analyze responses of LTI systems for different applications.
3. Investigate the stability of LTI systems.

Mapping of course outcomes (COs) into the program outcomes (POs)

CO	PO	Taxonomy domain/level	Assessment tool
Explain different properties of systems and signals.	PO1	Cognitive/ Understand	Mid Term exams, Final exam
Analyze responses of LTI systems for different applications	PO1	Cognitive/Analyze	Mid Term exams, Final exam, Assignment
Investigate the stability of LTI systems	PO2	Cognitive/Analyze	Mid Term exams, Final exam, Assignment

EEE 304: Electrical Power Systems

Credits: 3+1=4, Pre-requisites: EEE 301

Course content

Network Representation: Single line and reactance diagram, per unit quantities. Line Model and Performance: Equivalent circuit of short, medium and long lines, traveling waves, surge impedance loading, complex power flow and line compensations. Network Calculation: Node equations, matrix partitioning, bus impedance and admittance matrix. Load Flow Analysis: Gauss-Seidel method. Synchronous Machine Transient Analysis: transient phenomena, synchronous machine transients, Park transformation. Symmetrical Faults: Symmetrical fault calculation methods, selection of circuit breakers. Symmetrical Components: Fortescue's theorem, symmetrical components of unsymmetrical phasors, power in terms of symmetrical components, sequence circuits of symmetric transmission lines, synchronous machines and transformers, sequence networks. Asymmetrical Faults: Different types of unsymmetrical faults and fault current calculations. Stability: Definition, transient and steady state stability, swing equation, equal area criterion, case studies, multi-machine systems and stability. Power System Control: Generator model, load model, prime mover model, and governor model. Automatic generation control, reactive power and voltage control. HVDC Systems: components of HVDC systems, power flow and controls.

The course includes lab work based on theory taught.

Course rationale

The ongoing increase in power demand results in an expanded and a more complex power system/network. To understand, design, construct and operate safely, one should have a strong background of the fundamental concepts related to the electric power system i.e. modeling the network, analyzing the power flow, detecting and analyzing fault and stability in the network. Students will find the learnings from this course useful in other advanced courses on power system as well as in the practice of engineering in electric power sector.

Course objectives

The objectives of this course are to

1. Discuss the modeling of transmission line and power network
2. Introduce the method of load flow analysis
3. Discuss symmetrical and asymmetrical faults in power system
4. Prepare the students to design load flow for a given system specifications
5. Provide hands-on experience of electric power system

Course outcomes

After successfully completing this course, the students will be able to

1. Explain the aspects of network representation, transmission line and stability in power system
2. Apply numerical methods to solve load flow problems of a power system
3. Analyze symmetrical and asymmetrical faults in power system
4. Design a tool for analyzing a power system, subject to specific requirements and/or constraints
5. Conduct experiment for analysis of electric power system behavior

Mapping of course outcomes (COs) into the program outcomes (POs)

CO	PO	Taxonomy domain/level	Assessment tool
Explain the aspects of network representation, transmission line and stability in power system	PO1	Cognitive/Understand	Mid Term exams, Final exam
Apply numerical methods to solve load flow problems of a power system	PO1	Cognitive/Apply	Mid Term exams, Final exam, Assignment
Analyze symmetrical and asymmetrical faults in power system	PO1	Cognitive/Analysis	Mid Term exams, Final exam
Design a tool for analyzing a power system subject to specific requirements and/or constraints	PO3	Cognitive/Create	Project, Assignment
Conduct experiment for analysis of electrical power system behavior	PO5	Psychomotor/Precision	Lab experiment, lab report, lab test and/or viva

EEE 305: Electromagnetic Fields and Waves

Credits: 3+0=3, Pre-requisites: MAT 102, MAT 104

Course content

Electrostatics: Review of Curvilinear co-ordinates, rectangular, cylindrical and spherical co-ordinates, and Vector Analysis; Gauss's theorem and its application, electrostatic potential, Laplace's and Poisson's equations, method of images, energy of an electrostatic system, conductor and dielectrics. Magnetostatics: Concept of magnetic field, Ampere's Law, Biot-Savart law, vector magnetic potential, energy of magnetostatic system, mechanical forces and torques in electric and magnetic fields. Solutions to static field problems; Graphical field mapping with applications, solution to Laplace's equations, rectangular, cylindrical and spherical harmonics with applications. Maxwell's equations: Their derivations, continuity of charges, concepts of displacement current. Boundary conditions for time-varying systems. Potentials used with varying charges and currents. Retarded potentials, Maxwell's equations in different coordinate systems. Propagation and reflection of electromagnetic waves in unbounded media: Plane wave propagation, polarization, power flow and Poynting's theorem. Transmission line analogy, reflection from conducting and dielectric boundary.

Course rationale

Electromagnetic fields and waves are manifested and manipulated in vast number of natural and man-made systems. Applications that rely on the utilization of electromagnetic fields and waves include wireless communications, circuits, computer interconnects and peripherals, optical fiber links and components, microwave communications and radar, antennas, sensors, micro-electromechanical systems, motors, and power generation and transmission. The course covers types and propagation of electromagnetic waves and their importance in electrical and telecommunications engineering.

Course objectives

The objectives of this course are to

1. Understand basic concepts of electromagnetic theory, principles of electromagnetic radiation, Electromagnetic boundary conditions and electromagnetic wave propagation
2. Understand how the motion of charges leads to radiation, and implications in equipment design.
3. Demonstrate knowledge and understanding of electromagnetic fields in simple electronic/photonic configurations and apply electromagnetic theory to simple practical situations.
4. Analyze interactions of electromagnetic waves with materials and interfaces
5. Understand electric and magnetic properties of matter
6. Apply computational electromagnetics in engineering.

Course outcomes

Having successfully completed the module, the students will be able to:

1. Solve engineering problems on electro- and magnetostatics
2. Apply electromagnetic theories to study time-varying electromagnetic phenomena
3. Analyze interactions of electromagnetic waves with materials and interfaces
4. Demonstrate the ability for continuous learning of topics and issues related to electromagnetic fields and waves

Mapping of course outcomes (COs) into the program outcomes (POs)

CO	PO	Taxonomy domain/ level	Assessment tool
Solve engineering problems on electro-	PO1	Cognitive/Apply	Mid Term exams, Final

and magnetostatics			exam
Apply electromagnetic theories to study time-varying electromagnetic phenomena	PO1	Cognitive/Apply	Mid Term exams, Final exam
Analyze interactions of electromagnetic waves with materials and interfaces	PO2	Cognitive/ Analysis	Mid Term exams, Final exam, Assignment/ project report and/or presentation
Demonstrate the ability for continuous learning of topics and issues related to electromagnetic fields and waves	PO12	Affective/ Valuing	Assignment/ project report and/or presentation

EEE 307: Telecommunication Engineering

Credits: 3+1=4, Pre-requisite: EEE 303, STA 102.

Course content

Elements of communication systems, necessity of modulation, system limitations, message source, bandwidth requirements, transmission media types, bandwidth and transmission capacity. Amplitude Modulation (AM) and Demodulation: Double side band (DSB-SC, DSB), single side band (SSB), and vestigial side band (VSB). Spectral analysis of each type, envelope and synchronous detection; Angle modulation: instantaneous frequency, frequency modulation (FM) and phase modulation (PM), spectral analysis, demodulation of FM and PM. Effect of noise on analog modulation schemes, SNR calculation, channel capacity using Shannon's theorem. Pulse modulation: Pulse amplitude modulation (PAM), Pulse code modulation (PCM), analog to digital conversion, quantization principle, quantization noise, demodulation of PCM. Time division multiplexing (TDM) and their applications (T-carrier system). Introduction to Digital modulation techniques (ASK, PSK, FSK, OFDM). Introduction to telephony: Poissonian traffic, probability of congestion, grade of service (GOS) using Erlang's lost call theory for lost-call system and queuing system.

The course includes lab work based on theory taught.

Course rationale

This course aims to introduce the EEE students to the fundamentals of telecommunication engineering. Analog modulation methods, performance of different modulation schemes in presence of noise, and conversion from analog to digital communication system are the major aspects of this course. Additionally, teletraffic system and digital modulation schemes are introduced in this course.

Course objectives

The objectives of this course are to

1. Introduce the EEE students to the fundamentals of communication engineering. Basic principles of communication systems and analog and digital modulation schemes are also introduced
2. Enable students to analyze communication problems employing analog modulation and demodulation techniques
3. Enable students to calculate teletraffic parameters
4. Enable students to design communication blocks with specified system parameters
5. Enable students to implement the modulation schemes using simulation

Course outcomes

At the end of the course, the students are expected to

1. Apply principles of communication systems, analog and digital modulation schemes
2. Analyze communication problems employing various analog modulation and demodulation techniques.
3. Use teletraffic parameters for design of communication system
4. Design communication blocks with specified system parameters.
5. Use simulation tools to implement the modulation schemes.

Mapping of course outcomes (COs) into the program outcomes (POs)

CO	PO	Taxonomy domain/level	Assessment tools
Apply principles of communication systems, analog and digital modulation schemes.	PO1	Cognitive/Apply	Mid Term exams, Final exam
Analyze communication problems employing various analog modulation and demodulation techniques.	PO2	Cognitive/ Analysis	Assignment, Mid Term exams, Final exam
Use teletraffic parameters for design of communication system.	PO1	Cognitive/Apply	Mid Term exams, Final exam
Design communication blocks with specified system parameters.	PO3	Cognitive/ Analysis	Project
Use simulation tools to implement the modulation schemes.	PO5	Psychomotor/ Manipulation	Lab reports, Lab test

EEE 308: Electronic Properties of Materials

Credits: 3+0=3, Pre-requisites: PHY 209

Course content

Crystal Structures: Types of crystals, lattice and basis, and Miller indices. Classical Theory of Electrical and Thermal Conduction: Scattering, mobility and resistivity, temperature dependence of metal resistivity, Matthiessen's rule, Hall Effect and thermal conductivity. Review of the basic concepts of quantum mechanics.Band Theory of Solids: qualitative description energy bands, effective mass, density-of-states. Carrier Statistics: Maxwell-Boltzmann and Fermi-Dirac distributions, Fermi energy. Modern Theory of solids: Determination of Fermi energy of electrons in metals, energy band diagrams of intrinsic and extrinsic semiconductors, electron and hole concentrations in semiconductors at equilibrium. Dielectric Properties of Materials: Dielectric constant, polarization – electronic, ionic and orientation; internal field, Clausius-Mosotti equation, spontaneous polarization, frequency dependence of dielectric constant, dielectric loss and piezoelectricity. Magnetic Properties of Materials: Magnetic moment, magnetization and relative permittivity, different types of magnetic materials, origin of ferromagnetism and magnetic domains. Superconductivity: Zero resistance and Meissner effect, Type I and Type II superconductors and critical current density. Environmental issues in processing and recycling of electronic materials: components of e-waste, E-waste management, health hazards related to e-waste.

Course rationale

Successful understanding of physics and working principle of solid state devices needs basic knowledge of the electronic properties of materials of the device. Moreover, the ability to analyze various materials with respect to their properties as well as environmental

implications is essential to make judicial choices to select the suitable material for a specific electronic application. This course aims to prepare the students with necessary background to work on solid state devices and undertake higher level electronic courses.

Course objectives

The objectives of the course are to

1. Develop an understanding of the underlying physics and different electronic properties of materials
2. Enable students to calculate responses of materials related to different electronic properties
3. Develop the capability to compare different materials and select the most appropriate one for specific electrical engineering application
4. Enable students to extend learning beyond classroom lectures and activities
5. Develop an understanding of the environmental issues in processing and recycling of electronic materials

Course outcomes

At the end of the course, the students are expected to

1. Describe the underlying physics and characteristics of different electronic properties of materials
2. Calculate responses of materials related to different electronic properties
3. Compare and select the most appropriate material based on first principle calculations for specific electrical engineering application
4. Demonstrate the capacity to extend learning beyond classroom lectures and activities
5. Describe environmental issues in processing and recycling of electronic materials

Mapping of course outcomes (COs) into the program outcomes (POs)

CO	PO	Taxonomy domain/level	Assessment tools
Describe the underlying physics and characteristics of different electronic properties of materials	PO1	Cognitive/Understand	Mid Term exams, Final exam
Calculate responses of materials related to different electronic properties	PO1	Cognitive/Apply	Mid Term exams, Final exams
Compare and select the most appropriate material based on first principle calculations for specific electrical engineering application.	PO2	Cognitive/Evaluate	Assignment report and/or presentation
Demonstrate the capacity to extend learning beyond classroom lectures and activities	PO12	Affective/Valuing	Assignment report and/or presentation
Describe environmental issues in processing and recycling of electronic materials	PO7	Cognitive/Understand	Mid Term exams, Final exam

EEE 309: Digital Signal Processing

Credits:3+1 = 4,Pre-requisite: EEE 303

Course content

Introduction to Digital Signal Processing (DSP): Discrete-Time Signals and Systems, Analog to Digital Conversion, Linear Time-invariant system, Impulse response, Finite Impulse Response (FIR), Infinite (IIR) Impulse Response, Difference equation, Recursive, Non-Recursive Realization, Transient and Steady State Response, Correlation, Cross-correlation and Auto-correlation, Applications. Z-transforms: Properties, System Function, Location of Poles and Zeros, Effect on stability and Causality, Inverse Z-transform. Implementation structures of discrete time systems. Discrete Transforms: Discrete Fourier series, Discrete-Time Fourier Transform (DTFT), Properties, Discrete Fourier Transform (DFT), Properties, Linear Filtering Methods based on DFT. Digital Filters: FIR filters, Linear Phase Filters, Specifications, Design using Windows, Chebyshev Approximation Method, Frequency Sampling Method, IIR filters, Specifications, Design using Impulse Invariant and Bi-linear Z-transformation, Finite Precision Effects.

The course includes lab work based on theory taught along with an open ended-design lab.

Course rationale

Digital signal processing (DSP) functionalities are embedded in electronic devices and software that encompass many aspects of our daily lives. Applications that manipulate digital signals include media players on PCs and phones, speech coders and modems in cellular phones, image processors on digital cameras, GPS navigators etc. DSP enables information transmission in telephones and communications infrastructures, measurement and control in medical equipment (pacemakers, hearing aids), and formation and analysis of medical, earth, and planetary images. The list of applications is virtually endless. In this course, the students will learn the necessity and scope of DSP in various systems and how to use the relevant tools and techniques for processing of digital signals and implementing digital systems.

Course objectives

The objectives of the course are to

1. Develop an understanding of the fundamentals of digital signal processing and issues related to the digital representation of signals and system implementation
2. Develop the capability to analyze discrete time signals and systems
3. Enable the students to compare between different system structures according to their performance characteristics
4. Develop the capability to create, analyze and process signals, systems and design filters using sophisticated design tools
5. Develop the capability to investigate signal processing related issues through design of experiments
6. Develop the capability to work effectively as a member of a team

Course outcomes

After successful completion of the course, the students will be able to,

1. Implement discrete time (DT) linear time invariant (LTI) systems using various structures
2. Apply different tools and techniques for processing DT signals and analyzing systems.
3. Analyze DT signals and LTI systems in time, frequency and z-domain
4. Design filters subject to different specification and constraints
5. Investigate issues related to signal processing by designing and conducting experiments and data analysis
6. Display the ability to work within a team to investigate signal processing related problems.

Mapping of course outcomes (COs) into the program outcomes (POs)

CO	PO	Taxonomy domain/level	Assessment Tools
Implement discrete time (DT) linear time invariant (LTI) systems using various structures	PO1	Cognitive/Apply	Mid Term exams, Final exam
Apply different tools and techniques for processing DT signals and analyzing systems.	PO1	Cognitive/Apply	Mid Term exams, Final exam
Analyze DT signals and LTI systems in time, frequency and z-domain	PO2	Cognitive/Analyze	Mid Term exams, Final exam
Design filters subject to different specification and constraints	PO3	Cognitive/ Create	Project report and/or presentation
Investigate issues related to signal processing by designing and conducting experiments and data analysis	PO4	Cognitive/ Analyze	Open-ended design lab performance and/orreport
Display the ability to work within a team to investigate signal processing related problems.	PO9	Affective/ Organization	Peer level review

EEE 399: Engineering Project Management

Credits:3+0=3, Pre-requisite:ENG 102

Course content

Introduction: definition of project management, objectives of project management. Project management processes: initiating, planning, executing, monitoring and controlling, project closing. Project planning: elements of a project plan, work breakdown structure and linear responsibility chart. Budgeting: cost estimates, elements of estimates and budgets, life cycle costs. Economic analysis: economic assessment of projects, economic decision making. Project scheduling: CPM, PERT, Gantt chart. Risk management and change management: risk concepts, identification and assessment, change management. Monitoring and controlling: control of scope, quality, schedule and cost, monitoring of performance indices and variances, PMIS. Environmental impact: need for environmental impact assessment, screening, environmental legislation. Compliance and ethics of engineering management.

Course rationale

A practicing engineer needs to know and apply the concepts of project management and project planning, execution, monitoring and control and evaluation. This course aims to teach students the principles of project management and their applications to allocate resources, prepare schedules and budget, manage risks, time and change, and plan engineering projects.

Course objectives

The objectives of the course are to

1. Enable the students understand the various stages in project management and plan a project
2. Develop capability for cost estimation and budget preparation

3. Enable the students to apply economic concepts and analysis in engineering projects
4. Develop capability of the students to schedule different activities of a project
5. Enable the students to understand the management of risks and changes in a project
6. Enable the students to understand monitoring and controlling a project using PMIS
7. Enable the students to understand the issues related to environmental impact assessment
8. Communicate about the project in written and oral forms

Course outcomes

On completion of the course, the student will be able to

1. Prepare a project plan and explain various stages of project management process
2. Prepare budget and schedule of a project considering realistic milestones
3. Apply economic and financial principles to economic decision-making and cost-estimation in a project
4. Explain the management of risk, time and change in a project
5. Explain issues related to assessment of environmental impact of a project
6. Write technical reports and give presentations on various aspects of the project

Mapping of course outcomes (COs) into the program outcomes (POs)

CO	PO	Taxonomy domain/level	Assessment tool
Prepare a project plan and explain various stages of project management process	PO11	Cognitive/Understand	Mid Term exams, Final exam, Assignment/Project
Prepare budget and schedule of a project considering realistic milestones	PO11	Cognitive/Apply	Mid Term exams, Final exam, Assignment/Project
Apply economic and financial principles to economic decision-making and cost-estimation in a project	PO11	Cognitive/Apply	Mid Term exams, Final exam, Assignment/Project
Explain the management of risk, time and change in a project	PO11	Cognitive/ Understand	Mid Term exams, Final exam, Assignment/Project
Explain issues related to assessment of environmental impact of a project	PO7	Cognitive/ Understand	Mid Term exams, Final exam
Write technical reports and give presentations on various aspects of the project	PO10	Psychomotor/Precision	Project Report and Presentation

EEE400A: Final Year Design Project (part 1 of 3)

Credits: 0+1=1; Pre-requisites: EEE 399

Final Year Design Project or the Capstone Project is divided into three parts extending over three consecutive semesters. EEE400A is the first of the three parts.

Course content

The Final Year Design Project or the Capstone Project provides the students an opportunity to apply the knowledge and skills gathered through the earlier course works to the solution of complex engineering problems. Students will take the primary responsibility to identify, organize, plan and execute different tasks associated with the designing of a practical Electrical and Electronic Engineering System or Component. Students will work on the projects in teams.

Course rationale

The Final Year Design Project gives the students hands-on experience in solving real world problems. Successful completion of such project facilitates the transition of the students from the academia to the industry. The design project also improves the soft skills of the students which are of vital importance the practical field.

Course objectives

The main objective of the Final Year Design Project is tocreate a platform for the students to get experience in finding acceptable solution of a practical open ended electrical and electronic engineering design problem. During this project, the students are expected to learn how to manage a project, work in a team and to acquire soft skills.

Course outcomes

At the end of the semester, the students are expected to

1. Identify a contemporary challenging problem whose solution can be designed, developed and verified
2. Explains the objectives, functions and requirements of the solution
3. Prepare a project management plan and a realistic budget, establish milestones considering risks and contingencies
4. Assess the impact of the project and the product on societal, health, safety, legal and cultural issues
5. Assess the impact of the project on environment and sustainability and propose mitigating solution where needed
6. Work effectively as an individual and as a team member towards the successful completion of the project
7. Demonstrate application of ethical principles and practices in the project

Mapping of course outcomes (COs) into the program outcomes (POs)

CO	CO description	PO
CO1	Identify a contemporary challenging problem whose solution can be designed, developed and verified	PO12
CO2	Explains the objectives, functions and requirements of the solution	PO3
CO3	Prepare a project management plan and a realistic budget, establish milestones considering risks and contingencies	PO11
CO4	Assess the impact of the project and the product on societal, health, safety, legal and cultural issues	PO6
CO5	Assess the impact of the project on environment and sustainability and propose mitigating solution where needed	PO7
CO6	Work effectively as an individual and as a team member towards the successful completion of the project	PO9

CO7	Demonstrate application of ethical principles and practices in the project	PO8

Activities, deliverables, deadlines and CO assessments

1.	**Problem Definition**		
	a.	Selection of a problem concept – objectives, requirements, constraints, customer expectations	
	b.	Review of problem	
	c.	Review of commercial and regulatory requirements	
	d.	Literature review	
		Deliverable:	Project concept paper/peer evaluation
		Deadline:	Middle of the semester
		CO Assessment:	CO1 (PO12), CO2 (PO3)
2.	**Project Planning**		
	a.	Finalization of specifications and requirements	
	b.	Selection of methodology for analysis and design	
	c.	Identification of resources required	
	d.	Study of project impact on society, environment, health and safety	
	e.	Preparing a project management plan	
	f.	Preparing a budget	
		Deliverable:	Project proposal/peer evaluation
		Deadline:	End of the semester
		CO Assessment:	CO3 (PO11), CO4 (PO6), CO5 (PO7)

CO6, CO7 to be evaluated through peer level and instructor assessment

EEE400B: Final Year Design Project (part 2 of 3)

Credits: 0+2=2; Pre-requisites: EEE 400A

Final Year Design Project or the Capstone Project is divided into three parts extending over three consecutive semesters. EEE400B is the second of the three parts.

Course content

The Final Year Design Project or the Capstone Project provides the students opportunity to apply the knowledge and skills gathered through the earlier course works to the solution of complex engineering problems. Students will take the primary responsibility to identify, organize, plan and execute different tasks associated with the designing of a practical Electrical and Electronic Engineering System or Component. Students will work on the projects in teams.

Course rationale

The Final Year Design Project gives the students hands-on experience in solving real world problems. Successful completion of such project facilitates the transition of the students from the academia to the industry. The design project also improves the soft skills of the students which are of vital importance the practical field.

Course objectives

The main objective of the Final Year Design Project is tocreate a platform for the students to get experience in finding acceptable solution of a practical open ended electrical and electronic engineering design problem. During this project, the students are expected to learn how to manage a project, work in a team and to acquire soft skills.

Course outcomes

At the end of the course, the students are expected to

1. Analyze solutions of the problem to select the most suitable one
2. Design an engineering solution subject to the constraints and standards
3. Work effectively as an individual and as a team member towards the successful completion of the project
4. Demonstrate application of ethical principles and practices in the project

Mapping of course outcomes (COs) into the program outcomes (POs)

CO	CO description	PO
CO1	Analyze solutions of the problem to select the most suitable one	PO2
CO2	Conduct economic analysis of the potential solutions	PO11
CO3	Work effectively as an individual and as a team member towards the successful completion of the project	PO9
CO4	Demonstrateapplication of ethical principles and practicesin the project	PO8

Activities, deliverables, deadlines and CO assessments

1.	**Project Design**

	a.	Development of a design process considering the objectives, requirements and constraints	
	b.	Consideration of multiple solutions	
	c.	Preliminary design of the system	
	d.	Analysis and/or simulation to functionally verify the preliminary design	
	e.	Optimization and preparation of the draft design	
		Deliverable:	Design report/peer evaluation
		Deadline:	End of the semester
		CO Assessment:	CO1 (PO2), CO2 (PO11), CO3 (PO3)
	CO4, CO5 to be evaluated through peer level and instructor assessment		

EEE400C: Final Year Design Project (part 3 of 3)

Credits: 0+3=3; Pre-requisites: EEE 400B

Final Year Design Project or the Capstone Project is divided into three parts extending over three consecutive semesters. EEE400C is the third of the three parts.

Course content

The Final Year Design Project or the Capstone Project provides the students opportunity to apply the knowledge and skills gathered through the earlier course works to the solution of complex engineering problems. Students will take the primary responsibility to identify, organize, plan and execute different tasks associated with the designing of a practical Electrical and Electronic Engineering System or Component. Students will work on the projects in teams.

Course rationale

The Final Year Design Project gives the students hands-on experience in solving real world problems. Successful completion of such project facilitates the transition of the students from the academia to the industry. The design project also improves the soft skills of the students which are of vital importance the practical field.

Course objectives

The main objective of the Final Year Design Project is tocreate a platform for the students to get experience in finding acceptable solution of a practical open ended electrical and electronic engineering design problem. During this project, the students are expected to learn how to manage a project, work in a team and to acquire soft skills.

Course outcomes

At the end of the course, the students are expected to

1. Evaluate the performance of the developed solution against standards and specifications
2. Incorporate the use of modern engineering tools in the design, development and verification processes

3. Finalize design that meets the requirements based on the performance evaluation
4. Achieve the milestones set in the project proposal or revises the schedule appropriately to complete the project within the deadline
5. Work effectively as an individual and as a team member towards the successful completion of the project
6. Demonstrate application of ethical principles and practices in the project
7. Conduct economic analysis and estimate the cost of the developed solution
8. Write professional technical documents related to the project and orally present project results

Mapping of course outcomes (COs) into the program outcomes (POs)

CO	CO description	PO
CO1	Evaluate the performance of the developed solution against standards and specifications	PO4
CO2	Incorporate the use of modern engineering tools in the design, development and verification processes	PO5
CO3	Finalize design that meets the requirements based on the performance evaluation	PO3
CO4	Achieve the milestones set in the project proposal or revises the schedule appropriately to complete the project within the deadline	PO11
CO5	Work effectively as an individual and as a team member towards the successful completion of the project	PO9
CO6	Demonstrateapplication of ethical principles and practicesin the project	PO8
CO7	Write professional technical documents related to the project and orally present project results	PO10

Activities, deliverables, deadlines and CO assessments

1.	**Product Development and Prototyping**		
	a.	Construction/development of the system	
	b.	Performance evaluation of the system	
	c.	Finalization of design based on performance evaluation	
	d.	Finalization of the developed system in accordance with the final design	
		Deliverable:	Demonstration of the working product/peer evaluation

		Deadline:	Middle of the semester
		CO Assessment:	CO1 (PO4), CO2 (PO5)
2.	**Economic Analysis**		
	a.	Economic analysis	
	b.	Cost estimation	
3.	**Final Comprehensive Report Submission**		
		Deliverable:	Final report/peer evaluation
		Deadline:	End of the semester
		CO Assessment:	CO7 (PO10)
4.	**Final Presentation**		
		Deliverable:	Final presentation
		Deadline:	End of the semester
		CO Assessment:	CO1 (PO4), CO3 (PO3), CO4 (PO11), CO7 (PO10)
	CO5, CO6 to be evaluated through peer level and instructor assessment		

EEE402: Control Systems

Credits: 3+1 = 4, Pre-requisite: EEE 303

Course content

Linear System Models: Transfer function models (frequency domain models), electrical and electronic systems, mechanical systems, translational systems, rotational systems. Block Diagram and Signal Flow Graph (SFG): Mason's rule and simplification of complex systems. State Space Models (time domain models): State variables, converting transfer function to state space and vice versa, converting SFG to state space and vice versa. Feedback Control System: Closed loop systems, transient characteristics, sensitivity to parameter changes, second order approximation of higher order systems. System Types and Steady State Error: Routh stability criterion, root locus of a system. Frequency Response of Systems. Design of Feedback (PID) Controllers: Using root locus methods, frequency response methods, and state space methods, controllability and observability.

The course includes lab work based on the concepts introduced. The lab also includes open ended design.

Course rationale

In the modern society, automatic control systems are an essential part. Application of control systems can be found all around us: in home appliances and industries (for the control of temperature, pressure, humidity, flow, etc.), in rockets and space shuttles (control of maneuvering), in robots and self-guided vehicles etc. It is desirable that engineers are familiar with the theory and practice of automatic control. This course aims to develop an understanding of the analysis, design and simulation of automatic control systems.

Course objectives

The objectives of the course are to

1. Develop the ability to compose mathematical model of systems
2. Develop the skills to identify system characteristics
3. Develop the capabilities to design controllers according to needs
4. Enable the students to simulate industrial standard control systems
5. Enable students to investigate control systems as well as develop a sense of teamwork through open-ended lab activities

Course outcomes

A student successfully completing this course will be able to

1. Construct mathematical models of different systems
2. Identify the characteristics of systems from their mathematical models
3. Design controllers satisfying desirable control objectives
4. Display the ability to work as an individual and within a team to investigate control systems
5. Investigate issues related to control systems by designing and conducting experiments and data analysis.

Mapping of course outcomes (COs) into the program outcomes (POs)

CO	PO	Taxonomy domain/ level	Assessment tools
Construct mathematical models of different systems	PO1	Cognitive/Apply	Mid Term exams, Final exam
Identify the characteristics of systems from their mathematical models	PO2	Cognitive/ Analyze	Mid Term exams, Final exam
Design controllers satisfying desirable control objectives	PO3	Cognitive/Create	Project report and/or presentation
Display the ability to work as an individual and within a team to investigate control systems	PO9	Affective/ Organization	Peer level evaluation
Investigate issues related to control systems by designing and conducting experiments and data analysis	PO4	Cognitive/ Analyze	Open ended lab performance and/orreport

EEE403: Engineer and Society

Credits: 3+0 = 3, Pre-requisite: ENG102

Course content

Introduction: Engineering philosophy, engineering ethics and professionalism, ethical terminology. Ethical Issues in Engineering: Understanding ethical problems, qualities of engineers, moral codes. Responsibilities of Engineers: Commitment to society, sustainable development, technology and society, risk, safety, and liability. Institutional Ethics: Code of ethics, key concepts, importance, limitations. Rights of Engineers: Workplace rights, whistle blowing. Professionalism for International Engineers: Challenges of globalization.

Course rationale

Engineers have a core responsibility to serve the society and work for the betterment of the world. Throughout their careers, they are faced with ethical issues many a times, and the decisions they take may adversely affect the world, or a part of the world. It is often difficult to understand the morally right course of action, and ethical decision making requires more than having an enlightened sense of right and wrong. Engineers must be sensitive to ethical issues for the continuing professional development in their careers. It is, therefore, essential that modern day engineers have a clear understanding of how engineers should interact with the society, and the impacts of engineering decisions on the society and environment. This course aims to (i) sensitize students to ethical issues in engineering, (ii) develop an appreciation of the ethical responsibilities of engineers, and (iii) equip students with the necessary skills required for ethical decision making.

Course objectives

The objectives of the course are to

1. Develop the ability to identify responsibilities of engineers
2. Enable the students to critically assess the effects of engineering decisions on society and environment
3. Develop an understanding of the engineering code of ethics
4. Develop skills to decide on ethical issues using the engineering code of ethics
5. Develop an appreciation of ethical responsibilities of engineers towards public safety and welfare

Course outcomes

At the end of the course, the students are expected to

1. Identify an engineer's responsibilities in the societal or cultural context
2. Value the engineer's responsibility to maintain the public's safety and welfare
3. Assess the effects of engineering decision on society and environment
4. Apply professional codes of ethics to make ethical decisions in engineering practice
5. Defend engineering decisions considering professional rights and responsibilities of engineers

Mapping of course outcomes (COs) into the program outcomes (POs)

CO	PO	Taxonomy domain/level	Assessment tools
Identify an engineer's responsibilities in the societal and cultural context	PO6	Cognitive/Analyze	Mid Term exams, Final exam
Value the engineer's responsibility to public safety	PO6	Affective/Value	Presentation and/or report on case study

Assess the effects of engineering decision on society and environment	PO7	Cognitive/Evaluate	Presentation and/or report on case study
Apply professional codes of ethics to make ethical decisions in engineering practice	PO8	Cognitive/Apply	Mid Term exams, Final exam
Defend engineering decisions considering professional rights and responsibilities of engineers	PO10	Affective/Valuing	Presentation and/or report on case study

EEE413: Fundamentals of Nanotechnology

Credits: 3+0 = 3, Pre-requisite: EEE 308

Course content

Introduction: Nano-dimension and paradigm, definitions, background and current practice. Technology transitions from more-Moore beyond CMOS towards more-than-Moore heterogeneous integration technologies. Nanofabrication & characterization: Brief processing steps of Nano-devices fabrication, Nano-lithographic and Nano-characterization techniques. Techniques of nanomaterial growth: Top down and bottom up approaches, molecular electronics, nanocrystal growth, self-assembly and self-organization. CMOS nanotechnology: Scaling of transistors dimension, Advances in Microelectronics—From Microscale to Nanoscale Devices and non-classical nano-MOSFET structures. Carbon based nanotechnology: The geometry of nanoscale carbons, formation, band structure, structural and electronic properties; Fullerenes: Families of fullerenes, reactivity and potential applications; Carbon nanotubes: Molecular and supra-molecular structure, properties of single wall and multi wall carbon nanotubes, synthesisand characterization, applications. Nanotechnology in magnetic systems: Magneto resistive materials and devices and nano-magnetic storages. 2D electronics:The Challenging Promise of 2D Materials for Electronics, 2D Layered Materials: From Materials Properties to Device Applications: paradigm shift fromSingle-crystalline, poly-crystalline and amorphous silicon/germanium thin film towards III-V materials; Metal oxide thin films and molybdenum-di-sulfide material system. Bionanotechnology: Brief introduction to the integration of conventional nanoelectronics with life sciences, biomimetic nanostructures, bimolecular motors and biosensors.

Course rationale

Nanotechnology is behind many cutting edge electronic devices that find applications in diverse areas such as modern computer processors, data storage devices and biosensors. This course provides a comprehensive understanding of nanotechnology by covering material growth, nanoscale device fabrication and characterization techniques. Students will have an in-depth understanding of existing CMOS (complementary metal-oxide semiconductor) technology as well as exploratory materials such as carbon based nanotechnology, 2D materials and group III-V semiconductors.

Course objectives

The objectives of the course are to

1. Discuss history of scaling in CMOS technology from microscale to nanoscale
2. Explain the challenges of fabricating nanoscale transistors and discuss the future of scaling
3. Discuss nanoscale device fabrication, nanolithography and device characterization techniques
4. Discuss the challenges and opportunities of nanotechnology based on emerging materials such as carbon, 2D materials and group III-V semiconductors
5. Explain nanoscale storage technologies using magnetic systems

6. Explain the application of nanotechnology for biomedical applications

Course outcomes

At the end of the course, the students are expected to demonstrate knowledge and understanding of:

1. Explain nanoscale fabrication and characterization
2. Describe different types of nanomaterials and/or nanostructures and their applications
3. Discuss advances in microelectronics from microscale to nanoscale
4. Molecular electronics, nanoscale optoelectronics/photonics, MEMS, NEMS etc.

EEE 414: Optoelectronics

Credits: 3+0=3, Pre-requisite: EEE 308

Course content

Optical Properties of Semiconductors: Direct and indirect band-gap materials, radiative and non-radiative recombination, optical absorption, photo generation of excess carriers, minority carrier life time, luminescence and quantum efficiency in radiation. Photo-Detectors: Photoconductors, junction photo-detectors, PIN detectors, avalanche photodiodes and phototransistors. Solar cells: solar energy and spectrum, operation, I-V characteristics and performance analysis of p-n junction solar cells, technology trends. Light Emitting Diode (LED): Principles, materials for visible and infrared LED, internal and external efficiency, loss mechanism, structure and coupling to optical fibers. Stimulated Emission and Light Amplification: Spontaneous and stimulated emission, Einstein relations, population inversion, absorption of radiation, optical feedback and threshold conditions. Semiconductor Lasers: Population inversion in degenerate semiconductors, laser cavity, operating wavelength, threshold current density, power output, optical and electrical confinement. Introduction to quantum well lasers.

Course rationale

Optoelectronic devices such as LED and Laser are important electronic components in application fields such as high speed communications and lighting and optical imaging. To design and model such devices, one needs an in-depth knowledge of their device physics and dynamic behaviors. This course aims to develop students' skills for analysis and design of such devices.

Course objectives

The objectives of the course are to

1. Explain the band structure of optical materials
2. Explain the optical processes in semiconductors
3. Analyze the physics and performance characteristics of different types of photo-detectors
4. Analyze the physics and performance characteristics of solar cells
5. Discuss the technology trend of solar cells
6. Analyze the physics and performance characteristics of LEDs
7. Analyze the physics and performance characteristics of semiconductor lasers

Course outcomes

At the end of the course, the student will be able to

1. Explain the key concept of electrical and optoelectronic properties of materials, their applications to optoelectronic devices and the major optical processes in semiconductors
2. Explain and analyze the optoelectronic device physics of solar cells, photo-detectors, light-emitting diodes and laser diodes
3. Analyze and compare the optoelectronic device characteristics
4. Describe the current trend of selected optoelectronic devices and techniques to improve their characteristics for new applications by employing the understanding of optoelectronic device physics

EEE 415: Semiconductor Processing and Fabrication

Credits: 3+1=4, Pre-requisite: EEE 308

Course content

Introduction: Semiconductor materials & devices, key semiconductor technologies Crystal growth: Silicon crystal growth from melt, silicon Float-Zone process; GaAs crystal growth techniques. Cleaning: Surface cleaning, Organic and metal contamination removal, RCA and PIRANHA cleaning, impact of cleaning on device performance. Silicon oxidation: Thermal oxidation, impurity redistribution during oxidation, masking properties of silicon Dioxide, oxide characterization techniques. Photolithography: Photo reactive materials, pattern generations and pattern transfer, Optical lithography, advanced lithographic techniques: Electron beam lithography, Extreme ultraviolet lithography, X-ray lithography, Ion beam lithography, Nano imprint lithography & comparison of different lithographic methods & technology node. Etching: Wet chemical etching: Silicon, silicon dioxide, silicon nitride, aluminum and different metals, GaAs etching, Dry etching: Plasma fundamentals, etch mechanisms, plasma diagnostics & end point control, Reactive plasma etching techniques and equipment, Reactive plasma etching applications, selective etching, dry physical etching, ion beam etching etc. Diffusion: Basic diffusion process, extrinsic diffusion, lateral diffusion, Diffusion simulation. Doping techniques: Diffusion and Ion implantation, Ion distribution, stopping and channeling, Implant damage annealing, multiple implantations & masking, high energy and high current implantation. Material growth techniques: Chemical vapor deposition, Epitaxial growth techniques, chemical vapor phase epitaxy, Molecular beam epitaxy, Plasma enhanced chemical vapor deposition. Thin film and dielectric deposition: Silicon dioxide, nitride, low and high-K dielectrics deposition techniques, poly & amorphous silicon deposition techniques, Metallization: E-beam evaporation, thermal evaporation, sputtering and silicidation. Process Integration: Passive components, Bipolar, CMOS, SOI, MESFET, MEMS/NEMS and Heterogeneous Integration. Future trends & challenges: Integration challenges: Ultra shallow junction formation, ultra-thin oxide, silicide formation, new materials for interconnection, power limitation, SOI integration and system-on-a-chip.

The course includes lab work based on the concepts introduced.

Course rationale

Life now a days cannot be thought without electronics. Electronics is everywhere from personal computer to digital camera or camcorder, in cell phones and even in automobiles. Electronics industry surpassed the automobile industries in1998 and semiconductor industry is the foundation of the electronics industry, which is the largest industry in the world with global sales over several trillion dollars since 1998. The course contents are structured around the state-of-the-art facilities in modern semiconductor industries like INTEL, IBM, IMEC etc. The various fabrication techniques that are relevant for micro/nano devices in the field of electronics, optoelectronics and micro-electro-mechanical-systems (MEMS) will be addressed in the lectures, with an emphasis on their physical and chemical principles. The integration of these techniques will be explained with an example of a complete process flow for the fabrication of a specific microdevice.

Course objectives

The objectives of the course are to

1. Introduce and appreciate the modern micro/nano fabrication technology
2. Provide an overview of fabrication techniques and mechanisms
3. Introduce the characterization tools associated with micro/nano fabrication
4. Illustrate integration of the various techniques with a specific micro/nano device

Course outcomes

At the end of the course, the students are expected to

1. Demonstrate knowledge and understanding on the fundamental principles and tools used for major fabrication steps like oxidation, lithography, etching, diffusion other micromachining processes.
2. Design fabrication process flow for micro/nano system devices based on different material systems.
3. Differentiate fabrication technology for different types of device processes.

4. Perform process simulation for specific device fabrication to find out parameters of different fabrication steps and integrate them to realize the device in any fabrication facility.

EEE 416: VLSI Circuits and Systems

Credits: 3+1=4; Pre-requisite: EEE 205

Course content

MOS devices and technology: Different MOS models, simulation and associated accuracy; Brief introduction to IC fabrication: Wafer processing, die preparation and interrelation between device simulation, CAD layout and processing; Layout for VLSI: Standard cell layout, Design rules, Full and semi-custom design, Floor planning, Bit slice design; transmission gates, inverter, ring oscillator and latch up effects; Interconnects; Performance estimation: rise time & fall times, gate sizing & power consumption; VLSI architecture design and optimization: Basic gates: NAND, AND, NOR, OR, XOR, multiplexor, shifters; Arithmetic circuits: Adder, subtractor, comparator, multiplier; Sequential cell design: Latch, registers, counters; Embedded memories: RAM, EEPROM etc.; simple microprocessor; Digital design using System Verilog: Introduction to System Verilog, module design, place & route; layout optimization; IC packaging and testing.

The course includes lab work based on the concepts introduced.

Course rationale

VLSI (Very Large Scale Integration) technology started it's era in 1970's when thousands of transistors were integrated into one single chip. Nowadays, industries are able to integrate more than a billion transistors on a single chip which has brought tremendous benefits to our everyday life. VLSI circuits are used everywhere, real applications include microprocessors in a personal computer or workstation, chips in a graphic card, digital camera or camcorder, chips in a cell phone or a portable computing device, and embedded processors in an automobile. This course covers different phases of designing integrated circuits that is somehow inevitable for EEE students for understanding electronics now a day. It is expected that the course will provide students necessary background to work in IC fabrication facilities.

Course objectives

The course aims to:

1. Discuss standard submicron CMOS devices and principles of digital integrated circuit design
2. Demonstrate knowledge and understanding of VLSI architectures like basic gates, arithmetic circuits, Sequential cell, Embedded memories, simple microprocessor and optimization
3. Identify issues related with transistor sizing, power consumption and parasitic effects on system design
4. Manage a complex system through systematic approach of cell design, the use of hierarchy, place and route and test strategy to reduce the problems of debugging large system
5. Design complex systems using a hardware description language
6. Verify function and performance of designs using digital and analogue simulators

Course outcomes

At the end of the course, the students are expected to

1. Demonstrate knowledge and understanding of digital CMOS integrated circuit design considering fabrication steps starting from basic device simulation, transferring them into CAD layout and possible fabrication steps through process simulation.
2. Analyze VLSI architectures considering issues related with transistor sizing, power consumption and parasitic effects.
3. Design a complete IC using systematic approach of cell design, the use of hierarchy, place and route and performance verification.
4. Design complex systems using a hardware description language

EEE 417: Semiconductor Devices

Credits: 3+0=3, Pre-requisite: EEE 308

Course content

Charge carriers and carrier statistics in semiconductors. Drift and diffusion of carriers. Generation-recombination of excess carriers. P-N junctions in Equilibrium: junction formation, energy band diagram, space charge. Current flow in a P-N Junction: basic physics, carrier injection, the diode equation, reverse-bias breakdown, reverse recovery transient, diffusion and junction capacitances. Metal semiconductor junctions: Schottky barrier, rectifying and Ohmic contacts. Bipolar junction transistor: BJT fundamentals, energy band diagrams, minority carrier profiles, BJT currents and current gains. Metal-oxide-semiconductor FET: ideal MOS capacitor, different biasing modes, flatband threshold voltages, capacitance-voltage characteristics, current-voltage relationships, non-ideal effects. Device scaling. Industry trends in semiconductor devices.

Course rationale

Semiconductor devices are at the heart of modern integrated electronics as well as power electronics. Knowledge and understanding of how semiconductor devices operate is necessary not only for device design and analysis but also for design and performance analysis of modern complex electronic circuits. This course on one hand provides knowledge of existing devices and skills for analysis, and on the other hand, equips the student with necessary knowledge and skills on fundamentals theories of semiconductor physics so that the students understand the physics, operation and challenges of emerging semiconductor devices.

Course objectives

The objectives of the course are to

1. Enable the students understand how the basic principles of solid-state physics are used to explain semiconductor properties
2. Develop capability of the students to draw energy band diagrams of semiconductor devices
3. Develop capability of the students to calculate electric charge, current, voltage and capacitance of semiconductor devices
4. Enable the students to investigate the relationship between material properties, device architecture and device characteristics
5. Enhance self-learning capacity of the students by going beyond class room lectures and discussions

Course outcomes

At the end of the course, the students are expected to

1. Explain how the basic concepts of solid-state physics relate to the different properties of semiconductors
2. Determine the energy band diagrams of different semiconductor devices under different operating conditions
3. Calculate charge, current, voltage and capacitance of different semiconductor devices under different operating conditions
4. Investigate how material properties and structural parameters affect the device characteristics
5. Assess the trends of the semiconductor device industry by reviewing literature

EEE 418: Analog Integrated Circuits

Credits: 3+1=4, Pre-requisite: EEE 202

Course content

Brief review of BJT and MOS amplifiers; Current mirror: general properties, basic, cascade and active-load current mirrors; Active load: complimentary, depletion and diode-connected active loads for BJT and MOS amplifiers, differential pair with active load; Voltage and current references: supply independent biasing, temperature insensitive biasing, proportional to absolute temperature current generation and constant transconductance biasing; D/A and A/D converters: ideal circuits, quantization noise, performance limitations, different types of converters; Switched capacitor circuits: sampling switches, basic operation and analysis, switched capacitor amplifier, integrator and other switched capacitor circuits.

The course includes lab work based on the concepts introduced.

Course rationale

Analog integrated circuits have their contributions to the field of communication, sensors, biomedical etc. To be able to design such circuits, one needs to have strong fundamental background about the functionality, performance parameters, pros and cons of different topologies and technological influences. This course introduces the design aspects of amplifier (biasing network, different loading effect, different amplifier topologies etc.), A/D & D/A converters and switch capacitor circuits. The aim of this course is to develop the skills required for designing and analyzing electric circuits in nanometer process/technology.

EEE 419: Biomedical Electronics

Credits: 3+0=3, Pre-requisite: EEE 309

Course content

Human body: Anatomical terminology, structural level of the human body, muscular, skeletal, nervous, cardio-vascular, respiratory systems; Physiological instrumentation: Measurement systems & amplifiers, biopotentials (ECG, EMG, EEG and neurostimulation methods), cardiovascular instrumentation (pacemakers, blood pressure, defibrillator, dissolved gas measurement, blood flow measurements, plethysmography, cardiogrpahy & cardioverter), Imaging technology: X-Ray, gamma camera, nuclear magnetic resonance imaging, cerebral angiography, tomography, ultrasound imaging, including doppler ultrasound; Bioanalysis, diagnostic methods: electrophoresis, isoelectric focusing as applied to genomic and proteomic applications; mass spectrometry as applied to proteomic, metabolomics applications, nuclear magnetic resonance imaging as applied to metabolomics applications, biophotonic methods for analysis and imaging, conventional diagnosis(ELISA and overview of urine, blood and tissue based clinical diagnostic tests), biosensing approaches related to remote and intelligent sensing (evolving technologies i.e. bionanotechnology & nanosensors, drug delivery, diabetic monitoring, epilepsy and pain management); ICU/CCU monitoring, Sources of information and regulations with regard to medical devices: Reports and investigations with respect to electrical/electronic technology on human health aspects, Regulations, standards, and approaches for taking devices from the research lab to the clinic.

Course rationale

Biomedical Engineering is an exciting new area, applying the principles of science and engineering to the medical technologies used in the diagnosis, monitoring and treatment of patients.The course offers you the opportunity to become one of the next generation of engineers needed to meet the demands of this highly technological industry. It will educate you in the design and development processes needed for new specialist medical healthcare processes, problems and technological advances involving materials, imaging, monitoring, simulation and microelectromechanical systems.

Course objectives

This course aims to provide an in-depth understanding, appropriate to an engineer, of medical technologies for clinical applications. Having successfully completed the course, students will be able to demonstrate knowledge and understanding of:

1. Human anatomy and physiology (as appropriate to an engineer)
2. Physical/electrical properties of human tissues and organs including their biological function (as appropriate to an engineer)
3. Physiological measurement principles & instruments
4. The application and operation of medical imaging systems, monitoring and in vivo sensing systems
5. Electrical and electronic methods for biomolecular and cellular based analytical and diagnostic applications
6. Emerging technologies like biosensing approaches related to remote and intelligent sensing
7. Regulation, standardization of medical technologies and requirements for bringing new technologies to market.

Course outcomes

At the end of the course, the students are expected to

1. Demonstrate knowledge and understanding on the human physiology & anatomy (as appropriate to an engineer) to enable engagement with clinicians.
2. Understand the principles of Physiological measurements and medical imaging systemsapplied by clinicians and biomedical researchers to their field.

3. Demonstrate knowledge and understanding of Electrical and electronic methods for biomolecular and cellular based analytical and diagnostic applications.
4. Appraise emerging technologies in biomedical engineering.
5. Source and apply literature from many different sources towards electronic and electrical applications for healthcare, be conversant with documentation applicable to the environmental impact of biomedical instruments on human health, and the regulations, standardization of medical technologies.

EEE421: RF and Microwave Engineering

Credits: 3+1=4, Pre-requisite: EEE 305

Course content

Transmission lines: Voltage and current in ideal transmission lines, reflection, transmission, standing wave, impedance transformation, Smith chart, impedance matching and lossy transmission lines. Waveguides: general formulation, modes of propagation and losses in parallel plate, rectangular and circular waveguides. Micro strips: Structures and characteristics. Rectangular resonant cavities: Energy storage, losses and Q. Radiation and Antenna: Small current element, radiation resistance, radiation pattern and properties, Hertzian and halfwave dipoles. Antennas: Mono pole, horn, rhombic and parabolic reflector, array, and Yagi-Uda antenna.

The course includes lab works based on the concepts introduced.

EEE 422: Digital Communications

Credits: 3+1=4, Pre-requisite: EEE 307

Course content

Introduction to Communication channel:Communication channels, mathematical model and characteristics; Probability and stochastic processes. Description of M-array digital modulation systems: PSK, MSK, QAM; Source coding: Mathematical models of information, entropy Huffman code and linear predictive coding, Lempel-Ziv algorithm. Optimal Receiver Design: Matched filter, Bit error rate; Coherent receivers: ASK, FSK, PSK modulations; Incoherent receivers: ASK, FSK, PSK modulations; DPSK, MAP, ML, MQAM. Detection of M-ary signals: Eye diagrams and intersymbol interference (ISI); Bit error performance in presence of AWGN and ISI; Channel capacity: Entropy for continuous random variables; Channel capacity; Shannon's second theorem; Capacity of a band-limited Gaussian channel. Channel coding: Error correcting codes; Linear block codes; cyclic codes;

The course includes lab works based on the concepts introduced.

Course rationale

Communication is always been a promising professional field for electrical engineers. Therefore, thorough grounding in the theory and practice of modern digital communication systems is a must for future engineers willing to work in this field. This course aims to provide a sound understanding of the standards of digital communication systems from a global perspective.

Course objectives

The objectives of the course are to

1. Develop a thorough understanding of the basic structures and fundamental principles of modern digital communication systems
2. Enable students to analyze the commonly used techniques of modulation, source coding, and channel coding
3. Develop a profound understanding of information, entropy and channel capacity in the context of digital communications and coding
4. Enable students to design optimal digital receivers

Course outcomes

At the end of the course, the students are expected to

1. Explain the basic structures and fundamental principles of modern digital communication systems
2. Analyze the commonly used techniques of modulation, source coding, and channel coding.
3. Apply the concepts of information, entropy and channel capacity to study communications and coding.
4. Design optimal digital receivers.

EEE 423: Wireless and Mobile Communications

Credits: 3+1=4, Pre-requisite: EEE 307

Course content

Wireless Channels: Signal propagation, Dispersive channels and multipath, Path loss, Shadowing, Small-scale fading, Statistical fading models, Slow fading, fast fading and Doppler, Level crossing rate and fade duration, narrowband channels. Channel Equalization and Impairments: Maximum likelihood sequence estimation, Nyquist's condition for zero intersymbol interference, linear equalization (zero forcing and minimum mean-square error), Nonlinear equalization (decision-feedback equalization), Orthogonal frequency-division multiplexing, Single-carrier transmission with frequency-domain equalization. Diversity and Multiplexing: SNR outage probability, Diversity gain, Coding gain, Time diversity, Spatial diversity, Frequency diversity, Diversity reception, Equal-gain combining Selection combining, Maximum ratio combining, Diversity transmission, Multiple-input multiple-output (MIMO), Space-time coding, Alamouti code. Capacity and System Performance: Ergodic capacity, Parallel channels, Diversity channels, Effects of channel state information at the transmitter and/or the receiver, Information outage probability, error probability. Interference and Multiple Access: Uplink and downlink, Cellular network models, Signal-to-interference-plus-noise ratio, Wireless LAN, Wireless PAN, TDMA, (O)FDMA, CDMA, Frequency hopping.

The course includes lab work based on theory taught.

Course rationale

Communication is always been a promising professional field for electrical engineers. Moreover, the wide spread progression of wireless technology all over the world has led to the emergence of the wireless communication engineering as one of the major stem of engineering in research and practice. This course aims to provide a sound understanding of the standards of wireless communication systems.

Course objectives

The objectives of this course are to

1. Develop an understanding of the salient properties of wireless channels, channel fading and how different statistical fading models apply in different contexts, important parameters of interest, including the level crossing rate and the fade duration, for simple statistical fading models
2. Explain how a receiver can recover a transmitted message using optimal and suboptimal techniques in nondispersive and dispersive channels
3. Enable the students to formulate the system model for dispersive and nondispersive wireless channels and calculate linear equalizers for narrowband and wideband systems
4. Enable the students to analyze the concept of diversity and how it can be exploited in practice, be able to calculate the outage probability for basic diversity channels and use this to determine the diversity and coding gains of a system.
5. Develop an understanding of main sources of interference in wireless networks and how interference is modeled for the purposes of system analysis and design, diversity techniques, and design of architectures that would yield a prescribed diversity gain.
6. Enable the students to analyze multiple-input multiple-output channels and where and how these channels are encountered in practice, as well as to identify the advantages and disadvantages of linear and nonlinear methods of detection. Enable the students to analyze the capacity and error probability of practical wireless channels.

Course outcomes

At the end of this course, the students are expected to

1. Explain the salient properties of wireless channels, channel fading and how different statistical fading models apply in different contexts; be able to calculate important parameters of interest, including the level crossing rate and the fade duration, for simple statistical fading models
2. Explain how a receiver can recover a transmitted message using optimal and suboptimal techniques in nondispersive and dispersive channels
3. Be able to formulate the system model for dispersive and nondispersive wireless channels and calculate linear equalizers for narrowband and wideband systems
4. Analyze the concept and motivation for diversity and how it can be exploited in practice, be able to calculate the outage probability for basic diversity channels and use this to determine the diversity and coding gains of a system, proposition of architectures that would yield a prescribed diversity gain
5. Analyze multiple-input multiple-output channels and where and how these channels are encountered in practice, and be able to describe advantages and disadvantages of linear and nonlinear methods of detection
6. Be able to quantitatively analyze the capacity of key wireless channels encountered in practical systems, error probability for basic wireless communication systems. Explain the main sources of interference in wireless networks and how interference is modeled for the purposes of system analysis and design

EEE 425: Digital Image Processing

Credits: 3+0=3,Pre-requisite: EEE 309

Course content

Introduction to digital image processing, fundamental steps in Digital Image processing, components of an image processing system, elements of visual perception, image sensing and acquisition, image sampling and quantization, relationships between pixels, introduction to mathematical tools used in digital image processing. Intensity transformations and spatial filtering: Background, basic intensity transformation functions, histogram processing, fundamentals of spatial filtering, smoothing and sharpening spatial filters, combining spatial enhancement methods, and fuzzy techniques for intensity transformations and spatial filtering. Filtering in Frequency Domain: Review of 1-D DFT, extension of DFT to two variables, properties of 2-D DFT, basics of filtering in frequency domain, image smoothing and sharpening using frequency domain filters, selective filtering and implementation. Image restoration and reconstruction: Model of the image degradation/restoration process; noise models; Restoration in presence of noise only: spatial filtering; Periodic noise reduction by frequency domain filtering, linear position-invariant degradations, estimating the degradation function. Filtering techniques: Inverse, Wiener, Constrained least square, Geometric mean. Color image processing: Color fundamentals, color models, pseudocolor image processing, basics of full-color image processing, color transformations, smoothing and sharpening, image segmentation based on color, noise in color images, and color image compressions.

Course rationale

Image processing is of fundamental importance to any field where improvement of pictorial information for human interpretation is required. It is also necessary for the processing of image data for image storage, transmission, and representation for autonomous machine perception. It plays a key role in remote sensing, medical imaging, inspection, surveillance, autonomous vehicle guidance, and more. The course contains theoretical material introducing the mathematics of images and imaging, as well as computer exercises designed to introduce methods of real-world digital image manipulation using the relevant programming tools and packages.

Course objectives

The objectives of the course are to

1. Develop an understanding of the fundamentals of digital image processing
2. Enable the students to analyze different image manipulation techniques
3. Enable the students to apply image filtering techniques
4. Develop the capability to design a system to perform a specific image processing task
5. Develop the ability to use standard tools and packages for image processing

Course outcomes

On completion of the course, the students will be able to,

1. Explain the general terminology in digital image processing
2. Compare signal processing algorithms for image manipulation
3. Apply filters for image enhancement and feature extraction
4. Design image processing systems to perform specific tasks
5. Use standard programming tools and packages for image processing

EEE 426: Advanced Telecommunication Engineering

Credits: 3+0=3, Pre-requisite: EEE 307

Course content

Principle, evolution of telecommunication networks. National and International regulatory bodies, Telephone apparatus, telephone Exchanges, subscriber loop, supervisory tones, PSTN. Switching systems: Crossbar switching systems, stored program control (SPC) systems, Space division switching, time division switching, Blocking probability and Multistage switching, and Digital memory switch. Traffic analysis: Traffic characterization, grades of service, network blocking probabilities, delay system and queuing. Integrated services digital network (ISDN): N-ISDN and B-ISDN, architecture of ISDN, B-ISDN implementation. Digital subscriber loop (DSL), Wireless local loop (WLL), FTTx, SONET/SDH, WDM Network, IP telephony and VoIP, ATM network and Next Generation Network (NGN).

Course rationale

The objective of this course is to introduce the senior EEE students to the advanced telecommunication engineering. Students will learn rigorously various switching systems and acquire ability to analyze modern teletraffic network. The trend of present communication technologies is also focus of this course.

Course objectives

The objectives of the course are to

1. Introduce the students to telecommunication engineering at an extended level.
2. Enable students to analyze switching systems and compute parameter of interest.
3. Enable students to perform traffic analysis for delay system.
4. Develop a thorough understanding regarding ISDN, DSL, SONET/SDH, ATM.

Course outcomes

At the end of the course, the students are expected to

1. Analyze thoroughly various switching systems employed in telecommunication.
2. Calculate blocking probabilities for different systems.
3. Perform traffic analysis for queuing and delay system.
4. Describe present trends in communication engineering.

EEE 433: Computer Networks

Credits: 3+1=4, Pre-requisite: EEE 205

Course content

Introduction to network and protocol. The Network Edge, Core, and Access, Networks Physical Media Delay and Loss in Packet-Switched Networks ,Protocol Layers and Their Service Models, Internet Backbones, NAPs and ISPs, a Brief History of Computer Networking and the Internet. The Application Layer: Principles of Application-Layer Protocols, The World Wide Web: HTTP, File

Transfer: FTP, Electronic Mail in the Internet, The Internet's Directory Service: DNS, Socket Programming. The Transport Layer: Transport-Layer Services and Principles, Multiplexing and Demultiplexing Applications, Connectionless Transport: UDP, Principles of Reliable of Data Transfer, TCP case study , Principles of Congestion Control, TCP Congestion Control. The Network Layer: Introduction and Network Service Model, Routing Principles, Hierarchical Routing. IP: The Internet Protocol, routing in the Internet, What is Inside a Router, Mobile networking. The Link Layer and Local Area Networks: The Data Link Layer: Introduction, Services, Error Detection and Correction, Multiple Access Protocols and LANs, LAN Addresses and ARP, Ethernet Hubs, Bridges and Switches, Wireless LANs: IEEE 802.11, PPP: the Point-to-Point Protocol, ATM. Security in Computer Networks: What is Network Security, Principles of Cryptography Authentication, Integrity, Key Distribution and Certification, Firewalls, Attacks and Countermeasures.Protocols.

The course includes lab work based on the concepts introduced.

Course rationale

Computer networks play a very important role in the society by connecting remote IT systems and allowing users to share data through the network. After taking this course students will be able to understand the standards, analyze the requirements for a given network and address the security issues.

Course objectives

The objectives of the course are to

1. Enable the students to analyze basic architectures of computer networks.
2. Understand network protocols,network layers
3. Understand network security issues
4. Identify limitations of existing network protocols and propose new solutions

Course outcomes

At the end of the course, the students are expected to

1. Understand the OSI Reference Model
2. Analyze the requirements for a given organizational structure and select the most appropriate networking architecture and technologies
3. Understand the basic use of cryptography and network security
4. Specify and identify deficiencies in existing protocols, and then go onto formulate new and better protocols

EEE 434: Computer Architecture

Credits: 3+1=4, Pre-requisite: EEE 205

Information representation and transfer, instruction and data access methods, the control unit: hardwired and micro programmed, memory organization, I/O systems, channels, interrupts, DMA, Von Neumann SISD organization, RISC and CISC machines. Pipelined machines, interleaved memory system, caches, Hardware and architectural issues of parallel machines, Array processors, associative processors, multiprocessors, systolic processors, data flow computers and interconnection networks, High level language concept of computer architecture.

The course includes lab works based on the concepts introduced.

EEE435: Embedded Systems

Credits:3+1 = 4, Pre-requisites:EEE105, EEE302

Course content

Embedded Systems Descriptions: Definitions and terminologies, architecture, design philosophies of microcontroller families, field programmable gate arrays (FPGAs). Overview of FPGA: FPGA architecture, configurable logic block structure, memory hierarchy,

look up tables, I/O blocks. Overview of microcontrollers: 8 bit and 32 bit microcontrollers, special registers, instruction sets, digital signal processors. Design Considerations in Embedded Systems: Specifying requirements, selection of microcontrollers/ FPGAs, tradeoffs, issues related to energy and power. Programming Embedded Systems: FPGA programming using VERILOG/ VHDL, microcontroller programming using C, programming I/O ports, interrupts, timers, A/D converter, analog comparator, PWM, Debugging. Supervisory Circuits: Watchdog timer, reset. Interfacing with Embedded System Peripherals: Hardware and software requirements. Memory Mapping: EEPROMs. Embedded Systems Networks: Serial peripheral interface (SPI), (inter-integrated circuit) I2C, (universal synchronous/asynchronous receiver/transmitter) USART and serial communications. Interfacing with a Personal Computer. Designing embedded systems.

The course includes lab works based on the concepts introduced.

Course rationale

An embedded system is a computer system designed to perform a dedicated function. These systems interact with the physical world and are sometimes part of a larger system. Embedded system applications can be found all around us and in versatile fields, such as, consumer electronics, medical equipment, toys, industrial control, traffic control, energy management, automobiles etc. With the increasing popularity of embedded systems, it is becoming essential that modern day engineers are equipped with the knowledge of designing embedded systems and programming the required firmware. This course aims to provide students with the competence to design and understand embedded systems.

Course objectives

The objectives of this course are to

1. Develop an understanding of the key features of embedded systems.
2. Enable the students to write firmware for embedded systems.
3. Choose appropriate components for designing embedded systems.
4. Develop the capabilities to design embedded systems.
5. Enable the students to simulate embedded systems using sophisticated software tools.

Course outcomes

A student successfully completing this course will be able to

1. Classify the key components of an embedded system
2. Compose firmware for embedded systems to perform specified tasks.
3. Choose various embedded system components based on features and requirements.
4. Design embedded systems for specific applications.
5. Simulate embedded systems using advanced tools.

EEE 441: Power Stations

Credits: 3+0=3, Pre-requisites: EEE 304

Course content

Introduction to mechanical components used in power stations: internal combustion engines,boilers, steam turbines and gas turbines. Methods of generation of electricity in different types of power plants: hydroelectric, steam, gas, combined cycle and nuclear power plants.Comparison among types of plants, selection of plant location for different types of plants, plant performance and operation characteristics. Estimation of load, load curves, interpretation and analysis of load curves. Determination of demand and capacity of various components in a system, plotting of the expected load curve of a system, load growth and extrapolation of load curves. Selection of units, standby units, large or small units, number and sizes of units. Base load and peak load, capacity scheduling, load division between steam and hydro plants. Economics of power generation: calculation of depreciation, cost per unit generated. Bus systems: different types of bus system layouts. Substations: classifications and equipment of a substation.

Course rationale

Industrial strength, thus economic health of any modern country strongly depends on the availability of the electric energy and on the volume of its use. A country must expand its electric power generation at least at the same rate of its industrial growth. For this reason, the electrical engineers need to be able to take part in designing, developing and maintaining the power stations of their respective countries. After studying this course students will be capable of taking this challenge.

Course objectives

The objectives of the course are to

1. Introduce the students to different equipment of power stations
2. Enable the students to select plant type, plant location and unit size for particular cases
3. Enable the students to evaluate plant capacity to meet load demand
4. Develop student ability to calculate depreciation and cost of energy
5. Introduce the students to substations and bus systems

Course outcomes

At the end of the course, the students are expected to

1. Understand the operation of different equipment in different types of power stations
2. Analyze requirements of different types of power plants to select type, site and unit size
3. Evaluate capacity of plant by analyzing load demand
4. Calculate economics of power generation
5. Understand roles of bus and sub-stations in transmission of generated power

EEE 442: Switchgear and Protective Relays

Credits: 3+1=4, Pre-requisite: EEE 304

Course content

Circuit breakers; speed of circuit breakers. Relays Voltage rating (high, medium, lower, low) of circuit breakers. Oil circuit breakers. Circuit breaker operating mechanism and control systems. Arc extinction. Recovery voltage. Devices to aid are extinction in oil. Maintenance of oil circuit breakers, minimum oil circuit breakers. Air circuit breakers, air blast circuit breakers, vacuum circuit breakers, SF6 circuit breakers. Ratings of power circuit breakers and selection of circuit breakers. Testing of circuit breakers. Protective Relays: General requirements. Relay operating principles. Construction of relays. Relay currents and voltages; use of instruments transformer for relays. Problems of high speed relaying of transmission lines. Over current relays. Directional relays. Distance relays. Sequence and negative sequence relays. Balanced current relaying of parallel line. Ground fault relaying. Pilot relaying principles. Carrier pilot relaying. Operating characteristics of different types of relays. Apparatus protection; circuits and relay setting. Generator motor protection; Transformer protection. Bus protection; line protection.

The course includes lab works based on the concepts introduced.

EEE 444: High Voltage Engineering

Credits: 3+0=3, Pre-requisite: EEE 304

Course content

Introduction to high voltage engineering - High voltage transmission/distribution systems - Overvoltage types and insulation types - Withstand levels, S curves; insulation coordination. Breakdown mechanisms in solids, liquids, gases and vacuum - High voltage transmission/distribution systems - Overvoltage types and insulation types Testing and Weibull statistics - Non-destructive testing of apparatus; insulation resistance, tan d, partial discharge - Measurements - Destructive testing: short term breakdown test, life testing, accelerated life testing. - Weibull statistics. System over voltages - Occurrence and characteristics, power frequency and harmonics,

switching - Lightning over voltages; transient calculations, Bewley lattice diagrams, wave tables - Attenuation and distortion of surges; overvoltage protection devices, rod and expulsion gaps; surge diverters Circuit breakers - Types - General principles of operation. High voltage generators - Impulse generators - Cascaded transformers and series resonant circuits - Rectifier circuit and Cockcroft-Walton cascade circuits High voltage measurements - Electrostatic meters - Impedance dividers: resistive dividers and capacitive dividers - Digital techniques

Course rationale

High voltage engineering deals with high voltage transmission, distribution and protection. With increase in electric power consumption, high voltage is becoming increasingly more important. This course aims to prepare the students to deal with various challenges related to high voltage engineering.

Course objectives

The objectives of the course are to

1. Develop a general understanding of the students about high voltage technology and insulation
2. Develop student capabilities to apply statistical data analysis approaches
3. Enable the students to understand breakdown mechanisms of insulators of different phases
4. Enable the students to design protection systems by analyzing transient over voltages
5. Enable the students to assess insulation quality from test results

Course outcomes

At the end of the course, the students are expected to

1. Demonstrate knowledge and understanding of high voltage technology and insulation design in general
2. Apply statistic approach to analyze testing data
3. Understand breakdown mechanisms in solids, liquids and gases
4. Design protection systems by analyzing transient over voltages
5. Examine the quality of insulation from data of diagnostic tests

EEE 445: Renewable Energy

Credits: 3+0=3,Pre-requisites: EEE 202, EEE 304

Course content

Conventional energy sources, reserves, challenges, alternatives. Solar radiation, spectrum, insolation, geographical and atmospheric factors, basic operation and characteristics of solar cells. Solar PV system, load curve, maximum power point tracking, design of stand-alone and grid connected PV systems. Wind power, temperature and altitude corrections, efficiency, wind turbine generators, grid connection, probability distribution function, capacity factor. Biomass, properties, aerobic and anaerobic processes, environmental impact. Emerging renewable energy sources. Fuel cells and hydrogen based economy. Energy economics, energy and environment, introduction to smart grid and sustainability.

Course rationale

Successful harnessing of renewable energy resources requires understanding of a number of interrelated issues including global and local environmental and technological challenges. Moreover, the ability to characterize and analyze various renewable energy technologies is essential to make judicial choices, design systems and predict system performance. This course aims to prepare the students to undertake these challenges in a global perspective.

Course objectives

The objectives of the course are to

1. Develop an understanding of the technological, environmental and economic issues driving the harness of renewable energy

2. Enable the students to characterize and analyze different renewable energy technologies including solar photovoltaic, wind, biomass and hydroelectricity
3. Enable the students to make comparison among different renewable energy technologies to select the appropriate resource for a particular locality
4. Develop capability to design solar photovoltaic systems
5. Impart the skills to calculate cost of renewable energy
6. Develop an understanding on how renewable energy can influence sustainability and how smart grid can facilitate the use of renewable energy

Course outcomes

At the end of the course, the students are expected to

1. Explain the technological, environmental and economic basis for harnessing renewable energy
2. Analyze different renewable energy technologies and their fundamental characteristics
3. Compare different renewable energy technologies and choose the most appropriate one based on local conditions
4. Design simple solar photovoltaic systems
5. Calculate the cost of energy produced from renewable sources
6. Analyze issues related to smart grid and energy sustainability

EEE 446: Power System Operation and Reliability

Credits: 3+0=3,Pre-requisites: EEE 304, STA 102

Course content

Power Semiconductor Switches and Triggering Devices: BJT, MOSFET, SCR, IGBT, GTO, TRIAC, UJT and DIAC. Rectifiers: Uncontrolled and controlled single phase and three phase. Regulated Power Supplies: Linear-series and shunt, switching buck, buck boost, boost and Cuk regulators. AC Voltage Controllers: single and three phase. Choppers. DC motor control. Single phase cycloconverter. Inverters: Single phase and three phase voltage and current source. AC motor control. Stepper motor control. Resonance inverters. Pulse width modulation control of static converters.

Course rationale

Modern power systems have grown larger with many interconnections between neighboring power systems. Proper planning, operation and control of such large power systems require advanced computer based techniques. This course will provide strong foundation in classical methods and modern techniques in power systems for senior level electrical engineering students for various normal and fault conditions, which includes load flow, balanced and unbalanced fault and transient stability analyses.

Course objectives

The objectives of the course are to

1. Understand the operation of power systems in a competitive environment
2. Understand various issues arising from electricity market operations
3. Analyze various operational and control issues using new mathematical models
4. Discuss operational practices of various electricity markets around the world

Course outcomes

At the end of the course, the students are expected to

1. Understand the solution methods of economic dispatch and static state estimation and explain the automatic generation control of a multi-area system
2. Apply the gradient and the Newton’s method to unconstrained nonlinear optimization problems

3. Apply the Lagrange's method to the economic dispatch of thermal units
4. Analyze the automatic generation control and carry out a small-signal analysis of a multi-area system
5. Understand and derive the weighted least-squares state estimation method of an electric power system

EEE 447: Power Electronics

Credits: 3+1=4,Pre-requisites: EEE 202, EEE 304

Course content

Introduction to power electronics, Power processing (DC-DC, DC-AC, AC-DC, and AC-AC conversion) ,Applications of power electronics; Analysis of DC-DC converters in equilibrium, Principles of inductor volt-second balance and capacitor charge (amp-second) balance, Small-ripple assumption; Basic magnetic modeling and design, Inductor modeling, DC transformer modeling and equivalent circuit, Step-by-step design procedures for inductor and transformer designs, Loss estimation; Switch realization, Multi-quadrant switches, Survey of power semiconductor switches specific to power electronics (diode, power MOSFET, IGBTs, and thyristors), Switching (turn-on and turn-off) and conduction loss calculations, Gate-driver requirements and designs; DC-DC power-converter topologies and modulation, Isolated and non-isolated converter topologies; Converters dynamics and control, AC equivalent circuit modeling, Voltage-and current-mode controls, linear feedback-controller design, Converter transfer functions; Rectifier circuits, Single-ended and double-ended rectifier circuits, Half-bridge and full-bridge rectifiers; Introduction to basic inverters, voltage source inverters (VSI), inverter voltage control techniques, PWM inverters, Ideal current source inverters (CSI).

The course includes lab works based on the concepts introduced.

Course rationale

Modern power electronics devices and circuits are now in widespread use, across an ever-increasing number of power conversion and power control applications. This course will provide a strong foundation in power electronics for engineers, including a strong laboratory component. This course gives a detailed introduction to the key aspects of power electronic circuits, components and design. Techniques for analyzing and designing switch-mode power supplies, DC-DC converters, power rectifiers, static power inverters and universal power supplies are examined, along with electric machines, motors and transformers, and their associated power electronics drive requirements. The course also gives an overview on the electrical power system in the context of power electronics applications and their interaction with the power network.

Course objectives

The objectives of the course are to

1. Study basic operation of different switching power converters and analyze their performance and design of power state of dc-dc converters for dynamic specifications.
2. Design inductors and transformers for high-frequency power converters.
3. Utilization of power converters in dc and ac motor drives and rectifiers.
4. Survey power semiconductor switches specific to power electronics and different kind of losses in power electronic circuits.
5. Enable the students to make comparison among different converters and inverters for different uses

Course outcomes

At the end of the course, the students are expected to

1. Construct mathematical models of different types of inverters, converters and rectifiers
2. Identify the characteristics of power electronics systems from their transfer functions
3. Design of converters satisfying specific requirements
4. Examine power electronics systems for different required specifications
5. Simulate Power electronics circuits using industrial standard software and hardware

EEE 450: Special Topic in Electrical and Electronic Engineering

Credits: 3+0=3,Pre-requisites:to be decided by the concerned faculty member.

Course content

An advanced course on a new or emerging topic of Electrical and Electronic Engineering, which is not covered by the course curriculum, may be offered under this title. Prior approval of DDC is required for offering a special topic course. Not more than one course on special topic may be offered in any semester.

EEE 490: Research project

Credits: 3+0=3; Pre-requisites:completion of 90 credit hours. Concerned faculty member may require additional pre-requisites.

Course content

Any specific research topic and/or problem as suggested by the concerned faculty member.

Course rationale

The undergraduate experience is greatly enriched by attaining research experience. There are numerous benefits for undergraduate students who get involved in research. Research experience allows undergraduate students to better understand published works, learn to balance collaborative and individual work, determine an area of interest, and jump start their careers as researchers. Through exposure to research as undergraduates, many students discover their passion for research and continue on to graduate studies and faculty positions. Participating in undergraduate research is a great way to interact with experts, acquire new knowledge, develop analytical and problem-solving abilities and gain valuable experience for graduate school applications and resumes. When you contribute to research as an undergraduate, you'll not only develop academic and professional skills, but also help improve the world around you through discovery.

Course objectives

The objectives of this course are to

1. Enable the students to conduct literature review
2. Enable the students to investigate complex problems
3. Enable the students to select appropriate research tools and methods
4. Teach students how to communicate effectively research findings
5. Develop an appreciation for self-learning

Course outcomes

Having successfully completed the module, you will be able to:

1. Review research literature relevant to engineering problems
2. Conduct investigations of complex problems using research-based knowledge and research methods
3. Select and apply appropriate resources and/or modern engineering tools
4. Write effective reports and make effective presentations.
5. Demonstrate the depth for continuous learning

ENG 099: Remedial English

Remedial English is an intensive course for students who need to improve their academic English. Writing lessons will focus on identifying students' mistakes commonly made in writing and show how to correct them. This will be a helpful revision course in grammar too. Students will improve their ability to write clear sentences using varied structures, and will practice linking these together into more complex sequences and paragraphs. Besides, specific lessons will be dedicated to improving students' reading skills and the fluency of their spoken English.

Credits: None; Prerequisite: none

ENG 100: Improving Oral Communication Skills

In these classes, students develop their ability to speak with greater confidence, particularly in academic situations. Also, the course is designed to help students to improve their ability to listen to lectures in English. It is useful for students who need to give presentations as part of their course. It looks at common areas of difficulty such as structuring a presentation, designing effective visual materials and questioning techniques. Besides, it will train students for extempore talk, debating, and facing and taking interviews along with a number of notions and functions of essential oral communication skills

Credits: 3; Prerequisite: None

ENG 101: Basic English

This course is designed students to provide the opportunity for understanding and improving all four skills in English with special emphasis on reading and writing. Lessons are balanced in this way: Grammar and vocabulary lessons to improve the students' accuracy in real-life settings; speaking and listening lessons to improve their confidence, fluency and presentation skills; and reading and critical thinking lessons to provide integrated language practice involving diverse topical issues. Overall, students' capacity to organize and present ideas in English is developed.

Credits: 3; Prerequisite: ENG 099 for students who are required to do ENG 099, (no pre-requisite for English department students, and students who are not required to do ENG 099)

ENG 102: Composition and Communication Skills

In this composition course, students will study the principles of writing and analyzing non-fiction prose, focusing on argument and academic research strategies. As students, one should be able to write a literate and well-argued essay and should be able to read a literary text with some understanding and sensitivity. For practical purposes, this means that students should be able to write an effectively organized and substantial essay that is generally grammatically and syntactically sound, and acquire the capacity to identify and discuss prose features. In English 102, students will acquire and polish the tools fundamental to effective writing and reading that will help them participate successfully in the discourse systems of the university and beyond.

Credits: 3; Prerequisite: ENG 101

ENG 145: Introduction to Linguistics

The course aims to provide an overview of key areas of Applied Linguistics. Phonetics and phonology, morphology, syntax, discourse analysis, semantics, language and society, language change, brain and language and other related ideas will be addressed from the point of view of current theory and practice. Through lecture input, video observation and practical tasks, students will acquire a basic understanding of these issues to develop critical and analytical skills for language study.

Credits: 3; Prerequisite: None

ENG 154: English Phonetics and Phonology

The course introduces central themes relating to sound patterns and pronunciation in languages. Students have the opportunity to acquire knowledge and understanding of the production of sounds, and to acquire the skills necessary to describe, define and transcribe consonants, vowels and certain prosodic features such as stress and rhythm. The course includes the study of variation in sound patterns, such as those which are characteristics of various accents of English. Students are also introduced to the distribution of sounds in languages and to fundamental concepts and analytical techniques related to contrast and meaning in sound structures.

Credits: 3; Prerequisite: ENG 145

ENG 155: Improving Reading and Writing Skills

All students need to be able to meet the linguistic demands of a course of study - and this need is critical if they are studying in a second or foreign language. This course focuses on the central problem of written and oral communication in academic contexts, and gives students an opportunity to develop their understanding of the language and teaching issues that are central to studying in

English. The course draws on a range of practical insights and tips on preparing for academic demands of different English literature and linguistics courses, test-taking strategies, time management, and guidelines for preparing long assignments.

Credits: 3; Prerequisite: ENG 102

ENG 191: Introduction to Literature: Fiction and Non-Fiction Prose

This course introduces students to the major genres of literature such as short and long fiction and non-fiction prose with a view to introducing students to the forms and styles of these genres of literature.

Credits: 3; Prerequisite: None

ENG 192: Introduction to Literature: Poetry and Drama

This course aims at familiarizing students with two major genres of literature: Poetry and Drama. It covers different elements/aspects of poetry and drama such as language use in poetry, differences between prose and poetry, poetic diction, figures of speech, sound effects in poetry, different types of drama (tragedy, comedy, tragi-comedy, history, melodrama etc), elements of drama (dialogue, action, conflict, dramatic irony, plot construction etc).

Credits: 3; Prerequisite: None

ENG 200: Advanced Verbal Communication Skills

The ability to deliver effective speeches and presentations is a critical factor in job advancement and success. Preparation, including adopting different oral communication strategies, audience analysis and adaptation, enhances the effectiveness of speaking in public. In this course, students will learn how to develop and deliver messages and how to use supporting materials. Students will also learn how to lessen anxiety and leave a lasting impression on audiences, whether large or small.

Credits: 3; Prerequisite: None

ENG 201: Theories of Writing

The course familiarizes students with current theories of writing. It offers a perspective on the writing profession's theoretical evolution from process to cohesion to cognition to social construction. Students will be asked to apply the theories learnt to their own writing practices.

Credits: 3; Prerequisite: ENG 155

ENG 205: History of the English Language

The purpose of this course is to introduce students to major developments in the English language. It includes salient features of Old, Middle and Modern English. It also incorporates a comparison between British and American English, as well as a comparison among some non-native varieties of English such as Indian and African ones.

Credits: 3; Prerequisite: ENG 145

ENG 207: Psycholinguistics

Psycholinguistics is the study of people's actions and mental processes as they use language. The course primarily highlights (a) Theories of L1 Acquisition: Behaviourist, Mentalist, Maturation, Functional, Cognitive, (b) Brain and Language, (c) Child Language Acquisition: Sound System/Phonology, Syntax, Semantics, Speech Acts, and gives an overview on theories of L2 learning and individual differences in L2 learning.

Credits: 3; Prerequisite: ENG 145

ENG 208: Sociolinguistics

This course aims to investigate some of the ways in which linguistic and social variables interact in speech communities. We will examine both multilingual and monolingual speech communities. We consider language as a resource to convey cultural and personal identity, and what it reveals of language attitudes and social structure -- and therefore of status and inequality in areas such as social

class, gender, age, and ethnicity. We see how social identity illuminates variation in language, and learn about such topics as regional and social dialects, code-switching and bilingualism, pidgin and creole languages, rules of discourse, language rights, and speech in public arenas.

Credits: 3; Prerequisite: ENG 145

ENG 209: Political and Social History of England

This course introduces students to the major social and political events of England and also of Europe from the Tudor period to the end of 20th Century and the different literary movements during these periods.

Credits: 3; Prerequisite: None

ENG 211: Representations of Women in Literature

The course examines representations of women in canonical literary works by men and women in the light of major issues raised by current feminist criticism. By the end of the semester students will be able to interpret texts using feminist terminology and judge them from a variety of feminist theoretical frameworks.

Credits: 3; Prerequisite: ENG 191+ ENG 192

ENG 213: English Satire

This course is designed to acquaint students with the forms and techniques of satire, from Augustan to contemporary literature. Students will be able to distinguish satire from other literary forms and identify elements of satire in a variety of genres. The course also enables students to recognize the target(s) and purposes of satire and introduces them to the devices and degrees of humor used to achieve the satirical tones in texts. The students will also learn to identify and analyze satire in other forms of media such as cartoons and comic strips, music, the internet and cinema.

Credits: 3; Prerequisite: ENG 191+ ENG 192

ENG 222: Introduction to Bangla Literature

বাংলা সাহিত্য

বাংলা ভাষা ও সাহিত্য সম্পর্কে শিক্ষার্থীদের কৌতূহল এবং আগ্রহ বৃদ্ধির জন্য এই কোর্সটির পরিকল্পনা করা হয়েছে। বাংলা সাহিত্যের কতিপয় প্রতিনিধিত্বমূলক রচনা এখানে পাঠ্যসূচিভুক্ত হয়েছে। কোর্সটি অধ্যয়ন করলে বাংলা সাহিত্যের বিভিন্ন শাখা সম্পর্কে শিক্ষার্থীদের যেমন জ্ঞান অর্জিত হবে, তেমনি ইংরেজী ও বাংলা সাহিত্য সম্পর্কে একটা তুলনামূলক ধারণা লাভ করতে পারবে।

উপন্যাস : সৈয়দ ওয়ালীউলাহ : লালসালু।

নাটক: মুনীর চৌধুরী : কবর।

কবিতা: রবীন্দ্রনাথ ঠাকুর : পৃথিবী, সোনার তরী।

নজরুল ইসলাম : মানুষ।

জীবনানন্দ দাশ : মৃত্যুর আগে, আট বছর আগের একদিন।

শামসুর রাহমান : ইলেকট্রার গান।

প্রবন্ধ : মোতাহের হোসেন চৌধুরী : সংস্কৃতি কথা ।

ছোট গল্প : রবীন্দ্রনাথ ঠাকুর : শান্তি, রবিবার ।

প্রভাতকুমার মুখোপাধ্যায় : বিবাহের বিজ্ঞাপন ।

প্রেমেন্দ্র মিত্র : বিকৃতুধার ফাঁদে ।

সুবোধ ঘোষ : জতুগৃহ ।

Credits: 3; Prerequisite: ENG 192

ENG 226: Business and Professional Writing

The course is designed to provide students of English with the language and personal skills to help them interact effectively with colleagues in the workplace. It provides information on writing CVs, reports, memos, faxes, meeting minutes, publicity material and proposals. In addition, the course will enable students to understand interviews, discussions, telephone conversations and recorded messages (Listening skills), read business documents to understand their gist and to extract specific information (Reading skills), write effective reports, proposals and email, describe information presented in diagrammatic form (Writing skills), discuss business problems and negotiate agreement, and prepare and deliver a short presentation (Speaking skills).

Credits: 3; Prerequisite: ENG 102

ENG 230: Nineteenth Century Novel

This course includes the major novelists of the period and their representative works. The course usually starts with Jane Austen and then moves chronogically through the century, exploring and examining the nature and development of fiction through representative works of Emily Bronte, Charles Dickens, George Eliot, and Thomas Hardy. Students read the novels closely and discuss the issues raised by them.

Credits: 3; Prerequisite: ENG 191

ENG 235: Teaching Language through Literature

The purpose of this course is to familiarize students with some techniques of using literature for language skills training. The course will discuss some of the ideas both for and against the use of literature in language teaching, and consider how literature might prove an effective tool for training listening, speaking, reading and writing skills of English.

Credits: 3; Prerequisite: ENG 306 + ENG 145

ENG 245: Romantic Poetry

This course is designed to provide students with an overview of the poetry of the Romantic period in English Literature. The course includes the major poets of this period. It examines Romanticism as a literary movement and then relates each individual poet to this movement. The focus will be on close reading of the poems. At the end of the semester students are expected to be able to independently examine and judge individual poems of the Romantic period.
Credit: 3; Prerequisite: ENG 192

ENG 255: Second Language Acquisition (SLA)

The aim of the course is to look at some major areas related to second language acquisition or learning-mainly from an applied linguistic perspective. It covers the areas in breadth rather than in depth. By the end of the course, student should become familiar with the major theories relating to second language acquisition and gain an understanding of the complex relationship between theory and practice in language education.

Credits: 3; Prerequisite: ENG 145+ENG 207

ENG 301: Elizabethan and Restoration Drama

In the course students will not only read plays from the two periods but will gain a perspective on the historical, religious and political backgrounds of these periods of English history also. Texts include selections from Thomas Kyd, Christopher Marlowe, William Shakespeare, Ben Jonson, and William Congreve.
Credits: 3; Prerequisite: ENG 192

ENG 303: Syllabus and Material Design

The purpose of this course is to introduce students to different types of syllabuses such as grammatical syllabus, structural syllabus, notional-functional syllabus, and communicative syllabus. It considers some of the fundamental considerations of syllabus design such as needs analysis, setting of goals, defining objectives, deciding about pedagogic approaches, selecting, grading and sequencing of items, and recommending testing procedures. The course also focuses on the basic considerations in selecting, adopting, and designing materials. Some of the checklists will be consulted for evaluation and a unit of material will be evaluated. The course will also include lesson planning and task design.
Credits: 3; Prerequisite: ENG 306

ENG 305: Linguistic Theories

The course discusses the historical developments of Linguistics as a discipline. It incorporates the theories of Saussure, the descriptivists, the Sapir Whorf hypothesis, functional Linguistics of Prague School, Noam Chomsky and generative grammar and London school.

Credits: 3; Prerequisite: ENG 145 + ENG 154

ENG 306: Methodology of Language Teaching

This course critically reviews different methodologies and their implementation in international English Language Teaching environments. We will consider how different methodologies have emerged out of theories of language learning and language acquisition and examine to what extent they are relevant to different pedagogic cultures.
Credits: 3; Prerequisite: ENG 145

ENG 307: Academic Writing

This course is designed to help and guide students to write well-developed academic papers for their courses following the processes and conventions of academia. Practice of critical reading and critical thinking will be emphasized. Students will learn how to write a sound academic paper with a good introduction and conclusion through the process of paraphrasing, incorporating and synthesizing ideas, and selecting and using quotations from various primary and secondary sources of their readings. Building self-confidence as an original thinker and avoiding plagiarism will be also a component part of the course. It will acquaint students with current APA and MLA citation practices.
Credits: 3; Pre-requisite: ENG 155

ENG 309: Advanced Reading and Writing

Students will be required to study selected literary pieces in order to develop an awareness of the linguistic devices an author employs and the effects they produce. They will explore different rhetorical modes including narration, description, process, comparison/contrast, classification, cause and effect. The course will also focus on word choice, sentence variety and organization of ideas. Reading will cover such areas as critical reading, finding explicit and implicit relationships between elements of texts, identifying author's attitude and feelings, mood and tone, recognizing bias, and interpreting and critically evaluating texts. Writing will focus on styles of writing, introducing point of view, using the writer's tone, conventions of referencing and quoting.

Credits: 3; Prerequisite: ENG 155

ENG 310: Shakespeare

The course aims to familiarize students with Shakespeare's craft, technique, use of language and with the rudiments of Shakespearean stage structure through the reading of Shakespearean plays and poetry. Texts to be studied include Shakespearean tragedy, comedy, history plays, the problem plays and selected sonnets.

Credits: 3; Prerequisite: ENG 301 + ENG 192

ENG 313: English for the Media

This course seeks to train students in journalistic writings such as short news reports with interesting captions/headings, subtitling, translating reports obtained from foreign news agencies, preparing long reports for the press or electronic media, writing special features for the media, and editing. It will focus on both objective reporting or distancing the self from the report and subjective

reporting or taking a position while reporting. The course will train students to take active parts in press briefing/conferences and prepare reports on the briefings, interview persons, conduct surveys and prepare reports for the media. The course will give training in the art of news-casting with emphasis on pronunciation, stress, intonation, confidence, and naturalness.

Credits: 3; Prerequisite: ENG 102

ENG 315: Seventeenth and Eighteenth Century Poetry

This course will survey the major poets of the 17th and 18th century in English literature and will discuss the salient aspects of metaphysical and neo-classical poetry as well as Milton's poetics. The poets who will be studied in detail include Donne, Marvell, Herbert, Dryden, Pope and Gray.

Credits: 3; Prerequisite: ENG 192 + ENG 245

ENG 316: English for Specific Purposes

This module aims to introduce students to the history, distinguishing features, theoretical foundations and methodological innovations of TESP: the teaching of English for Specific Purposes. It also aims at introducing students to the ideas of English for specific purposes such as English for academic or professional purposes, Engineering, or English for Business.

Credits: 3; Prerequisite: ENG 303 + ENG 306

ENG 319: Translation Studies

The aim of this course is to train students in the art of translation to meet the growing need of translators. It covers recent theoretical developments in the art of translation, and focuses on the use of theoretical insight in the practice of translating literary and non-literary texts from English to Bangla and vice-versa. Students will examine some works of translation and compare translations with original works. They will be required to translate some short stories, poems, or parts of some longer literary and non-literary texts from English to Bangla and vice-versa.

Credits: 3; Prerequisite: ENG 102

ENG 320: Victorian Prose and Poetry

This course introduces students to some major Victorian poets and prose writers. It focuses mainly on close analysis of prescribed texts, but it also grapples with the issue of the relation of each poet and writer to his or her Romantic predecessors and to the spirit of the age.

Credits: 3; Prerequisite: ENG 191 + ENG 245 + ENG 192

ENG 330: English Prose from Bacon to Lamb

The course consists of prose writings from the Elizabethan to the Nineteenth Century. It includes selected writings of Bacon, Addison and Steele, Swift, Boswell and Lamb

Credits: 3; Prerequisite: ENG 191

ENG 340: Eighteenth Century Fiction

Students will focus on the rise of the novel and discuss the major works of prose fiction of the period. Texts to be studied include, among others, Robinson Crusoe, Gulliver's Travels, Joseph Andrews, Tom Jones and Rasselas.

Credits: 3; Prerequisite: ENG 191

ENG 402: Pragmatics and Discourse Analysis

This course introduces students to speech act theory, conversational maxims, relevance and implicature, communicative events, modality, cohesion, coherence, frames, presupposition and the pragmatics of politeness, topic change, turn taking, interruptions, conversation structure, clarification, repair, face saving and solidarity. It will also focus on spoken and written discourse analysis, contrastive pragmatics, anthropological perspective and cross-cultural communication. By the end of the course it is expected that

students will be able to critically analyze spoken interaction and to evaluate written texts with particular reference to context, cohesive ties, topic framework, illocution and inference.

Credits: 3; Prerequisite: ENG 208

ENG 403: Modern Novels

This course will examine some of the leading novels of the first half of the 20th century. It considers the relationship of the novel to the modernist movement and tries to understand the exceptional nature of the novels of the first half of the 20th century. An attempt will also be made to assess the contribution of such major novelists as Conrad, Woolf, Lawrence and Joyce. Students are expected to learn how to understand the characteristics of the modern novel, recognize concepts and themes prevalent, identify central issues and problems of the societies which the novels explore, formulate criteria for interpretation and evaluation of modern novels and compare and contrast characters, themes, settings, styles, and techniques

Credits: 3; Prerequisite: ENG 230

ENG 405: Creative Writing

This is an introductory course on writing poetry and short fiction. The course will give students the opportunity to explore how poetry and short stories can express ideas and emotions and transform the mundane and commonplace into works of art. Keeping in mind the tensions between aesthetic and communicative values of words and the demands of finding one's voice, students will discover the surprises, challenges and pleasures that lie hidden behind all creative work of art shaped by language. Students will read some selected models of poetry and short story, but will be encouraged to be creative.

Credits: 3; Prerequisite: ENG 155+ENG 309

ENG 410: Continental Literature

The course aims at familiarizing students with some major writers of Continental Literature. It includes works of Flaubert, Tolstoy, Brecht, Pirendello, Baudelaire and Rilke.

Credits: 3; Prerequisite: ENG 230 + ENG 301

ENG 411: Language Acquisition Theories in EFL/ESL Contexts

This course introduces students to the different theories of language acquisition, and to interlanguage, universal linguistics, and error analysis theories, and examines their relevance in teaching English in foreign/second language contexts.

Credits: 3; Prerequisite: ENG 207

ENG 412: Techniques of Teaching English Language Skills

This course aims at familiarizing students with different techniques of teaching listening, speaking, reading and writing skills to help develop their efficiency in teaching these English language skills.

The course will require students to also do practice teaching.

Credits: 3; Prerequisite: ENG 145 + ENG 306

ENG 413: Language Testing and Evaluation

This course introduces students to different types of language tests-placement, diagnostic, proficiency, achievement, norm-referenced and criterion referenced tests. It also discusses some fundamental considerations in language testing such as reliability, validity, (face validity, content validity, construct validity etc.), and administrability. It trains students to evaluate the tests and design reading, writing, speaking and listening tests.

Credits: 3; Prerequisite: ENG 207 + ENG 306 + ENG 145

ENG 414: Research Methodology in ELT

This is an advanced course that aims at introducing students to the approaches and methods of ELT research so that they can understand the problems of English language teaching in Bangladesh and recommend solutions to those problems. It introduces

students to the different areas and different types of ELT research such as qualitative research, quantitative research, experimental research, case studies and action research. It talks about setting a research program, doing literature review, designing research tools which include tools for questionnaire survey for interviews and classroom observation, data processing and analysis, and presenting the results. It also introduces students to statistical concepts such as central tendency (mean, median, mode), and distribution (standard deviation, normal distribution curve etc).

Credits: 3; Prerequisite: ENG 207 + ENG 208 + ENG 306

ENG 415: Language Policy and Planning

The purpose of this course is to introduce students to important issues and considerations in language policy and planning. It considers the nature and function of 'official' languages and the relationships between languages and identity and the pluralism - assimilation issue. Students will have to study the language policies of some other countries, examine the language policy of Bangladesh and come up with new ideas for planning an effective language policy for Bangladesh.

Credits: 3; Prerequisite: ENG 208

ENG 417: Problems & Prospects of ELT in Bangladesh

This course provides an overview of the present state of ELT in Bangladesh and seeks to help students find out the means to resolve its problems. It closely examines classroom methodology, curriculum and testing across primary, secondary and higher secondary levels of English teaching and learning. Students will also be made familiar with ELT projects like PERC, ELTIP and the American Peace Core initiative for the improvement of English language teaching and learning in Bangladesh.

Credits: 3; Prerequisite: ENG 412

ENG 420: American Literature (1620-1891)

The course covers the earliest writings in American literature starting from the colonial period to the 19th century. Writers include, among others, Ann Bradstreet, Jonathan Edwards, Nathaniel Hawthorne, Henry Wadsworth Longfellow, Henry David Thoreau, Henry James, Mark Twain and Walt Whitman.

Credits: 3; Prerequisite: ENG192

ENG 422: Bilingualism and EFL/ESL

This is a course in the sociolinguistics of bilingualism. Other dimensions of bilingualism such as psychological and grammatical issues in bilingualism will be touched upon. Some of the topics covered are: bilingual communities, language planning, and bilingualism in education with specific references to ELT in Bangladesh.

Credits: 3; Prerequisite: ENG 207 + ENG 208

ENG 423: Old and Middle English

This course contains epics and poetical pieces written in old and Middle English available in modern English translation.

Credits: 3; Prerequisite: ENG192 + ENG 301

ENG 424: Classics in Translation

The aim of this course is to familiarize students with the ancient classics in the form of Greek and Roman plays and epics in translation. The authors include, among others, Homer, Virgil, Aeschylus, Sophocles, Euripides, and Aristophanes.

Credits: 3; Prerequisite: ENG-192 + ENG 310

ENG 426: American Literature (Modern to Contemporary)

The course will introduce students to the themes, ideas, and values prevalent in American literature of post World War II to the contemporary times. Writers will include Robert Frost, Eugene O'Neill, Earnest Hemingway, and Emily Dickinson.

Credits: 3; Prerequisite: ENG 230 + ENG 245 + ENG 301 + ENG 315

ENG 430: Cultural Studies

The course will deal with writings on culture from the Nineteenth century to modern culture studies. Writers include Mathew Arnold, Simon During, Roland Barthes, Stuart Hall, Cornel West and Edward Said.

Credits: 3; Prerequisite: ENG 310

ENG 435: Postcolonial Theory and Literature

In the course students will interrogate the category of postcolonial theory and literature to discern the pitfalls of using such a broad terminology. They will also enquire into the different forms of literature and writing that can be encompassed within this category. Texts to be studied will include selections from Edward Said, Homi Bhabha, Sara Suleri, Gayatri Spivak, Chandra Mohanty Talpade, Salman Rushdie, Chinua Achebe, R.K. Narayan, Meena Alexander and Bharati Mukherjee.

Credits 3; Prerequisite: ENG 310

ENG 436: ELT Project

The purpose of this course is to provide students with some practical training in doing ELT research. Students are required to do a mini-research project in any one of the following areas under a teacher's guidance: (a) Needs analysis, (b) Designing a communicative syllabus, (c) Evaluating a syllabus, (d) Evaluating materials and designing materials, (e) Evaluating teaching, (f) Evaluating tests and designing reading, writing, speaking and listening tests, (g) Learner's learning style preferences, and (h) Learner's beliefs and expectations.

Credits: 3; Prerequisite: ENG 414

ENG 438: Literary Criticism

This course introduces students to some of the fundamental ideas of literary criticism. It examines different views about literature offered by great writers and critics as well as the philosopher Aristotle. It will enable students to get a perspective on the history of criticism and the rise of literary studies, key ideas in the philosophy of literature, and the practice of criticism over the centuries. Critics to be studied include, among others, Aristotle, Johnson, Dryden, Wordsworth, Arnold, Sartre & Nictzsche.

Credits: 3; Prerequisite: ENG 301 + ENG 310

ENG 440: Literary Theory

The aim of this course is to familiarize students with different literary theories. The course includes selected works of Freud, Cleanth Brooks, E M Froster, M H Abrams, R Barthes, William Wordsworth, Fish, Said, and Kora Kaplan.

Credits: 4; Prerequisite: ENG 438

ENG 445: Modern Poetry

This course will study 20th century Modern English and American lyric poetry. It aims to place the major emphasis on the major English canonical poets of the modernist period. One important component of the course will entail exploring modernism as an all-encompassing cultural movement and relate the poems we read to this movement. Moreover, we will also explore how the individual poets of this period influence and compete with each other. Particular emphasis will be placed on close reading of some of the selected poems. Poets may include, among others, T S Eliot, W.B. Yeats, Ted Hughes, H.D, Marianne Moore, Dylan Thomas and W.H. Auden.

Credits: 3; Prerequisite: ENG 320

ENG 450: Modern Drama

In this course students will familiarize themselves with Modern English Drama. They will learn about the major trends, conventions and influences of nineteenth and twentieth century plays and significant playwrights in England and compare the affinities of Modern English Drama with contemporary European drama. Students are also required to read texts under the historical, political, social and

philosophical forces under the traits of Modernism. Since this is an advanced course they are expected to relate Modern drama with their previous reading of Elizabethan, Caroline, Jacobean and Restoration drama. Writers may include, among others, G. B. Shaw, J. M. Synge, Samuel Beckett, George Osborne and Harold Pinter.

Credits: 3; Prerequisite: ENG 301 & ENG 310

ENG 451: Computer Assisted Language Learning (CALL)

The aims of this course are to equip students with the ability to assess the potential of IT in language teaching; to provide them with principles for using IT effectively; to introduce students to, and explore with them, a range of issues involved in the use of IT in language teaching; and to familiarise them with recent research into IT applications in language teaching. In addition, students will develop increased understanding of the technical, practical and conceptual aspects of IT applications in language teaching; familiarity with relevant softwares, computer-based discussion forums, Internet navigation and composition skills, and ability to author simple language learning multimedia activities.

Credits: 3; Prerequisite: ENG 145 + ENG 306

ENG 452: Contemporary English Literature

The course will include novels, poems and plays by some prominent writers of the 1950s, 60s and 70s from England. Authors may include, among others: John Fowles, A.S. Byalt, Harold Pinter, Tom Stoppard, Philip Larkin, Ted Hughes, Sylvia Plath and J. G. Farell

Credits: 3; Prerequisite: ENG 426

ENG 455: Comparative Literature

This course includes non-English writers like R.K. Narayan, V.S. Naipaul, Arundhuti Roy, Chinua Achebe, Wole Soyinka, Naquib Mahfuz, and Nadine Gordimer.

Credits: 3; Prerequisite: ENG 211

ENG 458: Feminist Readings of Literature

The course introduces students to the history of feminist literary criticism and to the challenges and problems it has been facing. The course familiarizes students with the major trends and main conception of the feminist movement and prepares them to understand the readings included in the syllabus better. The course also aims to overview the productions of popular culture which are thematically connected to those literary pieces that are included in the readings, with the aim to observe to what extent and by what means are gender roles being modified. This course will also explore the relationship between Anglo-American and European feminist literary theory and Third World feminisms. As such, it will examine the tensions, negotiations and new articulations (specifically as transnational feminism) that can be read through the lens of historical developments from the nineteenth century to the present. In particular, the history of Euro-American colonialism, anti-colonial movements, nationalism, decolonization, development and modernization projects post-World War II, crises of global capitalism, new social movements, and neo-liberalism will provide broad frameworks for understanding transnational feminism.

Credits: 3; Pre-requisite: ENG 211 + ENG 230

ETE 103: Structured Programming

Credit Hours and Teaching Scheme:

	Theory	Laboratory	Total
Credit Hours	3	1	4

Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks + Final Exam in the 14th week

Prerequisite: None

Course Objective:

The purpose of this course is to introduce the students to computer programming using structured language. The students will be able to enhance their analyzing and problem-solving skills and use the same for writing programs using C language. Knowledge of this course will be needed as prerequisite knowledge for future courses such as ETE107 Object Oriented Programming, ETE207 Data Structures, ETE245 Algorithms, ETE301 Database Systems, ETE476 Artificial Intelligence, ETE302 Computer Networks and many others.

Course Contents:

Programming Language: Concept of programming language and its classification; Programming logic and flow Chart; Structured Programming using C - Constants, variables and data types, arithmetic and logical operation, loops and decision making, user defined functions, character and strings, arrays, pointers, structures, file management.
The course includes lab work based on theory taught.

Recommended Textbook:

1. The C Programming Language, Brian W. Kernighan, Dennis M. Richie.
2. Programming in ANSI C, E. Balagurusamy, McGraw-Hill Education.

Reference Book:

1. Schaum's Outlines Programming with C, Byron Gottfried, McGraw-Hill.

ETE 107: Electrical Circuits – I

Credit Hours and Teaching Scheme:

	Theory	Laboratory	Total
Credit Hours	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks + Final Exam in the 14th week

Pre-requisite: None.

Course Objective:

This is a foundation course for the undergraduate students of Electrical, Electronic and Telecommunications Engineering. In electrical and electronic engineering almost every device/system is modeled through electrical circuit and the device/system performances are then predicted for either DC or AC excitation. To model any electrical or electronic device or systems, the knowledge of electrical circuit and circuit performance under DC excitation is a must. Thus students should have clear idea about the network theorems and network solution methods. The objective of this course is to teach the students the fundamentals of electrical circuit solution techniques, network theorems and transient analysis of R-L and R-C circuits under DC excitations.

Course Contents:

Introduction to DC Circuits: Fundamental electrical concepts and measuring units, D.C. voltage, current, resistance and power. Introduction to circuit theory and Ohm's law, Kirchhoff's current and voltage laws. Simple resistive circuits: Series and parallel circuits, voltage and current division, Wye-Delta transformation. Various techniques for solving circuit problems: Mesh and Nodal analysis. Network theorems: Superposition theorem, Source transformation, Thévenin's and Norton's theorems with their applications in circuits having independent and dependent sources; maximum power transfer and reciprocity theorem. Energy storage elements: Inductors and capacitors, series parallel combination of inductors and capacitors. Responses of RL, RC and RLC circuits to natural and step responses.

The course includes lab work based on theory taught.

Recommended Textbook:

1. Fundamental of Electric Circuits, Charles K Alexander and Mathew N O Sadiku, Tata, McGraw Hill.

Reference Book:

1. Introduction to Electric Circuits, RC. Dorf, John Wiley.
2. Introductory Circuit Analysis, Robert L Boylestad.
3. Introduction to Electrical Circuits, Nilsson, Addison-Wesley.

ETE 110: Electrical Circuits – II

Credit Hours and Teaching Scheme:

	Theory	Laboratory	Total
Credit Hours	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks + Final Exam in the 14th week

Pre-requisite: ETE 107

Course Objective:

For electrical engineering students, one of the core requirements is to develop their skills for electrical circuit analysis. The objective of this course is to introduce the fundamental knowledge for AC circuit analysis. The students will be able to solve AC circuits using network theorems and different analysis techniques. This course also aims to introduce the concepts of three-phase systems, magnetically coupled circuits and resonant circuits. The students will achieve adequate knowledge to analyze and extract different parameters from these circuits.

Course Contents:

Introduction to the basics of sinusoids, phasors, impedance and admittance. Basic circuit laws for AC circuits. Nodal and mesh analysis, network theorems for AC circuits. AC power analysis: instantaneous, average, complex, apparent and reactive power due to sinusoidal excitation, RMS values, power factor calculation and improvement. Three phase circuits: balanced and unbalanced, magnetically coupled circuits and introduction to transformer. Series and parallel resonant circuits and passive filters.

The course includes lab work based on theory taught.

Recommended Textbook:

1. Fundamental of Electric Circuits, Charles K Alexander and Mathew N O Sadiku, Tata, McGraw Hill.

Reference Book:

1. Introduction to Electric Circuits, RC. Dorf, John Wiley.
2. Introductory Circuit Analysis, Robert L Boylestad.
3. Engineering Circuit Analysis, Hayt&Kemmerly, McGraw Hill.

ETE 212: Electronic Circuits – I

Credit Hours and Teaching Scheme:

	Theory	Laboratory	Total
Credit Hours	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks + Final Exam in the 14th week

Pre-requisite: ETE 110

Course Objective:

For the undergraduate students studying electronic and communications engineering, one of the core requirements is to develop their understanding of basic operation of electronic devices such as diodes, BJTs, MOSFETs and their applications in real life. This course will focus on designing electronic circuits, their biasing etc. The students will be provided with the fundamentals for analysis of such circuits.

Course Contents:

Diode: physical operation, terminal characteristics, circuit analysis, and applications - rectifier, clipper and clamper. Zener diode: physical operation, terminal characteristics, and application as voltage regulator. BJT: physical operation, terminal characteristics, biasing, small and large signal models, amplifier configuration. MOSFET: physical operation, terminal characteristics, threshold voltage, body effect, early effect, biasing and Q-point analysis, small signal models, amplification and amplifier configurations.

The course includes lab work based on theory taught.

Recommended Textbook:

1. Microelectronic Circuits by Adel S. Sedra, Kenneth Carless Smith, Oxford University Press.

Reference Books:

1. Electronic devices and circuit theory, Robert L Boylestad, Prentice Hall.
2. Microelectronic Circuits and Devices, M. N. Horenstein, Prentice Hall.
3. The Art of Electronics, P. Horowitz and W. Hill, Cambridge University Press.

ETE 214: Electronic Circuits – II

Credit Hours and Teaching Scheme:

	Theory	Laboratory	Total
Credit Hours	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks + Final Exam in the 14th week

Pre-requisite: ETE 212

Course Objective:

One of the major requirements for the students studying electronic and communications engineering is to develop their understanding of basic operation of electronic devices, and their real life applications. The objective of this course is to introduce the students to one of the major branches of electronics i.e. metal-oxide semiconductor field effect transistor (MOSFET). This course will also focus on designing electronic circuits, their biasing, frequency responses, feedback topologies, cascade topologies, electronic filters etc. The aim of this course is to provide the students with the foundation for designing and analyzing electronic circuits.

Course Contents:

Integrated circuits: Low and high frequency analysis of MOS amplifiers, current sources, current mirrors and advanced mirror circuits, MOS amplifiers with active loads, Introduction to multistage and cascade amplifier circuits. MOS differential amplifier, large and small signal equivalent circuit, high frequency response and CMRR. Feedback: concept, properties of negative feedback, shunt and series topologies, and stability. Signal Generators: application of positive feedback, sinusoidal oscillators, Wien bridge, and LC-crystal oscillator. Op-Amp: ideal op-amp, inverter and non-inverter, difference amplifier, integrator, differentiator, and weighted summer. Open and closed loop gain and frequency response of Op-amps. Filters: transmission function, Butterworth, Chebychev, 1st and 2nd order filter. Introduction to active filters. Classification of power amplifiers: class A, AB, B, power conversion efficiency, impedance matching by transformer coupling.

The course includes lab work based on theory taught.

Recommended Textbook:

1. Microelectronic Circuits, Sedra and Smith, Oxford University Press.

Reference Book:

1. Electronic devices and circuit theory, Robert L Boylestad, Prentice Hall.
2. Microelectronic Circuits and Devices, M. N. Horenstein, Prentice Hall.
3. The Art of Electronics, P. Horowitz and W. Hill, Cambridge University Press.

ETE 216: Signals & Systems

Credit Hours and Teaching Scheme:

	Theory
Credit Hours	3

Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week

Prerequisite: MAT 205

Course Objective:

The purpose of this course is to introduce the students to basic signals & system engineering. The students will be able to enhance their analyzing and problem-solving skills and apply them in their engineering activities. Knowledge of this course will be needed as prerequisite knowledge for future courses such as ETE312 Communication Theory, ETE314 Digital Communications, ETE322 Digital Signal Processing and many others.

Course Contents:

Signals and their properties, Basic operations on signals, Different types of signals, Relation between signals and systems, Linear Time-Invariant Systems: Introduction, Convolution: Impulse Response Representation for LTI Systems, Properties of the Impulse Response Representation for LTI Systems, Differential and Difference Equation Representations for LTI Systems, Block Diagram Representations, State Variable Descriptions for LTI Systems. Fourier Representations for Signals (both continuous-time and discrete-time). Application of Fourier analysis in signals. The Laplace Transform, Transform Analysis of Systems; Applications of Laplace Transform.

Recommended Textbook:

Signals & Systems, S. Haykin and B. Van Veen, Wiley & Sons.

Reference Book:

Digital Signal Processing, S. Salivahanan and A. Vallavaraj, Tata McGraw Hill

ETE 217: Digital Electronics

Credit Hours and Teaching Scheme:

	Theory	Laboratory	Total
Credit Hours	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks + Final Exam in the 14th week

Pre-requisite: ETE 214

Course Objective:

Digital electronics is the backbone of all sorts of modern electronic, telecommunication and mechatronics. Modern computers, mobile handsets, electronic clocks, medical equipment, industrial automation equipment etc. are the end product of digital electronics. The objective of this course is to provide students the fundamental knowledge of building blocks of digital systems and learn how to design those building blocks. Students will also learn the architecture of semiconductor memories and their working principles.

Course Contents:

Review of number systems and codes; Boolean operators and logic gates - NOT, AND, OR, NAND, NOR, XOR, and XNOR, Boolean algebra and logic circuits: De Morgan's Theorem; Simplification of Boolean functions using Boolean algebra and Karnaugh Map. Combinational circuit analysis: Adders, Subtractor, Encoder, Decoder, Multiplexer, Demultiplexer, ROM, PLA. Sequential logic circuits analysis: Latch, flip flops, counters, Shift Registers. Memory: Classification, capacity calculation, SRAM, DRAM. Different logic families - TTL, ECL, IIL, CMOS and performance parameters - Fan-out, Noise margin, noise immunity, power dissipation, propagation delay, delay-power product.

The course includes lab work based on theory taught.

Recommended Textbook:

1. Digital Design, M. M. Mano, Prentice Hall.

Reference Book:

1. Digital Systems – Principles and Applications, Ronald J Tocci, Prentice Hall.
2. Digital Logic Design, Dr. Mozammel Huq Azad Khan, UGC.

ETE 223: Data Structure & Algorithm

Credit Hours and Teaching Scheme:

	Theory	Laboratory	Total
Credit Hours	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks + Final Exam in the 14th week

Prerequisite: ETE103

Course objective:

This course develops students' skills for designing and analyzing linear and non-linear data structures. It strengthens student's ability to identify and apply the suitable data structure for solving real world problems. Knowledge of this course will be needed as prerequisite knowledge for future courses such as ETE245 Algorithms, ETE476 Artificial Intelligence, ETE302 Computer Networks, etc.

Course Contents:

Abstract data types and data structures, Classes and objects, Complexity of Algorithms: worst case, average case, and amortized complexity. Algorithm analysis. Algorithm design paradigms. Lists: stacks, queues, implementation, garbage collection. Dictionaries: hash tables, binary search trees, AVL trees, red-black trees, splay trees, skip-lists, B-trees. Priority queues. Graphs: Shortest path algorithms, minimal spanning tree algorithms, depth-first and breadth-first search. Sorting: Advanced sorting methods and their analysis, lower bound on complexity, order statistics.

The course includes lab work based on theory taught.

ETE 302: Computer Communications & Networks

Credit Hours and Teaching Scheme:

	Theory	Laboratory	Total
Credit Hours	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks + Final Exam in the 14th week

Prerequisite: ETE 223

Course Objective:

This course explores the field of computer networking and communication, emphasizing network architecture and software issues. Student will learn the basic performance and engineering trade-offs in the design and implementation of computer networks. Knowledge of this course will be needed as perquisite knowledge for future courses such as ETE441 Wireless and Mobile Communications.

Course Contents:

Use of computer networks, network hardware and software; Layering, reference models and their comparison. Theoretical basis for data communication, transmission media and impairments, IEEE802.3, switching systems. Design issues, framing, MAC address, error detection and correction, elementary and sliding window protocols, examples of data link layer protocols. Ethernet, data link layer switching. Routing algorithms, congestion control, QoS, internetworking, IPv4 and IPv6 addressing, subnetting, VLSM, NAT, CIDR. Transport service, elements of transport protocols, port address, TCP and UDP. Client/server model, peer to peer model, Email, DNS, HTTP, HTTPS, FTP.

The course includes lab work based on theory taught.

Recommended Textbook:

1. Computer Networks, Andrew S. Tanenbaum, Prentice Hall.

Reference Book:

1. Data and Computer Communications, Stallings, MacMillan.

ETE 310: Electromagnetic Theory

Credit Hours and Teaching Scheme:

	Theory
Credit Hours	3
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week

Pre-requisite: MAT205

Course Objective:

EM is all around us. In simple terms, every time we turn a power switch on, every time we press a key on our computer keyboard, or every time we perform a similar action involving an everyday electrical device, EM comes into play. It is the foundation for the

technologies of electrical and computer engineering, communication based and photonic technologies. As such, in the context of communication engineering education, it is a very core and essential subject to learn Maxwell's equations and its applications so that they may also be used directly in the study Microwave Devices and Circuits, Antenna Systems and Radar. This course aim to cover the basic of electro-magnetic waves and its propagation characteristics.

Course Contents:

Electrostatics: Review of vector analysis & co-ordinate systems (rectangular, cylindrical and spherical), divergence and curl concepts, divergence theorem, Stoke's theorem, Gauss's theorem and its application, electrostatic potential, Laplace's and Poisson's equations, energy of an electrostatics system, conductor and dielectrics.

Magnetostatics: Concept of magnetic fields, Ampere's law, Biot-Savart's law, Vector magnetic potential, energy of magnetostatic system, Mechanical forces and torques in electric and magnetic fields.

Maxwell's equations: their derivations, and continuity of charges, concept of displacement current, boundary conditions, time-varying and time-harmonic electromagnetic fields, wave equations and its solutions, & Poynting's theorem, propagation of uniform plane waves in lossy and lossless media.

Recommended Textbook:

1. Fundamental of electromagnetics, David K Cheng, Pearson.

Reference Book:

1. Advanced Engineering Electromagnetics, Constantine A Balanis, Wiley and Sons.

ETE 312: Communications Theory

Credit Hours and Teaching Scheme:

	Theory
Credit Hours	3
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week

Prerequisite: ETE 216

Course objective:

The purpose of this course is to introduce the students to basic communication engineering. The students will be able to enhance their analyzing and problem-solving skills and apply them in their professional activities. Knowledge of this course will be needed as prerequisite knowledge for future courses such as ETE314 Digital Communications, ETE448 Information Theory & Coding, ETE441 Wireless & Mobile Communication and many others.

Course Contents:

Stochastic Processes and Signals: Introduction; Definition of random processes and signals; Autocorrelation and cross correlation of random signals; Transmission of a random signal through a linear filter; Power spectral density functions of random signals; White noise; Stationarity; Ergodicity; Gaussian and Poisson processes; Narrow-band noise; Sine wave plus narrow-band noise. Continuous Wave Modulation and Noise: Introduction, Amplitude modulation and demodulation; frequency modulation and demodulation; Frequency-division multiplexing (FDM); Angle modulation; Noise in CW modulation systems; Noise in linear receivers; Noise in AM receivers; Noise in FM receivers; Phase-locked loop; Nonlinear effects in FM systems; Receiver model; Noise in DSB-SC receivers; Noise in SSB receivers; Noise in AM receivers; Noise in FM receivers. Pulse Modulation: Sampling process; Pulse-amplitude modulation; Time division multiplexing; Pulse-position modulation; Bandwidth-noise tradeoff; The quantization process; Pulse-code

modulation; Noise consideration in PCM systems; Digital multiplexers; Linear prediction; Differential PCM; Delta modulation; Adaptive DPCM.

Recommended Textbook:

1. Communications System, Simon Haykin, Wiley.
2. Modern Digital & Analog Communication Systems, Lathi.

Reference Book:

1. Digital Communications, John J. Proakis, McGraw Hill.

ETE 313: Microprocessors & Interfacing

Credit Hours and Teaching Scheme:

	Theory	Laboratory	Total
Credit Hours	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks + Final Exam in the 14th week

Pre-requisite: ETE 217

Course Objective:

Nowadays computer plays an important role in office automation, control systems, robotics and in many other applications. Without a computer we cannot think of our life. The heart of the computer is the microprocessor. Microprocessor is also used in many other control systems starting from a simple room heater to sophisticated robotics or satellites.

This course is directed to provide students with the knowledge of microprocessor and assembly language. This course also includes laboratory works on assembly language and interfacing of peripheral devices with microprocessor. Students will be able to gather theoretical and practical knowledge of microprocessor. After completion of this course students will be able to design microprocessor based system and to pursue higher studies in microprocessor.

Course Contents:

Microprocessor: Evolution and internal architecture of Intel8086 microprocessor. Addressing Modes. Data Movement Instructions, Arithmetic and Logic Instructions, Program Control Instructions. Intel 8086 Hardware Specifications: Pin outs and pin functions, clock generators, bus buffering and latching, bus timing, minimum and maximum mode operation. Memory Interfacing. Basic I/O Interfacing, Programmable Peripheral Interfaces (8255, 8254, 8279, ADC, DAC controllers). 8259 Programmable Interrupt Controller. DMA controller. Introduction to Pentium and upgraded processors. Introduction to Microcontrollers.

The course includes lab work based on theory taught.

Recommended Textbook:

1. The Inter Microprocessors 8088/8088, 80186, 80286, 80386 and 80486: Architecture, Programming and Interfacing, Barry B. Brey, Prentice-Hall.

Reference Book:

1. Microprocessor and Interfacing, Douglas Hall, McGraw Hill.

ETE 314: Digital Communications

Credit Hours and Teaching Scheme:

	Theory	Laboratory	Total
Credit Hours	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks + Final Exam in the 14th week

Prerequisite: ETE 312

Course Objective:

The students will be able to understand the mismatch of bandwidth between baseband pulse train and the communication channel of limited bandwidth from the spectrum of line code. They will also be able to realize the Nyquist theorem of baseband signal using both sinc and raised cosine pulse train. Knowledge of this course will help them to design equalizer in avoiding nonlinear distortion of wired and wireless channel, as well as analyze different modulation schemes and coherent/non-coherent demodulations including matched filter detection.

Course Contents:

Idea of baseband signal, Nyquist theorem of baseband signal and impulse response of such communication system, raised-cosine pulse in baseband communication, intersymbol interference, eye diagram, power spectral density of different line codes, on-off binary transmission, the matched filter, properties of matched filter, linear and non-linear distortion channel, design of equalizer, concept of passband signal, digital modulation schemes (basic principle, modulator and demodulator, BER and constellation diagram): BFSK, BPSK, MPSK, QPSK and QAM, basic principle of OFDMA.

The course includes lab work based on theory taught.

Recommended Textbook:

1. Digital and Analog Communication Systems, Leon W. Couch; Pearson Education
2. Modern Digital & Analog Communication Systems, Lathi.

Reference Book:

1. Digital Communications Fundamentals and Applications; Bernard Sklar, Pearson Education
2. Communication Systems, Simon Haykin, Wiley.

ETE319: Electronic Properties of Materials

Credit Hours and Teaching Scheme:

	Theory
Credit Hours	3
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week

Pre-requisite: PHY 209

Course Objective:

Learning of electronic properties of materials in convenient way is inevitable. The study of the electronic properties of rigid bodies, or solids, through methods such as quantum mechanics, crystallography, and electromagnetism is one of the largest branches of condensed matter physics. This study shows how the large-scale properties of solid materials result from their atomic-scale properties. It has direct applications, for example in the semiconductors devices and nanotechnology. Therefore, understanding and realizing the basics of solid states physics, semiconductor device concepts, and their applications in today's semiconductor technology is the objective of this course.

Course Contents:

Crystal Structures of solids, X-ray diffraction and scattering, Bonding in solids, Elastic properties of crystals, Lattice vibrations, Imperfections in solids, Thermal properties of crystal lattices - Thermal conductivity and electrical conductivity, Free electron theory of metals, Hall effect, Distribution functions – Maxwell-Boltzmann statistics, Bose-Einstein statistics and Fermi-Dirac statistics, Elementary band theory of solids; Semiconductors: Doping, transport, and excess carriers; Introduction to semiconductor junctions, Dielectric properties of materials, Magnetic properties of materials, Superconducting properties of materials.

Recommended Textbook:

1. Electronic Materials & Devices, D.K. Ferry and J.P. Bird, Academic Press, 2001.
2. Principles of Electronic Materials and Devices, S O Kasap, McGraw Hill.
3. Electronic Properties of Materials, Rolf E. Hummel, Springer, 2001.
4. Semiconductor Physics and Devices, Donald A Neamen, McGraw Hill.

Reference Book:

1. Lectures on the Electrical Properties of Materials, 5th edition, Oxford University Press, New York, 1988.
2. Introduction to the Electronic Properties of Materials, David Jiles, CRC Press.
3. Solid State Electronic Devices, B.G. Streetman, Prentice Hall.

ETE 322: Digital Signal Processing

Credit Hours and Teaching Scheme:

	Theory	Laboratory	Total
Credit Hours	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks + Final Exam in the 14th week

Prerequisite: ETE 216

Course Objective:

The objectives of this course are to make the concepts of students clear about discrete time signals and systems along with transform the signal in z-domain of complex plane to simplify the expression of time domain signal and extract the properties of a system. Again they will be able to realize the spectrum of discrete time signal using DFT and design of FIR and IIR filter and filtering of signal also design of adaptive filter and de-noising of signal.

Course Contents:

The z-transform: z-transform and ROC, properties of z-transform, analysis of LTI systems using z-transform; Discrete Fourier Transform: DFT and its inverse operation, circular and linear convolution using DFT, Fast Fourier Transform (FFT), IIR filter: Realization of IIR filters, direct form I and II, cascade and parallel, poly-phase decomposition, digital IIR filter design by bilinear transformation, FIR filter: frequency sampling structure, digital FIR filter design using window functions, Finite word length effect in digital filter, Multirate digital signal processing, Concept of adaptive filter.

The course includes lab work based on theory taught.

Recommended Textbook:

1. Digital Signal Processing, John G. Proakis, Prentice Hall.

Reference Book:

1. Digital Signal Processing, Tarun Kumar Rawat, Oxford University Press.
2. Digital Signal Processing a Practical Approach, Emmanuel C. Ifeachor. Barrie W. Jervis; Addision-Wesley.
3. Digital Signal Processing a Computer Based Approach, Sanjit K. Mitra; Tata McGraw-Hill.

ETE 325: Control Systems

Credit Hours and Teaching Scheme:

	Theory	Laboratory	Total
Credit Hours	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks + Final Exam in the 14th week

Pre-requisite: ETE 322

Course Objective:

Control Engineering plays a fundamental role in modern systems. Systems like lift, washing machine, microwave oven, TV, fridge, cars, etc. have made our life so much easier. Control systems are present in all of these things. For this reason, it has become important to learn about control systems. This course is intended to offer the students the knowledge of control system analysis and design. This course will provide the students a basic understanding of control systems related issues such as modeling, time responses of systems, performance specifications, stability evaluation and important requirements to design a control system.

Course Contents:

Linear System Models: Transfer function, transfer function of electrical network, translational and rotational mechanical systems. Reduction of multiple subsystems: Block diagram and Signal-flow graph. State Variables: transfer function to state variable and state variable to transfer function; SFG to state variables. Time response: poles, zeros and system response; first-order and second-order systems. Feedback Control System: Closed loop systems; transient characteristics of control systems; parameter sensitivity; stability analysis of closed-loop systems using Routh-Hurwitz Criterion; system types and steady state error. Design of Feedback Control System: Controllability and observability; root locus; frequency response and state variable methods.

The course includes lab work based on the concepts introduced.

Recommended Textbook:

1. Control System Engineering, Norman S. Nise, John Wiley & Sons.

Reference Book:

1. Modern Control Engineering, Katsuhiko Ogata.
2. Modern Control Systems, Dorf & Bishop, Prentice Hall.
3. Schaum's Outline of Feedback and Control Systems, Allen J. Stubberud, Ivan J. Williams, Joseph J. DiStefano, McGraw Hill.

ETE 370: Applied Numerical Methods

Credit Hours and Teaching Scheme:

	Theory
Credit Hours	3
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week

Pre-requisite: MAT 205

Course Objective:

To teach basic numerical methods required for typical engineering and business applications. Give students experience in understanding the properties of different numerical methods so as to be able to choose appropriate methods and interpret the results for engineering problems that they might encounter. Students will implement and study some of the numerical methods using MATLAB or some other high-level language. Emphasis is given to the graphical representation of results.

Course Contents:

Basic Concept: Approximations and round-off errors, truncation errors.
Root of Equations: Bracketing methods – Bisection methods, Open methods – Newton-Raphson method.
Linear Algebraic Equations: Gauss Elimination – Naive Gauss, Gauss-Jordan. LU-decomposition, Gauss-Seidal method.
Curve Fitting: Least-square regression – Linear regression, polynomial regression. Interpolation – Newton divided-difference interpolating polynomials, Spline interpolation.
Numerical Differentiation and Integration: Newton-cotes integration formulae – Trapezoidal rule, Simpson's rules, Numerical differentiation – Richardson Extrapolation, Derivatives of unequal spaced data.
Ordinary Differential Equation: Runga-Kutta Methods – Euler's method.

Recommended Textbook:

1. Advanced Engineering Mathematics, E. Kreyszig, John Wiley.

Reference Book:

1. Numerical Methods for Engineers, Steven C. Chopra and Raymond P. Canale.
2. Engineering Mathematics, Neil, Thomson Learning.

ETE400: Semiconductor Devices

Credit Hours and Teaching Scheme:

	Theory
Credit Hours	3
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week

Pre-requisite: ETE319

Course Objective:

Semiconductor devices are inevitable for modern integrated electronics. Knowledge and understanding of how semiconductor devices operate is necessary not only for device design and analysis but also for design and performance analysis of modern complex electronic circuits. The objective of this course is to enable the students to understand how the basic principles of solid state physics are used to explain the semiconductor properties so that students will understand the operation and challenges of emerging semiconductor devices.

Course Contents:

Review of energy bands, metals, and semiconductors, charge carriers, effective mass, density of states in semiconductors, intrinsic and extrinsic semiconductor, degenerate and non-degenerate semiconductors, electron and hole concentrations at equilibrium, temperature dependence of carrier concentrations, compensation and space charge neutrality, conductivity and mobility, diffusion and drift of carriers, generation and recombination of excess charge carries.

P-N junction in equilibrium: junction formation, formation of space charge, energy band diagram, built-in fields, contact potential, equilibrium Fermi levels, current flow in junction, carrier injection in forward and reverse-biased junctions; reverse-bias breakdown (Zener and Avalanche), reverse recovery transient, junction capacitances.

Metal semiconductor junctions: Schottky barrier, rectifying contacts, Ohmic contacts, heterojunctions.

Bipolar Junction Transistor (BJT): fundamentals, energy band diagram, minority carrier profiles, modes of operation of BJT, non-ideal effects.

Metal Oxide Semiconductor Field Effect Transistor (MOSFET): basic operation, different biasing modes, ideal MOS capacitor, flatband threshold voltages, I-V characteristics, short channel effects, non-ideal effects. MESFET and HEMT. Device scaling, industry trends in semiconductor devices.

Recommended Textbook:

1. Solid State Electronic Devices, B.G. Streetman, Prentice Hall.
2. Semiconductor Physics and Devices, Donald a Neamen, Tata McGraw Hill.

Reference Book:

1. Semiconductor Devices, M.J. Cooke, Prentice Hall.
2. Principles of Electronic Materials and Devices, S O Kasap, McGraw Hill.

ETE401: VLSI Circuit Design

Credit Hours and Teaching Scheme:

	Theory	Laboratory	Total
Credit Hours	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks + Final Exam in the 14th week

Pre-requisite: ETE319

Course Objective:

This course on VLSI design is important for engineering students to understand the different phases of designing Integrated Circuits (IC) so that they will be able to implement their knowledge in different sectors such as microprocessors, computers, digital camera, chips in a cell phone, portable computing device, chips in graphics card, embedded processors in automobiles etc. Finally, it can be surmised that this course will provide students necessary background to work for IC fabrication.

Course Contents:

Review of semiconductor physics pertinent to VLSI design, NMOS and PMOS transistors, transistors as switches, CMOS inverters, NAND and NOR gates, cross section of an inverter, inverter mask sets, fabrication steps, simplified design rules, stick diagram, layout, CMOS circuit design, gate level and transmission gate based multiplexers, multiplexer based design, CMOS latches and flip-flops as basic building blocks of sequential circuits, standard cell layout, area estimation from stick diagram and layout, VLSI design flow, logic design, circuit design, physical design, structured design approach, design partitioning, hierarchical design, Verilog Code at behavioral and structural level, gate level and transistor level netlist, CMOS transistor theory, cut-off, linear, saturation, non-ideal transistor behavior, mobility degradation, velocity saturation, channel length modulation, body effect on threshold voltage, subthreshold, gate and junction leakage, effect of process and environmental variation, pass transistor, DC and transient response, logic levels and noise margins, RC delay models, delay estimation, logical effort and parasitic delay, delay in multistage logic networks, dynamic and static power, activity factor, low power circuit design, pseudo-NMOS, dynamic and domino logic family, adders, six transistor static and four transistor dynamic memory cell, sense amplifier.

The course includes lab work based on theory taught.

Recommended Textbook:

1. Design of VLSI system – A practical introduction by Linda E. M. Brackenbury, MacMillan Education Ltd.
2. Basic VLSI Design, Douglas A. Pucknell and Kamran Eshragian, Prentice Hall.
3. CMOS VLSI Design, Weste, Harris & Banerjee.

Reference Book:

1. Fundamentals of Digital Logic with Verilog Design, Stephen Brown and ZvonkoVranesic, Tata McGraw-Hill.
2. Basics of CMOS Cell Design, Etienne Siccard, Sonia Delmas Bendhia (For lab).

ETE403: Optoelectronics

Credit Hours and Teaching Scheme:

	Theory
Credit Hours	3
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week

Pre-requisite: ETE319

Course Objective:

Modern era of communication has made our life easy and sophisticated. The long distance communication shifted from wireless to wired communication through optical fiber. Moreover, optoelectronics find applications in information processing, robotics, bio-photonics, lighting, spectroscopy, visual arts etc. This course introduces the basic concepts of optical processes such as absorption, emission, and amplification of light, carrier dynamics such as drift, diffusion, generation, and recombination of carriers. In the second part of the course, those concepts and equations will be applied to analyze the optoelectronic devices such as photo-detectors, solar cells, light emitting diodes (LEDs), and LASER. Also, optical fiber communication system will be discussed briefly.

Course Contents:

Types of semiconductor, optical properties of semiconductors, radiative and non-radiative recombination, optical absorption, photo generation of excess carriers, minority carrier life time, luminescence and quantum efficiency.

Photo-Detectors: Photoconductors; junction photo-detectors, PIN detectors, avalanche photodiodes and phototransistors. Solar Cells: Solar energy and spectrum, single and multijunction solar cells. IV characteristics and performance analysis of pn junction solar cells and technology trends.

Light Emitting Diode (LED): Principles, materials for visible and infrared LED, internal and external efficiency, loss mechanism, heterostructure LED, structure (SLED and ELED) and applications.

Stimulated Emission & Light Amplification: Spontaneous and stimulated emission, Einstein's relations, population inversion, absorption of radiation, optical feedback and threshold conditions.

Types and basic structure of lasers, Semiconductor Lasers: Edge and vertical cavity surface emitting lasers, operating wavelength, threshold current, power output, efficiency, spectral response, introduction to quantum well and quantum dot lasers.

Recommended Textbook:

1. Semiconductor Optoelectronics: Physics and Technology, Jasprit Singh, McGraw Hill.

Reference Book:

1. Optoelectronic Devices: Advanced Simulation and Analysis, Joachim Piprek, Springer.
2. Optoelectronic Devices and Photonics: Principles and Practices, S O Kasap, Prentice Hill.

ETE409: Semiconductor Processing and Fabrication

Credit Hours and Teaching Scheme:

	Theory
Credit Hours	3
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week

Pre-requisite: ETE319

Course Objective:

This course is designed around the state of the earth facilities in modern semiconductor industries like Intel, IBM, IMEC etc. The objective of this course is to introduce the students with different fabrication techniques that are relevant for micro and nano devices in the field of electronics, optoelectronics and micro-electromechanical systems with an emphasis on their physical and chemical principles. This course will also provide the characterization tools and various techniques associated with micro and nano fabrications and devices.

Course Contents:

Substrate materials: Crystal growth and wafer preparation, epitaxial growth technique, molecular beam epitaxy, chemical vapor phase epitaxy and chemical vapor deposition (CVD).

Doping techniques: Diffusion and ion implantation.

Thin film and dielectric deposition: Silicon dioxide, nitride, low and high-k dielectrics deposition techniques, poly and amorphous silicon deposition techniques.

Etching: Wet chemical etching, silicon and GaAs etching, anisotropic etching, selective etching, dry physical etching, ion beam etching, sputtering etching and reactive ion etching.

Metallization: E-beam evaporation, thermal evaporation, sputtering and silicidation.

Cleaning: Surface cleaning, organic cleaning and RCA cleaning.

Lithography: Photo-reactive materials, pattern generation, pattern transfer and metallization.

Process integration: passive components, Bipolar, CMOS, SOI, MESFET, MEMS/NEMS and Heterogeneous Integration.

Integration Challenges: Ultra shallow junction formation, ultra-thin oxide, silicide formation, new materials for interconnection; power limitation, SOI integration and system-on-a-chip. Testing, bonding and packaging.

Recommended Textbook:

1. Fundamentals of Solid State Electronics, C.T. Sah, World Scientific.

Reference Book:

1. Semiconductor Devices, M.J. Cooke, Prentice Hall.

ETE411: Analog Integrated Circuits

Credit Hours and Teaching Scheme:

	Theory
Credit Hours	3
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week

Pre-requisite: ETE214

Course Objective:

Analog integrated circuits have their contributions to the field of communication, sensors, biomedical etc. To be able to design such circuits one needs to have strong fundamental background about the functionality, performance parameters and different technological influences. The objective of this course is to introduce students the design aspects of amplifiers (biasing network, loading effect, different amplifier topologies), A/D and D/A converters and switch capacitor circuits.

Course Contents:

Review of BJT and MOS Amplifiers: active and passive loads and frequency limitation. Current Mirror: Basic, cascade and active current mirror. Differential Amplifier: Introduction, large and small signal analysis, common mode analysis and differential amplifier with active load. Noise: Introduction to noise, types, representation in circuits, noise in single stage and differential amplifiers and bandwidth. Band-Gap References: Supply voltage independent biasing, temperature independent biasing, proportional to absolute temperature current generation and constant transconductance biasing. D/A and A/D converters. Switch Capacitor Circuits: Sampling switches, switched capacitor circuits including unity gain buffer, amplifier and integrator. Phase Locked Loop (PLL): Introduction, basic PLL and charge pumped PLL.

Recommended Textbook:

1. Microelectronic Circuits, Sedra& Smith.
2. Microelectronic Circuits and Devices, M.N. Horenstein, Prentice Hall.

Reference Book:

1. Integrated Circuits, K.R. Botkar, Khanna Publishers.

ETE413: Introduction to Nanotechnology

Credit Hours and Teaching Scheme:

	Theory
Credit Hours	3
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week

Pre-requisite: ETE319

Course Objective:

In today's world, life is impossible without electronics and nanotechnology is behind many cutting edge electronic devices. Nanotechnology has application in areas such as modern computers, data storage devices, and biomedical equipment. This course is designed to provide a broad understanding on nanotechnology by covering material growth, nanoscale device fabrication and characterization techniques. After completing this course, students will have a thorough knowledge of existing CMOS based nano devices as well as carbon based nano electronics.

Course Contents:

Introduction: Nano-dimension and paradigm, definitions, background and current practice. Technology transitions from more-Moore beyond CMOS towards more-than-Moore heterogeneous integration technologies. Nanofabrication and characterization: Brief processing steps of nano-devices fabrication, Nanolithographic and Nanocharacterization techniques. Techniques of nano-material growth: top down and bottom-up approaches, molecular electronics, nanocrystal growth, self-assembly and self-organization. CMOS nanotechnology: Scaling of transistors dimension, advances in microelectronics – from microsale to nanoscale devices and non-classical nano-MOSFET structures. Carbon based nanotechnology: The geometry of nanoscale carbons, formation, band structure and electronic properties; Fullerenes: Families of fullerenes, reactivity and potential applications; Carbon nanotubes: Molecular and supra-molecular structure, properties of single wall and multi wall carbon nanotubes, synthesis and characterization, applications. Nanotechnology in magnetic systems: Magneto resistive materials and devices and non-magnetic storages. 2D electronics: The challenging promise of 2D materials from electronics, 2D layered materials: From materials properties to device applications: paradigm shift from single-crystalline, poly-crystalline and amorphous silicon/germanium thin film towards III-V materials; Metal oxide thin films and molybdenum-di-sulfide material system bionanotechnology: Brief introduction to the integration of conventional nanoelectronics with life science, biomimetic nanostructures, biomolecular motors and biosensors.

Recommended Textbook:

Fundamentals of Solid State Electronics, C.T. Sah, World Scientific

Reference Book:

Semiconductor Devices, M.J. Cooke, Prentice Hall.

ETE 417: Electrical Drives and Power Electronics

Credit Hours and Teaching Scheme:

	Theory
Credit Hours	3
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week

Pre-requisite: ETE 110

Course Objective:

This course aims to provide the students with the fundamental knowledge of power electronic circuits, components and design. In this course techniques for analyzing and designing switch mode power supplies, DC-DC converters, power rectifiers, static power inverters and universal power supply will be examined. The students will also enhance their knowledge of electric motor and transformer associated power electronic drives.

Course Contents:

Power Semiconductor Switches and Triggering Devices: Diode, BJT, MOSFET, SCR, IGBT, GTO, TRIAC. Switching loss and conduction loss of MOSFET and diode. Rectifiers: Uncontrolled and controlled single phase and three phase. Regulated Power Supplies: Linear-series and shunt, switching buck, buck boost, boost and Cuk regulators. AC Voltage Controllers: single and three phase. Choppers. DC motor control. Single phase cycloconverter. Inverters: Single phase and three phase voltage and current source. AC motor control. Stepper motor control. Pulse width modulation control of static converters.

Recommended Textbook:

Power Electronics: Circuits, Devices and Applications, H. Rashid, Prentice Hall.

Reference Book:

Power Electronics: Principles and Applications, Vithayathil, McGraw Hill.

ETE418: Introduction to Embedded Systems

Credit Hours and Teaching Scheme:

	Theory
Credit Hours	3
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week

Pre-requisite: ETE217

Course Objective:

An embedded system is a computer system designed to perform a dedicated function. These systems interact with the physical world and are sometimes part of a larger system. Embedded system applications can be found all around us and in versatile fields, such as. consumer electronics, medical equipment, toys, industrial control, traffic control, energy management, automobiles etc. With the increasing popularity of embedded systems, it is becoming essential that modern day engineers are equipped with the knowledge of designing embedded systems and programming the required firmware. This course aims to provide students with the competence to design and understand embedded systems.

Course Contents:

Embedded Systems Descriptions: Definitions and terminologies, architecture, design philosophies of microcontroller families, field programmable gate arrays (FPGAs). Overview of FPGA: FPGA architecture, configurable logic block structure, memory hierarchy, look up tables, I/O blocks. Overview of microcontrollers: 8 bit and 32 bit microcontrollers, special registers, instruction sets, digital signal processors. Design Considerations in Embedded Systems: Specifying requirements, selection of microcontrollers/ FPGAs, tradeoffs, issues related to energy and power. Programming Embedded Systems: FPGA programming using Verilog/ VHDL, microcontroller programming using C, programming I/O ports, interrupts, timers, A/D converter, analog comparator, PWM. Supervisory Circuits: Watchdog timer, reset. Interfacing with Embedded System Peripherals: Hardware and software requirements. Memory Mapping: EEPROMs. Embedded Systems Networks: Serial peripheral interface (SPI), (inter-integrated circuit) I2C, (universal synchronous/asynchronous receiver/transmitter) USART and serial communications. Interfacing with a Personal Computer. Designing embedded systems.

Recommended Textbook:

Embedded System Architecture: A Comprehensive Guide for Engineers and Programmers, Tammy Noergaard, Newnes.

Reference Book:

Embedded system: From Hardware to Application, P. Raghavan, Auerbach.

ETE419: Biomedical Electronics

Credit Hours and Teaching Scheme:

	Theory
Credit Hours	3
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week

Pre-requisite: ETE217

Course Objective:

The main objective of this course is to provide the students with a basic understanding of different types of electronic circuitry used in biomedical systems. This course will also provide students with fundamental knowledge of biological signals, their applications and measurements. Students are supposed to comprehend the theories first, then based on that knowledge, they will be able to implement a relevant project.

Course Contents:

Origin and major types of biological signals, The human body: cells and physiological systems, Bioelectric potential, Bio-potential electrodes and amplifiers, Electro-conduction system of the heart: optically coupled amplifiers, Current loading type isolation amplifiers, Chopper amplifiers, Differential chopper amplifiers, Electrocardiograph (ECG) waveform, ECG preamplifiers, defibrillator, Blood pressure measurements and electronic manometry pressure transducers, Pressure amplifiers, systolic, diastolic and mean director circuits, Practical problems in pressure monitoring, Blood flow measurements, Plethysmography, Vector cardiography, Cardioverter and pacemakers; Measurement of human brain parameters; cerebral angiography, cronical X-ray, brain scans; Tomography and ultra- sonogram; Electroencephalography (EEG); electrode, frequency bands, EEG patterns and EEG preamplifiers, ICU/ CCU central monitoring system.

Recommended Textbook:

1. Introduction to Biomedical Engineering, John D. Enderle, Susan M. Blanchad, Academic Press.

Reference Book:

1. Introduction to Biomedical Engineering, Michael M. Domach, Prentice Hall.

ETE422: Renewable Energy Technology

Credit Hours and Teaching Scheme:

	Theory
Credit Hours	3
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week

Pre-requisite: ETE319

Course Objective:

The renewable energy is a growing field. Since conventional energy does not get replenished after their consumption, renewable energy which is renewed by nature can be the promising new energy sources to meet the future needs of the world. Rapid deployment of renewable energy and energy efficiency can result in significant energy security, mitigation of climate change, and economic benefits. The development and use of renewable energy sources can enhance diversity in energy supply markets, contribute in securing long term sustainable energy supplies and ensure electrical energy supply in remote rural areas. The objective of this course is to make students understand and realize the basics of renewable energy sources and their utilizations together with the world's energy scenario and their compatibility with current technologies.

Course Contents:

Conventional energy sources, reserves, challenges, environmental impact, alternatives. Importance of renewable energy, and emerging renewable sources. Solar radiation and its spectrum, geographical and atmospheric factors, solar radiation measurements, basic operation of solar thermal collectors. Solar photovoltaic: principle of operation, characteristics, and losses in solar cells and optimization, design parameters of single and multi-junction solar cells, factors affecting conversion efficiency, PV modules and arrays, maximum power point tracking. PV systems, battery storage, charge controller, DC-DC converter, inverters off-grid and grid-tied. Wind energy, methods of wind energy extraction, Wind turbine: efficiency, types, operational characteristics. Biomass: properties, aerobic and anaerobic processes, environmental impact. Hydropower, Geothermal energy, Fuel-cells and hydrogen based economy. Energy economics and introduction to smart-grid and sustainability.

Recommended Textbook:

1. Renewable Energy and Climate Change, Volker Quaschning.
2. Solar photovoltaics – Fundamentals, Technologies and Applications, Chetan Singh Solanki.

Reference Book:

1. Renewable and Efficient Electric Power Systems, G. M. Masters.

ETE434: Microwave Engineering

Credit Hours and Teaching Scheme:

	Theory	Laboratory	Total
Credit Hours	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks + Final Exam in the 14th week

Prerequisite: ETE310

Course Objective:

The purpose of this course is to introduce the students to basic RF and microwave communication engineering. The students will be able to enhance their analyzing and problem-solving skills and apply them in their professional activities. Knowledge of this course will be needed as prerequisite knowledge for future courses such as ETE314 Digital Communications, ETE448 Information Theory & Coding, ETE441 Wireless & Mobile Communication and many others.

Course Contents:

Review of Maxwell's equations and transmission line theory, circuit models. Microwave network analysis: Scattering matrices and mulitport analysis techniques. Impedance Matching: Design of matching networks including lumped elements, stubs and transmission line sections, circuit tuning. Passive Components: Theory of operation, practical design and implementation of power dividers, directional couplers and hybrids, resonators as well as system applications of these devices. Noise and distortion in RF Systems: Theory of noise in RF circuits, distortion of RF signals, dynamic range limitations, effects on channel capacity. Active Circuits: Theory of operation, practical design and implementation of amplifiers for low-noise or power applications, detectors, mixers. Overview of microwave tubes and solid state devices. Non-Reciprocal Devices: Theory of operation and implementation of isolators, circulators and variable attenuators and phase shifters. Microwave Systems: Receiver and system performance calculations, RF link analysis, end-to-end microwave system ("the physical channel") analysis. Applications: Antennas, propagation and microwave filter synthesis.

The course includes lab work based on theory taught.

Recommended Textbook:

1. Foundations for Microwave Engineering, R. E. Collin. McGraw Hill.

Reference Book:

1. Fields and Waves in Communication Electronics, S. Ramo, J.R. Whinnery, Wiley

ETE 439: Engineering Ethics

Credit Hours and Teaching Scheme:

	Theory
Credit Hours	3
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week

Pre-requisite:ENG 102

Course Objective:

Engineers have a core responsibility to serve society and work for the betterment of the world. Throughout their careers, they are faced with ethical issues many a times, and the decisions they take may adversely affect the world, or a part of the world. It is often difficult to understand the morally right course of action, and ethical decision making requires more than having an enlightened sense of right and wrong. Engineers must be sensitive to ethical issues for the continuing professional development in their careers. It is, therefore, essential that modern day engineers have a clear understanding of how engineers should interact with the society, and the impacts of engineering decisions on the society and environment. This course aims to (i) sensitize students to ethical issues in engineering, (ii) develop an appreciation of the ethical responsibilities of engineers, and (iii) equip students with the necessary skills required for ethical decision making.

Course Contents:

Introduction: engineering philosophy, engineering ethics and professionalism, ethical terminology. ethical Issues in Engineering: understanding ethical problems, qualities of engineers, moral codes. Responsibilities of Engineers: commitment to society, sustainable development, technology and society, risk, safety, and liability. Institutional Ethics: code of ethics, key concepts, importance, limitations. Rights of Engineers: workplace rights, whistle blowing. Professionalism for International Engineers: Challenges of globalization.

ETE 441: Wireless & Mobile Communications

Credit Hours and Teaching Scheme:

	Theory
Credit Hours	3
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week

Prerequisite: ETE314

Course Objective:

The purpose of this course is to introduce the students to basic communication engineering. The students will be able to enhance their analyzing and problem-solving skills and apply them in their professional activities. Knowledge of this course will be needed as prerequisite knowledge for future courses such as ETE448 Information Theory & Coding and many others.

Course Contents:

Radio propagation characteristics: models for path loss, shadowing and multipath fading, delay spread, coherence bandwidth, coherence time, Doppler Spread, Jake's channel model. Digital modulation for mobile radio: analysis under fading channels, diversity techniques and RAKE demodulator. Introduction to spread spectrum communication. Multiple Access Techniques: FDMA/TDMA/CDMA. The cellular concept: frequency reuse, basic theory of hexagonal cell layout, spectrum efficiency. FDMA/TDMA cellular system; channel allocation schemes. Handover analysis. Cellular CDMA; soft capacity. Erlang capacity comparison of FDM/TDM systems and CDMA. Discussion of GSM standards, signaling and call control, mobility management, location tracing. Wireless data networking, packet error modeling on fading channels, performance analysis of link and transport layer protocols over wireless channels, wireless data in GSM, IS-95, GPRS and EDGE.

Recommended Textbook:

1. Modern Wireless Communications, Simon Haykin and Michael Moher, Pearson Education.
2. Wireless Communications & Networking, J.W. Mark and W. Zhauang, Pearson Education Inc., 2005.

Reference Book:

1. Wireless Communications: Principles and Practice, Theodore S. Rappaport, Prentice Hall.

ETE 442: Optical Fiber Communications

Credit Hours and Teaching Scheme:

	Theory	Laboratory	Total
Credit Hours	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks + Final Exam in the 14th week

Pre-requisite: ETE310, ETE314

Course Objective:

The objective of this course is to provide the students with a comprehensive understanding over the fundamentals of operation and partial design concept of optical fiber communication links and the elements used in such links through the study of basic components to establish optical fiber based communication system and its transmission characteristics.

Course Contents:

Overview of optical fiber communication systems: evolution, nature of light, advantages and applications.

Characteristics of optical transmission media.

Optical fibers: propagation and transmission characteristics, loss and dispersion mechanisms.

Nonlinear Characteristics.

Optical sources: principles of operation, modulation characteristics and driver circuits.

Photo detectors: principles of operation, circuits and performance.

Optical link accessories: Fiber optic connectors, couplers, multiplexers and splices, wavelength converters, routers, optical amplifiers, regenerative repeaters.

Fiber optic communication systems and link budget using direct detection.

This course includes lab works based on theory taught.

Recommended Textbook:

1. Optical Fiber Communications: Principle and Practice, John M. Senior, Prentice Hall.

Reference Book:

1. Gerd Keiser, Optical Fiber Communications, third edition, McGraw Hill, 2000
2. Fiber-Optic Communication Systems, 4th Ed., G. P. Agrawal, John Wiley & Sons, 2010.
3. Understanding Optical Fiber Communications, A.J. Rogers, Artech House Publishers.

ETE446: Satellite Communications

Credit Hours and Teaching Scheme:

	Theory
Credit Hours	3
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week

Prerequisite: ETE441

Course Objective:

The purpose of this course is to introduce the students to satellite communications engineering. The students will be able to enhance their analyzing and problem-solving skills and apply them in satellite communications engineering activities like TV, Radio, weather broadcast and especially for defense and security purposes.

Course Contents:

Orbits: Kepler's Laws, Newton's Law, Orbital Parameter, Inclined Orbits, Geostationary Orbit. Space Environment: Mechanical Effects, Atmospheric Effects (Radiation, Ionospheric Effects, Rain Attenuation), Polarization, Propagation. Link Analysis: Equivalent Isotropic Radiated Power, Received Signal Power, Noise Power at the receiver input, The Uplink, The Downlink, Station-to-station link. Satellite Access: FDMA, TDMA, CDMA, Fixed and on-demand assignment, Random access, Inter-satellite links. Earth Stations: Standards, Antennas, Radio Frequency Subsystem, Communication Subsystem, Network Interface Subsystem. The Payload: Transparent Repeaters, Multibeam Satellite Repeater, Regenerative Repeater, Antenna Characteristics. The Platform: The Propulsion

System, the Power Supply (Solar Power Satellites), Telemetry, Tracking and Command, Thermal Control, Satellite Tool Kit (STK). Satellite Installation: Installation in Orbit, Launch Vehicles, Reliability issues, Cost issues, Network Dimensioning. Satellite Services: Broadcasting Satellite Services (DBS, DVB-S), Integrated Services Digital Broadcasting - Satellite, Fixed Satellite Services (INTELSAT, VSAT), Navigational Satellite Services (NAVSTAR GPS), Earth Resource Satellite Services (Radarsat, NOAA), Mobile Satellite Services, International Space Station. Satellite Internet: TCP/IP, Proposed Systems (DirecPC, Spaceway, StarBand, Skystar Advantage, SkyBridge, Teledesic, Loral Cyberstar, Eutelsat), DVB: Multi-Protocol Encapsulation, ATM connection handover in LEO networks. Introduction to communication using satellites; Kepler's laws and orbital mechanics, satellite launching, propagation characteristics, frequency spectra and bands, satellites sub-systems, earth station technology, multiple access techniques, applications of GEO, MEO, LEO and V-SATS, mobile satellite communications.

ETE448: Information Theory & Coding

Credit Hours and Teaching Scheme:

	Theory
Credit Hours	3
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week

Prerequisite: ETE312

Course Objective:

The purpose of this course is to introduce the students to information theory & coding. The students will be able to enhance their analyzing and problem-solving skills and apply them for solving real world problems. Knowledge of this course will be needed as prerequisite knowledge for future courses such as ETE441 Wireless & Mobile Communication, ETE452 Multimedia Communications and many others.

Course Contents:

Information Theory: Uncertainty, information and entropy, Source coding theorem, Discrete memoryless channels, Mutual information, Channel capacity, Channel coding theorem, Differential entropy and mutual information for continuous ensembles, Information capacity theorem, Rate distortion theory. Error Control Coding: Introduction to error control coding, Review of elements of linear algebra and set theory, Block coding and decoding - algebraic, Cyclic and RS codes, Performance of block codes, Convolution coding and decoding, Types of codes and their properties, Majority logic, Sequential and Viterbi decoding, Interleaving, Multi-stage coding techniques, Punctured and Turbo codes, TCM, System application examples, Basic of data (Image) Compression, Idea of cryptography.

Recommended Textbook:

1. Communication Systems, Simon Haykins, Wiley.
2. Modern Digital & Analog Communication Systems, Lathi.

Reference Book:

1. Digital Communications, John J. Proakis, McGraw-Hill.

ETE452: Multimedia Communications

Credit Hours and Teaching Scheme:

	Theory

Credit Hours	3
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week

Prerequisite: ETE322

Course Objective:

The purpose of this course is to introduce the students to multimedia communications. The students will be able to enhance their analyzing and problem-solving skills and apply them in their professional communications engineering activities.

Course Contents:

This course introduces technologies for multimedia communications and will address how to efficiently represent multimedia data, including video, image, and audio, and how to deliver them over a variety of networks. In the coding aspect, state-of-the-art compression technologies will be presented. Emphasis will be given to a number of standards, including H.26x and MPEG. In the networking aspect, special considerations for sending multimedia over ATM, wireless, and IP networks, such as error resilience and quality of services, will be discussed. The H.32x series, standards for audiovisual communication systems in various network environments, will be described. The internet browsing principle along with the procedure of Messenger and Viber mechanism. Current research results in multimedia communications will be reviewed through student seminars in the last weeks of the course.

ETE 453: Computer and Cyber Security

Credit Hours and Teaching Scheme:

	Theory
Credit Hours	3
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week

Prerequisite: ETE302

Course Objective:

This course builds up the fundamental concepts of cryptography, computer security and cyber security. Standard methodologies and tools for the evaluation and application of organizational security policies related to confidentiality, integrity and availability will also be covered.

Course Contents:

Fundamental concepts of computer security. Well known attack types and vulnerabilities. Social engineering attacks. Cryptography and classical cryptosystems. Authentication protocols and public key infrastructure. IPSec, VPNs, E-Commerce issues. Security evaluation and auditing of networked system. Intrusion Detection, Prevention, Response, Containment (Digital forensic evidence) and Disaster Recovery. Network defense tools: Firewalls, VPNs, Intrusion Detection, and filters.

Recommended Textbook:

1. Computer Networks, Andrew S. Tanebaum, Pearson Education.

Reference Book:

1. Cryptography and Network Security, William Stallings, Prentice Hall.
2. Data Communications and Network Security, Houston H. Carr and Charles Snyder, Mc Graw Hill.

ETE461: Object Oriented Programming

Credit Hours and Teaching Scheme:

	Theory	Laboratory	Total
Credit Hours	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks + Final Exam in the 14th week

Prerequisite: ETE103

Course Objective:

This course presents a conceptual and practical introduction to object oriented programming (OOP). The course will cover general principles of programming, designing, and problem-solving skills. This course introduces object oriented concepts and develops OOP programs which provides solution to real world object oriented problems. Knowledge of this course will be needed as prerequisite knowledge for future course, such as ETE207 Data structure, ETE245 Algorithms, and ETE370 Applied Numerical Methods.

Course Contents:

Object Oriented Concepts: Classes, objects, methods, inheritance, and class methods. OO Programming in JAVA: Java foundation, control flow, abstract classes and packages, exception handling, applets, web based Java application, multithreading. The course includes lab work based on theory taught.

Recommended Textbook:

1. The Complete Reference Java 2, Herbert Schildt, McGraw-Hill Osborne Media.

Reference Book:

1. An Introduction to Object Oriented Programming with JAVA, C Thomas Wu, Tata McGraw-Hill.

ETE462: Database Systems

Credit Hours and Teaching Scheme:

	Theory	Laboratory	Total
Credit Hours	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks + Final Exam in the 14th week

Prerequisite: ETE103

Course Objective:

This course introduces the fundamental concepts and practices of designing and implementing database system. It also enables the student to design and perform complex query operations on relational databases. It builds the capability of optimizing the databases

efficiently by applying different techniques. Knowledge of this course will be needed as prerequisite knowledge for future courses such as ETE476 Big Data Analytics etc.

Course Contents:

Concept & Overview of DBMS, Data Models, Database Languages, Database Administrator, Database Users, Three Schema architecture of DBMS. Basic concepts, Design Issues, Mapping Constraints, Keys, Entity-Relationship Diagram, Weak Entity Sets, Extended E-R features. Structure of relational Databases, Relational Algebra, Relational Calculus, Extended Relational Algebra Operations, Views, Modifications Of the Database. Concept of DDL, DML, DCL. Basic Structure, Set operations, Aggregate Functions, Null Values, Domain Constraints, Referential Integrity Constraints, assertions, views, Nested Sub queries, Database security application development using SQL, Stored procedures and triggers. Functional Dependency, Different anomalies in designing a Database., Normalization using functional dependencies, Decomposition, Boyce-Code Normal Form, 3NF, Normalization using multi-valued dependencies, 4NF, 5NF. File & Record Concept, Placing file records on Disk, Fixed and Variable sized Records, Types of Single-Level Index (primary, secondary, clustering), Multilevel Indexes, Dynamic Multilevel Indexes using B tree and B+ tree.

The course includes lab work based on theory taught.

Recommended Textbook:

1. Fundamentals of Database Systems, Elmasri and Navathe, Addison Wesley.

Reference Book:

1. Database System Concepts, Abraham Silberschatz, Henry Korth and S. Sudarshan, McGraw-Hill.

ETE466: Operating Systems

Credit Hours and Teaching Scheme:

	Theory
Credit Hours	3
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week

Prerequisite: ETE 223

Course Objective:

This course introduces the principles and techniques for the design and implementation of operating systems. This course also emphasizes the implementation of various techniques required for management, scheduling, allocation and communication of resources used in computer system. Knowledge of this course will be needed as prerequisite knowledge for future courses such as ETE469 Computer Architecture.

Course Contents:

Basic concepts of operating system, Operating systems hardware interaction, Process and thread management, Inter process communication, Scheduling algorithms for multi-tasking, Mutual exclusion principles and deadlock handling, Memory and I/O management. Storage Management; Implementing file management.

Recommended Textbook:

Operating Systems: Design and Implementation, Andrew Tanenbaum and Albert S. Woodhull, Prentice Hall.

Reference Book:

Operating System Concepts, Silberschatz, Galvin and Gagne, Wiley.

ETE 469: Computer Architecture

Credit Hours and Teaching Scheme:

	Theory
Credit Hours	3
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week

Prerequisite: ETE313, ETE466

Course Objective:

The objective of this course is to study the structure, behavior, and characteristics of computer systems. This course will exhibit the design of the various functional units of digital computers, discuss different types of memories and their properties, and introduce basics of parallel computer architecture.

Course Contents:

Computer arithmetic: ALU, Integer representation and arithmetic and floating point representation, computer memory system: main memory, cache memory, Instruction sets: Machine instruction, operands, and operations, instruction sets: addressing modes and addressing format. RISC instruction set architecture, CPU design: hardwire control and microprogrammed control, Input/Output: external devices, I/O modules, Programmed I/O, Interrupt driven and DMA, pipelining, multiprocessors.

Recommended Textbook:

Computer Organization & Design, David A. Patterson and John L. Hennessy, Morgan Kaufmann.

Reference Book:

Structured Computer Organization, Andrew Tanenbaum, Prentice Hall.

ETE 472: Speech & Image Processing

Credit Hours and Teaching Scheme:

	Theory	Laboratory	Total
Credit Hours	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks + Final Exam in the 14th week

Prerequisite: ETE322

Course Objective:

The objective of this course is to provide the students with the knowledge of digital speech and image processing, analysis techniques and concepts. Topics include intensity transformations for image enhancements, two dimensional discrete Fourier Transform, spatial and frequency domain linear and non-linear image filtering, binary image processing, edge detection, image segmentation, and digital video processing basics. Linear predictive coding for speech processing, pattern matching through dynamic programming, Hidden Markov model for training.

Course Contents:

Speech Processing: Human speech communication - Speech production/ perception/linguistics. Time-Varying Signal Analysis: Short-time Fourier transform, Gabor transform, spectrograms. Quasi-Stationary Analysis: Cepstrum, linear-prediction (AR) and ARMA models. Feature Space Formulation: Mixture-Gaussian model, Fischer discriminant measure, feature transformations - linear and nonlinear. Maximum likelihood classification and pattern matching through dynamic programming; Hidden Markov modeling of speech.

Image Processing: Why image processing? Digital image fundamentals, Image transform, Image enhancement, Image restoration, Image compression, Image segmentation, Representation and description, Recognition and interpretation.

The course includes lab work based on theory taught.

Recommended Textbook:

1. Digital Image Processing, Rafael C. Gonzalez, Richard E, Prentice Hall.
2. Circuits, Signals and Speech and Image Processing, Richard C. Dorf, CRC Press.

Reference Book:

1. Digital Image Processing Algorithms and Applications, Ioannis Pitas, Wiley-Interscience.

ETE 473: Project Management, Entrepreneurship and Industry Interaction

Credit Hours and Teaching Scheme:

	Theory
Credit Hours	3
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week

Prerequisite: All 300 level courses

Course Objective:

To work in the industry environment, an electronics and communications engineer needs concepts of project management and skills of project planning, monitoring, and evaluation. The course aims to expose students to project management principles and their applications to Electrical Engineering projects.

Course Contents:

General principles, process, and tools of project management. Teamwork and communication. Strategic issues in project management, cost analysis, risk and crisis management. Practical consideration in implementing project management in the industry. Project monitoring and evaluation. Project documentation and reporting. Role of entrepreneurship in the society, personality characteristics of successful entrepreneurs, sources of ideas for new ventures, sources of funding, development of the business plan.

ETE476: Artificial Intelligence

Credit Hours and Teaching Scheme:

	Theory
Credit Hours	3
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week

Pre-requisite: ETE223

Course Objective:

This course introduces the fundamental concepts and knowledge of Artificial Intelligence (AI) principles and techniques, the state-of-the-art models and algorithms used to undertake these problems. This course is also designed to expose students to the frontiers of AI-intensive computing, while providing a sufficiently strong foundation to encourage further research in machine learning. Knowledge of this course will be needed as prerequisite knowledge for future courses such as ETE479 Robotic Engineering.

Course Contents:

Intelligent agents: a discussion on what Artificial Intelligence is about and different types of AI agents Search: Searching as a problem-solving technique: a review of "conventional" searching methods including breadth-first, depth-first, bi-directional and best-first search. Heuristic functions and their effect on performance of search algorithms. Introduction to genetic algorithms. Knowledge Representation and Reasoning: Propositional Logic, First-Order Logic, Reasoning and Logical Inference. First-order logic as a basis for building intelligent agents capable of acting and reacting in a complex environment. Knowledge engineering: building knowledge bases and automated theorem proves. Production systems as an example of logical problem solving, Uncertain Knowledge: Bayes' Rule, Probabilistic Reasoning, Bayes Nets. Planning agents: representation of states, goals and actions. Learning: Supervised Learning, Unsupervised Learning, Reinforcement Learning.

Decision trees and the ID3 algorithm Applications of AI: Semantic Web. Philosophy of AI.

Recommended Textbook:

Artificial Intelligence, A Modern Approach, Russel and Norvig, 3rd Edition.

Reference Book:

Deep Learning, Adaptive Computation and Machine Learning Series, By Ian Goodfellow, YoshuaBengio, Aaron Courville.

ETE 478: Machine Learning

Credit Hours and Teaching Scheme:

	Theory
Credit Hours	3
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week

Prerequisite: ETE 476

Course Objective:

This course will introduce the field of Machine Learning, in particular focusing on the core concepts of supervised and unsupervised learning. Students will learn the algorithms which underpin many popular Machine Learning techniques, as well as developing an understanding of the theoretical relationships between these algorithms. The hands-on exercise will concern the application of machine learning to a range of real-world problems.

Course Contents:

Introduction to machine learning, Supervised learning setup, Linear prediction: Regression, Classification: Decision tree, Logistic regression, Probabilistic modelling: Bayesian method, Naive bias, Unsupervised learning: Clustering, Apriori, Principal component analysis, Clustering: Partitioning, Hierarchical, Artificial Neural Networks: perceptron, MLPs, back propagation, introduction to Deep learning, Support vector machines, Reinforcement learning and control.

Recommended Textbook:

Understanding Machine Learning: From theory to algorithms, Shai Shalev and Shai Ben-David, Cambridge University Press.

Reference Book:

Deep learning, Ian Goodfellow and YoshuaBengio and Aaron Courville, MIT Press Book.

ETE 479: Robotic Engineering

Credit Hours and Teaching Scheme:

	Theory
Credit Hours	3
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week

Prerequisite: ETE476

Course Objective:

The objective of this course is to introduce students to the field of Robotics and stimulate their interests through a variety of multidisciplinary topics necessary to understand the fundamentals of designing, and building, and programing robots. The course will address fundamental mathematical modeling of robots-kinematics, inverse kinematics, sensors and sensor processing algorithms, different control architectures, their management and programming strategies.

Course Contents:

This course provides an overview of robot mechanisms, dynamics, and intelligent controls. Topics include planar and spatial kinematics, and motion planning; mechanism design for manipulators and mobile robots, multi-rigid-body dynamics, 3D graphic simulation; control design, actuators, and sensors; wireless networking, task modeling, human-machine interface, and embedded software. Weekly laboratories provide experience with servo drives, real-time control, and embedded software.

Recommended Textbook:
Handbook of Industrial Robotics, Shimon Y. Nof, 2nd Edition, John Wiley.

Reference Book:
An Introduction to AI Robotics, Robin R. Murphy, MIT Press.

ETE 496: Capstone Project

Credit Hours: 6

Prerequisite: Students must complete at least 100 credits hours.

Course Objectives:
The main objective of the Capstone project is to create a platform for the students to get experience in finding acceptable solution of a practical open-ended electronics and telecommunications engineering design problem. During this project, the students are expected to learn how to manage a project, work in a team and to acquire soft skills.

Course Contents:
The Capstone project provides the students opportunity to apply and integrate the knowledge and skills gathered through the earlier course works. Students will take the primary responsibility to identify, organize, plan and execute different tasks associated with the designing of a practical electronics and telecommunications engineering System or Component. Students will work on the projects in teams.

FIN 101: Principles of Finance

This course is designed to provide the basic concepts, principles, analytical methods and tools that are used in basic financial management. The course includes the following topics- the study of financial environment including financial markets, instruments and institutions, risk and return, valuation of financial assets, introduction to capital budgeting and financial statement analysis.

Credits: 3; Prerequisites: ACT 101, ECO104, ECO 101.

FIN 201: Business Finance

This course has been designed to develop understanding of both theoretical and practical issues of financial decision making tools for the students. After completing this course, students are expected to be able to make many financial decisions both at strategic and operation level related to cost of capital, analyzing company's current financial policies and redesign a more effective financial planning and controlling mechanism through ratio analysis, short-term liability management, management of working capital, managing the very basics of operation process like management of inventory, management of receivables, designing credit policy that improves the market share and cash flow, usability of financial and operating leverage to multiply the return to the shareholders.

Credits: 3; Prerequisites: FIN 101

FIN 335: Financial Institutions and Markets

Financial Markets facilitate the flow of funds in order to finance the investment by individual, corporations and governments. Financial institutions are the key players in financial markets. Hence an understanding of money markets, capital markets: equity market and bond market, financial instruments traded in these markets, valuation and risks of these instruments, determination of interest rates, term structure of interest rates, primary market and stock offering, secondary market and market microstructure, mutual funds operations, pension funds operations, discussions of major financial institutions and the understanding of the financial markets and institutions in Bangladesh with its regulatory environment are the major focus of this course.

Credits: 3; Prerequisites: ECO 102, FIN 201, BUS 231

FIN 350: Real Estate Finance

Real estate assets account for about one-third of the value of all capital assets in the world. Therefore, this immensely important course provides students with a comprehensive understanding of real estate valuation, house price dynamics, real estate brokerage, real estate liabilities, decision-making and public policies associated with real estate investment, using modern finance and economics tools. Topics of studies includes: real estate properties - cash-flow uncertainties, debt sources and tax features etc, commercial real estate markets, financing and valuation of real estate, commercial real estate investment strategies, residential real estate markets and housing prices, real estate brokerage markets, mortgage and structured finance markets, applications of basic tools of finance to evaluate the mortgage, lease, and asset-based contracts. pricing of these contracts, strategy to securitize both debt and real estate equity, and recent topics like housing market bubble and crisis in real estate sector across the globe.

Credits: 3; Prerequisite: FIN 201, BUS 231

FIN 380: Management of Commercial Banks

With the increasing importance of commercial banking in the economic development, it has become necessary for students to know about the managerial issues of banks. This course is designed to acquaint the students with the basic ideas, practice and principles of banking in Bangladesh. The topics include banking environment, deposit products, interest rate, credit management, investment function, capital and risk management, liquidity management, off balance sheet activities, banking regulation etc.

Credits: 3; Prerequisite: FIN 201, BUS 231

FIN 408: Financial Analysis and Control

This course is designed to provide students with tools and techniques for proper analysis of financial statement of business organizations. The analysis will focus from the point of view of the primary users of financial statements: equity and credit analysts, corporate managers and those trained to be managers, requiring an understanding of how financial statement provides information regarding an enterprise and its functions, understanding and analysis of basic financial statements, such as, the income statement, balance sheet, and statement of cash flows, foundation of ratio and financial analysis, analysis of inventories, long-lived assets, financial liabilities, inter-corporate investments, and accounting-and-finance based measures of risk.

Credit: 3; Prerequisites: ACT 201, FIN 201, BUS 231

FIN 410: Risk Management and Insurance

This course is designed to orient students with tools and techniques of risk management and insurance. Insurance has become indispensable for person, business and international trade. This course will acquaint students with the essential details of risk and its

management, insurance contracts and insurance markets. Hence, this course will enhance the ability of students to think critically and analytically and solve problems in order to better prepare them to confront the myriad opportunities and problems that confront business managers and individuals. After completing the course, the students are expected to learn about risk and its management, risk measurement and risk polling, the scope and functions of insurance, life insurance, accident and sickness insurance, marine and fire insurance, reinsurance and principles of insurance.

Credits: 3; Prerequisite: FIN 201, BUS 231

FIN 425: Investment Analysis and Management

This course is designed to equip the students with the underlying concepts, theories, and models related to the analysis and management of investment in financial market place. The emphasis is placed on understanding how an investment professional would allocate funds in constructing and managing investment portfolio. The course gives emphasis on three major areas. Investment issues and environment, revisiting the linkage between real and financial economy in the wake of global financial crisis, a review of financial products, a comprehensive review of mutual fund and merchant banking operations with especial focus on Bangladesh, understanding the mechanism of stock exchanges with focus on Dhaka Stock Exchange; risk-return tradeoff, portfolio construction and optimization models like modern portfolio theory, capital assets pricing model, index models etc., fixed income securities analysis: duration, convexity, maturity matching, and measuring portfolio performances; option market ideas and strategies, market efficiency, technical analysis and behavioral finance.

Credits: 3; Prerequisites: FIN 201, MAT 211, ECO 204, BUS 231

FIN 435: Managerial Finance

This course is designed to orient students with tools and techniques that financial managers use for making decisions in companies and firms with efficiency. After completing the course, the students are expected to learn about an overview of managerial finance, corporate firm and goals of corporate firm, managerial goals, agency conflict, agency costs, ethical issues in managerial finance and firm's value, capital budgeting decision, risk and refinements in capital budgeting, leverage and firm's capital structure, dividend decision, firm's exposure to hybrid and derivative securities: preferred stock, warrants, convertibles and options; lease financing, corporate merger analysis: rationale for merger, types of merger, merger valuation, setting the bid price, tactics to prevent a hostile takeover.

Credits: 3; Prerequisite: FIN 201, BUS 231

FIN 450: Cases in Financial Management

The decision making process of a financial manager is rather a practical issue than theoretical. So class room discussion on theoretical issues is not sufficient to equip the students to face the challenges of real world. Hence the objective of this course is to enhance the capability of students to deal with practical financial problems by assigning them some real world financial cases, so that they can have a virtual experience in practical decision making of a financial manager by solving those cases along with their course work. It will include case problems on capital budgeting, financial planning, cost of capital, capital structure, dividend policy, mergers and acquisitions, financial distress and financial restructuring and real options. Students are expected to apply the financial tools and techniques to analyze real world financial cases, make their own decision and judgment, prepare reports and make case presentation extensively.

Credit: 3; Prerequisite: FIN 201, BUS 231

FIN/ITB 465: International Financial Management

This course focuses on the theoretical and practical aspects of financial management of multinational companies along with due importance on the global financial architecture and its components. Topics include among others: global financial systems and its operation, international financial markets, international capital market, the foreign exchange market, international arbitrage and parity conditions, history and growth of MNCs, international investment and financing opportunities, use of currency derivatives in the management of foreign exchange exposure, foreign direct investment and cross-border transactions, valuation and international restructuring, country risk analysis, and international capital structure, cost of capital, capital budgeting and cash management decisions.

Credits: 3; Prerequisite: FIN 201, BUS 231

FIN 475: Option and Future

This course provides a thorough introduction to the valuation, characteristics and use of different financial derivatives. Topics include forward and future contract, option, swap and other derivatives; forward contract: forward market, participants, quotation, premium or discount, relationship between forward and spot price, arbitrage arguments; future contract: future market, clearing houses, positions, taxation, open interest, making to market, basis, spreads; options: characteristics and principles, pricing relationship and graphical presentation of option's payoff, factor affecting prices of options, early exercise, equity as a call option, put-call parity and synthetic construction of options, effects of dividends; trading strategies involving options; option pricing models: risk neutral argument, binomial option pricing model, the Black and Scholes options pricing model; options on stock indices, currencies, and futures; credit derivatives, interest rate derivatives, and real options.

Credits: 3; Prerequisite: FIN 425. , BUS 231

GEB 101: Basic Biology

Credits: 3; Prerequisites: none

This course introduces some of the basic biological concepts needed to prepare the student for a deeper understanding of life at the molecular level. The course will begin with an overview of a scientific view of the origin of life and progress into descriptions of the range of life forms found today. Finally, the course will emphasize evolutionary theory, both as found in worldwide life and as it applies to the behavior of life and the molecules of life in the laboratory.

GEB 103: Cell Biology 1

Credits: 3; Prerequisites: None

This is a foundation course for the students of Genetic Engineering and Biotechnology. This course will focus on providing students the basic concepts and knowledge required for learning biomolecules, biochemistry, metabolism and molecular biology. This course will introduce basic knowledge on cells and genome, cell chemistry and biosynthesis, catalysis and the use of energy in cells, how cells obtain energy from molecules, the structure and function of proteins and nucleic acids, molecular dogma, how cells read and express the genome and their manipulation.

GEB 104: Basic Microbiology

Credits: 3+1=4; Prerequisites: None

Basic microbiology will give the students a historical overview of the field of microbiology and its scientific, medical and industrial importance. The remarkable range of the field will be addressed both in class and in lab. Theoretical discussions in class will focus on the biology of microorganisms. Laboratory experiments will focus on the different techniques of how the structure and behavior of microorganisms can be observed and manipulated such as with the different nutrient requirements, the use of antibiotics and the growth phase.

GEB 105: Cell Biology-II

Credits: 3; Prerequisites: GEB 103

This course mainly deals with the knowledge of cell which is the unit of living organisms. The students will learn about the structures and functions of cell membrane as well as the intracellular membrane bound compartments such as mitochondria, Chloroplasts, cytoskeleton, intracellular matrix and many more. They will also gain knowledge of molecular trafficking, cell-cell adhesion proteins and cell junctions, cell life cycle, apoptosis and cancer. Furthermore, the course will provide the theoretical knowledge to use of the light and electron microscope.

GEB 201: Basic Biochemistry

Credits: 3+1=4, Prerequisite: CHE 108, GEB 103

Basic biochemistry will emphasize the overview of macromolecules- carbohydrate, protein, lipids and nucleic acids. The students will acquire knowledge on metabolism of the cell. It will focus on how macromolecules are produced and degraded by the cell. The energetics of metabolism that is ATP synthesis and storage will be a primary topic. Also, the course will integrate with the other courses in the department to give the student a different perspective of some topics such as nucleic acid metabolism that were covered in other courses.

GEB 202: Molecular Biology

Credits: 3+1=4; Prerequisites: CHE 108, GEB 105

The molecular structure and biology of genomes will be the primary topic. Comparisons will be made between the different organization of genomes of prokaryotes, eukaryotes and viruses to show both the required features that all show up and how the problems facing all organisms can be addressed by nature with different solutions. The laboratory course will introduce the basic techniques available to manipulate DNA and to do introductory work in recombinant DNA.

GEB 203: Animal Physiology

Credits: 3; Prerequisites: GEB 103, CHE108

The basic concept involving human physiology are addressed in this course with particular emphasis placed on the molecular and biochemical aspects of physiology as these are the ones most likely to be addressed using biotechnology and genetic engineering.

GEB 204: General Genetics and Genetic Analysis

Credits: 3+1=4; Prerequisites: GEB 201, GEB 202

This is a foundation course for the students of Biotechnology for providing students the basic concepts and knowledge on Genetics. This course will focus on genetic variation, patterns of inheritance, microbial genetics, epigenetics, extra-nuclear genes, population genetics, quantitative genetics, evolutionary genetics. The basic biology of Medelian and non-Mendelian genetics will be studied in both theory and laboratory works. The theory of biochemistry and genetics in several different biological systems will be introduced to show their common features and differences. Also how these concepts are being applied in current medical and scientific technologies as well as the problems and the challenges associated with these applications will be introduced.

GEB 301: Plant Physiology

Credits: 3; Prerequisites: GEB 101, GEB 103

Agriculture and plant science is an indispensable part of genetic engineering and biotechnology. Some of the basic and modern concept of plant physiology will be discussed in this course.Cellular, morphological and anatomical structure as well as various physiological and biochemical activities, growth and developmental pattern of plant system will be discussed for the proper application of plants in the field of biotechnology.

GEB 302: Fundamentals of Genetic Engineering & Biotechnology

Credits: 3; Prerequisites: GEB 201, GEB 202

This is a course designed to give the necessary theoretical understanding for a variety of current biotechnological technologies in the fields. The topics covered will include cell tissue culture techniques and recombinant DNA technology and gene cloning. Also, the course will be updated frequently to give the student the basics necessary to understand recent developments and trends in the various fields of biotechnology.

GEB 304: Immunology

Credits: 3+1=4; Prerequisites: GEB 203

Immunology is perhaps one of the most interesting and important of all medical fields. Also, it is central to biotechnology. This course will cover the overview of immune system including initiation of immune response and fighting differnet pathogens. Some of the rapidly expanding ways that antibodies are being used in both medicine and diagnostic technology will be introduced. It will also

focus on the applied immunoly such as vaccine development and transplantation which apply the knowledge of genetic engineering in humans to reverse immunological disorders and control viral diseases such as AIDs.

GEB 305: General Virology

Credits: 3; Prerequisites: GEB 104

General virology introduces the basic physiology of the molecular forms of viruses. Different viruses like bacteriophage, plant virus and animal virus are studied in details. This course also illustrates how viruses share both common features as well as remarkable differences between them. Also, it familiarizes students on how viruses can be used as molecular tools in biotechnology.

GEB 306: Environmental Biology

Credits: 3; Prerequisites: GEB 101 and GEB105

Some of the topics included will be the basic concepts in ecology and environmental biology and its effects on and causes by man, the future of biosphere and global climate changes. Both the benefits and disadvantages of our technology will be discussed as well as some of the possible uses for it in the near term future. Also, the ethics of these changes, such as the changes occurring as a result of population growth will be discussed.

GEB 308: Separation Technologies and Analytical Methods

Credits: 3+1 = 4; Prerequisites: GEB 201

This course aims to introduce various types of Separation Technologies and analytical methods which are regularly used in the researches related to biological sciences. Topics to be covered are: Chromatography, Gel Electrophoresis, Hybridization Technologies, Microarray, Spectrophotometry Methods (UV-vis, IR, NMR, MS, etc.), Next generation DNA sequencing, etc. The students will understand the underlying basics of the instruments of a typical molecular biology lab. During the practical classes, they will do some common lab procedures and will learn about the operation of some of the instruments and how to interpret the data obtained from such analysis.

GEB 402: Advances in Recombinant Gene Technology

Credits: 3+1; Prerequisites: GEB 202 and GEB 302

The student will be introduced to both a theoretical understanding and a “hands on” experience of DNA manipulation. Recombinant DNA will be illustrated, both as it is known to occur in nature and as it is practiced in the lab. The course will cover in detail some of the key concepts of recombinant gene expression in different host organisms. They will have the basic knowlegde of advanced recombinant DAN technologies and will learn when and where to implement such technologies. Students will have the opportunity to practice many of the same techniques routinely used in state of the art scientific research.

GEB 403: Animal and Plant Tissue Culture

Credits: 3+1=4; Prerequisites: GEB 203 and GEB 301

This course has a vocational focus and introduces the theory and practice of animal and plant tissue culture with their role and applications in biotechnology and biochemical research. This course includes a broad overview on the techniques of tissue culture as used in plant and animal transformation, rapid clonal production, aseptic manipulation, etc. and provide “hands on” experience in using some basic steps for deeper understanding and further application in modern research.

GEB 406: Genomics, Proteomics and Bioinformatics

Credits: 3, Prerequisites: GEB 202 and GEB 302

The objective of this course is to inform students about the emerging field of bioinformatics which is currently essential in almost any kind of biological research. This course aims to let students know about the history of bioinformatics, important databases of biological information, common types of bioinformatics analysis involving pairwise alignment, database similarity search, multiple sequence analysis, etc. Several bioinformatics based research on evolutionary process, vaccine and antibiotic production,

pharmacogenomics, protein-protein interaction, gene-regulatory network, etc., will also be discussed during the course. This course will lay the foundation to do bioinformatics research which will help them in future studies.

GEB 407: Industrial Biotechnology of Microbial Systems

Credits: 3; Prerequisites: GEB 104, GEB 302

Recombinant DNA technology can offer great promise for developing new microbial strains that can be used in producing various therapeutic agents for new cost effective medical treatments. These microbes will be industrially beneficial for producing various commercial products and economically important metabolites. By learning this course, students would be able to know how new microbial strains can be developed using rDNA technology along with the therapeutic and industrial usage of these microbes. This course will focus on microbial production of therapeutic agents, synthesis of commercial products by recombinant microorganisms, microbial production of economically important primary and secondary metabolites, fermentation and other industrial usage of microbes, bioremediation. Current industrial applications of microbial systems in production of complex drug molecules, vaccines, and commercial products will be explored. Also the chemical applications of industrial microbiology for the commercial large scale production of simple molecules such as ethanol for fuel will be covered as will more traditional uses such as the production of food. Some of the more traditional uses such as waste management and some of the newer uses such as ore leaching will also be covered.

GEB 408: GMOs, Biosafety Regulations and Environmental Management

Credits: 3; Prerequisites: GEB 306

Genetically Modified Organisms (GMOs) are an increasing common fact of agriculture. Also, they are being produced unintentionally by the widespread use of antibiotics and perhaps other chemicals being introduced into the environment. The practical and ethical issues involved in these facts and possible solutions and other potential uses for GMOs will be surveyed. Also covered will be new ways of detecting organisms that can not be cultured and what uses this information can give.

GEB 410: Current topics in Genetic Engineering and Biotechnology

Credits: 3; GEB core courses numbered 100-300.

Students will either choose or be assigned current Genetic Engineering and Biotechnology journal articles from top rated international journals for presentation to the class.

GEB 420: Biochemistry & Molecular Biology of Diseases

Credits: 3; Prerequisites:

This course is an introduction to the medical pathology of a number of important diseases including diabetes, cancer, heart disease, metabolic disorders, diseases of the nervous system, AIDS, diarrheal diseases and some lesser known diseases. The emphasis will be on developing an understanding of the diseases at the molecular and biochemical levels, both as lessons in advanced physiology and to bring light to the various molecular approaches being used to treat these diseases. Student will also gain an appreciation of the potentials for future biotechnological advances in treating these and other diseases.

GEB 421: Methods in Enzymology

Credits: 3; Prerequisite: All required courses numbered 100-300.

The biochemical features of enzymes will be covered in detail. The course will focus on enzyme kinetics, factors affecting efficiency of enzyme activity and the mechanism of enzyme action. Protein enzymes, the basis of all life, are finding increasing use as industrial agents. To prepare for their use in industrial and pharmaceutical applications, the different concepts concerning both their biochemistry and modern industrial applications will be covered in ways that will provide the student with a more profound understanding of the molecules that are found in all genetic engineering and molecular biological work.

GEB 422: Developmental Biology

Credits: 3; Prerequisite: All required courses numbered 100-300.

Developmental biology is the study of the process by which organisms grow and develop. Modern developmental biology studies the genetic control of cell growth, differentiation and morphogenesis. The study of developmental mechanisms is inherently interdisciplinary and employs embryological, genetic, genomic, cell biological, biochemical, and systems biology approaches. By learning this course, students would be able to understand the mechanisms that are involved in development as well as how the study of developmental processes can uncover many links with human disease. This course will focus on signal transduction, cell cycle, fertilization and embryogenesis, plant and animal developmental process. These topics will cover the general principles of the cell differentiation and the development of complex organisms from a single fertilized cell and also how knowledge from more simple developmental systems such as *Drosophila* is helping us to understand processes found to be involved in human. These topics will also cover both a description of the visible developmental features and a description of our understanding of the complex genetics and epigentics mechanisms involved here.

GEB 423: Human Molecular Genetics and Molecular Diagnostics

Credits: 3; Prerequisite: GEB core courses numbered 100-300.

This course emphasizes molecular functions and techniques involving human genetics – mutations, recombination, chromosomal aberrations, pedigree analysis, RNA interference and drosophila model of eukaryotic organisms. It will also focus on different diseases that arise due to mutations, chromosomal abnormality, transposon and different genetic elements and how we could effectively diagnose and possibly treat these disorders.

GEB 424: Microbial Genetics

Credits: 3; Prerequisite: GEB core courses numbered 100-300.

This course will focus on the general principles of microbial genetics. Special emphasis will be given to processes and features unique to prokaryotes. Also the use of prokaryotic systems as research tools will be discussed in detail.

GEB 425: Plant Development Biotechnology

Credits: 3; Prerequisites: GEB 301, GEB 403

Agriculture industry is one of the most promising and rising sectors in modern world. This course will illustrate all the modern and advanced techniques of crop improvement regarding the introduction and propagation of new desired strains as well as manipulation of existing strains for the application in development of agriculture industry.

GEB 426: Pharmaceutical Biotechnology

Credits: 3; Prerequisites: GEB 202, GEB 302, GEB 304, GEB 402

This course deals with the importance of pharmaceutical products and techniques involved in its formulation – pharmacologically important proteins and peptides, monoclonal antibodies, recombinant insulin, vaccines and antisense drugs. It also deals with current status of gene therapy, different drug delivery system and the challenges faced in this field and future directions of pharmaceutical biotechnology.

GEB 427: Stem Cells and Tissue Engineering

Credits: 3; Prerequisites: GEB 203

Stem cells and Tissue Engineering can offer great promise for new medical treatments. By learning this course, students will be able to know about what stem cells are, what they can do for us and how they can be used for our betterment. This course will focus on the properties and types of stem cell, isolation and culture of stem cells, production of stem cell derived organs, use of stem cell therapy in treating diseases and in repairing damaged organs, stem cell controversy, future of stem cell and tissue engineering.

GEB 428: Forensic Biology

Credits: 3; Prerequisites: GEB 202, GEB 302, GEB 308

Forensic Biology and Toxicology is concerned with the application of the techniques of molecular biology (DNA profiling) and analytical chemistry (drug and alcohol analysis) to fight against crime. The major provides in-depth study of modern molecular

genetics including practical training in the techniques of genetic analysis such as the polymerase chain reaction (PCR) and the use of STRs (short tandem repeats) and SNPs (single nucleotide polymorphisms) to identify regions of DNA. The application of these techniques to the analysis of ancient DNA is also discussed. Biological specimen collection. DNA extraction and applications of DNA profiling will also be discussed.

GEB 489: Industrial Training/Internship

Credits: 3; Prerequisite: GEB core courses numbered 100-300.

Each student will be placed on industrial training for one semester in an organization of related industry. The student must complete the training within one consecutive semester.

GEB 490 Research Proposal

Credits: 3; Prerequisite: GEB core courses numbered 100-300.

Student will research an approved current topic and provide a realistic research proposal of some significance and present and defend this proposal. The general format will be-the student will present a seminar on the background material and the proposed research to the entire student body and then defend the proposal before a committee of faculty members. The student will be evaluated on their seminar, committee defense and submitted written proposal.

GEB ELECTIVE UPPER LEVEL COURSES

GEB 499: Research Project

Credits: 3; Prerequisite: GEB core courses numbered 100-300.

Individual research projects will be arranged for a student to actively pursue original laboratory research of some significance.

GEN 201: Bangladesh Studies

The objective of this course is to familiarize the students with the notion of our glorious struggle for the independence of Bangladesh as well as the thematic areas of national importance and public good. The course will be offered from an interdisciplinary perspective with the aim of covering a wide range of issues including the pre-colonial and colonial historical episodes leading to the emergence of the nation-state; geographic features, natural resources, and environmental aspects; education, society, and politico-cultural change, economic and social inequality, and urbanization; functioning of state focusing judicial, administrative, and legislative systems and governance; socio-economic development focusing on economic growth plans (rural and urban), poverty eradication, livelihoods, social transformation, social safety net, local governance, role of NGOs, civil society, and development agencies and partners.

Credits: 3; Prerequisite: ENG102

GEN202: Eastern Culture & Heritage

The objective of this course is to introduce the culture and civilization of eastern part of the world. The specific goal is to make the students familiar with different religions, culture and heritage, and intellectual tradition of this region. Major topics include: a brief study of the life of early man; an analytical view about cultural settings of our present and ancient civilizations; various features of Eastern epistemology; an elaborate discussion about various features of culture and heritage of our subcontinent especially in Bangladesh; cultural contact between the East and the West; and contributions of some major scholars of Eastern tradition.

Credits: 3; Prerequisite: None

GEN203: Ecological System and Environment

The objective of this course is to help students learn basic environmental problems and ecological principles, develop their ability to use these principles to interpret ecological problems and understand the repercussions of environmental mismanagement. Topics include: Environment science, input reduction, population bomb, resources, ecology and population, abundance control, community diversity, energy flow, type of species, demography, resource management, biodiversity, pollution, controlling pollution, water pollution, air pollution, ethics.

Credits: 3; Prerequisite: None

GEN 204: Western Thought

The aim of the course is to introduce students with some masterpieces of western literature. The course includes selections from William Shakespeare, Charles Dickens, Anthon Chekov, Guy de Mupassant, Robert Frost, T.S. Elliot.

Credits: 3; Prerequisite: None

GEN 205: Introduction to Psychology

This introductory course on Psychology aims at familiarizing the students of other disciplines with the central concepts and theories of Psychology. It covers both the traditional areas of Psychology and applied topics, including the biological foundations of behavior, sensation, perception, learning, memory, abnormal behavior and treatment and health psychology. The course will not only provide the students with a conceptual overview of understanding human behavior and mental processes, but also a pathway to self-understanding, offer the potentials of a future career, and will give them an opportunity for intellectual discovery.

Credits: 3; Prerequisite: ENG102

GEN 207: Industrial Psychology

Industrial Psychology (I/O Psychology) is the applied field in which the principles of psychology are used to provide insights into how organizations function, and why they do what they do. This course is based on the science of peoples' behavior at work and the application of psychological principles of organizational and work settings. The purpose of I/O Psychology is to provide how it will directly influence ones lives as job applicants, trainees, employees, managers, coordinators, and consumers, in brief, the nature of work in modern society. It is going to make students familiar with Job Analysis, Performance Appraisal, Assessment Methods for Selection and Placement, Selecting Employees, Training and Development, Theories of Employee Motivation, Job Satisfaction and Organizational Commitment, Productive and Counter Productive Behavior, Working Conditions, Employee Health and Safety from behavioral perspective.

*Credits: 3; Prerequisite: **None***

GEN 208: Introduction to Philosophy

This course is designed to familiarize students with some fundamental problems and issues in philosophy. As a course in a second or *higher order* discipline concerned with critical thinking, this can help us improve our ways of making sense of the world. This will provide an opportunity for cultivating the skills of evaluating arguments and developing the habits of cooperative rather than adversarial argumentation for problem solving and effective deliberation. The topics to be discussed include: Definition, Nature and Scope of Philosophy; Thinking as the way we make sense of the world; Problem Solving as Thinking Critically; Theories of Reality; Knowledge; Values; Theories of Truth; Proofs for the existence of God; Problem of Freedom of Will; Mind-Body Relation; Existentialism, Pragmatism and Logical Positivism as philosophical trends.

Credits: 3; Prerequisite: None

GEN209: Introduction to Social Psychology

Social Psychology mainly focuses on understanding how and why individuals think and feel as they do in social situations. It seeks to understand the cause of social behavior and thought or identifying factors that shape our feelings, behavior and thoughts in social situations. This course is intended to make students sentient of the application of the information of social factors or social behavior in the field of their interest. Students will be proverbial with social perception, cognition, attitudes, social identity, prejudice and discrimination, interpersonal attraction and relationship, social influence, prosocial behavior, aggression, and groups and individuals.

Credits: 3; Prerequisite: ENG102

GEN 210: International Relations

The study of International Relations attempts to analyze world events and speculate future in a systemic way. The basic objective of this course is to understand the world that is fast changing. Towards this end, this course intends to equip the students with knowledge and analytical tools necessary to comprehend, evaluate, and respond to an increasingly complex array of problems both at the national

and international levels. The course focuses on such key areas as Theories of International Relations, Concept of Power, War and Peace, Diplomacy, United Nations, Regional Organizations, Nuclear Arms Race, Inter-State Conflict and Cooperation, International Terrorism and Counter Terrorism, Third World Poverty, International Development, and Globalization.

Credits: 3; Prerequisite: ENG 102

GEN 211: Concepts of Journalism & Media Studies

The broad objective of the course is to examine the basic tenets of newspaper journalism on the one hand and media studies on the other. *Journalism:* The specific objective of the course in Journalism is to show how to research, organize and write stories; understand the internal structures of newspapers; advertising, circulation and readership and editorial policies of the newspapers; different political systems in which media exists, newspaper censorship and laws of libel as well as ethical issues. *Media Studies*: The students will be introduced to the various forms of media including print and electronic such as newspaper, radio and television; conceptual learning about operating system of different form of media especially the applications of information technology in TV; news script writing for print and TV media.

Credits: 3; Prerequisite: ENG 102

GEN212: Women in Development

The course focuses on conceptual overview and practical tools for understanding the role of women in development process. It discusses the interrelationship between various development issues and gender. The course helps students to become aware of gender issues in both theoretical and Bangladesh contexts. It also attempts to help students to contribute to the efforts to eliminate all forms of gender discrimination in Bangladesh society. The course examinees the role of women in economic development. Students are expected to gather knowledge and skill to develop a career plan in the perspective of gender. The course includes feminist analysis of international relations and development theories and Women Development Policy and Programme in Bangladesh. Topics include: Sex and Gender, Society; Patriarchy; Men-Women relationship in the patriarchal society, Theories of WID, WAD and GAD, Gender role, division of labour and gender needs. Women's reproductive health and right, Adolescence health care in relation to gender, Health and nutritional and HIV/AIDS issues in relation with gender, Gender and poverty, Gender and environment, Violence against women, One stop crisis centre visit/ Visit to a village, Case preparation, CEDAW and its clauses, Constitutional and fundamental rights of women, Beijing platform for action(PFA), Anti-dowry laws, and labour laws.

Credits: 3; Prerequisite: ENG101

GEN 213: Introduction to German Language

This course will provide an opportunity for gaining elementary competence in German language. It will enable the course participants to verbally act and react in simple everyday life situation.

Credits 3; Prerequisite: None

GEN214: Introduction to Development Studies

The course provides an introductory look at the theories and concepts, which form the foundation of development. The student throughout the course will be facilitated to critically assess contemporary development issues such as poverty, gender discrimination and lack of access to natural resources. Key theoretical concepts such as modernization, liberalism, development projects and human rights will be addressed along with the usefulness of social research.

Credits: 3; Prerequisite: ENG 102

GEN 215: Introduction to French Language

This course will allow the students to develop their basic communication skills in French. Speaking a new language helps one to get to know another people and culture, as language and culture go hand in hand.

Credits 3; Prerequisite: None

GEN 216: Introduction to Spanish Language

This course has been designed to provide understanding of the basic competence in Spanish course. Speaking more than one language is a skill which will increase the marketability of student.

Credits 3; Prerequisite: None

GEN 217: Introduction to Chinese Language

The objective of the course is to familiarize students with the basics of Chinese language. Employers tend to prefer candidates who speak one or more foreign languages and the fact is that the global economy depends on communication; China plays a vital role in world economy Chinese language plays an imperative role in business.

Credits 3; Prerequisite: None

GEN 218: Introduction to Arabic Language

The course focuses on essentials of Arabic Language. The course is designed to express basic capability in it. Interest in the Arabic language has increased greatly throughout the world.

Credits 3; Prerequisite: None

GEN220: Principles of Public Relations

The primary objective of this course is to familiarize students with the basic concepts and principles of public relations. At the end of the course, students should have attained knowledge and understanding of the role and functions of public relations in an industrialized society, the basic tools, process and theories of public relations which include research, planning, communication, evaluation and the use of dynamic communication strategies to achieve organizational goals. This course also strives for a better understanding of public relations activities, impression management and how public relations works during crisis situations in personal and organizational arena.

Credits: 3; Prerequisite: ENG 102

GEN221: Globalization, Development and Change

This course has been designed to provide a comprehensive understanding of basic principles of globalization and social identity from an analytical perspective. The course will aid the students to make analytical conclusions regarding key social issues such as migration, governance, terrorism, globalization and international trade. From a developing nation perspective the course will also shed light on the debate between the Asian and Western Value systems, and thus provide a comprehensive view of people's perceptions of the globalizing world.

Credits: 3; Prerequisite: ENG 102

GEN223: Contemporary Security Studies in Asia-Pacific

This course will focus on contemporary socio-economic and politico-military security issues in the context of Asia-Pacific region. The course will make an attempt to introduce key elements of global and regional security---nuc1ear security threats, rise of strategic powers and forms and dimensions of security in relation to national and international politics. The course also explores future perception of threats and preventive mechanisms to develop confidence building among the actors. It will address both theoretical and applied knowledge of security discourse in the context of global politics. The objective of the course is to examine the rationale of the security studies and to consider the implications of traditional security in the context of international relations and politics.

Credit: 3; Prerequisite: ENG102, GEN210

GEN224: Bangla Language (বাংলা ভাষা)

স্নাতক (Undergraduate) পর্যায়ের ছাত্রছাত্রীদের বাংলা ভাষায় লিখন ও সৃজনদক্ষতা বৃদ্ধির লক্ষ্যে এই কোর্সটি প্রণীত হয়েছে। মাতৃভাষায় দক্ষতা বৃদ্ধি যে-কোনো মানুষের প্রকাশ ক্ষমতার পূর্বশর্ত। মাতৃভাষায় দক্ষতা অন্য ভাষা শিক্ষণের ক্ষেত্রেও পূর্বশর্ত হিসেবে কাজ করে। সেদিক বিবেচনা করে এই কোর্সে বাংলা ভাষার অতি আবশ্যক কতিপয় বিষয় পাঠ্যসূচির অন্তর্ভূক্ত হয়েছে। এই কোর্সে বাংলা ভাষার ধ্বনি, শব্দগঠন, বানানের নিয়ম, উচ্চারনরীতি,

প্রয়োগ-অপপ্রয়োগ, পরিভাষা, সমার্থ শব্দ, চিঠিপত্র ও দরখাস্ত লিখন, সাহিত্যের বিভিন্ন রূপকল্প (কবিতা, উপন্যাস, ছোটগল্প, নাটক, প্রবন্ধ) অন্তর্ভূক্ত করা হয়েছে।

Prerequisite: None

Credit: 3

GEN226: Emergence of Bangladesh

The main objective of this course is to let students know the history of the emergence of Independent Bangladesh which had been achieved through lots of sacrifice from all sorts of people. It will also help to understand the true meaning of the spirit of independence and get pledged to uphold that without any compromise. The course includes:

Background-the rule of Colonial power and their Divide and Rule policy, Politics of revivalism of religious nationalism by both Hindu and Muslim community. Hindu-Muslim relation- disparity, distance and distrust. Two nation theory, partition of India. Bengali Muslims' role in the creation of Pakistan.

Disillusionment- Question of state language. Response of the Bengali intelligentsia. Disparity and emergence of the notion: 'one nation and two economy'. Consolidation of power by Punjab-dominated military & civil Bureaucracy. Deprivation and economic plundering, internal colonialism.

Movements- Language movement of 1952. Student movement against the education policy and constitutional movement of 1962. Sheikh Mujib's 6 point movement for autonomy in 1966. Mass Upsurge of 1969 and Rise of a charismatic leader of the people. Awakening and unification of the emerging nation. Refusal of the Pakistani Janata to hand over the power to the elected representative, crackdown and genocide to the recommended reading level. Non-cooperation movement in 1971. Liberation War of 1971. Birth of a nation.

Fight on and off front- Freedom fighters, Sector commanders, Guerilla warfare, Mass participation in war, women's participation in the liberation struggle. Participation of ethnic minorities.

Safe repressions and anti-liberation activities-Operation search light, Genocides, Mass exodus, Life at refugee camps. Women as war victims. Sufferings of children. Arson look & Destruction, Collaboration politician, commited activists andf fortune seekers in peace committees and armed cadres like Rajakar, Al-Badar, Al Shams.

War by media and cultural front- Participation and initiatives in diplomatic and cultural front. Role of the media especially the swadhin Bangla Betar Kendra, Akashvani and BBC, British and Indian newspaper, Concert for Bangladesh, Musical squad of Muktijuddha Sahayak Samity. Break through news by some leading journalists like Simon Dring etc, role of the foreign governments: India, USSR and the East European countries. USA, UK, China, Non-aligned countries, etc. role of the United Nations and demographic forces of the world including USA.

Credit: 3; Prerequisite: ENG102

GEN 239: Professional Ethics

This course is designed to introduce ethical and spiritual commitment in the profession in order to maintain higher standard at work environment. More specifically, the course will focus on moral character, character development, moral leadership, developing mortality in organization, moral behavior, characteristics of moral standards, moral issues and ethical principles, moral obligations, spirituality, natural laws-the concept of a moral being, duties and rights, applying natural laws, moral decision-making process-steps in the decision making process, making ethical decisions, decision strategies, personal mortality, codes of professional conduct-purpose of a code of conduct, critical elements in the development of a code of professional conduct, rules of professional conduct, professional standards.

Credits: 3; Pre-requisite: ENG 102

HRM 301: Human Resource Management

This course covers the concept of human resource management and its importance, factors in organizational performance, HR planning, job design, recruitment and selection, training and development, performance appraisal, compensation and motivation, health and safety, internationalhuman resource management, labor relation and the future of HRM.

Credits: 3, Prerequisites: MGT 101, MGT 251, BUS 231

HRM 411: Human Resource Planning

This course introduces the importance of human resource planning in overall human resource management of an organization. Topics covered in this course: reasons and importance of human resource planning, various forecasting techniques of manpower planning, demand and supply methods of human resources and availability, methods of calculating manpower needs for future requirements, approaches to manpower monitoring and controlling, HR auditing, International HRM, career development issues and role of succession planning in human resource planning.

Credits: 3, Prerequisites: MGT 251, HRM 301, MAT 211, ECO 104. , BUS 231

HRM 412: Compensation Management

This course examines the strategic choices in managing total compensation. The total compensation model introduced serves as an integrated framework throughout the course. The major topics to be discussed include: meaning of compensation, dimensions of compensation system, work and rewards, identifying job contents and determining payment, compensation survey, performance appraisal, designing pay structure, employee incentives and fringe benefits.

Credits: 3 Prerequisites: MGT 251, HRM 301, BUS 231

HRM 413: Industrial Relations and Labour Law

This course has two major areas - theoretical part and labor code part. Major topics covered under theoretical part are: industrial revolution and nature of industrial relations, theories of industrial relations, trade unions, collective bargaining, and international labor organization (ILO). different legal provisions of the Bangladesh labor code, 2006 have been covered under labor code parts which are definition of different terms, employment and conditions of service, employment of adolescent, maternity benefit, special provisions relating to health, hygiene and safety, welfare measure, working hour and leave, wages and payment, wage board, compensation for injury by accident, trade unions and industrial relations, settlement of disputes, labor court, labor appellate tribunal, legal proceedings, workers' participation in companies' profits, provident fund, offence, penalties and procedure etc.

Credits: 3, Prerequisites: MGT 251, HRM 301, BUS 361, BUS 231

HRM 415: Training & Development

The course is basically a ToT (Training of the Trainers) course i.e. it has been designed for the trainers. Training is a process and as a process it includes some steps. These steps are training needs assessment, designing training programs, implementing training programs, evaluating training programs, checking and ensuring the implementation of learning from training programs. This course demands the detail discussion of each of these different steps of training process. Other topics of this course are training policy, performance model, strategic significance of training, learning organization, learning approaches in training, methods of training, special issues of training and development, and special issues of training and development in Bangladesh.

Credits: 3, Prerequisites: MGT 251, HRM 301, BUS 231

HRM 416: Strategic Human Resource Management

This course addresses the strategic role that human resource management plays in creating competitive advantages for firms. major topics include strategy formulation and implementation, role of HRM in supporting the corporate strategies, impact of workforce diversity and globalization, finding the hr fit in the organizational goal setting and mission achievement, hr inputs in the organizational strategic management process, human resource management in the face of rapid technological changes, globalization and rising employee expectation.

Credits: 3, Prerequisites: MGT 251, HRM 301, HRM 411, HRM 412, BUS 231

HRM 417: Human Resource Information System

This course focuses on computer-based information system in the management of human resources of an organization. The course underlines the application of information technology in all sphere of management decision making, including that of human resources management. The course aims at increasing the effectiveness of today's human resources managers through proper uses of HRIS and make judicious decisions about HR. It deals with the nature, purpose and promises of HRIS, the managerial, technological and

organizational factors driving its adoption, implementation and maintenance. In addition it explores the relationship of HRIS with organizational knowledge, learning and decision-making processes. The course has both theoretical and practical dimensions, the practical part is built around database software, like MS Access where the students learn designing and developing a model HR database.

Credits: 3, Prerequisites: MGT 251, MIS 305, HRM301, BUS 231

HRM 418: Job Analysis and Performance Appraisal

This course deals with analyzing job for selecting right people for the organization and evaluating employee performance for rewarding. Course topics include job analysis and job evaluation, job analysis and selection, competency modeling, measuring employee behavior and performance, various appraisal methods and systems, developing and administering an effective performance appraisal system, linking performance with reward, motivating employees through rewards, legal issues in performance appraisal administration, emerging issues and innovations.

Credit: 3 Prerequisites: MGT 251, HRM301, BUS 231

HRM 419: Leadership, Power and Influence

This course includes three major parts: individual as leaders, team leadership and organizational leadership. The part first titled individual as leaders covers nature of leadership, leadership traits and ethics, leadership behavior, motivation and communication, coaching and conflict skills. The second part titled team leadership covers contingency leadership theories, dyadic relationships, follower ship, delegation and leading effective teams and the third part titled organizational leadership covers influencing: power, politics and negotiation, organizational leadership, change and leadership of culture, diversity and the learning organization.

Credit: 3, Prerequisites: MGT 251, HRM301, BUS 231

HRM 420: Organization Development

This course concentrates on various issues and topics of organizational development which has become a current focus in modern organizations. The course content includes current theory and practice in organization development, organizational systems, organizational ethics, values and culture, diagnosis of organizational bottlenecks and impact analysis of organizational changes. The course focuses on developing practical skills in establishing productive relationships with clients and work groups. The students will develop the capacity to understand organizations as system levels, learn why, when, and how to intervene at different system levels. The course further expands in developing capabilities for using one's self as a change agent, expand skills in specialized areas such as organization design, strategic goals, diversity, facilitation, systems change and application of OD theory.

Credit: 3, Prerequisites: MGT 251, MIS 305, HRM 301, BUS 231

HRM-421: International Human Resource Management

This course addresses and defines the role of HRM in developing countries, organizations working beyond boundaries and contemporary issues of HRM in international context. It also investigates the design of and effects of HR practices in cross-cultural contexts for both local and global competitive advantages. at the end of this course, the students could possess: the basic understanding of hr practices in subsidiaries of multinational companies (MNC) in developing countries especially in Bangladesh and other south Asian countries, knowledge of managing hrm in global context, understand complexities and dynamics of cross-cultural and borderless organizations, understand the presence of country of origin, localization and dominance effects on mnc subsidiaries to the host country hr culture.

Credits: 3, Prerequisites: HRM 301, HRM 411, HRM 412, BUS 231

ICE103: Structured Programming

Credit Hours and Teaching Scheme:

	Theory	Laboratory	Total

Credit Hours	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks + Final Exam in the 14th week

Prerequisite: None

Course Objective: The purpose of this course is to introduce the students to computer programming using structured language. The students will be able to enhance their analyzing and problem-solving skills and use the same for writing programs using C language. Knowledge of this course will be needed as prerequisite knowledge for future courses such as ICE107 Object Oriented Programming, ICE207 Data Structures, ICE245 Algorithms, ICE303 Database Systems, ICE476 Artificial Intelligence, ICE302 Computer Networks and many others.

Course Contents: Programming Language: Concept of programming language and its classification; Programming logic and flow Chart; Structured Programming using C - Constants, variables and data types, arithmetic and logical operation, loops and decision making, user-defined functions, character and strings, arrays, pointers, structures, file management.

The course includes lab work based on theory taught.

Recommended Textbook:

1. The C Programming Language, Brian W. Kernighan, Dennis M. Richie.
2. Programming in ANSI C, E. Balagurusamy, McGraw-Hill Education.

Reference Book:

1. Schaum's Outlines Programming with C, Byron Gottfried, McGraw-Hill.

ICE107: Object Oriented Programming

Credit Hours and Teaching Scheme:

	Theory	Laboratory	Total
Credit Hours	3	1	4
Contact Hours	3 Hours/Week for 13 weeks+ Final Exam in the 14th week	2 hours/Week for 13 Weeks	5 Hours/Weeks for 13 Weeks+ Final Exam in the 14th week

Prerequisite: ICE103 Structured Programming

Course Objective: This course presents a conceptual and practical introduction to object-oriented programming (OOP). The course will cover general principle of programming, designing, and problem-solving skills. This course introduces object oriented conceptual and develops OOP programs which provides solution to real-world object-oriented problems. Knowledge of this course will be needed as prerequisite knowledge for future course, such as ICE207 Data structure, ICE245 Algorithms, and ICE470 Applied Numerical Methods.

Course Contents: Object Oriented Concepts: Classes, objects, methods, inheritance, and class methods. OO Programming in JAVA: Java foundation, control flow, abstract classes and packages, exception handling, applets, web-based Java application, multithreading. The course includes lab work based on theory taught.

Recommended Textbook:

1. Introduction to Java Programming, Daniel Liang, 11th edition.

Reference Book:

1. The Complete Reference Java 2, Herbert Schildt, McGraw-Hill Osborne Media.

ICE109: Electrical Circuits

Credit Hours and Teaching Scheme:

	Theory	Laboratory	Total
Credit Hours	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks + Final Exam in the 14th week

Pre-requisite: None.

Course Objective:

- To learn Electrical circuit analysis in easy and pleasant way.
- To understand the principle and operation of Electrical circuits and their application in different sectors, especially in communication sector.

Understanding: Passive and active components of electrical networks. Use of mesh analysis, nodal analysis, Thevenin's theorem and Norton's theorem in circuit analysis. The different transient response of R and, RC circuits, L and RL circuits.

Knowledge: Circuit laws, including Kirchhoff's current and voltage laws; Thevenin's and Norton's theorems, the principle of superposition. Use differential equations to analyze the transient response of first order equation.

Skills: Analysis of circuits with independent and dependent sources. Calculation of response time for RL and RC. Reduction of simple dc circuits to their Thevenin and Norton equivalents. Application of nodal and mesh analysis and the principle of superposition.

Course Contents:

Basic concept of DC circuits: Fundamental electrical concepts and measuring units, DC voltage, current, resistance and power. Introduction to circuit theory and Ohm's law, Kirchhoff's current and voltage laws. Simple resistive circuits: Series and parallel circuits, voltage and current division, Wye-Delta transformation. Various techniques for solving circuit problems: Mesh and Nodal analysis. Network theorems: Superposition theorem, Source transformation, Thévenin's and Norton's theorems; maximum power transfer theorem. Energy storage elements: Inductors and capacitors, series parallel combination of inductors and capacitors.

Basic concept of AC circuits: sinusoids, phasors, impedance and admittance. Basic circuit laws for AC circuits. Nodal and mesh analysis, network theorems for AC circuits. AC power analysis: instantaneous, average, complex, apparent and reactive power due to sinusoidal excitation, RMS values, power factor calculation and improvement. Three phase circuits: balanced and unbalanced, magnetically coupled circuits and introduction to transformer. Series and parallel resonant circuits and passive filters.

The course includes lab work based on theory taught.

Recommended Textbook:

2. Fundamental of Electric Circuits, Charles K Alexander and Mathew N O Sadiku, Tata, McGraw Hill.

Reference Book:

4. Introduction to Electric Circuits, RC. Dorf, John Wiley.
5. Introductory Circuit Analysis, Robert L Boylestad.
6. Introduction to Electrical Circuits, Nilsson, Addison-Wesley.

ICE204: Discrete Mathematics

Credit Hours and Teaching Scheme:

	Theory	Laboratory	Total
Credit Hours	3	0	3
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week	0	3 Hours/Week for 13 Weeks + Final Exam in the 14th week

Prerequisite: ICE103 Structured Programming

Course objective: The course builds up students' ability to think and express logically and mathematically. The course will address mathematical reasoning, combinatorial analysis, algorithmic thinking, and discrete structures. Knowledge of this course will be needed as prerequisite knowledge for future courses such as ICE 207 Data Structures, ICE 245 Algorithms.

Course Contents: Propositional logic, propositional equivalences, predicates and quantifiers, nested quantifiers, rules of inference, introduction to proofs, mathematical induction, sets, set operations, functions, relations and their properties, the basics of counting, the pigeonhole principle, permutations and combinations, algorithms, the growth functions, complexity of algorithms, the integers and division, primes and greatest common divisor, graphs, graphs terminologies and special types of graphs, representing graphs and graphs isomorphism, introduction to trees.

Recommended Textbook:

1. Discrete Mathematics, Gary Chartrand and Ping Zhang, WAVELEND PRESS INC.

Reference Book:

1. Discrete Mathematics with Applications, Susanna S. Epp.

ICE207: Data Structures

Credit Hours and Teaching Scheme:

	Theory	Laboratory	Total
Credit Hours	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks + Final Exam in the 14th week

Prerequisite: ICE107 Object Oriented Programming

Course objective: The course develops student's skills for designing and analyzing linear and non-linear data structures. It strengthens student's ability to identify and apply the suitable data structure for solving real world problems. Knowledge of this course will be needed as prerequisite knowledge for fu7ture courses such as ICE245 Algorithms, ICE476 Artificial Intelligence, ICE302 computer networks, etc.

Course Contents: Data types, abstract data types and data structures; Efficiency of algorithms; Sequential and linked implementation of lists; Linked list and applications; Stacks and queue and applications; Tree representations and traversals, Binary heaps, binary search tree, AVL tree, Searching; Graphs, DFS and BFS, shortest path and minimum spanning tree; Internal and external sorting.

The course includes lab work based on theory taught.

Recommended Textbook:

1. Data Structures and Program Design in C, Kruse, Leung and Tondo, Prentice Hall.

Reference Book:

1. Data Structure and Algorithms in Java, Robert Lafore, Sams.

ICE213: Electronic Circuits

Credit Hours and Teaching Scheme:

	Theory	Laboratory	Total
Credit Hours	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks + Final Exam in the 14th week

Pre-requisite: ICE109

Course Objective:

The objective of this course is to understand the functions of different electronic devices and their applications of electronic circuits. After completion of the course, students are supposed to understand the operation of circuits, design of circuits based on diode, JFET and MOSFET. They will also learn the function of operational amplifier and its applications. They will be able to design different circuits like amplifier, oscillator, filter, power amplifier regulators and other operational circuits based on transistors and op amps.

Course Contents:

Diode: Physical operation, terminal characteristics, load line analysis, circuit analysis, and its applications: rectifier, clipper, clamper.
Op-Amp: Ideal op-amp, inverter, non-inverter, difference amplifier, integrator, differentiator, and weighted summer. Design of different amplifier and instrumentation circuits using op-amps.

BJT: Physical operation, terminal characteristics, operating modes. BJT as amplifier and switch, DC biasing and small signal operations.

MOSFET: Physical operation, terminal characteristics, operating modes, biasing, amplification, small signal model, gain and MOSFET switch.

The course includes lab work based on theory taught.

Recommended Textbook:

2. Microelectronic Circuits, Sedra and Smith, Oxford University Press.

Reference Book:

4. Electronic devices and circuit theory, Robert L Boylestad, Prentice Hall.
5. Microelectronic Circuits and Devices, M. N. Horenstein, Prentice Hall.
6. The Art of Electronics, P. Horowitz and W. Hill, Cambridge University Press.

ICE216: Signals & Systems

Credit Hours and Teaching Scheme:

	Theory	Laboratory	Total
Credit Hours	3	0	3
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week		3 Hours/Week for 13 Weeks + Final Exam in the 14th week

Prerequisite: MAT205 Linear Algebra & Complex Variables

Course Objective: The purpose of this course is to introduce the students to basic signals & systems engineering. The students will be able to enhance their analyzing and problem-solving skills and apply them in their engineering activities. Knowledge of this course will be needed as prerequisite knowledge for future courses, such as, ICE312 Communication Theory, ICE314 Digital Communications, ICE322 Digital Signal Processing and many others.

Course Contents: Signals and their properties; Basic operations on signals; Different types of signals; Relation between signals and systems; Linear Time-Invariant Systems: Introduction; Convolution: Impulse Response Representation for LTI Systems; Properties of the Impulse Response Representation for LTI Systems; Differential and Difference Equation Representations for LTI Systems; Block Diagram Representations; State Variable Descriptions for LTI Systems. Fourier Representations for Signals (both continuous-time and discrete-time). Application of Fourier analysis in signals. The Laplace Transform; Transform Analysis of Systems; Applications of Laplace Transform.

Recommended Textbook:

1. Signals & Systems, S. Haykin and B. Van Veen, Wiley & Sons.
2. Digital Signal Processing, S. Salivahanan and A. Vallavaraj, Tata McGraw Hill.

Reference Book:

1. Signals & Systems, Alan V. Oppenheim, Prentice Hall.

ICE217: Digital Electronics

Credit Hours and Teaching Scheme:

	Theory	Laboratory	Total
Credit Hours	3	1	4
Contact	3 Hours/Week for 13 Weeks + Final Exam in the 14th	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks + Final Exam in the 14th week

Hours	week		

Pre-requisite: ICE 213

Course Objective:
Digital electronics is the backbone of all sorts of modern electronic, telecommunication and mechatronics devices. Modern computers, mobile handsets, electronic clocks, medical equipment, industrial automation equipment etc. are the end products of digital electronics. In this course we shall study the fundamental building blocks of digital devices and learn how to design those building blocks. We shall also study the composition of semiconductor memory devices and their working principles.

Course Contents:
Review of Number systems and codes; Boolean operators (NOT, AND, OR, NAND, NOR, XOR, and XNOR); Boolean algebra and logic circuits: De Morgan's Theorem; Simplification of Boolean functions using Boolean algebra and Karnaugh map. Combinational circuit analysis: Adders, Subtractor, Encoder, Decoder, Multiplexer, Demultiplexer, ROM, PLA. Sequential logic circuits Analysis: Latch, flip flops, counters, Shift Registers, Memory: Classification, capacity calculation, SRAM, DRAM. Different logic families (TTL, ECL, IIL, CMOS) and performance parameters (Fan-out, Noise margin, noise immunity, power dissipation, propagation delay, delay-power product).

The course includes lab work based on theory taught.

Recommended Textbook:

1. Digital Design, M. M. Mano, Prentice Hall.

Reference Book:

1. Digital Systems – Principles and Applications, Ronald J Tocci, Prentice Hall.
2. Digital Logic Design, Dr. Mozammel Huq Azad Khan, UGC.

ICE245: Algorithms

Credit Hours and Teaching Scheme:

	Theory	Laboratory	Total
Credit Hours	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks + Final Exam in the 14th week

Prerequisite: ICE207 Data Structures

Course Objective: This course introduces students to the general tools and techniques for analyzing and designing computer algorithms. Initially necessary mathematical preliminaries required for analyzing and designing computer algorithms are taught. Then this course familiarizes students with several algorithmic approaches and corresponding problems. Knowledge of this course will be needed as prerequisite knowledge for future courses such as ICE476 Artificial Intelligence, and ICE302 Computer Communications & Networks.

Course Contents: Complexity of Algorithms: worst case, average case, and amortized complexity. Algorithm analysis. Algorithm design paradigms. Lists: stacks, queues, implementation, garbage collection. Dictionaries: Hash tables, binary search trees, AVL trees,

red-black trees, splay trees, skip-lists, B-trees. Priority queues. Graphs: Shortest path algorithms, minimal spanning tree algorithms, depth-first and breadth-first search. Sorting: Advanced sorting methods and their analysis, lower bound on complexity, order statistics

The course includes lab work based on theory taught.

Recommended Textbook:

1. Data Structures and Program Design in C, Kruse, Leung and Tondo, PrentECE Hall.

Reference Book:

1. Data Structure and Algorithms in Java, Robert Lafore, Sams.

ICE275: Operating Systems

Credit Hours and Teaching Scheme:

	Theory	Laboratory	Total
Credit Hours	3	0	3
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week		3 Hours/Week for 13 Weeks + Final Exam in the 14th week

Prerequisite: ICE 245 Algorithms

Course Objective: This course introduces the principles and techniques for the design and implementation of operating systems. This course also emphasizes the implementation of various techniques required for management, scheduling, allocation and communication of resources used in operating system. Knowledge of this course will be needed as prerequisite knowledge for future courses such as ICE469 Computer Architecture.

Course Contents: Basic concepts of operating system; Operating systems hardware interaction; Process and thread management; Inter process communication; Scheduling algorithms for multi-tasking; Mutual exclusion principles and deadlock handling; Memory and I/O management. Storage Management; Implementing file management;

Recommended Textbook:

1. Operating Systems: Design and Implementation, Andrew Tanenbaum and Albert S. Woodhull, Prentice Hall.

Reference Book:

1. Operating System Concepts, Silberschatz, Galvin and Gagne, Wiley.

ICE302: Computer Communications &Networks

Credit Hours and Teaching Scheme

	Theory	LABORATORY	TOTAL
Credit Hours	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks+ Final Exam in the 14th week	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks+ Final Exam in the 14th week

Prerequisite: ICE245 Algorithms

Course Objective: This course explores the field of computer networking and communication, emphasizing network architecture and software issue. Student will learn the basic performance and engineering trade-offs in the design and implementation of computer networks. Knowledge of the course will be needed as perquisite knowledge for future courses such as ICE 456 Wireless Networks, and ICE 441Wireless and Mobile Communications.

Course Contents: Use of computer networks, network hardware and software; Layering, reference models and their comparison. Theoretical basis for data communication, transmission media and impairments, IEEE802.3, switching systems. Design issues, framing, MAC address, error detection and correction, elementary and sliding window protocols, examples of data link layer protocols. Ethernet, data link layer switching. Routing algorithms, congestion control, QoS, internetworking, IPv4 and IPv6 addressing, subnetting, VLSM, NAT, CIDR. Transport service, elements of transport protocols, port address, TCP and UDP. Client/server model, peer to peer model, Email, DNS, HTTP, HTTPS, FTP.

The course includes lab work based on theory taught.

Recommended Textbook:

1 Computer Networks, Andrew S. Tanenbaum, Prentice Hall.

Reference Book:

1. Data and Computer Communications, Stallings, MacMillan.

ICE305: Database Systems

Credit Hours and Teaching Scheme:

	Theory	Laboratory	Total
Credit Hours	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks +Final Exam in the 14th week	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks +Final Exam in the 14th week

Prerequisite: ICE275 Operating Systems

Course Objective: This course introduces the fundamental concepts and practices of designing and implementing database system. It also enables the student to design and perform complex query operations on relational databases. It builds the capability of optimizing the databases efficiently by applying different techniques. Knowledge of this course will be needed as prerequisite knowledge for future courses such as ICE 476 Big Data Analytics etc.

Course Contents: Concept & Overview of DBMS, Data Models, Database Languages, Database Administrator, Database Users, Three Scheme architecture of DBMS. Basic concepts, Design Issues, Mapping Constraints, Keys, Entity-Relationship Diagram, Weak Entity Sets, Extended E-R features. Structure of relational Databases, Relational Algebra, Relational Calculus, Extended Relational Algebra Operations, Views, Modifications Of the Database. Concept of DDL, DML, DCL. Basic Structure, Set operations, Aggregate Functions, Null Values, Domain Constraints, Referential Integrity Constraints, assertions, views, Nested Sub queries, Database security application development using SQL, Stored procedures and triggers. Functional Dependency, Different anomalies in designing a Database., Normalization using functional dependencies, Decomposition, Boyce-Code Normal Form, 3NF, Normalization using multi-valued dependencies, 4NF, 5NF. File & Record Concept, Placing file records on Disk, Fixed and Variable sized Records, Types of Single-Level Index (primary, secondary, clustering), Multilevel Indexes, Dynamic Multilevel Indexes using B tree and B+ tree.

The course includes lab work based on theory taught.

Recommended Textbook:

1. Fundamentals of Database Systems, Elmasri and Navathe, Addison Wesley.

Reference Book:

1. Database System Concepts, Abraham Silberschatz, Henry Korth and S. Sudarshan, McGraw-Hill.

ICE310: Electromagnetic Theory

Credit Hours and Teaching Scheme:

	Theory
Credit Hours	3
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week

Pre-requisite: PHY 209

Course Objective:

Electromagnetics (EM) is the subject having to do with electromagnetic fields. An electromagnetic field is made up of interdependent electric and magnetic fields, which is the case when the fields are varying with time, that is, they are dynamic. An electric field is a force field that acts upon material bodies by virtue of their property of charge, just as a gravitational field is a force field that acts upon them by virtue of their property of mass. A magnetic field is a force field that acts upon charges in motion. EM is all around us. In simple terms, every time we turn a power switch on, every time we press a key on our computer keyboard, or every time we perform a similar action involving an everyday electrical device, EM comes into play. It is the foundation for the technologies of electrical and computer engineering, spanning the entire electromagnetic spectrum, from dc to light, from the electrically and magnetically based technologies to the electronics technologies to the photonics technologies. As such, in the context of electrical and computer engineering education, it is a very core and essential subject to learn Maxwell's equations and its applications so that they may also be used directly in the study Microwave Devices and Circuits, Antenna Systems and Radar. It is also important to understand light and its propagation characteristics.

Course Contents:

Electrostatics: Review of vector analysis & co-ordinate systems (Rectangular, Cylindrical and Spherical), Divergence and curl concepts, Divergence theorem, Stoke's theorem, Gauss's theorem and its application, electrostatic potential, Laplace's and Poisson's equations, energy of an electrostatics system, conductor and dielectrics.

Magnetostatics: Concept of magnetic fields, Ampere's law, Biot-Savart's law, Vector magnetic potential, energy of magnetostatic system, Mechanical forces and torques in electric and magnetic fields.

Maxwell's equations: their derivations, and continuity of charges, concept of displacement current, Boundary conditions, Time-varying and time-harmonic electromagnetic fields, Wave equations and its solutions, & Poynting's theorem, Propagation of uniform plane waves in lossy and lossless media.

Recommended Textbook:

2. Fundamental of electromagnetics, David K Cheng, Pearson.

Reference Books:

1. Advanced Engineering Electromagnetics, Constantine A Balanis, Wiley and Sons.

ICE312: Communications Theory

Credit Hours and Teaching Scheme:

	Theory	Laboratory	Total
Credit Hours	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks + Final Exam in the 14th week

Prerequisite: ICE 216 Signals & Systems

Course objective: The purpose of this course is to introduce the students to basic communication engineering. The students will be able to enhance their analyzing and problem-solving skills and apply them in their professional activities. Knowledge of this course will be needed as prerequisite for future courses such as ICE314 Digital Communications, ICE350 Information Theory & Coding, ICE441 Wireless & Mobile Communication and many others.

Course Contents: Stochastic Processes and Signals: Introduction; Definition of random processes and signals; Autocorrelation and cross correlation of random signals; Transmission of a random signal through a linear filter; Power spectral density functions of random signals; White noise; Stationarity; Ergodicity; Gaussian and Poisson processes; Narrow-band noise; Sine wave plus narrow-band noise. Continuous Wave Modulation and Noise: Introduction, Amplitude modulation and demodulation; frequency modulation and demodulation; Frequency-division multiplexing (FDM); Angle modulation; Noise in CW modulation systems; Noise in linear receivers; Noise in AM receivers; Noise in FM receivers; Phase-locked loop; Nonlinear effects in FM systems; Receiver model; Noise in DSB-SC receivers; Noise in SSB receivers; Noise in AM receivers; Noise in FM receivers. Pulse Modulation: Sampling process; Pulse-amplitude modulation; Time division multiplexing; Pulse-position modulation; Bandwidth-noise tradeoff; The quantization process; Pulse-code modulation; Noise consideration in PCM systems; Digital multiplexers; Linear prediction; Differential PCM; Delta modulation; Adaptive DPCM.

The course includes lab work based on theory taught.

Recommended Textbook:

1. Communications System, Simon Haykin, Wiley.
2. Modern Digital & Analog Communication Systems, Lathi.

Reference Book:

1. Digital Communications, John J. Proakis, McGraw Hill.

ICE313: Microprocessors & Interfacing

Credit Hours and Teaching Scheme:

	Theory	Laboratory	Total
Credit Hours	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks + Final Exam in the 14th week

Pre-requisite: ICE 217 Digital Electronics

Course Objective:

Nowadays computer plays an important role in office automation, control systems, robotics and in many other applications. Without a computer we cannot think of our life. The heart of the computer is the microprocessor. Microprocessor is also used in many other control systems starting from a simple room heater to sophisticated robotics or satellites.

This course is directed to provide students the knowledge of microprocessor and assembly language. This course also includes laboratory works on assembly language and interfacing of peripheral devices with microprocessor. Students will be able to gather theoretical and practical knowledge of microprocessor. After completion of this course students will be able to design microprocessor-based system and to pursue higher studies in microprocessor.

Course Contents:

Microprocessor: Evolution and internal architecture of Intel8086 microprocessor. Addressing Modes. Data Movement Instructions, Arithmetic and Logic Instructions, Program Control Instructions. Intel 8086 Hardware Specifications: Pin outs and pin functions, clock generators, bus buffering and latching, bus timing, minimum and maximum mode operation. Memory Interfacing. Basic I/O Interfacing, Programmable Peripheral Interfaces (8255, 8254, 8279, ADC, DAC controllers). 8259 Programmable Interrupt Controller. DMA controller. Introduction to Pentium and upgraded processors. Introduction to Microcontrollers.

The course includes lab work based on theory taught.

Recommended Textbook:

2. The Inter Microprocessors 8088/8088, 80186, 80286, 80386 and 80486: Architecture, Programming and Interfacing, Barry B. Brey, Prentice-Hall.

Reference Book:

2. Microprocessor and Interfacing, Douglas Hall, McGraw Hill.

ICE314: Digital Communications

Credit Hours and Teaching Scheme:

	Theory	Laboratory	Total
Credit Hours	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks + Final Exam in the 14th week

Prerequisite: ICE312 Communications Theory

Course Objective: The students will be able to understand the mismatch of bandwidth between baseband pulse train and the communication channel of limited bandwidth from the spectrum of line code. They will also be able to realize the Nyquist theorem of baseband signal using both sinc and raised cosine pulse train. Knowledge of this course will help them to design equalizer in avoiding nonlinear distortion of wired and wireless channel, as well as analyze different modulation schemes and coherent/non-coherent demodulations including matched filter detection.

Course Contents: Idea of baseband signal, Nyquist theorem of baseband signal and impulse response of such communication system, raised-cosine pulse in baseband communication, inter-symbol interference, eye diagram, power spectral density of different line codes, on-off binary transmission, the matched filter, properties of matched filter, linear and non-linear distortion channel, design of equalizer, concept of pass-band signal, digital modulation schemes (basic principle, modulator and demodulator, BER and constellation diagram): BFSK, BPSK, MPSK, QPSK and QAM, basic principle of OFDMA, PSD of analog band-pass and digital signals.

The course includes lab work based on theory taught.

Recommended Textbook:

1. Digital and Analog Communication Systems, Leon W. Couch; Pearson Education
2. Digital Modulation Techniques; FuqinXiong, Artech House, Boston, London

Reference Book :

1. Communication Systems, Simon Haykin, Wiley.
2. Modern Digital & Analog Communication Systems, Lathi.

ICE322: Digital Signal Processing

Credit Hours and Teaching Scheme:

	Theory	Laboratory	Total
Credit Hours	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks + Final Exam in the 14th week

Prerequisite: ICE216 Signals & Systems

Course Objective: The objectives of this course are to make the concepts of students clear about discrete time signals and systems along with transform the signal in z-domain of complex plane to simplify the expression of time domain signal and extract the properties of a system. Again, they will be able to realize the spectrum of discrete time signal using DFT and design of FIR and IIR filter and filtering of signal also design of adaptive filter and de-noising of signal.

Course Contents: The z-transform: z-transform and ROC, properties of z-transform, analysis of LTI systems using z-transform; Discrete Fourier Transform: DFT and its inverse operation, circular and linear convolution using DFT; Fast Fourier Transform (FFT); IIR filter: Realization of IIR filters, direct form I and II, cascade and parallel, poly-phase decomposition, digital IIR filter design by bilinear transformation; FIR filter: frequency sampling structure, digital FIR filter design using window functions; Finite word length effect in digital filter; Multirate digital signal processing; Concept of adaptive filter.

The course includes lab work based on theory taught.

Recommended Textbook:

2. Digital Signal Processing, John G. Proakis, Prentice Hall.

Reference Book:

4. Digital Signal Processing, Tarun Kumar Rawat, Oxford University Press.
5. Digital Signal Processing a Practical Approach, Emmanuel C. Ifeachor. Barrie W. Jervis; Addision-Wesley.
6. Digital Signal Processing a Computer Based Approach, Sanjit K. Mitra; Tata McGraw-Hill.

ICE370: Applied Numerical Methods

Credit Hours and Teaching Scheme:

	Theory	Laboratory	Total

Credit Hours	3	0	3
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week	0	3 Hours/Week for 13 Weeks + Final Exam in the 14th week

Pre-requisite: MAT205

Course Objective:

To teach basic numerical methods required for typical engineering and business applications. Give students experience in understanding the properties of different numerical methods so as to be able to choose appropriate methods and interpret the results for engineering problems that they might encounter. Students will implement and study some of the numerical methods using MATLAB or some other high-level language. Emphasis is given to the graphical representation of results.

Course Contents:

Basic Concept: Approximations and round-off errors, truncation errors.

Root of Equations: Bracketing methods – Bisection methods, Open methods – Newton-Raphson method.

Linear Algebraic Equations: Gauss Elimination – Naive Gauss, Gauss-Jordan. LU-decomposition, Gauss-Seidal method.

Curve Fitting: Least-square regression – Linear regression, polynomial regression. Interpolation – Newton divided-difference interpolating polynomials, Spline interpolation.

Numerical Differentiation and Integration: Newton-cotes integration formulae – Trapezoidal rule, Simpson's rules, Numerical differentiation – Richardson Extrapolation, Derivatives of unequal spaced data.

Ordinary Differential Equation: Runga-Kutta Methods – Euler's method.

Recommended Textbook:

1. Advanced Engineering Mathematics, E. Kreyszig, John Wiley.

Reference Book:

3. Numerical Methods for Engineers, Steven C. Chopra and Raymond P. Canale.
4. Engineering Mathematics, Neil, Thomson Learning.

ICE401: VLSI Circuit Design

Credit Hours and Teaching Scheme:

	Theory	Laboratory	Total
Credit Hours	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks + Final Exam in the 14th week

Pre-requisite: ICE313

Course Objective:

The main objective of this course is to provide the fundamental knowledge of VLSI Circuit Design. The knowledge will help the students (i) to understand the VLSI courses in the post-graduate studies at home and abroad, (ii) to pursue research in VLSI Circuit at home and abroad and (iii) to work in VLSI industries.

Course Contents:

Review of semiconductor physics pertinent to VLSI design, NMOS and PMOS transistors, transistors as switches, CMOS inverters, NAND and NOR gates, cross section of an inverter, inverter mask sets, fabrication steps, simplified design rules, stick diagram, layout, CMOS circuit design, gate level and transmission gate based multiplexers, multiplexer based design, CMOS latches and flip-flops as basic building blocks of sequential circuit, standard cell layout, area estimation from stick diagram and layout, VLSI design flow, logic design, circuit design, physical design, structured design approach, design partitioning, hierarchical design, Verilog code at behavioral and structural level, gate level and transistor level netlist, CMOS transistor theory, cut-off, linear, saturation, non-ideal transistor behavior, mobility degradation, velocity saturation, channel length modulation, body effect on threshold voltage, subthreshold, gate and junction leakage, effect of process and environmental variation, pass transistor, dc and transient response, logic levels and noise margins, RC delay models, delay estimation, logical effort and parasitic delay, delay in multistage logic networks, dynamic and static power, activity factor, low power circuit design, pseudo-NMOS, dynamic and domino logic family, adders, six transistor static and four transistor dynamic memory cell, sense amplifier.

The course includes lab work based on theory taught.

Recommended Textbook:

1. CMOS VLSI design: A Circuit and System Perspective by Neil H. E. Weste, David Harris &Ayan Banerjee, Pearson Education, 4th Edition.

Reference Book:

3. Basic VLSI Design (3rd Edition) by Douglas A. Pucknell and Kamran Eshragian, Prentice Hall.

ICE434: Microwave Engineering

Credit Hours and Teaching Scheme:

	Theory	Laboratory	Total
Credit Hours	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks +Final Exam in the 14th week	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks +Final Exam in the 14th week

Prerequisite: ICE310 Electromagnetic Theory

Course Objective: The purpose of this course is to introduce the students with basic communication engineering. The students will be able to enhance their analyzing and problem-solving skills and apply them in their professional activities. Knowledge of this course will be needed as prerequisite for future courses such as ICE314 Digital Communications, ICE350 Information Theory & Coding, ICE441 Wireless & Mobile Communication and many others.

Course Contents: Review of Maxwell's equations and transmission line theory, circuit models. Microwave network analysis: Scattering matrices and multiport analysis techniques. Impedance Matching: Design of matching networks including lumped elements, stubs and transmission line sections, circuit tuning. Passive Components: Theory of operation, practical design and implementation of power dividers, directional couplers and hybrids, resonators as well as system applications of these devices. Noise and distortion in RF Systems: Theory of noise in RF circuits, distortion of RF signals, dynamic range limitations, effects on channel capacity. Active Circuits: Theory of operation, practical design and implementation of amplifiers for low-noise or power applications, detectors,

mixers; Overview of microwave tubes and solid state devices. Non-reciprocal Devices: Theory of operation and implementation of isolators, circulators and variable attenuators and phase shifters. Microwave Systems: Receiver and system performance calculations, RF link analysis, end-to-end microwave system ("the physical channel") analysis. Applications: Antennas, propagation and microwave filter synthesis.

The course includes lab work based on theory taught.

Recommended Textbook:

1. Foundations for Microwave Engineering, R. E. Collin. McGraw Hill.

Reference Book:

1. Fields and Waves in Communication Electronics, S. Ramo, J.R. Whinnery, Wiley.

ICE 439: Engineering Ethics

Credit Hours and Teaching Scheme:

	Theory
Credit Hours	3
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week

Pre-requisite: ENG102

Course Objective:

Engineers have a core responsibility to serve society and work for the betterment of the world. Throughout their careers, they are faced with ethical issues many a times, and the decisions they take may adversely affect the world, or a part of the world. It is often difficult to understand the morally right course of action, and ethical decision making requires more than having an enlightened sense of right and wrong. Engineers must be sensitive to ethical issues for the continuing professional development in their careers. It is, therefore, essential that modern day engineers have a clear understanding of how engineers should interact with the society, and the impacts of engineering decisions on the society and environment. This course aims to (i) sensitize students to ethical issues in engineering, (ii) develop an appreciation of the ethical responsibilities of engineers, and (iii) equip students with the necessary skills required for ethical decision making.

Course Contents:

Introduction: Engineering philosophy, engineering ethics and professionalism, ethical terminology. Ethical Issues in Engineering: Understanding ethical problems, qualities of engineers, moral codes. Responsibilities of Engineers: Commitment to society, sustainable development, technology and society, risk, safety, and liability. Institutional Ethics: Code of ethics, key concepts, importance, limitations. Rights of Engineers: Workplace rights, whistle blowing. Professionalism for International Engineers: Challenges of globalization.

Recommended Textbook:

1. Engineering Ethics, Charles B. Fleddermann, Pearson.

Reference Book:

1. Introduction to Engineering Ethics (Basic Engineering Series and Tools), Mike Martin and Roland Schinzinger.

ICE 441: Wireless & Mobile Communications

Credit Hours and Teaching Scheme

	Theory	Laboratory	TOTAL
Credit Hours	3	0	3
Contact Hours	3 Hours/Week for 13 Weeks+ Final Exam in the 14th week	0	3 Hours/Week for 13 Weeks+ Final Exam in the 14th week

Prerequisite: ICE314 Digital Communications

Course Objective: The purpose of this course is to introduce the students to basic communication engineering. The students will be able to enhance their analyzing and problem-solving skills and apply them in their professional activities. Knowledge of this course will be needed as prerequisite knowledge for future courses such as ICE350 Information Theory & Coding and many others.

Course Contents: Radio propagation characteristics: models for path loss, shadowing and multipath fading; delay spread, coherence bandwidth, coherence time, Doppler spread; Jake's channel model. Digital modulation for mobile radio: analysis under fading channels; diversity techniques and RAKE demodulator. Introduction to spread spectrum communication. Multiple access techniques: FDMA/TDMA/CDMA. The cellular concept: frequency reuse; basic theory of hexagonal cell layout, spectrum efficiency. FDMA/TDMA cellular system; channel allocation schemes. Handover analysis. Cellular CDMA; soft capacity. Erlang capacity comparison of FDM/TDM systems and CDMA. Discussion of GSM standards; signaling and call control; mobility management; location tracing. Wireless data networking, packet error modeling on fading channels, performance analysis of link and transport layer protocols over wireless channels; wireless data in GSM, IS-95, GPRS and EDGE.

Recommended Textbook:

1. Modern Wireless Communications, Simon Haykin and Michael Moher, Pearson Education.
2. Wireless Communications & Networking, J.W. Mark and W. Zhauang, Pearson Education Inc., 2005.

Reference Book:

1. Wireless Communications: Principles and Practice, Theodore S. Rappaport, Prentice Hall.

ICE 442: Optical Fiber Communications

Credit Hours and Teaching Scheme:

	Theory	Laboratory	Total
Credit Hours	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks + Final Exam in the 14th week

Pre-requisite: ICE310, ICE314

Course Objective:

The objective of this course is to provide the students with a comprehensive understanding over the fundamentals of operation and partial design concept of optical fiber communication links and the elements used in such links through the study of basic components to establish optical fiber-based communication system and its transmission characteristics.

Course Contents:

Overview of fiber optic communication systems: evolution, nature of light, advantages and applications, Characteristics of optical transmission media. Optical fibers: propagation and transmission characteristics, loss and dispersion mechanisms. Nonlinear Characteristics.

Optical sources: principles of operation, modulation characteristics and driver circuits.

Photo detectors: principles of operation, circuits and performance.

Fiber optic connectors, couplers, multiplexers and splices, wavelength converters, routers, optical amplifiers, post detection amplifiers, Fiber optic communication systems and link budget using direct detection. Coherent and WDM systems. This course includes lab works based on theory taught.

The course includes lab work based on theory taught.

Recommended Textbook:

1. Optical Fiber Communications: Principle and Practice, John M. Senior, Prentice Hall.

Reference Books:

2. Gerd Keiser, Optical Fiber Communications, third edition, McGraw Hill, 2000
3. Fiber-Optic Communication Systems, 4th Ed., G. P. Agrawal, John Wiley & Sons, 2010.
4. Understanding Optical Fiber Communications, A.J. Rogers, Artech House Publishers.

ICE446: Satellite Communication

Credit Hours and Teaching Scheme:

	Theory	Laboratory	Total
Credit Hours	3	0	3
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week		3 Hours/Week for 13 Weeks + Final Exam in the 14th week

Prerequisite: ICE 441 Wireless and Mobile Communications

Course Objective: The purpose of this course is to introduce the students with satellite communications engineering. The students will be able to enhance their analyzing and problem-solving skills and apply them in satellite communications engineering activities like TV, Radio, weather broadcast and especially for defense and security purposes.

Course Contents: Orbits: Kepler's laws, Newton's law, orbital parameters, inclined orbits, geostationary orbit. space environment: mechanical effects, atmospheric effects (radiation, ionospheric effects, rain attenuation), polarization, propagation. link analysis: equivalent isotropic radiated power, received signal power, noise power at the receiver input, the uplink, the downlink, station-to-station link. Satellite access: FDMA, TDMA, CDMA, fixed and on-demand assignment, random access, inter-satellite links. Earth stations: standards, antennas, radio frequency subsystem, communication subsystem, network interface subsystem. the payload: transparent repeaters, multi-beam satellite repeater, regenerative repeater, antenna characteristics. The platform: the propulsion

system, the power supply (solar power satellites), telemetry, tracking and command, thermal control. Satellite installation: installation in orbit, launch vehicles, reliability issues, cost issues and network.

Recommended Textbook:

1. Satellite Communications, D. Roddy, McGraw-Hill Professional.

Reference Book:

1. Satellite Communication System, M. Richharia, McGraw-Hill.

ICE448: Information Theory & Coding

Credit Hours and Teaching Scheme:

	Theory	Laboratory	Total
Credit Hours	3	0	3
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week		3 Hours/Week for 13 Weeks + Final Exam in the 14th week

Prerequisite: ICE 314 Digital Communications

Course Objective: The purpose of this course is to introduce the students to information theory & coding. The students will be able to enhance their analyzing and problem-solving skills and apply them for solving real world problems. Knowledge of this course will be needed as prerequisite knowledge for future courses such as ICE441 Wireless & Mobile Communication, ICE452 Multimedia Communications and many others.

Course Contents: Information Theory: Uncertainty, information and entropy; Source coding theorem; Discrete memoryless channels; Mutual information; Channel capacity; Channel coding theorem; Differential entropy and mutual information for continuous ensembles; Information capacity theorem; Rate distortion theory. Error Control Coding: Introduction to error control coding; Review of elements of linear algebra and set theory; Block coding and decoding - algebraic; Cyclic and RS codes; Performance of block codes; Convolution coding and decoding; Types of codes and their properties; Majority logic; Sequential and Viterbi decoding; Interleaving; Multi-stage coding techniques; Punctured and Turbo codes; TCM; System application examples; Basic of data (Image) Compression, Idea of cryptography.

Recommended Textbook:

1. Communication Systems, Simon Haykins, Wiley.
2. Modern Digital & Analog Communication Systems, Lathi.

Reference Book:

1. Digital Communications, John J. Proakis, McGraw-Hill.

ICE452: Multimedia Communications

Credit Hours and Teaching Scheme:

	Theory	Laboratory	Total
Credit	3	0	3

Hours			
Contact Hours	3 Hours/Week for 13 weeks+ Final Exam in the 14th week		3 Hours/Week for 13 weeks+ Final Exam in the 14th week

Prerequisite: ICE322 Digital Signal Processing

Course Objective: The purpose of this course is to introduce the students to multimedia communications. The students will be able to enhance their analyzing and problem-solving skills and apply them in their professional communications engineering activities.

Course Contents: This course introduces technologies for multimedia communications and will address how to efficiently represent multimedia data, including video, image, and audio, and how to deliver them over a variety of networks. In the coding aspect, state-of-the-art compression technologies will be presented. Emphasis will be given to a number of standards, including H.26x and MPEG. In the networking aspect, special considerations for sending multimedia over ATM, wireless, and IP networks, such as error resilience and quality of service, will be discussed. The H.32x series, standards for audiovisual communication systems in various network environments, will be described. Current research results in multimedia communications will be reviewed through student seminars in the last weeks of the course. The internet browsing principle along with the procedure of Messenger and Viber mechanism.

Recommended Textbook:

1. Multimedia Communication Systems: Techniques, Standards, and Networks,Rao, Bojkovic& Milovanovic, Prentice Hall.

Reference Book:

1. Multimedia Communications: Protocols and Applications, Kuo, Garcia Luna-Aceves &Effelsberg, Prentice Hall.

ICE453: Computer and Cyber Security

Credit Hours and Teaching Scheme:

	Theory	Laboratory	Total
Credit Hours	3	0	3
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week		3 Hours/Week for 13 Weeks + Final Exam in the 14th week

Prerequisite: ICE 302 Computer Communications and Networks

Course Objective: This course builds up the fundamental concepts of cryptography, computer security and cyber security. Standard methodologies and tools for the evaluation and application of organizational security policies related to confidentiality, integrity and availability will also be covered.

Course Contents: Fundamental concepts of computer security. Well known attack types and vulnerabilities. Social engineering attacks. Cryptography and classical cryptosystems. Authentication protocols and public key infrastructure. IPSec, VPNs, E-Commerce issues. Security evaluation and auditing of networked system. Intrusion Detection, Prevention, Response, Containment (Digital forensic evidence) and Disaster Recovery. Network defense tools: Firewalls, VPNs, Intrusion Detection, and filters.

Recommended Textbook:

1. Computer Networks, Andrew S. Tanebaum, Pearson Education.

2. Data Communications and Network Security, Houston H. Carr and Charles Snyder, Mc Graw Hill.

Reference Book:

1. Cryptography and Network Security, William Stallings, Prentice Hall.

ICE469: Computer Architecture

Credit Hours and Teaching Scheme

	Theory	Laboratory	TOTAL
Credit Hours	3	0	3
Contact Hours	3 Hours/Week for 13 Weeks+ Final Exam in the 14th week	0	3 Hours/Week for 13 Weeks+ Final Exam in the 14th week

Prerequisite: ICE 275 Operating System.

Course Objective: The objective of this course is to study the structure, behavior, and characteristics of computer systems. This course will exhibit the design of various functional units of digital computers, discuss different types of memories and their properties, and introduce basics of parallel computer architecture.

Course Contents: Computer arithmetic: ALU, Integer representation and arithmetic and floating-point representation, computer memory system: main memory, cache memory, Instruction sets: Machine instruction, operands, and operations, instruction sets: addressing modes and addressing format. RISC instruction set architecture, CPU design: hardwire control and microprogrammed control, Input/Output: external devices, I/O modules, Programmed I/O, Interrupt driven and DMA, pipelining, multiprocessors.

Recommended Textbook:

1. Computer Organization & Design, David A. Patterson and John L. Hennessy, Morgan Kaufmann.

Reference Book:

1. Structured Computer Organization, Andrew Tanenbaum, Prentice Hall

ICE471: Network Programming

Credit Hours and Teaching Scheme

	Theory	Laboratory	TOTAL
Credit Hours	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks+ Final Exam in the 14th week	2 hours/week for 13 weeks	5 Hours/Week for 13 Weeks+ Final Exam in the 14th week

Prerequisite: ICE 302 Computer Communications & Networks.

Course Objective: The objective of this course is to cover the practical aspects of computer network programming, with emphasis on the internet. The goal is to introduce the students to the basics of computer networks and the internet programming. The course will

introduce the students to the TCP /IP protocol stack and some of its important protocols, multi-tier application development and RPC technologies including RMI, COBRA, EJB, and Web services.

Course Contents: Introduction to networking and internet protocols, Complete coverage of the Java networking and I/O APIs, Details of multithreading and exception handling, Byte, Character, Object and Message streams, IP, TCP, UDP, Multicast, HTTP, DNS, RMI, CORBA and Servlets, Fingers, DNS, HTTP, and ping, Clients and Servers, Multiprotocol chat systems and whiteboards

The course includes lab work based on theory taught.

Recommended Textbook:

1. Java Network Programming, Elliotte Rusty Harold, O'REILLY Media.

Reference Book:

1. An Introduction to Network Programming with Java, Jan Graba.

ICE472: Speech & Image Processing

Credit Hours and Teaching Scheme

	Theory	Laboratory	Total
Credit Hours	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks+ Final Exam in the 14th week	2 Hours/Week for 13 Weeks.	5 Hours/Week for 13 Weeks+ Final Exam in the 14th week

Prerequisite: ICE 322 Digital Signal Processing.

Course Objective: The course is an introduction to digital speech and image processing, analysis techniques and concepts. Topics include intensity transformations for image enhancements, two-dimensional discrete Fourier Transform, spatial and frequency domain linear and non-linear image filtering, binary image processing, edge detection, image segmentation, and digital video processing basics. Linear predictive coding for speech processing, pattern matching through dynamic programming, Hidden Markov model for training.

Course Contents: Speech Processing: Human speech communication - Speech production/ perception/linguistics. Time-Varying Signal Analysis: Short-time Fourier transform, Gabor transform, spectrograms. Quasi-Stationary Analysis: Cepstrum, linear-prediction (AR) and ARMA models. Feature Space Formulation: Mixture-Gaussian model, Fischer discriminant measure, feature transformations - linear and nonlinear. Maximum likelihood classification and pattern matching through dynamic programming; Hidden Markov modeling of speech.

Image Processing: Why Image Processing? Digital image fundamentals, Image transform, Image enhancement, Image restoration, Image compression, Image segmentation, Representation and description, Recognition and interpretation.

The course includes lab work based on theory taught.

Recommended Textbook:

1. Digital Image Processing, Rafael C. Gonzalez, Richard E, Prentice Hall
2. Circuits, Signals and Speech and Image Processing, Richard C. Dorf, CRC Press

Reference Book:

1. Digital Image Processing Algorithms and Applications, Ioannis Pitas, Wiley-Inter-science.

ICE473: Project Management, Entrepreneurship and Industry Interaction

Credit Hours and Teaching Scheme:

	Theory
Credit Hours	3
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week

Prerequisite: All 300 level courses

Course Objective:

To work in the industry environment, an information and communications engineer needs concepts of project management and skills of project planning, monitoring, and evaluation. The course aims to expose students to project management principles and their applications to Electrical Engineering projects.

Course Contents:

General principles, process, and tools of project management. Teamwork and communication. Strategic issues in project management, cost analysis, risk and crisis management. Practical consideration in implementing project management in the industry. Project monitoring and evaluation. Project documentation and reporting. Role of entrepreneurship in the society, personality characteristics of successful entrepreneurs, sources of ideas for new ventures, sources of funding, development of the business plan.

Recommended Textbook:

1. A Guide to the Project Management Body of Knowledge, Project Management Institute.

Reference Book:

1. An introduction to Project Management, Kathy Schwalbe.

ICE474: Computer Graphics & Visualization.

Credit Hours and Teaching Scheme

	Theory	Laboratory	TOTAL
Credit Hours	3	0	3
Contact Hours	3 Hours/Week for 13 Weeks+ Final Exam in the 14th week		3 Hours/Week for 13 Weeks+ Final Exam in the 14th week

Prerequisite: ICE 245 Algorithms.

Course Objective: The course focuses on all aspects of fundamental computer graphics, including 2D / 3D object representations, transformations, modeling, and rendering algorithms. The course also aims to provide a good foundation for OpenGL programming, which is a widely accepted standard for developing graphics applications. The course will assume a good background in programming

in C or C++ and a background in mathematics including familiarity with the theory and use of coordinate geometry and of linear algebra such as matrix multiplication.

Course Contents: Scientific Visualization: An Engineering Perspective; Overview of Computer Graphics for Visualization; Data Analysis for Visualization; Scalar Visualization Techniques; A Unified framework for flow Visualization; Continuous Volume Display; Animation and Examination of Behavior Over Time; System Aspects of Visualization Application, Visualization Geometry and Algorithm, Surface Extraction, Solid Representation Techniques, CSG, B-Rep, Octree, Modeling Complexity, Application of Visualization to design and Analysis, Research Issues using Solid Modeling for Visualization.

Recommended Textbook:

1. Graphics and Visualization: Principles & Algorithms, Georgios Papaioannou, Nicholas M. Patrikalakis, Nikolaos Platis, and Theoharis, CRC Press.

Reference Book:

1. Data Visualization, Principle and Practice, AlexandruTelea.

ICE476: Artificial Intelligence.

Credit Hours and Teaching Scheme

	Theory	Laboratory	TOTAL
Credit Hours	3	0	3
Contact Hours	3 Hours/Week for 13 Weeks+ Final Exam in the 14th week	0	3 Hours/Week for 13 Weeks+ Final Exam in the 14th week

Prerequisite: ICE 245Algorithms.

Course Objective: This course introduces the fundamental concepts and knowledge of Artificial Intelligence (AI) principles and techniques, the state-of-the-art models and algorithms used to solve problems. This course is also designed to expose students to the frontiers of AI-intensive computing, while providing a sufficiently strong foundation to encourage further research in machine learning. Knowledge of this course will be needed as prerequisite knowledge for future courses such as ICE 479 Robotic Engineering.

Course Contents: Intelligent agents: a discussion on what Artificial Intelligence is about and different types of AI agents Search: Searching as a problem-solving technique: a review of "conventional" searching methods including breadth-first, depth-first, bi-directional and best-first search. Heuristic functions and their effect on performance of search algorithms. Introduction to genetic algorithms. Knowledge Representation and Reasoning: Propositional Logic, First-Order Logic, Reasoning and Logical Inference. First-order logic as a basis for building intelligent agents capable of acting and reacting in a complex environment. Knowledge engineering: building knowledge bases and automated theorem proves. Production systems as an example of logical problem solving, Uncertain Knowledge: Bayes' Rule, Probabilistic Reasoning, Bayes Nets. Planning agents: representation of states, goals and actions. Learning: Supervised Learning, Unsupervised Learning, Reinforcement Learning.

Decision trees and the ID3 algorithm Applications of AI: Semantic Web. Philosophy of AI.

Recommended Textbook:

1. Computational Intelligence: An Introduction, Andries P. Engelbrecht, John Wiley

Reference Book:

1. Fuzzy Expert Systems and Fuzzy Reasoning, William Siler, James J. Buckley, John Wiley.

ICE478: Machine Learning

Credit Hours and Teaching Scheme

	Theory	Laboratory	TOTAL
Credit Hours	3	0	3
Contact Hours	3 Hours/Week for 13 Weeks+	0	3 Hours/Week for 13 Weeks+ Final Exam in the 14th week

Prerequisite: ICE 476.

Course Objective: This course will introduce the field of Machine Learning, in particular focusing on the core concepts of supervised and unsupervised learning. Students will learn the algorithms which underpin many popular Machine Learning techniques, as well as developing an understanding of the theoretical relationships between these algorithms. The hands-on exercise will concern the application of machine learning to a range of real-world problems.

Course Contents: Introduction to machine learning, Supervised learning setup, Linear prediction: Regression, Classification: Decision tree, Logistic regression, Probabilistic modelling: Bayesian method, Naive bias, Unsupervised learning: Clustering, Apriori, Principal component analysis, Clustering: Partitioning, Hierarchical, Artificial Neural Networks: perceptron, MLPs, back propagation, introduction to Deep learning, Support vector machines, Reinforcement learning and control.

Recommended Textbook:

1. Understanding Machine Learning: From theory to algorithms, Shai Shalev and Shai Ben-David, Cambridge University Press.

Reference Book:

1. Deep learning, Ian Goodfellow and YoshuaBengio and Aaron Courville, MIT Press Book.

ICE479: Robotic Engineering

Credit Hours and Teaching Scheme

	Theory	Laboratory	TOTAL
Credit Hours	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks+ Final Exam in the 14th week	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks+ Final Exam in the 14th week

Prerequisite: ICE 476 Artificial Intelligence.

Course Objective: The objective of this course is to introduce students to the field of Robotics and stimulate their interests through a variety of multidisciplinary topics necessary to understand the fundamentals of designing, and building, and programming robots. The course will address fundamental mathematical modeling of robots-kinematics, inverse kinematics, sensors and sensor processing algorithms, different control architectures, their management and programming strategies.

Course Contents: This course provides an overview of robot mechanisms, dynamics, and intelligent controls. Topics include planar and spatial kinematics, and motion planning; mechanism design for manipulators and mobile robots, multi-rigid-body dynamics, 3D

graphic simulation; control design, actuators, and sensors; wireless networking, task modeling, human-machine interface, and embedded software. Weekly laboratories provide experience with servo drives, real-time control, and embedded software.

The course includes lab work based on theory taught.

Recommended Textbook:

1. Handbook of Industrial Robotics, Shimon Y. Nof, 2nd Edition, John Wiley.

Reference Book:

1. An Introduction to AI Robotics, Robin R. Murphy, MIT Press.

ICE483: Data Science

Credit Hours and Teaching Scheme

	Theory	Laboratory	TOTAL
Credit Hours	3	0	3
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week	0	3 Hours/Week for 13 Weeks+ Final Exam in the 14th week

Prerequisite: ICE476 Artificial Intelligence

Course Objective: The objective of the course is to introduce the basic concepts of data mining techniques to students. The course focuses on examining the type of data to be mined and applying preprocessing methods to raw data. The course emphasizes on discovering interesting patterns, analyzing supervised and unsupervised models and estimating the accuracy of the algorithms. The students will also be introduced to various data mining tools.

Course Contents: Introduction to data mining, data mining goals, stages of the data mining process, data mining techniques, knowledge representation methods, data preprocessing: data cleaning, data transformation, data reduction, data mining knowledge representation, representing input data and output knowledge, association rules, correlation analysis, classification rules, correlation analysis, classification, basic learning/mining tasks, decision trees, covering rules, prediction, prediction task, statistical classification, distance-based methods, linear models, clustering system, hierarchical methods, conceptual clustering, advanced techniques, data mining software and applications, text mining, web mining.

Recommended Textbook:

1. Data Science from Scratch: First Principles with Python, Joel Grus, O'Reilly Media.

Reference Book:

1. Data Science (MIT Press Essential Knowledge series), John D. Kelleher, Brendan Tierney

ICE484: Cyber Ethics and Legal Framework

Credit Hours and Teaching Scheme

	Theory	Laboratory	TOTAL
Credit Hours	3	0	3

Contact Hours	3 Hours/Week for 13 Weeks+ Final Exam in the 14th week	0	3 Hours/Week for 13 Weeks+ Final Exam in the 14th week

Prerequisite: None.

Course Objective: The course builds up the concepts of ethical and legal framework in the context of computing and information technology. With in-depth analysis of several moral and legal issues related to computing and IT, this course prepares the student to act in compliance with the ethical and applicable legal frameworks, towards becoming a professional.

Course Contents: Computer and information ethics at Stanford Encyclopedia of Philosophy. ACM code of ethics and professional conduct. Software engineering code of ethics and professional practice. Data protection act, computer misuse act, impact of the computer misuse act. Copyright, designs and patents act, freedom of information act, security of internet communications. Bangladesh: Information and communication technology act of 2006 and its amendment in 2013. Bangladesh: copyright act of 2000. Bangladesh: telecommunication regulatory act of 2001. Pornography: pornography act of 2012.

Recommended Textbook:

1. Cyberethics, Spinello, Jones and Bartlett learning

Reference Book:

1. Investigating Cyber Law and Cyber Ethics: Issues, Impacts and Practices, Alfreada Dudley, James Bramen, and Giovanni Vincenti.

ICE485: Internet of Things

Credit Hours and Teaching Scheme

	Theory	Laboratory	TOTAL
Credit Hours	3	0	3
Contact Hours	3 Hours/Week for 13 Weeks+ Final Exam in the 14th week	0	3 Hours/Week for 13 Weeks+ Final Exam in the 14th week

Prerequisite: ICE 302 Computer Communications & Networks.

Course Objective: This course will cover the building blocks of Internet of Things (IoTs) and their characteristics. Domain specific IoTs and their real-world applications will be developed here. This course also will introduce the programming aspects of IoTs with a view towards rapid prototyping of complex IoT applications.

Course Contents: Introduction to IoT, basics of networking, communication protocols, sensor networks: machine-to-machine communications, interoperability in IoT: integration of sensor and actuators, implementation of IoT with programmable devices, software defined networking (SDN) for IoT: data handling and analytics, cloud computing, Fog computing: smart cities and smart homes, connected vehicles: smart grid, industrial IoT: agriculture, healthcare, activity monitoring, and related case studies.

Recommended Textbook:

1. Precision: Principles, Practices and Solutions for the Internet of Things, Timothy Chou, lulu.com

Reference Book:

1. Smart Internet of Things Projects, Agus Kurniawan

ICE496: Capstone Project

Credit Hours:6

Prerequisite: Students must complete at least 100 credits hours.

Course Objectives:

The main objective of the Capstone project is to create a platform for the students to get experience in finding acceptable solution of a practical open-ended Information and Communication Engineering design problem. During this project, the students are expected to learn how to manage a project, work in a team and to acquire soft skills.

Course Contents:

The Capstone project provides opportunity to the students to apply and integrate the knowledge and skills gathered through the earlier course works. Students will take the primary responsibility to identify, organize, plan and execute different tasks associated with the designing of a practical Information and Communication Engineering System or Component. Students will work on the projects in teams.

ISL 101: Introduction to Information Studies and Library Management

Credits: 3

Description

1. Defining data, information and knowledge, characteristics of information and knowledge, varieties of information, human information needs, information models and theories, economics of information.
2. Information and knowledge management, information management process, information processing, information access models, controlled vocabularies and natural language as information access tools.
3. Information Science: Concepts and scope of information science, information, definition, types, qualities or properties, parameters, role of information in the society, barriers to use of information.
4. Information Processing and Storage: Concepts, information creation process, methods of information processing, batch-processing systems, real-time processing systems, cognitive model of information processing, process of documentation.
5. Tools for organizing knowledge, role of standards in information environments, various documentation standards, metadata protocols – Machine Readable Catalogue (MARC), Common Communication Format (CCF), Dublin Core, etc. digital object identifiers, system contexts for knowledge organization.
6. Introduction to information sources and services, various printed tools for exploring information resources and their use, information services for users including Current Awareness Service (CAS), Selective Dissemination Service (SDI), routings of periodicals, reference services etc.
7. Information technology, components of a computer system-hardware and software, information management software tools, digital ready reference apparatus such as dictionaries, encyclopedias, almanacs, atlases, catalogues, computer databases etc.

ISL 102: Organization of Information

Credits: 3

Description

1. Bibliographical/technical reading of a book: reasons, purposes, process of doing it, bibliographical elements / information in manual and automated catalogues.
2. Basic concepts of catalogue and cataloguing: Definition, purpose, functions of catalogue, Characteristics of an ideal catalogue, Outer or physical forms, comparative studies, Inner forms, types and kinds, merits and demerits of classified and dictionary catalogues.

3. Subject headings Sears List: Definition, Functions, requirements, and use in catalogue, bibliography, index, etc., Steps to subject determination, principles of subject determination, Choice, Kinds and types.
4. Basic elements of automated cataloguing: MARC format, variable data fields, tags of USMARC 3 format, Development of Online Public Access Catalogue (OPAC).
5. Introduction to Dewey Decimal Classification (DDC) and Library of Congress Classification (LC) schemes: Main classes / 1st and 2nd summary, tables, formation of area notation, Standard subdivisions and reasons for form classes / subdivisions in language and literature, Hierarchical structure, Mnemonic values in DDC, Main classes / structure / synoptically outlines of LC, merits, demerits.
6. Purpose, usefulness and functions of classification.
7. Principles of classifying books, analysis of Merrill's principles.
8. Notation, definition, functions, usefulness and criteria of good notation
9. The index: Types of index, use of specific and relative indexes.
10. Resource Description and Access (RDA)

ISL 103: Information and Society

Credits: 3

Description

1. Society, culture and civilization, evolution of society, development of the concepts of culture, civilization, society etc. Models of society, elements of society, structural context of socialization etc
2. Basic understanding of social organizations and institutions, various social institutions, functions and scopes of social institutions, elements and boundaries of social systems etc.
3. Society and the library, growth of social organizations and the need for reading, writing and printing, history of learning, evolution of libraries in the society.
4. Historical development of libraries in various civilizations, ancient and medieval libraries of Asia, Africa and Europe.
5. Library as a social, cultural and democratic institution in the society, relationship of libraries with other social institutions, changing role of libraries in the society.
6. Socio-economic implications of information, information society, ethics of information, intellectual property rights and related issues.
7. Information and its implications in today's society, information for development, information management, changing trends of information and its use for social development.
8. Technological dimensions of information, information and communication technologies, digital divide, role of Introduction to Information and Communication Technology (ICT) in development.
9. Communication, communication and its characteristics, significance of communication, mode of communication, communication theories, different types of communication, role of communication in society.
10. Elements of information communication, library as a center of social communication, changing roles of libraries and information centers in the society, communication process in developed countries and its application in developing societies including Bangladesh.

ISL 104: New Technologies and Current Trends in Information Science

Credits: 3

Description

1. Use and applications of ICT in different fields of library and information institutions in Bangladesh, impact of ICT in library and information systems, current trends and existing situation, problems and prospects of using ICT in Bangladesh.
2. Digital library, concepts, necessity, functions, characteristics, major activities and skills of digital librarianship, digital library scenario in Bangladesh.

3. Electronic journal, conceptual issues, categorization of e-journals, necessity of e-journals in Bangladesh, comparison between print journals and electronic journals, merits and demerits of e-journals, barriers of e-journals subscription in Bangladesh and the measures to overcome the barriers.
4. Classification of Library Software and Introduction of some application software used for the library and information center in Bangladesh
5. Integrated Library System software, Classification, features, Open Source and Proprietary software
6. Digital Library Software, Scope of digitization, Comparison for some Open Source and Proprietary digital library and repository software
7. Federated Search System, Necessity, functions and discussion about some software.
8. Remote Access Software, concept, functions, importance and comparison about some remote access software and service, MyAthens, EZproxy, etc.
9. Practical applications of Office Application software in Library, Open Office, and Microsoft office package etc.
10. Concept, Function, procedure, need Assessment and elements of Radio-frequency identification (RFID) technology, Consideration for Implementation of RFID system in Libraries
11. Information superhighway, definition, components, user groups, importance, advantages and disadvantages of information superhighway. Worldwide web, internet, web browser (Internet Explorer, Netscape Navigator etc.), web pages, website
12. Web Technology, languages for web development, Content Management system.

ISL 201: Information Resources Development

Credits: 3

Description

1. Book Selection, overview, book selection and librarianship, professional apex in librarianship, complexity of selection task.
2. Library mission statement, purpose and functions of selection, selection aims and objectives. Special reference to Ranganathan's Five Laws of Library Science and their relation to resource development.
3. Acquisition policy, book ordering and subsequent activities. Role of book selector, qualities of a good book selector
4. Library resource building and theories, selection principles advocated by: Drury, Dewey, Haines, Ranganathan, McColvin, Spiller, John Bonk and Magrill and others.
5. Evaluation and selection, an overview, selection of books, fiction and non-fiction books, and their evaluation criteria.
6. Selection principles and practices in public library, academic library, special library, national library.
7. Selection of reference books, periodicals, pamphlets, newspapers, Govt. publications, poster, report literature etc.
8. Selection of audio and visual materials, graphic materials, and microform materials, selection of multimedia and electronic resources.
9. Role of book reviews, written and oral reviews, role of bibliographies, national and trade bibliographies and indexing and abstracting journals.
10. Copyright Law, overview, need and functions, Bangladesh Copyright Law of 2000.
11. Weeding library materials, overview, criteria of weeding in different types of libraries.
12. Censorship, overview, library bill of rights American Library Abscission (ALA), IFLA principles, and article 19 (UN).
13. Book Selection tools: Bangladeshi aids and guides, Boi, Bangladesh National Bibliography, Bangladesh books in print, Publishers' lists, and catalogues, Major international aids and guides, British National Bibliography (BNB), Cumulative Book Index (CBI), Publishers Weekly, PTLA, LC catalogue, BNB, INB, Books in print.
14. Collection evaluation, overview, evaluation criteria by Stone, and Evans, Other methods of collection evaluation.
15. Definition, importance, scope and trends of Intellectual Property Right (IPR) and plagiarism.

ISL 202: Information Users and their Needs

Credits: 3

Description

1. Information Users: Identification of Users, Concept of Need, Want, Demand & Requirement, Users Categories: Planners, Policy Makers, Managers, R&D Personnel, People at Grass Root, Information Seeking Behavior of Different User Groups
2. Use of Information: Use of Information in Management activities, Use of Information in Decision Making, Use of Information in Research and Development (R & D), Role of Information in Raising the Standards & Quality of Life
3. User Studies: Scope and Content of User Studies, Studies by Types of Libraries: Different User Groups, Different Disciplines, Critical Review of Some Large Scale User Studies
4. Methodology of User Studies: Qualitative & Quantitative Paradigm, Data Collection Methods

   Other Specific Technique – Scenario Analysis, Interaction Analysis, Delphi Method and Repertory Grids, Evaluation of User Survey
5. User Education and Information Literacy: Concept & Importance of Information Literacy, Health Information Literacy, Media and Information literacy, Digital Literacy etc.
6. User Satisfaction: Measurement of User Satisfaction, Suggestion collection, Development of User service based on User Suggestion and Feedback
7. Models of information-seeking behaviors.

ISL 203: Management of Information Institutions

Credits: 3

Description

1. Introduction to organization, management and administration: Differences in organization, management and administration, Fayol's classical school: Adoption of Fayol's principles of library, System school: theories of Fayol, Max Weber, Urwick, Luther, Gulick: POSDCORB, Management by objectives (MBO): Peter Drucker, G. Odiorne.
2. Organization: Concepts, different patterns of organizational structure, line organization, staff organization, line and staff organization and functional organization etc.
3. Different types of libraries and their functions: Differences in the site, objectives, size, resource, staff, clientele, and management in different types of libraries, national, public, academic and special libraries
4. Internal organization of library operations and services: Acquisition, technical services and readers services, reference services and charging system: manual and online, Library committee: definition, types, functions and responsibilities, Library rules and regulations, Annual report, library statistics, Weeding.
5. Personnel management: Factors for ideal management: staff strength, principles and standards for selection and appointment, staff management, staff relations, working conditions. Salaries, job description
6. Financial management: Sources of income and heads of expenditure, Budget and budgeting, preparation of budget, Relationship between budgeting and reporting.
7. Planning of information institutions: Pre-requisites, rules, planning architecture and design in Bangladesh, Space organization and floor plan, Elements of planning.
8. Principles of planning: Site selection, Interior and exterior, Open access vs. closed access, Furniture, equipment, heating air-conditioning.

ISL 204: Information Sources and Services

Credits: 3

Description

1. Meaning of information and reference service, objectives and scope, distinction between information and reference service, referral service and document delivery service.

2. Kinds of information services and delivery techniques reference questions-types and representative sources of information. Question handling techniques
3. Sources of information: documentary and non-documentary, primary, secondary, tertiary and mixed group of sources, reference materials, encyclopedias, dictionaries, almanacs, handbooks, manuals, gazetteers, biographical sources, etc. Information sources in different disciplines, science and technology, humanities, social sciences, business, health sciences, government publications, and their evaluation.
4. Information services, nature of information services, distinction from reference and other services, techniques of providing information services, technology based information services, access to remote information sources and retrieval techniques, electronic document delivery, recent trends of information and reference services in different types of information institutions in developed world.
5. Technology-based information services, recent trends of reference and information services in different types of libraries and information institutions in developed world.
6. E-Information Services in Digital Era: E-information and digital information: concepts, sources, benefits, telecommunication based information services, concepts, types, importance, electronic mail, electronic publishing, internet, WWW (Worldwide Web), network based information services.
7. E-commerce and its application to library and information services.
9. Bibliographical control, nature, importance and scope, tools of bibliographic control and their utilities, national bibliographies, trade bibliographies, information systems, remote digital databases, library catalogues, universal bibliographies, bibliography of bibliographies, bibliographic control efforts such as University of British Columbia (UBC), Universal Availability of Publications (UAP) of IFLA, United Nations International Scientific Information System (UNISIST), General Information Program (PGI), United Nations Educational, Scientific and Cultural Organization (UNESCO), role of national bibliographic centers in bibliographic control in developed countries, bibliographic control efforts in Bangladesh existing situation, problems and prospects.

ISL 205: Writing, Editing and Publishing

Credits: 3

Description

1. Writing: types, models of writing process, reading and comprehending topic and theme to be expressed, note taking and arranging notes; determining and shaping purpose and audiences. Setting up audience, special considerations for argument and persuasion, deciding what to say.
2. Form and arrangement: Collection and organization of data and structure of writing. Building paragraph, revising a paragraph, shaping sentence, achieving sentence maturity, order of sentences. Using words effectively, style for quotations, footnotes, references and bibliographies. Rules for punctuation, illustration, notes and footnotes citing public documents.
3. Critical writing: Approaching, developing arguments, mode of arguments; techniques of writing short communications, technical article, review article, technical report, popular articles, monographs, dissertations, house bulleting, extension literature, manuscripts preparation.
4. Editing: Editing concepts, responsibilities, qualifications, functions and basic skills of an editor. Editorial processes, evaluation processes, author-referee relationship in quality control, manuscript preparation and production. Editorial tools: dictionaries, style manuals, standard specification etc.
5. Publishing: Different parts of a book, steps in book publishing, securing and selecting manuscripts type setting criteria of good type setting. Composition: hand composition, hot metal composition, film composition, computer setting, proof reading and copy editing: proof reading marks and its use, spelling, layout and design of physical books, printing, binding, Methods of printing: electronic type writers, printing press, Xerox etc. printing in color, set up duplicate printing plate. Binding: binding tools, process, different types of binding, rebinding old books, technology based binding systems. Desk top publishing, recent trends in publishing, problems of publishing in developing countries specially in Bangladesh.
6. Publishing ethics.

ISL 206: Bibliography, Reference and Citation

Credits: 3

Description

1. Introduction to bibliographic information sources, definition, origin, function and importance of bibliography, Bibliography vs catalogue, types of bibliographies.
2. Compilation of bibliographies, different methods of compilation, arrangement of entries, style etc.
3. Evaluation of Bibliography: Authority, scope, items and entries of information, special features, format and limitations.
4. Bibliographic description: Minimum standard entry, short standard entry, full entry with examples.
5. ISBN: Different Parts of ISBN, Calculation of Check digit.
6. Bibliographic services in various subjects; Bibliographic services of different countries
7. Definition, Importance, functions of Reference in a research work, Procedure of compiling References
8. Definition, objective, scope of Citation, Reference and Citation, online bibliographic citation tools
9. Different Styles of Reference, American Psychological Association (APA), Harvard, Modern Language Association (MLA), Chicago,
10. Use of Reference Management software for Reference and Citation Management, Endnote, Mendeley, etc.

ISL 207: Indexing and Abstracting

Credits: 3

Description

1. Definition of index, origin and development, importance, types of indexes: author index, alphabetic subject index, classified, cumulative and collective subject index.
2. Indexing methods, steps in indexing, level of indexing, indexing aids, rules, manuals, syntax, subject determination, different techniques, citation indexing, pre-coordinating indexing, post-coordinating indexing, chain indexing, POPSI, PRECIS- KWIC, KWOC etc. rules for arranging index entries, tools for indexer.
3. Periodical indexing: principles, techniques and arrangement, book indexing, principles, techniques, entry heading, subheading, style and layout, newspaper indexing, indexing non book materials – music, sound recordings, films etc. computer based indexing systems, statistical methods, syntactic method, semantic method.
4. Indexing language: free language and controlled vocabulary indexing, thesaurus-indexing terms and their relations, thesaurus construction and evaluation.
5. Index evaluation: different methodologies, recall, precision, ratios and devices, cost analysis.
6. Abstracting: definition of abstract, importance, abstracts vs. bibliographies, index vs. abstracts, abstracts vs. annotations, types of abstracts, quality of a good abstract.
7. Methods and procedures of abstracting, international standard for abstracting, evaluation of abstracts, online abstracting system.
8. Recent trends in indexing and abstracting, existing situation, problems and prospects of indexing and abstracting services in Bangladesh.
9. Structured abstract
10. Indexing and Abstracting practical

ISL 208: Automation of Information Institutions

Credits: 3

Description

1. Basics and operational concepts of information and communication technologies, introduction to library automation, historical background and present context.

2. Introduction to the basic functions of a library as an information institution, issues that influence library automation, need for automation, barriers to automation, levels of library automation, basic components of an automated library system, library automation activities.
3. Integrated library systems: Automated acquisition, major components of an automated acquisition system, major files used in automated acquisition, automated circulation system, major components of an automated circulation system, automated reservation systems.
4. Automated cataloguing concepts, online public access cataloguing and its use, major components of cataloguing system, necessary filers of cataloguing system, online computer library center (OCLC) and its services.
5. Automated serials control module and its subsystems, major files of automated serials control subsystems, shared library automation systems and their implications, inter library cooperation in an automated atmosphere, management issues in library automation, human resource development in library automation.
6. Online searching service, access to in-house databases and retrieval issues, CD-ROM search, access through online web pages, web sites and remote CD-ROM databases, management of electronic resources, application of IT in different services: CAS, SDI, information storage and retrieval issues.
7. Database and record format, text markup and metadata, database structure, MARC record format, common communications format, Z39.50.
8. Hardware and software considerations for automation of information institutions, selection of software, in house software development versus ready made software, cost benefit analysis, request for proposal (RFP) and selection of vendors.
9. Online library automation systems marketplace, front-end and back-end software used in library automation, major software packages available for libraries, components of web based library automation.
10. Current trends in library automation in Bangladesh and abroad, case studies of selected library and information centers, digital library, internet and its various services, essential features of a library website, open source library software packages.

ISL 301: Records and Archives Management

Credits: 3

Description

1. Introduction to unit, outline, assessment etc. and introduction to records management and records management profession.
2. Define records, official records, non-records and public records etc. Introduction to records management, records management system, records life cycle and continuum theory, inventories and forms, files/folders and filing, classifying and indexing records, develop space efficient strategies for the storage of records and their timely and efficient retrieval in a variety of formats in all dimensions of the continuum.
3. Record management, nature of records, types of records, record management, historical perspectives, structure of record management program, principles and formed of management, record inventory and appraisal, disposition and description, vital record protection, evaluation of record media and storage issues planning a record center.
4. Archives: definition, scope, objectives and types of archives, importance of archives in a society, archives and library.
5. Archives management: nature of archives control of archival materials. Archival description and classification levels of description, data elements, finding rules, rules of representation and retrieval, principles of archival classification, registry and filing systems, American filing systems, principles of arrangement, policy and rules governing access to and use of archives documents.
6. National archives of Bangladesh: its present activities, archival legislation of Bangladesh.
7. Preservation of archives materials, issues influencing preservation program, design of a preservation program, nature of different types of materials of their storage conditions. Enemies of archival materials, environment, biological, people, insects, disasters etc
8. Preventive measures: environmental control, good house-keeping, proper storage by type of materials, pest control etc. Post deterioration measures, fumigation, de-acidification, repair and restoration, binding, lamination, microfilming etc.
9. Digitization standards and best practices.

ISL 302: Information Production, Marketing and Public Relations

Credits: 3

Description

1. Information, identification of information need and information seeking behavior, needs, wants and demands, product, products and services, product classifications, individual product decisions, information as a product, concept of fee based information services, awareness and promotion of information products and services; designing information products and services for users, current trends in Bangladesh.
2. Marketing concept, marketing defined, key purposes of marketing, organizational orientations towards marketing, factors affecting achievement of organization /library objectives, barriers to marketing, marketing management, developing marketing programs for libraries, marketing approach, marketing and the quality revolution, market, what can be marketed, market planning and implementation.
3. Developing marketing plan: What is marketing plan, benefits of a marketing plan, how to develop a marketing plan, marketing audit, strategic direction for information center, implementation and control, marketing mix, four Ps and four Cs, creating the marketing mix.
4. Market segmentation: Characteristics of segmentation, levels of segmentation, and methods of segmentation, and requirements for effective segmentation. Marketing communications: Communication process, steps in developing effective communication.
5. Direct and online information marketing: Direct marketing, benefits and growth of direct marketing, forms of direct marketing, online marketing of information products in service, conducting online marketing, challenges of online marketing, new roles of libraries and information professionals.
6. Marketing research and information systems: Assessing information needs, developing and distributing information. Marketing research: defining the problems and research objectives, preparing the research brief, developing the research plan.
7. Reprography: Conceptual issues, types of reproduction, different methods and process of reprography, reprographic technologies, planning for a reprographic unit.
8. Advertising, promotion and public relations: Setting advertising objectives, developing advertising strategy, other advertising considerations, public relations planning, AIDA- a communication model, professional cooperation and promotion.

ISL 303: Documentation and Communication

Credits: 3

Description

1. Information Retrieval (IR) and Online Searching: Concepts, functions and activities, components of online IR, process or steps to online searching, techniques of online searching, basic searching techniques, advanced searching techniques, guidelines for better searching, process of searching an article and databases, role of internet technologies in information retrieval, thesaurus construction.
2. Information Dissemination Service: Concepts, types, purposes, methods of disseminating current information, criteria for assessment of current information, current awareness service (CAS), definition, purpose, characteristics, types and channels, selective dissemination of information (SDI) service.
3. Online Methods of Information Dissemination: Online SDI service, EDDS (Electronic Document Delivery Systems), EDI (Electronic Data Interchange), EFT (Electronic Fund Transfer), content management systems.
4. Information Consolidation: Information consolidation: concepts, objectives, process, user benefits and user studies, packaging and re-packaging of information: concepts, functions, process of re-packaging information, guidelines for preparing: an accession list, a bibliography, a directory, writing an abstract, literature review, case study, handbooks or manuals, packages of materials, translation of materials, newsletters and news sheets, an audio-visual materials.
5. Creative Presentation of Information: Multimedia: definition, features, types, components, advantages, process of multimedia creation, applications of multimedia in library and information services.
6. Information Communication Technology (ICT): Communication of information: concepts, model, role of library in the process of communicating information, data or information communication: concepts, model, channels or media of communication, telecommunication: concepts, components, functions, types, telecommunication infrastructure: transmission line.

7. Information Privacy and Security: Information privacy: concepts, techniques for protection, information security, concepts, threats to information communication systems (ICT), types of computer crime and criminals, security tips for ICT users.

ISL 304: Research Methodology

Credits: 3

Description

1. Concept of research, historical growth and development of research, its objectives, types and significance. Research paradigm: positivist, interpretative, action research model, research processes, criteria of good research, qualities and ethics of research, area of research in library and information science, different methods of research.
2. Research problem: Concept of research problem, characteristics of research problem, sources of information, personal experience, literature review, theories, paradigm, hypothesis, scope of hypothesis, testing hypothesis. Selection of research problems, techniques involved in defining a problem, different steps involved in writing a research proposal.
3. Research design (RD): Meaning, need, features of good design, concepts relating to RD, different types of RD, basic principles of experimental design.
4. Methods of research: Survey, case study, historical documentary-characteristics, advantages, limitations and techniques, collection of primary data, observation methods, interview method, questionnaire method, other method, their advantages and disadvantages, designing questionnaire and structured interview.
5. Sampling: Concepts, characteristics, requirements of a good sample, types of sampling-random and purposive sampling, systematic sampling, cluster, multiphase sampling, and sampling errors.
6. Data collection techniques: Questionnaire-mailed, structured, non-structured, close ended and open-ended questionnaire, interview-structured and non-structured, observation - structured, non-structured and participatory, selection of appropriate method in terms of research problems, understanding sources and note taking.
7. Data processing and analysis: Editing-central editing, field editing, coding and decoding, tabulation, application of statistics and statistical package in data processing.
8. Report writing and evaluation: Writing a research report characteristics of a good research report, designing framework of a research report, rafting report, reviewing and editing, rules for using quotations, footnotes, references and bibliographies, techniques and criteria for evaluation of a report.

ISL 305: Organization of Knowledge (Classification Theory)

Credits: 3

Description

1. The theory of classification: natural and artificial classification, terms and predicable, formal rules of divisions and canons of classification, knowledge classification and book classification, criteria of good classification, construction of schedules.
2. Special features of book classification: Generalia class, standard subdivisions, form class, notation, auxiliaries of notation, index: analysis and use.
3. Major schemes of classification: Dewey decimal classification, Universal Decimal Classification, Library of Congress Classification, Colon Classification, Bibliographical Classification.
4. Analysis and applications of Universal Decimal Classification (UDC): Special features, differences with DDC, main subject structure, notational systems: hospitality, mnemonics, common and special auxiliaries.
5. Practical classification work applying DDC.

ISL 306: Organization of Knowledge (Cataloguing Theory)

Credits: 3

Description

1. Utility of bibliographic reading of print media.
2. Use of sears list of subject headings, directions to follow, construction of subject headings adopting various subdivisions.

3. Comparative analysis of catalogues: Online / OPAC vs. card, microfiche, printed catalogues, Classified vs. dictionary catalogue, construction, appropriateness of classified and dictionary catalogues to different types of libraries, Catalogue vs. bibliography, entry patterns, methods, differences, Shelf list vs. public catalogues, accession register, Union catalogues.
4. Computerized cataloguing: Peripherals / hardware, software involved in integrated automated online catalogue, Reasons for development of automated system / superiority of automated processing system over traditional system, MARC: Machine readable cataloguing format, MARC derivative products, Utilities of OPAC, Integrated online library automation systems (IOLAS).
5. Resource Description and Access (RDA)
6. Dublin Core

ISL 307: Comparative Study of Information Systems

Credits: 3

Description

1. Definition, international vs. comparative librarianship, benefits, goals and objectives of international and comparative librarianship, theoretical approach, comparative librarianship as method and discipline, comparative method as scientific discipline, types of comparative librarianship.
2. Outline of basic data about a foreign information system, factors affecting the growth and development of information system in the developed and developing countries.
3. Information systems and pattern of information profession in modern times with special reference to USA, UK, Russia, India, Pakistan and Bangladesh: Public library and media centers, university and college libraries, national libraries and special libraries and information centers. Problems and prospects of information systems, libraries and information profession in developing countries especially in Bangladesh
4. Role of national and international organizations, professional and non-professional associations for the development and non-professional associations for the development of information systems and services both in developed and developing countries.
5. Information education in the continents of America, Europe and Asia with reference to Bangladesh.
6. Library co-operation, library and society, mass media and communication, development of library economy.
7. Use of new information technologies in information systems and libraries in USA, UK, Japan, India, Bangladesh.
8. Library legislation (a) Rationale (b) Principles of library legislation, growth of library legislation in UK, USA, Scandinavian countries, India and Bangladesh.
9. Bibliographical guide to information centers, professional training and information sources throughout the world.

ISL 308: Information Architecture

Credits: 3

Description

Principles of Information Architecture; Organization and Navigation.

Metadata and Taxonomies: Rules for creating, organizing and maintaining taxonomies; Case studies and presentation.

Creation, identification and organization of web-based user interfaces; Principles of web usability; Usability testing; Basic principles of user-centered design.

Web standards for representing data and knowledge including XML and the Semantic Web languages RDF and OWL.

Development and management of Information repositories.

Folksonomies and Crowdsourcing; Case studies and presentation.

Internet and web information architecture; Future of web information architecture.

ISL 309 Organization of Knowledge (Classification Practical)

Credits 4

Description

1. Number Building Process using Auxiliary Tables of DDC 23rd Edition

   Table – 1. Standard Subdivisions

   Table – 2. Geographic Areas, Historical Periods, Persons

   Table – 3. Subdivisions for the Arts, for Individual Literatures, for Specific Literary Forms

   Table – 4. Subdivisions of Individual Languages and Language Families

   Table – 5. Ethnic and National Groups

   Table – 6. Languages
2. Number Building Process using DDC Main Classes
3. Number Building Process using UDC Common and Special Auxiliaries
4. Number Analysis in DDC Scheme
5. Number Analysis in UDC Scheme

ISL 310: Organization of Knowledge (Cataloguing Practical)

Credits: 4

Description

Manual and automated practical cataloguing using AACR2, MARC21, RDA and Dublin Core

Single author.

Double authors.

Triple authors.

More than three authors.

Shelf list entry.

Title as main entry.

Encyclopedias and dictionaries.

Compiled and edited works.

Entry for work revised by different author.

Added entries.

Index entries, filing in classified and dictionary catalogues.

ISL 311: Applied Statistics

Credits: 3

Description

1. Introductory statistics: Meaning and functions of statistics, Scope and limitations of statistical use, Importance and applications of statistics in library and information systems.
2. Basic statistics: Frequency distribution, Measures of central tendency-arithmetic mean, median, mode, Measures of dispersion-range, quartile deviation, mean deviation, standard deviation, Correlation and it's types-positive and negative, simple, partial and multiple, linear and non-linear correlation, Regression analysis, simple and multivariate regression.
3. Inferential statistics: Concept, difference between descriptive and inferential statistics, Parametric and non-parametric tests.
4. Sampling: Techniques of sampling-random sampling: simple systematic, stratified, cluster, multiphase and purposive or judgmental sampling: probability and its formula.
5. Application of computer in data analysis and presentation: Introduction to SPSS (Statistical Package for Social Sciences).

6. Information and collateral areas: Meaning, definition, scope and importance in library research, Comparative study of bibliometrics, librametrics, scientometrics, informatics, Application of bibliometrics in library research, Bibliometrics and other indicators, citation studies, Mathematical bibliometrics.
7. Descriptive Statistics: Types of diagrams and construction techniques-bar diagram, histogram, frequency polygon, frequency curve, pie chart, Data presentation: general rules for constructing diagrams.

ISL 401: Information Networking and Resource Sharing

Credits: 3

Description

1. Definition, origin, objectives and fields of library cooperation, information networking and resource sharing, influencing and reducing factors and barriers to information networking and resource sharing, basic agreements of resource sharing.
2. Information networking and resource sharing processes, functions and activities of information resource sharing, components of information networking, rationale of establishment of information network in library and information institution.
3. Types of network and their configurations, local area network (LAN) and wide area network (WAN), network protocols, different programs / models of information networking and resource sharing, logical tools and technologies for information networking, factors to be considered for establishing library and information network.
4. Application and use of internet in information networking, tools for internet, process of digitization of library materials for automated information networking, use of multimedia in information networking and resource sharing. Technical aspects, hardware and software requirements for information networking, manpower needs for information networking and resource sharing with their job description, user needs.
5. Financial, and functional management issues in information networking and resource sharing, reasons for automated information network, national, regional and international information networks and resource sharing activities, existing status, problems and prospects of library and information networking in Bangladesh, preparation of a model plan for library and information network.
6. Consortia formation, licensing and management for subscribing of electronic resources.

ISL 402: Analysis and Design of Information Systems

Credits: 3

Description

1. Basic concepts: Introduction to systems and information systems, system elements, different types of information systems, introduction to system development models- waterfall, incremental, transformation and spiral model
2. Systems Development Life Cycle (SDLC): Introduction to SDLC and its functional steps, planning for system study, understanding existing systems, exploring the limitations and defining objectives, searching alternative and solutions and feasibility study.
3. Analysis: System anatomy, identify the new system requirements, object modeling, dynamic modeling and functional modeling, risk analysis, developing test criteria and plans.
4. Design: Design methodologies, design process, different aspects design of library and information systems- input/output design, form/interface design, database design, control design, network and communication subsystem design, procedural design, security design, developing implementation plan and maintenance manual, integrating subsystems.
5. System testing and implementation: Testing programs, installation of necessary equipment, recruitment and training of personnel, implementation plan, systems conversion, post implementation review.
6. Evaluation and maintenance: Concept and scope of evaluation in library and information systems, approaches to evaluation, performance measurement, evaluation of systems security and data integrity. Measuring effectiveness of information retrieval systems, analysis of users satisfaction, cost-effectiveness analysis.
7. Project management and professional aspects: Introduction to project management and SDLC project planning, the role, essential qualifications and standard of behavior of system analyst, information engineering and its different issues, ethics in SDLC and other professional issues.

ISL 403: Information Literacy

Credits: 3

Description

Introduction to information literacy: Evolution, nature, characteristics of information literacy, significance of information literacy in information society.

Different dimensions of information literacy: tool literacy, resource literacy, social-structural literacy, research literacy, publishing literacy, critical literacy.

Information literacy models: Big6, PLUS information skill model, seven faces of information literacy, seven pillars of information literacy.

Media Information Literacy: Definition, objectives, functions, skills.

Digital Literacy: Scope, evolution, features, skills, components.

Information literacy guideline of IFLA.

Information literacy assessment.

National and international perspective of information literacy.

Information literacy practices in Bangladesh.

ISL 404: Computer Hardware Maintenance and Troubleshooting

Credits: 4

Description

1. PC Hardware: Hardware used for input and output, hardware inside the computer case or system box, components (fan, Central Processing (CPU), CPU socket) used primarily for processing, temporary (primary) storage devices, permanent (secondary) storage devices, interface (expansion) cards.
2. Number systems and codes: Decimal, binary, octal and hexadecimal number system, conversion of numbers-binary to decimal, decimal to binary, hexadecimal to decimal and hexadecimal to binary conversion.
3. Troubleshooting common PC problems, their causes and solutions: General troubleshooting rules, steps to troubleshooting success, common problems- and solutions and troubleshooting trips for emergency.
4. Microprocessor: Control unit, its organs and organization, arithmetic-logic and its components and organization, registers, counter, decoder, encoder, feature summary of 80296, 80386 and Pentium processor, computer memories and their organization.
5. Understanding and managing computer memory: Physical memory and memory address, flash memory, main memory: SIMM and DIMM, ROM and RAM on the system board, main memory vs. cache memory, varieties of SRAM memory, conventional memory, expanded memory, virtual memory etc.
6. Purchasing a PC or building your own PC: Selecting a personal computer to meet your needs, purchasing a brand PC vs. a Clone PC, selecting software and hardware, building a personal computer step by step, overview of the assembling and disassembling process.
7. Installation and preventive maintenance: Pre-install planning, install practices, guidelines for developing a PC preventive maintenance plan, memory upgrade, installation of hardware and software.
8. Computer viruses and environmental hazards that may affect the PC: Computer virus, types of computer virus, Techniques of attack, symptoms of computer virus, anti-virus software, tips for protecting the PC against virus and other infestations.
9. Understanding and troubleshooting: Different types of printers, mice, key-boards, monitor and scanners.
10. Protecting and maintaining hard disks: Precautions for protecting the hard disk, data and software, backing up the MBR, system files and user data, automated system recovery, recovery console, checking disks for errors, defrag-menting the file system and dealing with dead disks.

ISL 405: Server Administration (Linux)

Credits: 4

Description

1. Operating System Overview, Operating System objectives and functions, The evolution of Linux, Modern UNIX Systems, Distributions of Linux, server and desktop version
2. DebianvsRedhat Linux, Installation details of Linux, Logging on the System, Touring Utilities and System Features.
3. File Management: overview, file organization and access, File Directories, File Sharing, Record Blocking, Secondary Storage Management, Linux Virtual File System
4. Mastering the Visual Editor, Creating and Changing Directories, specifying Instructions to the Shell,
5. User management: setting and using Permissions, Controlling User Processes
6. Accessing and Exploring Graphical Desktops, Maintaining and Administering a Linux System
7. Web server, File server, File Transfer Protocol (FTP) Server
8. Apache and MySQL administration
9. I/O Management and Disk Scheduling: I/O Devices, Organization of the I/O Function, I/O Buffering, Disk Scheduling, Disk Cache, Linux I/O.

ISL 406: Content Management Systems (CMS)

Credits: 4

Description

1. Introduction, benefits of CMS
2. Relationship with other information systems: document management, records management, digital asset management
3. Principles of CMS
4. CMS Architecture
5. System and data integration in CMS
6. Applications, CMS and Community Information Systems
7. Roles of other related technologies: Extended Markup Language (XML), DBMS, Portals, Data Mining, Agent technologies, Personalization,
8. Study of CMS Software Drupal, Joomla, Wordpress
9. Comparison and Evaluation of CMS
10. Project: CMS in Library environment.

ISL 407: Database Design and Applications in Library and Information Systems

Credits: 4

Description

1. Basic concepts: Introduction to database and database management systems (DBMS), purpose of database systems, introduction to database administration (DBA), basic components of DBMS and its system structure.
2. Data modeling: Concepts, entity relationship (ER) model, object oriented data model, relational data model, network data model and hierarchical data models.
3. RDBMS: Features, structure of relational databases, data structure of RDBMS, keys and other integrity constraints, database design- process, conceptual design, normalization and decomposition, relational algebra and relational calculus.
4. Storage structure and physical organization of records: Overviews of physical storage media, data storage formats on disk- track format, record format, file organization and addressing methods, data indexing and different type of indexing techniques, hashing and different type of hash functions.

5. Management: Transaction processing and concurrency control, buffer management, system failure and recovery.
6. Database applications in library and information systems: Necessary data items and data structure in library management, different type of transaction processing in library operations, searching metadata and free text searching, introduction to some database software and selection criteria of DBMS packages for libraries, recent trends, existing conditions, problems and prospects of database management in Bangladesh.

ISL 408: Web Technology and Web-based Information Services

Credits: 4

Description

1. HTML: Elements, Heading, Attribute, style, image, block, layout, table, lists, etc.
2. Introduction to XML, DHTML, XHTML, HTML5
3. CSS introductions, syntax, selectors, background, text, font, links, list, layout, align, DIV etc
4. TCP/IP, FTP, SSHD
5. Web Server installation, configuration with Apache..
6. Introductions, Importance and Functions of Java script, basic learning by example
7. PHP introductions, Syntax, variables, data type, loops, functions, form handling, validation, database connection etc
8. Basic database management through MySQL and using MySQL with PHP
9. Relevant W3 Standards and Protocols.

ISL 409: Integrated Library System Development

Credits: 4

Description

1. Project design: Need assessment, planning, hardware and software requirement for ILS development, comparison of software and selection, manpower requirement, time duration, budgeting, evaluation method, training need.
2. Procurement: Hardware, software, network equipment, IP and internet connectivity, electricity supply.
3. Setup and configuration: Server configuration with Linux for library software, software Installation (koha, Dspace, Greenstone Digital Library Software (GSDL), Vufind, Drupal, software configuration, RFID setup and integration with Integrated Library System (ILS) software.
4. Testing and running: Running on test basis, evaluation, configuration based on evaluation report, running the entire system.
5. Staff Training: Server maintenance, ILS maintenance, configuring ILS, running the entire system

ISL 498: Research Monograph/Project

Credits: 3

Description

1. Submission of research proposal/ project
2. Selection of topic for research/project
3. Selection of the supervisor
4. Literature reviewing/ project planning
5. Methodology determination/ project designing
6. Data collection/ feasibility analysis
7. Data presentation/ project execution
8. Draft preparation of the research monograph/project
9. Final approval by the supervisor

10.Submission of the research monograph/project

11.Presentation on the research monograph/project and Viva-Voce

ISL 499: Internship in Information Institutions

Credits: 3

Description

1. Procurement of library materials, purchase policy
2. Book selection policy
3. Processing of library materials
4. Shelving and circulation policy
5. Corresponding knowledge
6. Library staffing
7. Reporting
8. Stocktaking
9. Library automation
10. Digitization

Duration: 1 month

ITB 301: International Business

This course analyzes the basic issues in International Business (IB). Broadly defined areas of study include importance of IB, modes of IB, knowing about MNCs and international organizations, contemporary challenges and changing environment of IB, managing cultural differences, measuring economic opportunities of countries, trade theories, governmental influences on trade, foreign direct investment (FDI) and its functionalities, exchange rate fundamentals, economic integration and cooperative arrangements, international marketing strategies, export-import procedures, global manufacturing and control strategies.

Credits: 3, Prerequisites: MGT 101, MKT 101, ECO 102, BUS 231

ITB 401: International Operations

This course deals with factors affecting international operations in a changed world, international legal system, institutional context of multinational management, strategic management in the multinational company, content and formulation, alternative methods of international operation, organizational structure of international firms, motivation in multinational company, leadership and management behavior, ethical issues in international operations, international strategic alliance, multinational research and other recent issues.

Credits: 3, Prerequisite: ITB 301, BUS 231

ITB 428: International Economics

Review and analysis of international trade models, theories and tools of analysis-classical, neo-classical and alternative theories, international monetary system, its role, importance, structure and future performance, foreign exchange market, balance of payments adjustments.

Credits: 3, Prerequisite: ITB301, BUS 231

ITB 445: International Financial Institution

The course attempts to provide greater understanding of foreign exchange market and its intricacies in international trade. Major topics will include balance of payments, exchange rate regimes, Spot market, Forward market, BP curve, J-curve and the practices of IMF, World Bank, ADB, IDB, and other multilateral institutions.

Credits: 3, Prerequisite: ITB301, FIN201, BUS 231

ITB 450: International Business Negotiations

This course deals with the development of the conflict resolution, negotiating in the International context, mediation in International conflict, adjudication: International arbitral tribunals and courts, social-psychological dimensions of International conflict, Interactive conflict resolution, and contributions of training to International conflict resolution.

Credits: 3, Prerequisite: ITB301, BUS 231

ITB 455: Country Risk Analysis

This course provides framework for identification and analysis of economic and political issues of a country to assess the risk factors of that particular country. Topics include demographic trends, social issues, cultural knowledge through case analysis that will help students to develop skills necessary to identify, assess and deal with issues of risks and uncertainty in various countries.

Credits: 3, Prerequisite: ITB301, BUS 231

ITB 460: International Competitiveness

How a country competes in the world is the crucial factor in determining that country's ability to benefit from international trade in today's global economy. This course offers a complete and proper understanding of the meaning of International competitiveness, analyzes the implications it holds for an economy's progress, examines how it may be pursued and sustained at both the sect oral level (firms and industries) and the national level (strategic objectives). It would offer pertinent policy guidelines and prescriptions for how a nation can achieve and maintain international competitiveness in order to sustain the long-term prosperity of its industries, and hence the overall pace of economic growth.

Credits: 3, Prerequisite: ITB301, BUS 231

ITB/FIN 465: International Financial Management

This course focuses on the theoretical and practical aspects of financial management of Multinational Companies. Topics include international monetary system, the foreign exchange market, international parity relationships, international banking and money market, international capital market, currency derivatives, management of foreign exchange exposure, foreign direct investment and cross-border acquisition, international capital structure and the cost of capital, international capital budgeting, international cash management, trade financing, and corporate governance around the world.

Credits: 3, Prerequisite: FIN201, BUS 231

LAW 101: Law of Contract I

Definition of Contract, Nature and Kinds of Contracts, Essential Elements of Contract, Offer and Acceptance, Capacity of Parties, Consent, Consideration, Void Agreements, Contingent Contracts, Quasi Contracts, Performance of Contract, Terms and Conditions of a Contract.

Credits: 3

LAW 102: Muslim Law I

Nature, Sources and Origins of Muslim Law, Pre-Islamic Arabian Custom and their Impact on Islamic Law, The Concept of Islamic Jurisprudence, The Development of Muslim Law in Different Periods of Islamic History, The Schools of Islamic Jurisprudence, The Statutory Development of Muslim Law in Bangladesh and Judicial Decisions.

Muslim law of marriage: essential requirements and prohibitions, forms and legal effects, registration, restitution of conjugal rights, polygamy, Dower or Mahr, Maintenance or Nafaqaa Dissolution of marriage: its forms and legal effects.

Credits: 3

LAW 103: Law of Contract II

The main chapters of this module are Exclusion clauses in a contract, Misrepresentation, mistake, frustration, duress, breach of contract and damages for breach of contract. These chapters are taught in detail with critical analyses. The students are required to do in depth research on every topic by reading a number of cases, international journal articles and different books. The following chapters are taught in brief in order to introduce various aspects of a contract to students.

Indemnity and Guarantee

Definition, Rights of Indemnity Holder, Definition of Guarantee, Distinction between Guarantee and Indemnity, Rights and Liability of Guarantee and Surety, Revocation of Guarantee.

Law of Bailment and Pledge

Definition, Essential Elements of Bailment, Classification of Bailment: Gratuitous and Non-gratuitous, Bailment for Hire, Bailment for Custody, Bailment for Carriage, Rights and Duties of Bailor and Bailee, Termination of Bailement, Contract of Pledge, Pawnee's Right of Retainer, Pawnee's Rights when Pawnor makes Default, Pledge by Mercantile Agent, Laws relating to finder of goods.

Law of Agency

Definition of Agent and Principal, General Rules of Agency, Test of Agency, Nature of Agency, Who may Employ an Agent, Who may be an Agent, Types of Agents, Modes of Creation of Agency, Extent of Agent's Authority, Rights and Duties of agent and Principal, Irrevocable Agency, Termination of Agency.

Some modern concepts of business law

Consumer Protection, Monopolistic, Restrictive and Unfair Trade Practices, Business Ethics.

Credits: 3; Prerequisite: LAW 101

LAW 104: Muslim Law II

Custody and Guardianship, Legitimacy, Gift, Wakf, Pre-emption, Marz-ul-maut, Will, Inheritance, Family Court and Procedure.

Credits: 3; Prerequisite: LAW 102

LAW 105: Interpretations of Statutes and English for Law

Interpretation of Statutes

Rules of Interpretation and Construction, Approach to Interpretation, Literal Rule, Golden Rule and Mischief Rule of Interpretation, Rule of Harmonious Construction, Aids to Interpretation- Internal and External, Maxims of Interpretation, Interpretation of Penal Statute, Interpretation of Constitutional Law; General Rules and Special Rules, Problems of Constitutional Interpretation.

Object of the Act, General Definitions, Application of Certain Definitions to all Bangladeshi Laws, General Rules of Construction, Powers and Functionaries, Provisions as to Orders, Rules, etc., Miscellaneous Provisions.

English for Law

English for Law has been designed to make the students familiar with selected English and Latin words, which are exclusively used in law.

This course aims to familiarise the students with a number of English and Latin Legal terms, Maxims, Doctrines of Law, Principles of Law etc.

Credits: 3

LAW 106: Constitutional Law I

ntroduction, Definition, Scope and Nature of Constitutional Law, Classification of Constitutions, Forms of Government, the Doctrine of Separation of Powers.

An introduction to the Constitution of Bangladesh

Emergence of Bangladesh, the Proclamation of Independence Order, Establishment of the Bangladesh Constitution, Main Features of the Constitution, Supremacy of Bangladesh Constitution, Fundamental Principles of State policy and Fundamental Rights, The

Executive: The President, Powers and Functions of the President, The Prime Minister: Powers and Functions of the Prime Minister, Collective Responsibility of the Cabinet,

Credits: 3

LAW 107: Legal System of Bangladesh

Historical Background of the Legal System of Bangladesh, The Legal System of India during the Ancient (Hindu) and the Medieval (Muslim) Period, Justice under the Rule of the East India Company (1612-1857), The influence of English Law in India, Legal System during the Pakistan Period (1947-1971).

Judicial System on the emergence of Bangladesh, Basic Structure of the Courts, The Supreme Court, Subordinate Courts and Magistracy, Special Courts and Tribunals, Administration of Justice in the Subordinate Courts: Administration of Justice in the High Court Division: Administration of Justice in the Appellate Division.

Law Making Procedure in Bangladesh: Legislation, Supreme and Subordinate Legislation, Status of Order, Rule and Regulations and Various Notifications, Precedent, Ratio Decidendi and Obiter Dicta, Law Reporting in Bangladesh, Merits and Demerits of the Doctrine of Precedent, Custom as a Source of Law.

Legal Aid in Bangladesh, Alternative Dispute Resolution, Legal Profession in Bangladesh: The Bar Council, Powers and Functions of the Bar Council, Enrolment to the Bar Council, Tribunal and Disciplinary Proceedings, Judicial Activism, Public Interest Litigation, Martial Law and Judiciary, Problems and Prospects of the Administration of Justice in Bangladesh.

Credits: 3

LAW 108: Administrative Law

Administrative Law: Meaning, Nature, Importance, Sources and Development, Rule of Law, Separation of powers and Administrative Law, Legislative Powers of Administration; Delegated legislation, Limits of Delegated Legislation, Control of the Legislative Powers of the Administration, Judicial Powers of the Administration: Administrative Tribunals and Administrative Adjudication, Powers of Investigation & Inquiry; Control of Judicial Powers of the Administration; Administrative Tribunal and Administrative Appellate Tribunal in Bangladesh, Judicial review of Administrative Discretions, Administrative and Discriminatory Power- Its limits – Doctrine of Ultra Vires; Judiciary and Legislative Control of Administrative Actions- Various kinds of Writs and Public Interest Litigation, Ombudsman, Doctrine of Legitimate Expectation, Natural Justice- Concept and Its Principle- Due Process of Law, Liabilities of Government and Proceeding against Government, Public Corporation, Characteristic, Classification and functions, Status, Rights and Liabilities of Public Corporation, Control Mechanism, Decentralization of Administration, Its Aims and Objective, Growth and Evolution of Local and Local Self Government in Bangladesh, Independence of Judiciary.

Credits: 3

LAW 201: Constitutional Law II

Constitutional Law of Bangladesh (Continuation):

Legislature: Compositions, Powers and Functions of the Parliament, Privileges and Immunities of Parliament and Members, Qualification and Disqualification for Election to Parliament, Powers and Functions of the Speaker and Deputy speaker, Ombudsmen, the Judiciary: Jurisdiction and Powers of the Supreme Court, Appointment of Judges, Superintendence over Subordinate Courts, Advisory jurisdiction of Supreme Court, Independence of Judiciary, Administrative Tribunals, Attorney General, Judicial Review, Election, Proclamation of Emergency, Constitutional Amendments, Miscellaneous.

Credits: 3; Prerequisite: LAW 106

LAW 202: Criminal Law I

Origin, Development, and Nature of Criminal Law, Essential Elements of Crime; Crime and Civil Wrong, Crime and Morality, General Exceptions, General Principles of Liability: actus reus (Conduct); Acts and Omission; Consequences and Surrounding Circumstances; mens rea (State of Mind); Intention and Knowledge; Negligence; Strict and Joint Liability; Presumption of Innocence; Mistakes of Fact and Mistakes of Law; General Exceptions; Attempts, Abetment and Conspiracy; Punishment: its Objects and Limits;

Offences against State and other Public Interests; Offences affecting Human Body: Homicide; Culpable Homicide; Murder; Infanticide; Causing Miscarriage; Concealment of Birth; Exposure of Infant; Suicide; Non-fatal Offences against Person: Hurt; Grievous hurt; Criminal Force; Assault; Wrongful Restraint and Confinement; Kidnapping; Abduction; Slavery; Forced Labour and Unnatural Offences.

Governing Law: The Penal Code, 1860 (Act No. XLV of 1860).
Credits: 3

LAW 203: Hindu Law

Nature and Characteristics of Hindu law, History and Origin of Hindu Law, Sources of Hindu Law, Application of Hindu Law, Schools of Hindu law, Law of Inheritance, Concept of Hindu Joint Family and Coparcenary, Women's Property and Guardianship and Custody, Adoption, Debt, Impartible Property, Partition, Comparative Appliction of Hindu Law: Bangladesh and India.

Credits: 3

LAW 204: Criminal Law II

Crimes against Women and Children, Especially, Crimes under the Nari-o-Shishu Nirjatan Daman (Bishesh Bidhan) Ain, 2000, Acid Crime Control Act, 2002 and also the Relevant Provisions of the Special powers Act, 1974; Offences Relating to Property: Theft; Extortion; Decoity; Criminal Misappropriation of Property; Criminal Breach of Trust; Stolen Property; Cheating; Mischief; Criminal Trespass; Forgery. Other Interests of Individuals: Offences Relating to Marriage, Defamation, Criminal Intimation, Insult, Prejudicial Acts, Eve Teasing and Annoyance. Also the Concept of Crimes Against Humanity and the International War Crimes Tribunal of Bangladesh.

Credits: 3; Prerequisite: LAW 202

LAW 205: Law of Tort

Definition, Nature, Aims and Functions of Tort, Ingredients of Tort, The Bases of Liability, Strict Liability, Vicarious Liability, Joint and Several Liability, Defenses to an Action in Tort, Trespass and Other Intentional Injuries, Interference with Economic Interests, Negligence, Public and Private Nuisance, Defamation, Libel and Slander, Malicious Prosecution, Damage, Burden of Proof.

Credits: 3

LAW 206: Land Law

History of Land Law in Bangladesh. Permanent Settlement, Objects and Reasons of Permanent Settlement, Consequences of Permanent Settlement: Effects and Defects. Historical background of State Acquisition and Tenancy Act, 1950, Acquisition of Interest of the Rent Receivers and their Consequences; Land to be Retained by the Rent Receivers, Preparation of Records of Rights; Evidential Value of Records of Rights, Determination of Fair and Equitable Rents of Raiyat, Under Raiyat, and Non-agricultural Tenant, Prohibition of Tenant, Prohibition of Sub-letting, Incidents of Holding of Raiyat. Law Relating to Rights of Pre-emption. Grounds for Enhancement and Deduction of Rents.

Historical Background of Non-Agricultural Tenancy Act, 1949, Classes of Non-Agricultural Tenants, Purposes for Holding Non-agricultural Tenancy. Incidents of Holding Non-agricultural Lands for 12 Years and for Less than 12 Years, Under-tenant: Incidents of Under Tenancy.

Law Relating to the Right of Pre-emption, Difference between Right of Pre-emption under Section 96 of the State Acquisition and Tenancy Act, 1950 and under Section 24 of the Non-Agricultural Tenancy Act, 1949. Provision of Sub-letting, Delivery of Possession of Land with Structure Sold for Arrears of Rent.

Credits: 3

LAW 207: Criminology

The Concept of Crime, Nature and Scope of Criminology, Schools of Criminology, Causation of Crime, Forms of crime, White Collar Crime, Theories of Crime and Criminal Behavior, Biological Explanation, Genetic Science and Challenges for Judges and Lawyers,

Theories of Punishment and the Penal System, Police System, Prison System, Probation and the Penal System, Probation and Parole, , Juvenile Delinquency and Juvenile Justice.

Credits: 3

LAW 208: Laws on Partnership, Sale and Carriage of Goods

Law of Partnership

Definition and Nature of Partnership, Formation of Partnership, Types of Partnership, Rights and Duties of Partners, Dissolution of Partnership and Firm.

Sale of Goods

Definition and Essentials of a Contract of Sale of Goods, Sale and Agreement to Sell, Conditions and Warranties, Transfer of Property, Rights of an Unpaid Seller, Rights of a Buyer, Performance of Contract of Sale of Goods.

Carriage of Goods

Carriage of Goods by Land and Inland Water Ways, Definition of Common Carrier, Distinction between Common and Private Carrier, Rights and Duties of Common Carrier, Carriage of Goods by Sea, Charter Parties, Bills of Lading, Seaworthiness, Deviations, The Hague-Visby Rules, Freight, General and Particular Average. Carriage of Goods by Railways and Air.

Credits: 3

LAW 209: Laws on Equity and Trust

Equity

Nature and Origin of Equity, Development of Equity Jurisdiction in English Legal System, Equity Courts: Nature, Definition, Composition, Powers and Functions, Application of Equity Jurisdiction in Bangladesh, Maxims of Equity, Equitable Remedies: Specific Performance, Injunction, Appointment of Receiver.

Trust

Nature and Definition of Trust, Origin and Development of Trust, Constitutive Requirements of a Valid Trust, Public Trust and Private Trust, Resulting and Constructive Trust, Appointment, Retirement and Removal of Trustees, Rights, Powers and Duties of Trustees, Fiduciary Nature of Trusteeship, Breach of Trust and Remedies.

Credits: 3

LAW 301: Laws on Taxation

History of Income Tax in Bangladesh. Direct Taxes and Indirect Taxes. Income Definitions: Agricultural Income, Annual Value-Assessment, Assessment, Assessment Year and Income Year. Capital Assets and Capital Gains, Income Perquisite, Profits in Lieu of Salary, Total Income and Taxable Income, Written Down Value and Depreciation. Income Tax Authority and Powers of Income Tax Authority. Charge of Income Tax. Scope of the Total Income, Income Deemed to Accrue or Arise in Bangladesh. Unexplained Investments Deemed to be Income.

Heads of Income: Agricultural Income, Income from House Property, Income from Business or Profession, Capital Gain, Income from other Sources, Methods of Accounting. Carry forward and Set Off of Losses, Computation of Total Income. Exemption and Allowances, Advance Payment of Tax, Tax Deducted at Source, Return of Income, Different Types of Assessment, Special Provision Relating to Avoidance of Tax, Requirement of Furnishing Certain Information, Imposition of Penalty, Recovery of Tax, Double Taxation Relief, Refunds, Appeal & References.

Also Brief Discussion on Value Added Tax, Gift Tax, Shrimp Cultivation Tax, Land Development Tax, Travel Tax etc.

Credits: 3

LAW 302: Jurisprudence

Definition, Nature and Scope of Jurisprudence, Nature, Kinds and Classification of Laws, Law and Morals, Administration of Justice, Sources of Law, Legal Rights and Duties, Ownership and Possession, Persons, Liability, Title, Law of Property, Law of obligations, Law of Procedure.

Theories of Law

Legal Positivism, Pure Theory of Law, Natural law, Social Theories of law, Liberalism and Legal Reasoning.

Credits: 3

LAW 303: Laws on Transfer of Property and Registration

Transfer of property

Nature and Scope of the Law of Transfer of Property, Definition and Classification of Properties, Different Modes of Transfer of Immovable Property, Oral transfer, Transfer to Unborn Person; the Rule Against Perpetuity, Vested Interest and Contingent Interest, Conditional Transfer, Prior Disposition and Ulterior Disposition, Doctrine of Election, Doctrine of lis pendis, Fraudulent Transfer, Part Performance, Sale, Benami sale, Rights and Liabilities of Seller and Buyer, Mortgage, Kinds of Mortgages, Rights and Liabilities of Mortgagor and Mortgagee, Doctrine of Redemption, Foreclosure, Marshalling, Contribution, Subrogation, Priority and Prohibition of Taking, Charges, Lease, Exchange, Gifts, Transfer of Actionable Claims.

Registration

Registrable Documents, Documents Requiring Compulsory Registration, Documents whose Registration is Optional, Time and Place of Registration, Effects of Registration and Non-registration, Remedies for Refusal to Register.

Credits: 3

LAW 304: Labour Law

Background and Development of Labour Laws in Bangladesh, Classification of Workers and Conditions of Employment, Employment of Adolescent, Safety and Welfare of Workers including Maternity Benefit, Health and Hygiene, and Safety in the Workplace, Working Hours and Leave, Wages and their Payment, Workers' Compensation for Injury by Accident, Trade Union and Industrial Relations, Settlement of Industrial Disputes, the Labour Court and the Labour Appellate Tribunal, Workers' Participation in Companies' Profits, Provisions for Provident Fund, Apprenticeship, Offences, Penalty and Procedure, Authorities of Administration and Inspection.

Credits: 3

LAW 305: Law of Evidence I

Nature of the Law of Evidence, Classification of Evidence, Relevancy of Facts, Admissions, Statement by Persons who cannot be Called as Witnesses, Statements Made under Special Circumstances, How Much of a Statement is to be Proved, Judgments of Courts of Justice when Relevant, Opinions of Third Persons when Relevant, Character when Relevant, Facts which Need Not be Proved, Oral Evidence, Documentary Evidence.

Credits: 3

LAW 306: Laws on Insurance & Negotiable Instrument

Law on Insurance

Definition and Types of Insurance, Governance of Insurance Business, Definition and Nature of a Contract of Insurance, Fundamental Principles of Insurance Contracts, Reinsurance, Life Insurance: Definition of Contract of Life Insurance, Difference between Life Insurance and other Forms of Insurance, Insurable Interest, Procedure for Effecting a Life Policy, Kinds of Life Insurance Policies, Revival of Discontinued or Lapsed Policies, Loss of Policy, Effect of Suicide, Settlement of Claims. Fire Insurance: Definition of a Contract of Fire Insurance, Procedure for Effecting Fire Insurance Policy, Types of Fire Policies, Assignment of Fire Insurance Policies, Fire Insurance Claim. Marine Insurance: Definition of Contract of Marine Insurance, Subject of Marine Insurance, Characteristics of Marine Insurance Contracts, Kinds of Marine Policies, Assignment of Policy, Premium, Marine Losses.

Negotiable instruments

Definition, Characteristics and Types of Negotiable Instruments, Promissory Note, Bill of Exchange, Cheque, Difference between Note and Bill, Difference between Bill and Cheque, Difference between Cheque and Note, Difference between Open Cheque and Crossed Cheque, When Banker May Refuse the Payment of a Cheque, Payment in Due Course, Holder and Holder in Due Course. Negotiation: Meaning, Modes of Negotiation, Holder by Negotiation Back. Indorsement: Meaning, Different Types of Indoresement, Legal Effect of Indorsement, Maturity of Negotiable Instruments Not Payable on Demand, Capacity of Parties, Liability of Prties to Negotiable Instruments. Presentation of negotiable instruments: Whom to Present, Time of Presentation, Place of Presentation, Effects of non-presentment, Discharge of Negotiable Instruments, Discharge of Parties.

Credits: 3

LAW 307: Laws on Specific Relief and Limitation

Specific Relief:

Specific Relief How Given, Recovering Possession of Property, Specific Performance of Contracts, Rectification of Instruments, Recession of Contracts, Cancellation of Instruments, Declaratory Decrees, Appointment of Receivers, Enforcement of Public Duties, Preventive Relief and Injunctions.

Law of Limitation:

Object of the Law of Limitation, Limitation and Prescription, Waiver of Limitation, Limitation of Suits, Appeals and Application, Computation of Period of Limitation, Effect of Law of Limitation, Acquisition of Ownership by Possession.

Credits: 3

LAW 308: Company Law

History of Company Acts, Corporate Personality of Company, Formation of a Company, Kinds of Companies, Memorandum of Association, Doctrine of ultra virus, Articles of Association, Prospectus, Promoters, Shares, Shareholders, Directors, Meetings, Dividends, Audit and Accounts, Borrowing, Lending, Investment and Contracts, Debentures, Majority Power and Minority Rights, Prevention of Oppression and Mismanagement, Arbitration and Compromise, Winding Up.

Credits: 3

LAW 309: Law of Evidence II

Presumption as to Documents, Exclusion of Oral by Documentary Evidence, Production and Effect of Evidence, Burden of Proof, Estoppels, Witnesses, Examination of Witnesses, Improper Admission and Rejection of Evidence, Role of Judges Compared in Adversarial System and Inquisitorial System.

Definitions, Mode of Proof of Entries in Bankers' Books, Case in which Officer of Bank Not Compellable to Produce Books, Inspection of Books by Order of the Court, Costs etc.

Credits: 3; Prerequisite: LAW 305

LAW 310: Law on Criminal Procedure I

Definitions, Constitution and Powers of Criminal Courts and Offices, Information of Offence, Arrest, Escape and Retaking, Processes to Compel Appearance, Processes to Compel the Production of Documents, Prevention of Offences, Information to the Police and their Powers to Investigate, Proceedings in Prosecutions: the Jurisdiction of the Criminal Courts in Inquiries and Trials, Complaint to Magistrates, the Commencement of Proceeding before the Magistrates, Charge, Trial of Cases by Magistrates, Summery Trail, Trial before the Courts of Sessions, General Provisions as to Inquiry and Trial, Judgment.

Credits: 33

LAW 311: Law on Civil Procedure I

History of the Law on Civil Procedure, Scope and Application of the Code of Civil Procedure, Inherent Power of the Courts, Meaning of Suits of Civil nature, Jurisdiction of Civil Courts, Res judicata and Res sub judice,

Institution of Suits and Proceedings, Plaint, Written statement, Pleadings, Summons, Discovery and Inspection, Parties to Suits, Amendment of Pleadings, Appearance and Non-appearance of Parties, Examination of Parties, Admissions, Production, Impounding and Return of Documents, Settlement of Issues and Disposal of Suits, Adjournments, Hearing of the Suit and Examination of Witnesses, Affidavits, Judgment, Order and Decree.

Credits: 3

LAW 312: International Law I

'History' in International Law and Histories of International Law, The Politics of 'History' in International Law, The Colonial Origin of International Law: the Dichotomy of 'Self' and 'Other', Ancient Worlds, The Middle Ages: the Natural Law Era, the Classical Age (1600-1815), the Nineteenth Century (1815-1919), the Twentieth and Twenty-first Centuries (1919-), Theories as to the Basis of International Law, Is International Law True Law? The Sources of International Law, International Law and 'Relative Normativity', the Relationship between International Law and Municipal Law, the Subjects of International Legal Order, International Organizations, the Individual and the International Legal System.

Credits: 3

LAW 401: Law on Criminal Procedure II

Appeal, Reference and Revision, Special Proceedings, Supplementary Provisions Regarding Public Prosecutor, Bail, Bailable and Non-bailable Offences, Commission for the Examination of Witnesses, Transfer of Criminal Cases, etc.,

Law and Order Violating Offences (Speedy Trial) Act, 2002: Definition of Law and Order Violating Offences, Punishment of Different Offences, Composition, Jurisdiction, Procedures of the Court, Trial in Absentia, Bail,

Credits: 3; Prerequisite: LAW 310

LAW 402: Law on Civil Procedure II

Interim Orders: Arrest and Attachment before Judgment, Appointment of Receiver, Temporary Injunctions, Commission, Security for Costs

Suits in particular Cases: Suits by and against Government or Public Officers, Suits by and against Aliens and Foreign Rulers, Suits by or against Corporations, Suits by or against Trustees, Executors and Administrators, Suits by or against Minors and Lunatics, Suits relating to Public Nuisance, Suits relating to Public Charities,

Various kinds of Suits: Representative Suit, Interpleader Suit, Pauper Suit, Money Suit, Title Suit etc.

Withdrawal and Compromise of suits, Death, Marriage and Insolvency of parties, Suits Involving Interpretation of the Constitution

Credits: 3; Prerequisite: LAW 311

LAW 403: International Law II

Rights and Duties of States, Jurisdiction, State Responsibility, Responsibility to Protect: Unilateral Humanitarian Intervention, State Succession to Rights and Obligations, Asylum and Extradition, Immunities of States, Officials of States and International Organizations, International Law of Treaties, Responding to the Breaches of International Obligations, The Means of Dispute Settlement, Diplomatic Methods: Negotiation; Mediation; Inquiry; Conciliation, Legal Methods: Arbitration; International Court of Justice; other Courts and Tribunals, International Organizations and Dispute Settlement, Regional Organizations; the United Nations; Use of Force and the International Legal Order, Law of the Sea, Law of Aviation.

Credits: 3; Prerequisite: LAW 312

LAW 404: Legal Drafting I (Criminal)

Power of Attorney, FIR, General Diary, Bail Petition, Hajira Petition, Time Petition, Naraji Petition, Memorandum of Appeal, Revision, Petition under Section 241 A of the Cr.P.C., Petition of Complaint, Drafting under Section 561 Cr.P.C., Drafting under Section 491 Cr.P.C. (Detention), Drafting under Section 526 Cr.P.C., Drafting under Section 528 Cr.P.C.,

Credits: 3

LAW 405: Legal Drafting II (Civil)

1. Hazira
2. Application for Time
3. Plaints

(a) Suit for Declaration of Title

(b) Suit for Specific Performance of Contract

(c) Money Suit

(d) Suit for Compensation and Damages

(e) Family Case

(f) Recovery of Money under Artha Rin Adalat Ain

4. Written Statements of the Above Matters
5. Petitions

(a) Application under Order V Rule 20 for Substituted Service of Summons

(b) Application under Order VII Rule 11 for Rejection of Plaint

(c) Application under Order I Rule 10 for Addition of Parties

(d) Application under Order VI Rule 17 for Amendment of Plaint

(e) Application under Order XXXIX Rule 1 and 2 for Temporary Injunction

(f) Application under Order XXXIX Rule 7 for Local Investigation

(g) Application under Order XL Rule 1 for Appointment of Receiver

(h) Application under section 151 for Expeditious Hearing

(i) Application under Order XXIII Rule 4 for Substitution of Parties

(j) Application under Order XXII Rule 3 for Compromise of Suits

6. Written Objections of the above
7. Memorandum of Appeal

Application under Order IX Rule 4, 9 and 13 for Restoration of Suits

Credits: 3

LAW 406: Supervised Dissertation

This subject involves supervised research on certain topic. Students will select a topic from a list of topics provided by the Department. Students will meet their supervisor individually and undertake individual research. The maximum length of the dissertation is 8, 000 words. The supervisor will provide feedback on the draft materials submitted by his/her supervisee.

Credits: 3

LAW 407: Legal Drafting III (Civil)

1. Legal Notice

(a) Notice of Divorce

(b) Notice of Termination of Tenancy

(c) Notice for Specific Performance of Contract

(d) Notice for Recovery of Money

(e) Notice to Refrain from Committing Public/Private Nuisance

(f) Demand for Justice Notice to Government for Performance of Constitutional or Statutory Duties

2. Agreements

(a) For Sale (Baina)

(b) Business and Commercial Contracts between Companies and Individuals

(c) Service Contracts

(d) Contracts to Rent Movable Properties

(e) Hire Purchase Agreement

(f) Tenancy Agreement

3. Deeds

(a) Deed of Sale

(b) Deed of Lease

(c) Deed of Mortgage

(d) Deed of Redemption of Mortgage

(e) Deed of Exchange

(f) Deed of Gift

(g) Deed of Will

(h) Deed of Partition

(i) Deed of Heba-bil-ewaz

(j) Deed of Trust

4. Affidavits

(a) In Support of Oral Gift

(b) Declaration of Assets

(c) Declaration of Family Settlement

5. (a) Memorandum of Association and Articles of a Company

(b) Constitution of Cooperative Society

(c) Constitution of a Voluntary Association

6. Power of Attorneys

(a) Power to Sale Land

(b) Power to Conduct a Case

(c) Power to Conduct Business

7. Security Bonds

Promissory Notes

IOUs

Money Receipts

Bills of Exchange etc.

Credits: 3; Prerequisite: LAW 405

LAW 408: Trial and Advocacy Training (Criminal)

Client Interview, Marshaling of Facts, Opening of a Case, Charge Hearing and Charge Framing, Examination –in-chief, Cross examination, Exhibiting Documents, Arguments, Moving a Bail Petition,

Court Visit by the students.

Credits: 3

LAW 409: Trial and Advocacy Training (Civil)

Concepts and theories of Clinical Legal Education, Jurisdiction of Civil and Criminal Courts, Bar Council Order and Rules, 1972, Verbal and Non-verbal Skills: Client Interview, Choice of Forum: Court Jurisdiction, Court Fees, Suit Valuation, Limitation, Remedies etc., Framing of Issues, Moot Court: Opening of a Case/Suit, Examination –in-chief, Cross Examination, Exhibiting Documents, Moving an Injunction Petition, Moving a Bail Petition, Argument.

Court Visit by the students.

Credits: 3

MAT 100: College Mathematics

Differential Calculus: Function, Basic concepts on Limits & Continuity, Techniques of Differentiation, Indeterminate forms, Maxima and Minima of Functions, Point of Inflection, Functions of Two or More Variables, Partial Derivatives, Homogeneous Function, Euler's Theorem on Homogeneous Functions. Integral Calculus: Integration-the inverse of Differentiation, Integration by substitution, Definite Integral. Matrix: Different types of Matrix and Matrix operation, Identity Matrix, Minor, cofactor, Adjoin and Inverse of a Matrix. System of linear equations: Solution of a system of linear equations by using - Gauss Jordan Elimination Method, Inverse Method and Cramer's rule. Permutation and Combination, BinomialTheorem.

Credits 3; Prerequisite: None

MAT 101: Differential & Integral Calculus

Differential Calculus: Limit, Continuity and differentiability. Successive differentiation of various types of functions. Leibnitz's theorem. Rolle's theorem. Mean value theorems. Taylor's and Maclaurin's theorems in finite and infinite forms. Lagrange's form of remainders. Cauchy's form of remainders. Expansion of functions. Evaluation of indeterminate forms by L'Hospital rule. Partial differentiation. Euler's theorem. Tangent and normal. Concavity of functions. Determination of maximum and minimum values of functions and points of inflection with Applications. Curvature, Asymptotes.

Integral Calculus: Integration by the method of substitution. Standard integrals. Integration by successive reduction. Definite integrals, its properties and use in summing series. Walli's formulae. Improper integrals. Beta function and Gamma function. Area under a plane curve and area of a region enclosed by two curves in Cartesian and polar co-ordinates. Volumes of solids of revolution. Volume of hollow solids of revolution by shell method. Area of surface of revolution. Jacobians. Multiple integrals with applications.

Credits: 3; Pre-requisites: None.

Recommended Textbook: Calculus; Howard Anton, Irl Bivens, Stephen Devis, John Wiley & Sons.

Reference Book: Calculus and Analysis; M.R. Spiegel, Schaum's outline series.

MAT 102: Differential Equations & Special Functions

Ordinary Differential Equations: Degree and order of ordinary differential equations. Formation of differential equations. Solutions of first order differential equations; Separable & homogeneous equations, Exact equation. Integrating factor. Equations made exact by integrating factors. First order linear equation. Bernoulli's equation. Higher order linear homogeneous equation with constant

coefficients. Initial and Boundary value problems. Linear non-homogeneous equation with constant coefficients: Method of undetermined coefficients, Method of variation of parameters, Operator method; Series solution; Frobenius method.

Partial Differential Equations: Formation of PDEs & First order linear PDEs. Solution of PDEs of first order; Lagrange's Method. Second Order homogeneous & non-homogeneous PDEs with constant coefficients. Wave equations. Particular solutions with boundary and initial conditions.

Special Functions: Legendre differential equation and Legendre polynomials, Recurrence relations for Legendre polynomials, Spherical harmonics, Bessel differential equation, Bessel functions, Recurrence relations for Bessel functions, Modified Bessel functions, Hermite differential equation, Hermite polynomials, Hyper-geometric function.

Credits: 3; Pre-requisites: MAT101.

Recommended Textbook: Schaum's Theory and Problems of Differential Equations (Outline Series), Frank Ayres, Schaum Publishing.

Reference Book: Differential Equations**,** George F. Simmons, McGraw-Hill.

MAT 104: Co-ordinate Geometry and Vector Analysis

Two-Dimensional Geometry: Change of axes, transformation of co-ordinates, Pair of straight lines, Circles:Tangents and Normals, Chord of Contact, System of Circles: Orthogonal Circles. Conic Section: Parabola, Ellipse & Hyperbola. The general equation of second degree, Identification of Conics.

Three-Dimensional Geometry: Co-ordinate systems; Direction cosines & direction ratios, Plane, Straight line: The Shortest distance, Sphere: Tangent Plane. Cylinder and Cone.

Vector Analysis: Vectors and Scalars, Algebra of vectors, Vector differentiation and vector integration, Gradient, Divergence and Curl: Cartesian, Spherical, Polar and cylindrical systems, Physical significance of Gradient, Divergence and Curl. Green's theorem, Divergence theorem, Stoke's theorem and their applications.

Credits: 3; Pre-requisites: MAT101.

Recommended Textbook: Vector Analysis (Schaum's series), Murray R. Spiegel, Schaum Outline Series.

Reference Book: Coordinate Geometry, Luther PfahlerEisenhart, Dover Publications Inc.

MAT 110: Mathematics for Business and Economics I

Number System, Functions and Graphs: Linear functions and Straight lines, Quadratic Functions and Parabolas, Exponential and Logarithmic Functions and their applications in simplex and compound interest, Effective rate, Concept of Future Value and Present Value of an Annuity. Solving a system of Linear Equations, Matrices and their applications. Static Equilibrium Analysis- Linear Model. Concept of Comparative Static and Derivatives, Partial of Differentiation and Total derivative with application. Optimization problem (Unconstrained) one or more than choice variables. Applications in Economics and Business Model.

Credits 3; Prerequisite: ECO 101, MAT 100

MAT 201: Linear Algebra

Systems of linear equations and matrices: Introduction to systems of linear equations, Gaussian elimination and Gauss-Jordan elimination, Matrices and matrix operations, Inverses; rules of matrix arithmetic, Elementary matrices and a method for finding inverse of a matrix, Further results on systems of equations and invertibility, Diagonal, triangular, and symmetric matrices. Determinants: Basic concept on determent, Evaluating determinants by row reduction, Properties of the determinant function, Cofactor expansion and Formation of Adjoint matrix; Cramer's rule. General vector space: Real vector space, Subspace, Linear independence, Basis and dimension, Row space, column space and null space, Rank and nullity. Inner product spaces: Inner products, Angle and orthogonality in inner product spaces, Orthonormal bases; Gram-Schmidt process; QR-decomposition, Best approximation; least squares, Orthogonal matrices; change of basis. Eigenvalues and eigenvalues: Concepts on eigenvalues and eigenvalues, Diagonalization, Orthogonal diagonalization. Linear transformation: General linear transformation, Kernel and range, Inverse linear transformations, Matrices of general linear transformations. LU-decomposition: Solving linear system by factorization.

Credits: 3; Pre-requisites: MAT102.

MAT 205: Linear Algebra & Complex Variables

Linear Algebra: Matrices and operations with matrices; Systems of linear equations; Vector spaces; Linear independence; Basis and dimension; Linear transformations; Eigenvalues and eigenvectors; Diagonalization of matrices; Orthogonal sets and least square approximation; QR-decomposition; LU-decomposition; Applications.

Complex Variables: Functions of a complex variable and their derivatives; Analytic function; Singularities; Cauchy integral theorem and formula; Power series and Laurent expansions; Calculus of residues and contour integrals; Applications.

Credits: 3; Pre-requisites: MAT102.

Recommended Textbook: 1. Elementary Linear Algebra, Howard Anton, Wiley.

2. Complex Variables, Murray R SpiegelSchaum's Series, McGraw-Hill.

Reference Book: 1. Experiments in Computational Matrix Algebra, David R.Hill, McGraw-Hill

2. Complex Variables, L.V. Ahlfors, McGraw-Hill.

MAT 206: Basic Algebra and Linear Algebra

Credit 3

Part A: Basic Algebra

Theory of numbers: unique factorization theorem; congruencies; Euler's phi-function. Inequalities: order properties of real numbers; Weierstrass', Chebysev's and Cauchy's inequalities; inequalities involving means. Complex numbers: field properties; geometric representation of complex numbers; operations of complex numbers. Summation of algebraic and trigonometric finite series. Theory of equations: relations between roots and coefficients; symmetric functions of roots; Descartes rule of signs; rational roots; Newton's method.

Part B: Linear Algebra

Vectors: operations with vectors; scalar product; norm of a vector; vectors in n-space, Euclidian n-space; vector space and sub-space; linear combinations of vectors; spanning set; linear dependence and independence; basis and dimension; inner product spaces; orthogonal and orthonormal basis; Gram-Smidtorthogonalization process;

System of linear equation: homogeneous and non-homogeneous. Introduction of matrix; solution using Gauss, Gauss-Jordan elementary operations; definition and operations using matrices; different types of matrices. Transpose of a matrix; trace of a matrix; determinant of a square matrix; adjoint of a square matrix; inverse of a matrix; properties of inverse. Elementary matrix and method for finding inverse using elementary operations and by partitioning; solution of system of linear equations by matrix inverse and Cramer's rule. Rank of matrices and related theory; linear transformation; eigenvalue and eigenvectors; diagonalization, orthogonaldiagonalization. Fundamentals of quadratic forms and it's application in statistics; differentiation of matrix; g-inverse.

Text Books

1. Anton, H and Rorres, C (2005). Elementary linear algebra,
2. Searle, SR (1982). Matrix algebra useful for statistics.Wiley.
3. Ayres, F (1995). Theory and problems of modern algebra.McGraw-Hill.4th edition.Wiley.

MAT 211: Mathematics for Business and Economics II

Equilibrium Analysis: Partial market Equilibrium, General market Equilibrium. Marginal Analysis in Business and Economics, First derivatives and graphs, Second derivatives and Graphs. Optimization problems (Unconstrained): One or more than one choice variables. Optimization with equality constraints. Economic Dynamics and integral calculus. Linear programming: General Formulation of Linear Programming Model, Solving LP problem Using Graphical Method and Simplex Method. Duality of an LP problem.

Credits 3; Prerequisite: MAT 110

MAT 301: Complex Variables & Mathematical Transforms

Complex Variables: Complex number system, General functions of a complex variable, Limits and Continuity, Complex differentiation, Analytic functions, Cauchy Riemann equations, Necessary and Sufficient conditions. Singularities: Classification of singularities. Line integrals of complex functions, Cauchy's theorem, Cauchy's integral formula, Liouville's theorem, Taylor's and Laurent's series. The Residue theorem, Contour integration, Conformal mapping and its application. Laplace transform: Definition of Laplace transform, Laplace transform of different functions, Inverse Laplace transform, Convolution theorem, evaluation of improper integrals by Laplace transforms, Solution of differential equation by Laplace transforms.

Fourier Analysis: Fourier series; Dirichlet's conditions, Parseval's theorem, Fourier integral and Fourier transforms. Application of Fourier transforms in solving boundary value problems.

Credits: 3; Pre-requisites: MAT102.

MGT 101: Principles of Management

Meaning and importance of management, evaluation of management thought, managerial decision making, environmental impact on management, corporate social responsibly, planning setting objectives, implementing plans, organizing, organization design, managing change, human resource management-directing, motivating, leading managing workgroups, controlling- controlled principles, processes and problems, managing in a changing environment.

Credits: 3, Prerequisites: BUS 101, ENG101

MGT 251: Organizational Behavior

This course exposes students to advanced behavioral science theories and applications in management. the course includes introduction to organizational behavior, foundation of individual behavior, perception of individual decision making, value attitudes and job satisfaction, power and politics, conflict in organization, motivation from concepts to applications, foundation of group behavior, understanding team work, basic approaches and contemporary issues in leadership, understanding interpersonal communication in organization, understanding organizational culture, understanding cultural diversity, stress and work life balance, human resources policies and practices.

Credits: 3, Prerequisites: MGT101

MGT 321: Industrial Management

This course should be taught with emphasis on engineering and technological dimensions and practical examples drawn from engineering organizations and practices. Topics to be covered: business environment (types of business, entrepreneurship skills, the external environment of business, swot and pest analysis, steps in setting up a new business). general management (managerial roles and skills, five basic functions of management, organization structure, typical structure of a manufacturing organization, managerial tools for decision making, leadership, motivation models, strategic planning). operations management (product and services, product design and process selection, facility location and layout, operation planning and scheduling, quality management, inventory and material management, productivity measurement and improvement). Financial management (basic accounting and financial concepts, introduction to financial statements, financial statement analysis).

Credits: 3, Pre-requisite: ENG102

MGT 337: Production Operations Management

This course is designed to provide the students with an understanding of the foundation of the operations function in both manufacturing and service. The course provides a general introduction and frameworks to manage manufacturing and service operations efficiently. Topics include introduction to operation management, operation strategy, forecasting models, material requirement planning (mrp), production scheduling, facility location and layout planning, decision analysis, pert/cpm analysis, grant chart, supply chain management.

Credits: 3, Prerequisites: MAT 100, ECO104, ECO204, MGT 101, BUS 231

MGT 402: Management Science

Survey of the current literature in management science examines principles and practices of scientific management. Selected topics in this course include: MBO, quantitative methods, markov decision problems, simulation and queuing theory.

Credits: 3, Prerequisite: ECO204, MGT101, BUS 231

MGT 405: Organizational Development and Change

This course provides an understanding of basics of organizational development, organizational renewal and change, intervention process. The objective of this course is to provide students with an integrated and comprehensive view of the field of organizational development.

Credits: 3, Prerequisite: MGT251, BUS 231

MGT 410: International Labor Management

This course provides an overview of the history and development of labor relations, the structure of union organizations, and process of negotiations and contract administration. Topics include the study of labor management in developed market economies, international bargaining, ethics and employee relations. This course is a balanced approach from international or management viewpoint and an analysis from a behavioral, institutional and economic perspective.

Credits: 3, Prerequisite: BUS361, MGT101, BUS 231

MGT 421: Entrepreneurship Development

The objective of the course is to prepare students for the possibility of starting their own entrepreneurial ventures. The course includes topics on theories and characteristics of entrepreneurship, environmental conditions, scanning and evaluation of investment opportunities, forms of business ownership, government regulations sources and procedure of assistance, market study of production process, organization and staff planning, project appraisal and management information systems. The emphasis of the course is on improving the skills of the innovative individuals who identifies a market opportunity and mobilizes factors of production.

Credits: 3, Prerequisite: MGT101, BUS 231

MGT 425: Total Quality Management

Examines major issues of tqm principles and theories. Topics include demings, jurans, crrosbys tqm principles, JIT, HRM, leadership theories, quality and operational research.

Credits: 3, Prerequisite: MGT101, BUS 231

MGT 437: Small Business Management

Managing small firms is a multidisciplinary activity. Planning activity binds all other activities together. Besides planning, the course covers topics such as: setting up, business basics, finance, control and the growing business.

Credits: 3, Prerequisite: MGT101, BUS 231

MGT 448: Managing Globalization

This course contains topics on organizational strategy, global competitive advantage, and management dynamics: structuring, staffing, & sharing values, and cases regarding global management. This course also covers cultural and behavioral aspects of globalization, functional aspects of globalization and socio- ethical issues relating global management.

Credits: 3, Prerequisite: ITB301 MGT101, BUS 231

MGT 465: Leadership Management

This program responds to the leadership development needs of government and non-government organizations. This program provides a means by which students may discover and refine abilities fundamental to effective leadership.

Credits: 3, Prerequisite: MGT251, BUS 231

MGT 480: Strategic Management

Analysis of policy formulation and implementation from a companywide stand point. Emphasis on integration of knowledge and approaches across functional areas, both endogenous factors, which affect company policy and the role of the firm in the society.

Credits: 3, Prerequisite: 99 credits, BUS 231

MIS 101: Introduction to Management Information Systems

The primary objective of this course is to give an idea of different components of the Information Systems & the applications of Computer in different areas of businesses. The course will include the following topics: Information system concepts, Application of IS and IT in Business, Hardware, Software, Database, Personnel and Procedures component of IS and their role in Business, IT Infrastructure and Emerging Technologies, Security and Control Issues in IS, Privacy Issue in IS, Introduction to e-commerce and Database, Introduction to networking and networking in details, IT ethics, Ethics and system quality, Different types of collaboration, Office automation and Virtual work environment. It will also include fundamental of spreadsheet analysis, inventory control system, auditing formula, What-If Analysis tools such as sensitivity analysis, goal seek, scenario manager and different types of look up application in business.

Credits: 3; Prerequisite: CSE101

MIS 305: Enterprise Information Systems

This course provides an introduction to management information systems, what they are, how they affect the organization and its employees, and how they can make businesses more competitive and efficient. The course will focus on ways in which advances in information technology and communications networks continue to recast the role and value of information systems in business and management. Example topics include: organizational and technical foundations of information systems, systems development, information management, infrastructure management, system security, and creative business applications of information technology. Database management system, E-commerce, ERP, designing database, filtering data, query management, enhancing decision making etc.

Credits: 3; Prerequisite: MIS 101, BUS 231

MIS 401: Structural Programming

The course introduces students to basic programming concepts. Topics include Definition of Structure programming, Pseudo-code, Flowcharts, Data type, Expression, Variable & Reserve word, Memory variable address, Print function, Input, Array & Boolean expression, If statement, If else statement, Repetition structures (looping), Function & procedure: Definition, argument/parameter, call by value/call by reference, String operation, pointer. The course includes lab work based on theory taught.

Credits: 3; Prerequisite: MIS 305, BUS 231

MIS 402: System Analysis and Design

This course aims to familiarize the students with the role as A system analyst and System Designer who can play an important role to introduce and manage an automated modern organizations. This course will help to understand the requirements of a business entity and then design and implement an effective information system to assist that business in its business functions. It also course covers the traditional structured analysis and design approach and the emerging, prevailing object oriented approach. The course presents a variety of methodologies and techniques in modern systems design and analysis

Credits: 3; Prerequisites: MIS 305, MIS 401, BUS 231

MIS 403: Object Oriented Programming

The objective of this course is to teach students to program well in an object-oriented style. It will include object oriented concepts: classes, objects, methods, polymorphism and inheritance with C++/Java. This course will cover syntax, idioms and patterns of

C++/Java so that students are comfortable with object oriented programming. This course includes extensive lab works based on theoretical concepts of object oriented programming.

Credits: 3; Prerequisites: MIS 305, MIS 401, BUS 231

MIS 404: Networking and Operating Systems

The main object of this course is to understand the basic computer network and different network operating system. To provide students with necessary understanding of computer networks essential to system and network design and network management. Topics include what is network and why, Communication Model such as OSI and TCP/IP, Types of Network, Network service and software, Network architecture, Signal and Data communication, Network media, Network devices, DHCP, DNS, Network protocol, IP addressing and subnetting, Name resolution, IP routing, Network security and Operating systems.

Credits: 3; Prerequisite: MIS 305, BUS 231

MIS 406: Relational Database Management Systems

The main objective of this course is provide a theoretical and practical guidelines to the students with the background; how to design, implement, and use of database management systems in business. Upon successful completion of this course, students will have the skills to analyze business requirements and produce a viable model and implementation of a database to meet such requirements. This course focuses on Basic Concept of Relational Database - Database Design & E-R Model, Use of Structured Query Language (SQL), Data Mining & Information Retrieval and also give a guidelines to prepare a Practical DBM Project

Credits: 3; Prerequisite: MIS 305, BUS 231

MIS 407: System Integration & Security and Internet

This course will introduce business and system specification, existing hardware and software platform, enterprise application integration, file system of different operating system, integration features of various systems including hardware and software, security features of different hardware and software, history and current management of Internet engines, Internet services, Electronic business and business promotions, Internet software development and security.

Credits: 3; Prerequisites: MIS 305, MIS 404, BUS 231

MIS 408: Internetworking with TCP/IP and Implementing Exchange Server

Introducing to TCP/IP identifying machine with IP routing, IP address resolution, Host name resolution, Net BIOS name resolution, DHCP, WINS, Internet working, Integration of heterogeneous bandwidth environment, SNMP services, Trouble shooting and Administration of exchange server.

Credits: 3; Prerequisites: MIS 305, MIS 407, BUS 231

MIS 409: Client/Server Administration

Domain model in the enterprise, server managing, uses (logical and global) management, resource management, server and client, internet services, inter-network routing, system performance, network monitoring, and server and client trouble shooting.

Credits: 3; Prerequisite: MIS 408, BUS 231

MIS 410: Database Systems

Students successfully completing this course should be able to study the physical and logical database designs with the help of PHP and MySQL. This course will also help to understand and use data manipulation language to query, update, and manage a database. This course will also help to develop an understanding of essential DBMS concepts such as: database security, integrity, concurrency, distributed database, and intelligent database, client/server (Database Server), data warehousing. This course includes lab works based on practical theories of DBMS.

Credits: 3; Prerequisites: MIS 401, MIS 406, BUS 231

MIS 415: Decision Support Systems

The course will introduce with decision support systems; show their relationship to other computer-based information systems, demonstrate DSS development approaches, and show students how to utilize DSS capacities to support different types of decisions. This course covers the topics like DSS components, Decision making and DSS, DSS software and hardware, developing DSS, DSS models, types of DSS, group DSS, executive information systems, data mining, artificial intelligence and expert systems.

Credits: 3; Prerequisite: MIS 305, BUS 231

MIS 419: E-Commerce and Web Programming

The course will include the following topics: E-Business and managing web, different types of E-Business and strategic impact of E-Business, different business model for E- business, E-Commerce in Bangladesh, legal consideration, web application, corporate web server management, Electronic payment system(EPS), Different types of e-services, EDI, EFT, online product promotion, different form of web marketing, E-Supply Chains, Collaborative Commerce, Intrabusiness EC, Corporate Portals, Role of bank in E commerce, Mobile commerce in details and Web technology. More Emphasis will be given to static and dynamic web development technique using HTML, DHTML, JavaScript, PHP, Joomla, Web page Maker, Sothink software, Macromedia Dreamweaver MX and other web development tools. Other topics will include Domain registration and hosting issues, search engine optimization (SEO), online shopping cart/check out and payment system development etc.

Credits: 3, Prerequisites: MIS 305, MIS 401, BUS 231

MKT 101: Principles of Marketing

This course is designed to introduce fundamental marketing concepts, theories and analytical tools critical to manage profitable customer relationships in today's highly competitive and complex business environment. It provides an overview of all the marketing activities involved in the provision of products to final and organizational consumers. A diverse range of marketing topics is covered in this course including marketing strategy and planning, the marketing environment and how to monitor it, consumer and organizational behavior, marketing research, market segmentation and development of target markets, new product development, pricing, distribution, promotion and international marketing.

Credits: 3; Prerequisite: BUS 101

MKT 201: Marketing Management

This course aims at developing a solid understanding of the basic terminology, concepts, tools, and frameworks in marketing. A broad range of marketing issues in a variety of consumer, industrial, and service environments is covered. Topics include consumer buying behavior, market segmentation, product positioning, marketing mix, sales force management, and market research techniques.

Credits: 3; Prerequisite: MKT 101

MKT 401: Sales Management

The course is designed to introduce the students with the traits, competence, skills and working methodology of sales people. Special attention will be paid on the growing importance of strategic selling in this age of information. The focus will be on the four components of selling strategy: Relationship strategy, Product strategy, Customer strategy and Presentation strategy. A significant portion of the course will encompass students' hands on learning using sales role playing situation. Sales Management issues like sales budget, sales territories and quota, designing and managing the sales force will be covered to provide a holistic viewpoint. Management of sales not only focuses on sales procedure and salespeople solely rather it emphasizes on ways to integrate the activities of the sales department, to a broad aspect of the marketing department.

Credits: 3; Prerequisite: MKT 201, BUS 231

MKT 402: Integrated Marketing Communication

The Integrated Marketing Communication program is designed for students interested in integrated study of advertising, direct marketing, public relations, publicity, personal selling, sales promotion and digital marketing communication technologies. Emphasis

is placed on the ways IMC is used to ensure consistency of messages and complementary use of media in order to maximize the impact on consumers and other audiences. Topics include an evaluation of the role of promotion in marketing and the economy; the formulation and analysis of promotional goals; planning, organizing, and controlling the promotion function; creative planning; and budgeting and media selection.

Credits: 3; Prerequisite: MKT 201, BUS 231

MKT 408/ITB 408: International Marketing

This course provides a practical overview of the key elements of international marketing and issues businesses face when entering and operating in foreign markets. The course demonstrates awareness of local, regional and international issues that affect businesses. The course also demonstrates the knowledge of international marketing theories that will assist in research, analysis, planning, implementation and evaluation of global operations.

Credits: 3; Prerequisite: MKT 201, ITB 301, BUS 231

MKT 410: Consumer Behavior

Consumer behavior is a broad field that studies how individuals, groups, and organizations acquire, consume and dispose of goods and services. So, the knowledge of consumer behavior has important implications for marketing managers in the areas of environmental analysis, product positioning, segmentation of the market, and design of the marketing mix. This course examines the underlying psychological, sociological and economic factors which influence consumer behavior. Therefore, it assists the students in solving marketing problem and participating in marketing research.

Credit 3; Pre-requisites: MKT 201, BUS 231

MKT 411: Export-Import Management

Export-Import procedures/transactions; actors which include the banks, insurers, shippers, clearing & forwarding agents etc associated with export and import activities; documents which include L/C, shipping documents, certificate of origin etc. required for trade transactions and policies including incentive plan, foreign exchange regulation, export-import promotion methods, quota, tariffs etc which affect export-import activities will be discussed in this course.

Credit: 3; Pre-requisite: MKT 201, BUS 231

MKT 412: Service Marketing

This course is designed to recognize the differences between specific categories of services that may be as important to student understanding as the broader differences between goods marketing and service marketing. The course also draws a distinction between the marketing of services and the marketing of goods through service. The topics covered in this course are introduction to service industry, characteristics of service, fundamental differences between goods and services, consumer behavior and service consumption, ethical issues in service marketing, pricing, developing of communication mix, managing physical evidence, managing customer and customer care people, measuring customer satisfaction, measuring service quality, service failure and recovery strategies, customer retention, gap analysis, service research, future trends of service industry and other recent issues.

Credits: 3; Prerequisite: MKT201, BUS 231

MKT 414: Marketing Research

Marketing research serves as a central basis for firm's marketing strategy. It helps managers in addressing marketing problems such as: market segmentation, developing advertising and pricing policies, designing and positioning new products, etc. This course familiarizes the students with the techniques by which data are collected, analyzed, and made available for decision-making use by marketing managers. The approach is to provide a practical orientation to the marketing research process through hands-on assignments and projects.

Credit 3; Pre-requisites: ECO204, MKT 201, BUS 231

MKT 416: Brand Management

This course is designed to develop the necessary knowledge and skills for creating and managing brands which resonate with customers and allow the marketing organization to build and maintain customer equity in the 21st century. More specifically the course will outline a range of branding theories, concepts, strategies and practices addressing across a range of real world contexts, product types and industries. Topics include assessing brand meaning, brand equity, customer based brand equity, brand positioning, brand sense, blue ocean strategies, leveraging secondary brand association, evaluating brand extensions, brand audit and building brands via social media.

Credits: 3; Prerequisite: MKT 201, BUS 231

MKT 418: Supply Chain Management

This course aims to discuss the end-to-end supply chain issues and practices. This course gives emphasis on approaches to creating long term relationship with the value chain partners to make the marketing offer available at different stages and also suggest strategies to gain competitive advantage through ensuring maximum utilization of organizational resources. The course includes issues related to supply chain customer services, product characteristics as determinants of supply chain decisions, use of information system to capitalize on supply chain strengths, transportation fundamentals, inventory and warehousing management, distribution channel management, supply chain integration and co-ordination.

Credits: 3; Prerequisite: MKT 201, BUS 231

MKT 430: Strategic Marketing

This course provides students with solid experience in creating market-driven and market-driving strategies for the future success of a business. A focus is on discovering and developing a set of unique competencies for a firm that, through strategic differentiation, leads to sustainable competitive advantage in the marketplace. Students are provided ample opportunity to develop and practice creative problem-solving and decision-making skills to simulate the requirements of today's complex market environment. Industry analyzes will be performed that include the following: internal/external analysis, customer analysis, competitor analysis, market/submarket analysis, and comparative strategy assessment.

Credits: 3; Prerequisites: MKT 201, ECO 104, BUS 231

PHRM 101: Physical Pharmacy I

This course has the objective to get the students well versed with some of the basic concepts of Physical Chemistry having application in pharmacy, which includes states of matter, solutions, pH, buffer and chemical kinetics. The course has been designed to offer comfort for the students in understanding some of the very cardinal areas of drug manufacturing, realizing the vast roles of numerous chemical kinetics and spelling out some of the unique mechanisms that govern the ADME process.

Credits: 4; Prerequisite: None

PHRM 102: Cell Biology & Anatomy

This course deals with the molecular and cellular processes that occur for the development of human beings. The course will give an overview of basic structure and function of cells, cellular inclusions with anatomical focus. It also deals with anatomical structures and functions of tissues, organs and body systems, steps and histological perspectives of human development.

Credits: 3; Prerequisite: None

PHRM 103: Organic Pharmacy I

The course is designed to study the basic concepts of organic chemistry, atoms and structure, properties, reactions and mechanisms of some important organic reactions to generate compounds of pharmaceutical importance. The study is focused on aliphatic, aromatic and heterocyclic compounds. Synthesis and pharmaceutical uses of sulfa drugs, paracetamol, aspirin etc. will also be discussed.

Credits: 4; Prerequisite: None

PHRM 201: Human Physiology I

The essential concern of physiology is how living things work and, as physiology relates to man, it is the study of the normal functioning of the human body. Human Physiology I emphasizes the basic functions of organs, the interactions and coordination of these diverse functions, and attempts to analyze these functions in terms of physical and chemical processes. The overall objective of the course is to provide the students with an understanding of the specific functions of the major organs and systems of the body.

Credits: 4; Prerequisite: PHRM 102

PHRM 202: Basic Microbiology

This course is designed to introduce students to the historical perspective in terms of major innovations in the field of Microbiology. Basic tools like microscopes of various types, their principles and uses will be covered in this course. Simultaneously, morphology, nutritional requirements, growth of bacteria, virus, fungi, moulds and yeast will be briefly studied.

Credits: 4; Prerequisite: None

PHRM 203: Pharmaceutical Analysis -I

The aim of this course is to enable the students to understand the basics of pharmaceutical analysis like purity and management of pharmaceutical chemicals and finished products. The various aspects of pharmaceutical calculations would be taught based on some quantitative analytical procedures such as acid-base titrations, complexometric titrations, oxidation reduction titrations. The applications of all these techniques and of polarimetry in pharmaceutical analysis will also be discussed.

Credits: 4; Prerequisite: PHRM 204

PHRM 204: Physical Pharmacy II

The objective of this course is to provide knowledge about the principles of physico-chemical parameters involved in drug formulation processes and the factors effecting the formulations. This course specifically provides knowledge of the stability of drugs formulations, mechanism and rate of degradation by varied processes and different formulation approaches dealing with stabilization.

Credits: 4; Prerequisite: PHRM 101

PHRM 205: Inorganic Pharmacy

The course offers knowledge of various inorganic compounds, which are used in different physiological systems. The mechanisms of action of inorganic compounds in our body, their physical and chemical properties, methods of preparation, assay in laboratory and their application as drugs will be discussed in this course.

Credits: 4; Prerequisite: None

PHRM 206: Biochemistry

The course offers the students to understand the nature of carbohydrates, proteins, lipids, nucleic acids, their structures, reactions, uses, metabolism and synthesis. The course will focus on energy changes, electron transport and ATP generation, enzyme substrate reaction, competitive and non-competitive inhibition processes. Vitamins, minerals, hormones and their uses as drug molecules will also be discussed.

Credits: 4; Prerequisite: PHRM 103

PHRM 207: Pharmacognosy I

The course is focused on the natural products employed both in traditional and allopathic system of medicine. The basic research of pharmaceutical raw materials from plants and animals and origin of medicine will be discussed. The students will be familiar with varieties of molecular armature having different potential bioactivity. They will get an idea how the concept and development of novel

molecular armature of modern medicine come from natural bioactive molecules. Pharmaceutical use of different phytoconstituents with existing plant classification systems will be discussed in this course.

Credits: 4; Prerequisite: None

PHRM 208: Human Physiology II

This course will deal with the transport, metabolism (wherever applicable) of major biomolecules e.g., carbohydrates, lipids, proteins and nucleic acids including their building blocks (monomers). Mechanism of action of hormones; physiological role of different hormones; regulation of hormone secretion; different hormonal disorders and their control will also be discussed.

Credits: 4; Prerequisite: PHRM 201

PHRM 209: Statistics for Pharmaceutical Sciences

The objective of the course is to equip students with the basic statistical knowledge. The overall objective is to enable the students to understand and use the concepts of statistics as a decision-making and problem-solving tool in pharmaceutical manufacturing, quality assurance, research and marketing.

Credits: 3; Prerequisite: None

PHRM 210: Pharmaceutics I

The objective of the course is to give an introduction to basic aspects of Pharmacy, drug, dosage form and drug delivery systems. The students will understand the overall concepts and outlines of pharmaceutical dosage forms and related excipients from this course.

Credit: 4; Prerequisite: PHRM 204

PHRM 211: Organic Pharmacy II

The course is designed to provide advanced knowledge of organic chemistry to the students of Pharmacy. The course includes studies of mechanism of organic reactions like SN1, SN2, E1, E2 etc., stereochemistry, heterocyclic compounds (five membered, six membered fused ring systems) and the chemistry of natural compounds (polyhydroxy alcohols, alkaloids, terpenes etc.).

Credit: 3; Prerequisite: PHRM103

PHRM 301: Pharmacology I

In this course we set out general principles for explaining how drugs work in the living system, the interaction between drugs and different types of drug-receptors in the body. The primary objective of this course is to give the knowledge of drugs, but most importantly, those that are relevant to effective and safe use for medicinal purposes. This course includes physiological and biochemical effects of drugs and their mechanism of actions.

Credits: 3; Prerequisite: PHRM 208

PHRM 302: Medicinal Chemistry I

This course has been developed to make undergraduate students familiar with design and syntheses of organic and heterocycles having potential bioactivities. The course encompasses the chemistry of medicines including structure activity relationship, biochemical and physicochemical properties of different therapeutic classes of medicines.

Credits: 3; Prerequisite: PHRM 211

PHRM 303: Pharmacognosy II

This course includes phytochemistry and pharmaceutical uses of the plant constituents like alkaloids, glycerides, volatile oils and related terpenoids, flavonoids, resin and tannin containing drugs. Its scope includes study of physical, chemical, biochemical and therapeutic properties as well as biosynthesis of drugs from natural sources especially from plants.

Credits: 3; Prerequisite: PHRM 207

PHRM 304: Medicinal Chemistry II

The course aims at providing an idea about the discovery, synthesis and structural modification of drugs. It enables the students to understand the concepts of how the chemical natures of small molecules influence or exhibit biological activities and how the structural modification influences potential activity. It also emphasizes the influences of the structures on the mechanism of actions of the chemical compounds. Along with these, this course also gives an idea about some name reactions that are used to synthesize many compounds important for the medical science.

Credits: 4; Prerequisite: PHRM 302

PHRM 305: Pharmaceutical Microbiology

This course offers a general overview of the applied aspects of microbiology including sterilization processes, sterility tests of various pharmaceutical products, aseptic techniques and immunological preparations. The objective of this course is to provide a practical and theoretical foundation in the area of pharmaceutical microbiology.

Credits: 4; Prerequisite PHRM 202

PHRM 306: Pharmacology II

The course gives a basic idea about the different types of compounds used in infectious diseases, central nervous system disorders and cardiovascular system disorders. It includes the specific examples along with the mechanism of action, pharmacokinetic profiles, indications, contraindications, side effects etc. of the individual molecules. In the lab classes, this course emphasizes the actions of some compounds commonly used as medical practices. This provides the basic idea of research about the activities of the unknown compounds.

Credits: 4; Prerequisite: PHRM 301

PHRM 307: Pharmaceutical Technology I

This course intends to introduce students to three major aspects of industrial manufacturing of drugs dosage forms, preformulation studies and drug product developments etc. Here students will be familiar with industrial manufacturing of liquid dosage forms, suspensions, emulsions and suppositories.

Credits: 3; Prerequisite: PHRM 210

PHRM 308: Pharmaceutics II

The overall objective of this course is to enable students to acquire knowledge and understanding of different types of solid dosage forms. The solid dosage forms include formulation and manufacturing of different types of tablets and capsules, drug release mechanisms, microencapsulation, sustained release dosage forms, advantages, disadvantages and evaluation of these dosage forms.

Credits: 4; Prerequisite: PHRM 210

PHRM 309: Pharmaceutical Analysis II

The objective of the course is to equip the students with the knowledge of pharmaceutical analysis of the dosage forms following more precise methods such as volumetric analysis, aquametry, nonaqueous titrations, spectrophotometry and fluorometry.

Credits: 4; Prerequisite: PHRM 203

PHRM 310: Toxicology

This course has been designed to explain the fundamental principles of toxicology, some basic toxicology terminologies, routes of exposure of different toxicants, and different levels of exposures. The course also emphasizes the toxicokinetics (disposition, metabolism and elimination) and toxicodynamics of various toxicants with a comprehensive knowledge and understanding of the different types and levels of toxicity effects and their mechanisms, e.g. toxicity or poisoning of heavy metals, organic compounds, carcinogens, environmental toxins, etc. It also covers the mechanism of cytotoxicity of various toxicants and responses of different organs to these along with evaluation of toxicity of these agents.

Credits: 3; Prerequisite: PHRM 301

PHRM 311: Clinical & Hospital Pharmacy

The primary objective of the course is to provide students with a comprehensive idea about a hospital and its organizational pattern, drug distribution system and inventory management & documentation. This course also emphasizes overall understanding of practice of clinical pharmacy including stages of life, management of different types of diseases in hospital settings, mechanism of drug interaction & adverse drug reactions and their managements. The case studies of different diseases of different age groups are also to be discussed in this course.

Credits: 3; Prerequisite: PHRM 301

PHRM 312: Pharmaceutical Analysis III

This course is offered to give the detailed knowledge of the principle, methodology and application of thin layer chromatography (TLC), column chromatography, gas chromatography, ion-exchange chromatography etc. The principle, instrumentation of infra-red (IR) spectroscopy, chemical structures/functional groups showing IR spectra, and their applications in pharmaceutical analysis will also be discussed.

Credits: 3; Prerequisite: PHRM 309

PHRM 401: Pharmaceutical Management and Marketing

This course has been designed with an objective to orient the students to the fundamental principles of Marketing Management and its application to the pharmaceutical industry. The course will help to develop a conceptual framework about how pharmaceutical marketing works with respect to various external factors like economic, social, political, legal, technological and ethical factors.

Credits: 3; Prerequisite: PHRM 301

PHRM 402: Pharmaceutical Technology II

The course is introduced to educate the students regarding the engineering aspects of pharmaceutical production technology and the principles involved in drying, freeze drying, filtration, centrifugation, mixing and pelletization etc.

Credits: 4; Prerequisites: PHRM 307

PHRM 403: Drug Design and Development

This course will give a preliminary idea about the necessity of drug design based on lead compounds, modification of the lead structures to improve the activity and to reduce the side-effects. It will also enable the students learn various processes of molecular modification to improve drug receptor interactions and pharmacokinetic properties giving emphasis on some special processes like simplification and rigidification of lead structures, isosteric and bioisosteric approaches, QSAR, pro-drug approach and their role in drug discovery and development. The use of computers in drug designing and applications of combinatorial chemistry in drug design will also be discussed.

Credits: 3; Prerequisite: PHRM 304

PHRM 404: Pharmaceutical Research

The course is introduced as a means of providing an opportunity for exposure to investigational research. The course is designed principally to help students in practicing the various research patterns in graduate studies. The student undertakes a research project, involves him/herself in through field/lab procedures intensively under the guidance of faculty members and submits a report in a research paper format.

Credits: 5; Prerequisite: Minimum 90 Credits Completed.

PHRM 405: Pharmacy Quality Assurance

Quality assurance (QA) is an essential component in the process of pharmaceutical manufacturing. Its coverage starts from the raw materials to the finished products store. Now-a-days its coverage extends up to intake of those medicines by patients. This course will provide insights on WHO's good manufacturing practice (GMP), the standard principles of quality control (QC), good laboratory practice (GLP) and good clinical practice (GCP). This course will also deal with validation of manufacturing processes, in-process control methods, analytical methodologies, instruments and chemicals and reagents used in pharmaceutical industries. Additionally, this course will describe the procedures to perform stability studies of new products and stored samples. Finally, this course will shed some light on the most recent concept of total quality management (TQM).

Credits: 3; Prerequisite: PHRM 307, PHRM 308, PHRM 309

PHRM 406: Biopharmaceutics & Pharmacokinetics

This course explores how the functions of drugs in the body are influenced by physiological and biochemical processes. It will give an overview of time course of drug action in human body. It incorporates the basic techniques to determine the dose in normal and pathological conditions and has an orientation where the knowledge can be applied in a clinical set-up (case based analysis).

Credit: 4; Prerequisite: PHRM 308

PHRM 407: Pharmaceutical Biotechnology

The course offers modern biotechnological approaches like recombinant DNA technology, gene therapy, antisense oligonucleotide therapy, vaccine technology; immobilization of enzymes and fermentation technology. Gene cloning will also be introduced in terms of their innovations and uses/applications for pharmaceutical purposes.

Credits: 3; Prerequisite: PHRM 206, PHRM 305

PHRM 409: Advanced Pharmaceutical Analysis

The objective of this course is to orient students with the principles, instrumentation and applications of NMR Spectroscopy and Mass Spectrometry in order to understand characterization of the structure of unknown compounds by the combined application of all sprectoscopic methods. It will also enable the students to understand the principles, instrumentation and application of HPLC in advanced pharmaceutical analysis. Some advanced analytical techniques for pharmaceutical products like Atomic Absorption Spectroscopy and Radioimmunoassay will also be discussed in detail.

Credits: 4; Prerequisite: PHRM 312

PHRM 410: Pharmacy Law and Ethics

This course provides an insight into how pharmacy had evolved in relation to the evolution of civilizations, myths and histories contained in them, code of ethics as followed by a pharmacist, and various relevant regulations evolved in this sub-continent, especially in the country to control the production, sale and use of medicines. Knowledge of this historical development of pharmacy with the moral philosophy and ethical principles, the status of pharmacy practice, regulatory bodies like Pharmacy Council of Bangladesh and Drug Administration, study of the drug policies, various regulations and laws relating to the practice of pharmacy, standing of controlling drug advertisements and price of drugs, the national and global position of drug abuse and their control measures etc. are to be dealt with in this course.

Credits: 3; Prerequisite: None

PHRM 411: Cosmetology

This course provides an in-depth understanding of the technology and advancements on various common cosmetics preparations. The students will understand the art of compounding and quality control procedures of cosmetic preparations. As a science, cosmetics manufacture has grown considerably in recent years. In this course, the students will be able to enhance their knowledge and skill by a thorough and wide-ranging approach to new developments.

Credits: 4; Prerequisites: PHRM 307, PHRM 308

PHRM 412: Medicinal Chemistry III

The objectives of this course are to help the students understand the role of stereochemistry in case of showing the optimal medicinal activity, asymmetric synthesis, stereoselective and stereospecific reactions, pharmaceutical importance of stereospecificity. Besides, this course will also enable the students to learn about some important classes of drugs like synthetic antibacterial agents viz. quinolones, nitrofurans, methennamine and its salts, urinary analgesics etc.; antiviral drugs, antithyroid drugs, immunosuppressive agents, agents used in gene therapy; their syntheses, structure activity relationships and pharmaceutical importance from an advanced level. Some outstanding reactions for organic syntheses will also be discussed.

Credits: 3; Prerequisites: PHRM 304

PHRM 413: Pharmacology III

The course gives a basic idea about many important therapeutic classes of compounds used in common disorders. Its main focus is on the drugs acting on the gastrointestinal tract, respiratory tract and on various hormonal compounds, contraceptives, anticancer drugs etc. where it includes specific examples along with the mechanism of actions, pharmacokinetic profiles, indications, contraindications, side effects etc. of the individual molecules. It also provides an idea about some other important classes of drugs like vitamins, chelating agents, vaccines, gene therapy products etc. In the lab classes, this course will emphasize the actions of some compounds commonly used as medical practices related to the theory topics. This will provide some basic idea of research about the activities of the unknown compounds.

Credits: 4; Prerequisites: PHRM 306

PHRM 414: Pharmaceutical Engineering

This course provides an insight into how pharmaceutical industries adopt various engineering operations, the pharmaceutical machineries involved and the correct procedures a pharmacist should follow as per the standard GMP. After completion of this course, a student will be able to understand the theories and mechanisms behind these engineering operations vis-à-vis select or design the machineries as required.

Credits: 3; Prerequisites: None

PHY 100: Introductory Physics – I

Mechanics: Concepts of vectors and scalars, algebra of vectors, differentiation and integration of vectors, gradient, divergence and curl; Newton's laws of motion, Newton's laws, frictional forces, motion in more than one dimensions, uniform circular motion; work, energy and power; linear momentum and angular momentum, torque. **Waves and Oscillations:** Simple harmonic and damped harmonic oscillations, forced oscillation and resonance; different types of waves, interference of waves, standing waves, Doppler effect. **Heat and Thermodynamics:** Isothermal and adiabatic changes, reversible and irreversible processes, the three laws of thermodynamics and concept of entropy. **Electricity and Magnetism:** Electric charge and Coulomb's law, electric field and electric potential, electric dipole; dielectrics and capacitor; Biot-Savart law and Ampere's law, solenoid and toroid, Faradays law of electromagnetic induction. **Optics:** Light as electromagnetic wave, reflection and refraction of light, total internal reflection; interference, diffraction and polarization of light.

Credits: 3(Theory; Pre-requisites: None.

Recommended Textbook: Fundamentals of Physics, Halliday, Resnick & Walker, Wiley.

Reference Book: University Physics, Sears, Zamansky and Young, Addison Wesley Publishing Company.

PHY 107: Physics for Civil Engineering – I (General Physics)

Rotational dynamics, moment of inertia and angular momentum, momentum and impulses for linear and angular momentum; work and energy; Concept of Fluids; Pressure and Density; Measurement of Pressure; General Concept of Fluid Flow; the Equation of Continuity; Bernoulli's Equation; Applications; Fields of Fluid-Flow. Simple harmonic and damped harmonic oscillations; mechanical waves, longitudinal and transverse waves; sound waves, wave superposition and interference, standing waves. Introduction to Fourier concept; Doppler effects. Electric charge and fields, Gauss law and electric flux, electric potential, capacitors and dielectrics; current, resistance and emf, dc circuits, magnetic field and forces, Ampere's law and Biot-Savart law, inductance, ac circuits and resonance.

Credits: 3(Theory)+1.5(Lab)=4.5; Pre-requisites: None.

Recommended Textbook: Fundamentals of Physics, Halliday, Resnick & Walker, Wiley.

Reference Book: University Physics , Sears , Zamansky and Young, Addison Wesley Publishing Company.

PHY 108: Physics for Biologist – I

Rotational dynamics, moment of inertia and angular momentum, work energy and power, concept of fluids, Pressure and Density; Measurement of Pressure; General Concept of Fluid Flow; the Equation of Continuity; Bernoulli's Equation; Applications; Fields of Fluid-Flow; waves and oscillations: Different types of waves, wave superposition and interference of waves, simple harmonic and damped harmonic oscillations, sound waves, Doppler effect. Electric charge and field, Gauss law, electric potential, capacitors and dielectrics, current and resistance, emf, dc circuits, magnetic field and forces, Ampere's law, Biot-Savart law, inductance, ac circuits and resonance. Idea of Maxwall's equations.

Credits: 3(Theory)+1(Lab)=4; Pre-requisites: None.

Recommended Textbook: Fundamentals of Physics, Halliday, Resnick & Walker, Wiley.

Reference Book: University Physics, Sears, Zamansky and Young, Addison Wesley Publishing Company.

PHY 109: Engineering Physics – I (Introductory Classical Physics)

Mechanics: Review on Particle Dynamics; Conservation of Energy; Conservation of Linear Momentum; Collisions; Rotational Dynamics; Conservation of Angular Momentum. Concept of Fluids; Pressure and Density; Measurement of Pressure; General Concept of Fluid Flow; the Equation of Continuity; Bernoulli's Equation; Applications; Fields of Fluid-Flow.

Waves and Oscillations: Different types of Waves; Simple harmonic waves; Mechanical Waves; The Superposition Principle; Wave Speed; Power and Intensity in Wave Motion; Interference of Waves; Complex Waves; Standing Waves and Resonance.

Thermal Physics: Review of Temperature and Heat; Isothermal and Adiabatic Changes; Reversible and Irreversible processes; the three laws of Thermodynamics and the concept of Entropy; Carnot Cycle; Carnot Theorem.

Electricity and Magnetism: Concept of electric charge and electric field; Gauss' law and its applications; Electric potential; electric dipole; relation between electric field and electric potential; Capacitors and dielectrics; energy stored in capacitors; Biot-Savart law, Ampere's law and their applications; Faradays law of electromagnetic induction, energy stored in inductors..

Wave Optics: Light as electromagnetic wave; interference of light; Michelson interferometer, Newton's ring; Fresnel and Fraunhofer diffractions, diffraction by single and double slits, diffraction gratings and its resolving power; polarization of light, different types of polarization.

Credits: 3(Theory)+1(Lab)=4; Pre-requisites: MAT 102.

Recommended Textbook: Fundamentals of Physics, Halliday, Resnick & Walker, Wiley.

Reference Book: University Physics , Sears , Zamansky and Young, Addison Wesley Publishing Company.

PHY 207: Physics for Civil Engineering – II (Electromagnetic Theory and Modern Physics)

Electromagnetic Theory: Concept of electromagnetic waves, propagation of electromagnetic waves, Maxwell's equations, displacement current, equation of continuity, propagation of uniform plane electromagnetic waves in perfect dielectric media, phase velocity and group velocity. **Modern Physics: B**lack body radiation, photoelectric effect and Compton Effect, de Broglie hypothesis and wave-particle duality, x-rays and x-ray diffraction, postulates of quantum theory, simple applications of Schrödinger equation – simple harmonic oscillator, one-dimensional potential well potential barrier. Angular momentum and hydrogen atom.

Credits: 3; Pre-requisite: PHY107.

Recommended Textbook: Engineering Electromagnetics, W. H. Hyat, McGraw-Hill.

Quantum Physics: A Beginner's Guide, Alastair I. M. Rae, Oneworld Publications.

Reference Book: Introduction to Quantum Mechanics, David J. Griffiths, Benjamin Cummings.

PHY 208: Physics for Biologist – II

Concept of EM waves, propagation of EM waves. Introduction to quantum physics –breakdown of classical physics and the emergence of quantum theory, de Broglie waves, Compton effect and photoelectric effect; postulates of quantum theory; Schrödinger equation and its applications in simple systems like simple harmonic oscillator, one-dimensional quantum well and quantum barrier; angular momentum and hydrogen atom; Imaging systems, microscopes and telescopes, interference and diffraction, introduction to lasers and holography.

Credits: 4; Pre-requisite: MAT 205.

Recommended Textbook: Quantum Physics: A Beginner's Guide, Alastair I. M. Rae, Oneworld Publications.

Reference Book: Introduction to Quantum Mechanics, David J. Griffiths, Benjamin Cummings.

PHY 209: Engineering Physics – II (Introductory Quantum Physics)

Modern Physics: Black body radiation, Photoelectric effect, quantum theory of light, X-rays and X-ray diffraction, Compton effect**;** de Broglie waves and wave-particle duality, phase velocity and group velocity, particle diffraction.

Quantum Mechanics: Concept of operators, Postulates of quantum theory; Schrödinger equation, quantum theory of Simple Harmonic oscillator and other one-dimensional systems - infinite quantum well, potential step and potential barrier; quantum box; hydrogen atom; Kets, Bras; Matrix Formulation; Hilbert Space; Measurements, Observables, and the Uncertainty Relations; Position, Momentum, and Translation; Idea of quantum logic gates; Other simple applications.

Credits: 3; Pre-requisite: MAT 205.

Recommended Textbook: Quantum Physics: A Beginner's Guide, Alastair I. M. Rae, Oneworld Publications.

Reference Book: Introduction to Quantum Mechanics, David J. Griffiths, Benjamin Cummings.

POP 201: Health Challenges of Adolescents and Youths

The objective of this course is to make the students familiar with basic concepts of health and reproductive health, safe motherhood and adolescent health issues and problems at global and national levels, and on policies, programmes, service strategies and innovative interventions, with special reference to Bangladesh. The course will cover the following modules: Reproductive health and rights; family planning; maternal care; STIs and HIV/AIDS; human sexuality and gender relations; adolescents' sexual and reproductive health; male involvement in sexual and reproductive health; adolescents' and youths' friendly health services; reproductive health policies and programmes.

Credits: 3

Pre-requisite: None

POP202: Introduction to Public Health

Introduction to Public Health (POP202) is a 3-credit course, which is designed to deliver information about basic concepts of public health, epidemiology and biostatistics; core functions and essential services of public health; measures of health and diseases; causation in epidemiology, transmission of diseases, disease prevention and determinants of diseases; major sources of public health data; ecological, environmental and occupational health; health policy and planning and public health challenges in the 21st century. Throughout the course public health problems of Bangladesh will be highlighted.

Credits: 3

Pre-requisite: None

POP203: Introduction to Population Studies

Introduction to Population Studies (POP 203) is a 3-credit multidisciplinary course, which is designed to deliver information about: basic concepts of population and demography, sources of demographic/population data, population structure and age-sex pyramid, fertility and theories of fertility, mortality and determinants of mortality, demographic transition, migration and migration theories, urbanization and its impacts. It will also provide knowledge concerning population growth and economic development, population dynamics and population policy of Bangladesh. Required data for preparing lectures will be linked to Bangladesh if available.

Credits: 3

Pre-requisite: None

SOC 101: Introduction to Sociology

Introduction: Definition of Sociology. Nature and scope of Sociology. Origin and development of Sociology. Relationships with other Social Sciences. The emergence of Sociology and Fourfold origin of Sociology

Basic Concepts of Sociology: Group, Association, Institution, Community, Norms and Values, Role and Status, Folkways and Mores, Society and Organization

Culture: Definition. Elements of culture (norms, values, symbols, language). Material and Non- Material Culture. Cultural Lag, Cultural Evolution. Diversity and integration. Counter Culture, Cultural Relativism, Ethnocentrism, Cultural Integration).

Sub-culture. Basic elements of Bangladesh Culture, Cultural Traits and Complex.

Social Structure: Definitions of Social Structure. Levels of social structure (Micro and Macro). Components of social structure. Theories of Social Structure. Patterns of social relationships (exchange, Cooperation, Conflict, Competition, Domination and Subordination). Impact of structure upon individual.

Socialization: Definition. Nature and nurture. Dynamics of socialization. Socialization and early life cycle (Mead, Piaget, Erikson). Agents of socialization.

Social Groups and Social Interaction: Definition. Types of groups. Group dynamics. Functions of groups. Definition; Agencies of Social Control

Social Control: Definition of Social Control; Agencies of Social Control; Deviance and Crime. Explanation of deviance. Normal and Deviant careers.

Social Stratification: Definition. Types and theories of Stratification (Conflict, functional and other theories).

Social Institutions: Family; Functions of Family. Definitions of Family. Types of Family. State, Nature of State, Political Parties, Social Institutions, Economic Institutions; Education and Cultural Institutions.

Social Change and Technology: Definition. Perspectives of change. Sources of Change. Modernization. Theories of Social Change, Evolution, Progress and Development.

SOC 102: Introduction to Anthropology

The Anthropological Approach: Anthropology as a Field of Knowledge. Modes of Anthropological Understanding: Theory, Interpretation and Science. Different branches of Anthropology.

An Evolutionary Perspective: Human Evolution: The hominid lineage, The primate behavioral lineage, Language, and symbols. The Growth of Culture: Pre-historians as anthropologists, Paleolithic peoples, Food-producing, Urbanism and the Rise of states.

Culture, Society, and the Individual: Theories of Culture: Evolutionism, Diffusionism, Parallelism, Culture and people: Some basic concepts, The Anthropological concept of culture, The relation of culture to society. Language and Communication: the nature and organization of language, and from language to culture. Culture and the individual: culture and personality, and beyond cultural determinism.

Marriage, Family and Kinship: Marriage, Types of marriage, why is Marriage Universal? Restrictions on Marriage: The Universal Incest Taboo, Childhood Familiarity Theory, Freaud's Psychoanalytic Theory, Family-Disruption Theory, Cooperation Theory, Inbreeding Theory, Form of Marriage. The Family, Variation in Family Form. Kinship and the Structure of Kinship and Kinship Terminology

Religion and Magic: Origin of Religion, Elements of Religion. The Universality of Religion, Variation in Religious Beliefs and Practices, Functions of Religion, Theories of Religion, Magical Practices and Its influence on Society, Rituals and Rites. Religion and Adaptation, Religious Changes and Revitalization Change.

Tribal Peoples: Toward a Systematic View: The Tribal World as Mosaic, as Ladder, and as System. Modes of subsistence. Modes of adaptation: Contemporary hunter-gatherers, tropical horticulturalists, and pastoral adaptations. How cultures change: cultural ecology-cultural materialism.

The Tribal World: Economic systems: systems of production, the economics of distribution, and the integration of economic systems. Social structure: kinship in tribal societies, descent systems, kinship and social relations, marriage, family, and community. Marriage in comparative perspective: marriage contracts and transactions, incest, exogamy and alliance. Power and politics: the processes of politics, worlds of women, and worlds of men. Structures of inequality: law and social control, religion, ritual, myth, and cosmos. The integration of societies. The structure of cultures. Ethnic minorities and the notion of tribe in colonial politics.

Anthropology and the Present: Response to cataclysm: the tribal world and the expansion of the west, the peasants, and the creation of the third world. Cities: anthropology of cities, anthropology in cities. Social science and the postcolonial world. Decolonizing anthropology and toward Human Survival.

SOC 104: Social Problems

Introduction: Definition. Nature of social problems. Theoretical perspective on social problems. Roles of media. Research and statistics in identifying social problem.

Population: World population growth. Consequences of population growth. Bangladesh population. Impact upon society and environment.

Social Deviance: Theories of deviance. Sources of deviance. Labeling theory. Conflict theory.

Environment: Worldwide environmental problems. Depletion of natural resources. Forms of environmental pollutions. Climate change. Culture and environment. Social structure and environment. Environmental problems of Bangladesh. Solutions of problems.

Drug: Types and effects of drugs. Social factors associated with drug use. Social consequences of drug use. Drug use status of Bangladesh and its solutions.

Poverty: Nature and scope of poverty. Definitions of poverty. Causes of poverty in affluent and poor countries. Poverty of Bangladesh. Solution of poverty.

Social Inequality: Nature of inequality in society; Dimensions of inequality (class, age, sex, and minority) - Causes of inequality-solution to the problem.

Education: Nature of the problem. Education as a source of inequality in society. Education as a source of development. Access to education. Quality of education. Problems of universal equality of education in Bangladesh.

Urban Social Problems: Development of Slum, Mental illness, Alienation, Anomie, Urban Crime, Prostitution, AIDS/HIV.

Crime and Justice: Definitions. Types of crime. Crime rates. Causes of crime in Bangladesh. Correctional systems- Labeling theory. Nature of justice system in Bangladesh.

Politics and Social Unrest: Political Parties, Politics and Social Unrest, Student Politics, Terrorism and Violence.

SOC 105: Peasant Societies

Concept of Peasant and Peasant Society: Definitional criteria. Peasant society. Primitive peasant. Peasant economies. Peasant family. Peasant personality. Peasant belief system. Peasant culture.

Theories of Peasant Society: Chaynov, Lenin, Thorner, Shanin; Peasant Movements (s), Peasant Mobility; Impact of migration and Globalization on peasant society.

Characteristics of Peasants: In pre-feudal, feudal and capitalist societies.

Peasant Social Organization: Peasant family types. Kinship. Community. Values. Ritual. Corporate system.

Economic System and Institution: Land distribution. Tenure system and inheritance laws. Production process. Role of family in agriculture. Savings, credit, and investment. Distribution and market exchange. Capitalism and its impact upon society.

Social Stratification: Patterns of stratification. Social mobility. Basis of stratification. Power structure. Sources of power. Nature of policies in peasant society.

Changing Peasant Society: Factors affecting social change in peasant societies. Emergence of market economy. Rural urban Migration. Changing power structure. Cultural patterns and mobility.

Agrarian Development Approaches: Agrarian development theories. Constraints of development both in and out of Bangladesh.

Development Programs: Identification of major government and NGO programs (programs: introduction of new technology, and education.). Achievements and failure of programs. The quality of peasant life.

SOC 106: Historical Sociology

Course Contents:

Session 1: Introducing Historical Sociology

A: Classical: Auguste Comte: Theological; Metaphysical; Positive; Karl Marx: Tribal; Asiatic; Slavery; Feudalism; Capitalism; Sorokin: Ideational; Idealistic; Sensate

B. Contemporary: Charles Tilly; Randall Collins; Emmanuel Wallerstein; Theda Skocpol; George Steinmetz; Theda Skocpol; States and social Revolutions; Berrington Moore; The Social origins of Dictatorship; Charles Tilly; Big structures; Large Processes; Huge Comparisons; Coercion; Capital & European States; AD 990-1990; Michael Mann: The source of social power; Dark Side of Democracy; Emmanuel Wallerstein; The Modern world System

Session 2: Agrarian Communism: Agricultural organization; Property System and Slavery; Irrigation Civilization and Hydraulic Society

Session 3: Slavery: Distinction Between Slave (Chattel Slavery) and Un-free Labor (bonded; Forced); Slavery in early history: East-Babylon; Egypt; Israel; India; China; Slavery in Classical antiquity: East: Africa (Egypt); Asia (China); West: Greece; Rome; Slavery in Middle Ages: Arab Slave Trade; Ottoman; Europe; Slavery in modern age: Africa; America; USA; India; China; Japan and Koreas; Slavery in contemporary age: Women & Child; Trafficking; Sex-Slaves.

Session 4: Feudalism: Origin of Seigniorial Proprietorship; The Manor; Capitalistic development of Manor; Development of industry and Mining; Craft Guilds; Disintegration of guilds a development of domestic system; Shop Production; The factory

Session 5: Capitalism: Origin of modern Capitalism: External facts in the evolution of capitalism; Speculative Cries; Free Wholesale trade; Colonialism; Industrialism; Rational State and Citizenship

Session 6: Socialism: State Socialism in 1917: October Revolution and the emergence of USSR; Socialism is East Europe; Market Socialism/ State Capitalism; Chinese revolution In October 1949; Rural Collectivization

SOC 107: Social Problems and Analysis

Course Contents:

Session 1: Basic Concepts: Definition of Social Problems; Objective Elements of Social Problem; Subjective Element of Social Problem; Variability in Definitions of Social Problem

Session 2: Approaches and Methods: Sociological Approaches; Methods of Studying Social Problems; Qualitative Method; Quantitative Method; Problems of Studying Social Problem in Bangladesh

Session 3: Perspectives of Social Problems: Sociological Imagination; Functionalist Perspective: Social Pathology and Social Disorganization; Conflict Perspective: Economic Inequalities; Religious; Ethnic and Social Inequalities; Symbolic Interactionist Perspective: Blumer's Stages of a Social Problem; Labelling Perspective; Social Constructionism; Feminist Perspective

Session 4: Poverty and Wealth: Economic Inequality in Bangladesh; Rich and Poor: A Social Profile; Responding to Poverty: Microcredit; Politics and Poverty

Session 5: Religious and Ethnic Inequality: Religious Groups and Ethnicity – Hindu; Buddhist; Animist; Bahai's; Shias; ahmediyas; Chakmas; Garos; Santals; Patterns of Majority-Minority Interaction; Prejudice; Discrimination and Social Exclusion; Politics; Religion and Ethnicity

Session 6: Gender Disparity: Gender and Social Institutions; Gender Stratification; Gender Violence; Feminism and politics: Issues of Third Gender and LGBT

Session 7: Crime; Violence and Criminal Justice: Crime against Poverty; Crime against Person: Violent- Rape; Beating and Non-Violent; Organized Crime: Trafficking; Drug

Session 8: Alcoholism and Narcotism: Extent of Alcoholism and Narcotism; Types of Drugs; Responding to Drug Problem; Politics and Drugs

Session 9: Physical and Mental Health: Health and Illness; Health Policy- paying for Care; Mental Health and Illness; Politics and Health

SOC 201: Sociology of Family, Marriage, and Kinship

Introduction: Definitions of Family, Marriage and Kinship and Theories of Morgan, Karl Marx and Engels, Maine, Bechofen, Westermark, Universality of the Family.

Family: Origin of the family and marriage, structure and function of family. Contemporary Family Patterns in Bangladesh, Power Authority and Leadership in the Family, Family Crisis and Family Laws in Practice

Marriage: Types, Forms Marital Arrangement, Rules and Rites relating to marriage, System of mate selection, Cultural diversity of marriage, Structural Variety in Marriage.

Kinship Structure: Basis of Kinship, Kinship Organization, Kinship Terminology. Role of Kinship in every sphere of life (Social, economic, political). Theories of Kinship. Kinship in modern societies.

Variation in Family Structure: Types of family: nuclear and extended. Family and economy. Family structure in non-industrial society. Family structure in Industrial society. Changing pattern and other correlates.

Functions of the Family: Procreation. Socialization of children. Emotional support. Regulating sexual activity. Assignment of status and social roles. Changing family functions.

Family Crisis: Power, authority and leadership in the family, Family Violence. Violence against Women and Children. Forms of Violence. Divorce and Separation: causes and trends, legal aspects of divorce, Impact of divorce upon children. Single Parent Family. Remarriage. Family Laws in practice.

Contemporary Family Pattern in Bangladesh: Urban-rural families. Changing trends. Trends of dissolution of the family.

SOC 202: Social Psychology

Introduction: Definition. Nature and scope of Social Psychology. Origin and development of Social Psychology as a scientific discipline. Relation of Social Psychology with other social and biological sciences.

Schools of Psychology: Development of schools of modern social psychology. Methods of Social Psychology. Psychology of cognition.

Sensation and Perception: Types. Theories of Sensation and Perception, Stages of perception, Social and Cultural Determinants of Perception. Significance of stimulus and response. Meaning and various types of instincts. Development of self socialization of individual.

Social Interaction: Theories of social interaction. Group dynamics, Process of leadership, Types of Leadership, Types of group. Group solidarity. Morale and cohesiveness. Group leadership.

Motivation: Biogenic and Sociogenic motivation. Motivational Cycles.

Behaviour: Instinctive Behavior vs. learned behavior, Learning, Definition of Learning, Theories of Learning (Thorndike, Pavlov, Skinner), Socialization and its agencies.

Mass Behavior: Crowd; Audience; Mob; Fashion; Fad.

Collective Behavior: Public Opinion, Process, Factors and Agencies of Public Opinion, Propaganda, Rumor.

Attitude: Attitude Formation and Attitude Change, Scales to measure attitude (Thurstone Scale, Bogardus Scale, Likert Scale).

Personality: Theories of personality (Kardiner, Linton, Mead, Benedict, Adler, Harney and Freud). Personality and culture (Horno, Linton, Mead, Kardiner). Personality and class. Personality measurement.

SOC 203: Social Group and Social Development

Introduction: Definition, objectives, principles, types, nature, and its significance in individual and social development.

History of Social Group Work: History of Social Group Work and other methods of social group work.

Nature of Group: Definition, types, and importance of group life. Difference between group process and group work process.

Group Dynamics: Definition, use of the knowledge of group dynamics by social group workers.

Functions of Group Work: Preventive, curative, rehabilitative, educational promotional and development.

Techniques of Group Work: Program planning, concepts, principles, methods and program planning in Social Group Work.

Leadership: Concepts, types, functions in group work. Leadership skill and role of group leader and group worker.

Recording: Purpose, principles, and methods. Analysis of records for decision-making. Supervision and administration of Social Group Work.

Group Work Therapy: Concepts, methods and various forms.

Working with Various Groups: Children, adolescents, drug addicts, and correctional institutions.

Present Status: Trends and issues in Social Group Work in Bangladesh.

SOC 204: Research Methodology

Introduction: Sources of Knowledge. Definition of Social Research. Purpose of Social Research. Theory and Research- Value Judgment in Research. Concepts, Variables. Propositions. Levels of Measurements (Nominal, Ordinal, Interval, and Ratio).

Types of Research: Pure. Applied. Exploratory. Action. Experimental. Evaluative. Monitoring.

Research Design (Steps of Research): Formulation of the Problem. Review of Literature. Objectives. Theoretical Framework. Hypothesis. Methodology. Analysis Plan. Report Writing.

Hypothesis: Formulation. Sources of hypothesis. Types of hypothesis. Hypothesis testing.

Techniques of Data Collection: Survey. Observation. Content analysis. Field research.

Survey: Construction of interview schedule/questionnaire. Characteristics of a good interview schedule/questionnaire. Validity and reliability of research instrument. Assessment of validity: face validity, criterion validity, construct validity, internal and external validity. Assessing reliability: alternate and parallel methods, test-retest methods, and consistency test.

Sampling: Concept. Sampling frame. Probability and non-probability sampling. Types of probability sampling. Determination of sample size.

Construction of Scales: Likert, Thurstone, Guttman etc. Use and misuse of scale. Validity and reliability of scale.

Qualitative Methods: Observation (Different kinds). Case study. Historical. Content Analysis. Participatory Research Appraisal (PRA). Rapid Rural Appraisal (RRA). Interview guide. Techniques of qualitative Interviews. Analysis of Qualitative Data- Report Writing.

Data Analysis: Coding. Data entry into computer. Use of computer particularly SPSS.

SOC 205: Rural Sociology

Introduction: Definition. Scope and its importance. Origin and its growth as a separate discipline. Theoretical perspective of Rural Sociology.

Agrarian structure: Land ownership pattern. Land reforms (China, South Korea, Bangladesh). Changing agrarian structure. Development of capitalist agriculture. Obstacles and prospects.

Peasant Society and Change: Theories of Peasantry and Peasant Mobility (Chaynov, Lenin, Thorner, Shanin); Peasant Movement.

Rural Social Structure: Pre-British, British, Post-British, and Post-liberation. Village organization and leadership. Class structure. Social mobility and Stratification.

Rural Power Structure: Definition and Nature of Rural Power Structure. Contemporay Changes in Rural Power Structure. Characteristics of Rural Elites, Nature of Rural elite. Relationship between Rural Elite and National Power Structure. Power. Patron-client relationship. Kinship Relationship and Rural Structure. Nature and Functions of village Samaj. Social inequality, Stratification and Class.

Rural Institutions: Family, Education, Religion, Formal and Non-formal Credit, Samaj& Salish, Cooperatives, Local Government Institutions.

Rural Work and Livelihood: Natural and social sources of livelihoods, Changing patterns of livelihoods. Patterns of rural livelihood in Bangladesh.

Social Change in Rural Society: Rural-Urban interaction. Changes in economy and Culture. Social institutions and life style. Theories of social change. Nature of change in rural Bangladesh. Factors associated with change. Consequences of change. Contemporary changes in Bangladesh. Migration. Impact of Globalization on Peasant Society.

Rural Development Programs in Bangladesh: Village AID. Comilla Approach. Integrated Rural Development Program, Implementation of Technology in Agriculture, NGO Participation: Grameen Bank, BRAC, Gonoshasthaya Kendra, and Microcredit Program of NGOs, Evaluation of the Programs.

SOC 206: Statistics for Sociology

Introduction: Need for statistical understanding. Nature of social statistics. Importance of statistics in Sociology/Social Work.

Levels of Measurement: Types of graphs. Primary and secondary data. Qualitative and quantitative data. Organizing data. Preparing tables.

Measures of Central Tendency: Mean. Median. Mode. Use of these measures in sociology.

Measures of Dispersion: Range. Inequalities Range. Mean deviation. Quartile deviation. Standard deviation. Index of Dispersion (D).

Proportional Reduction of Error (PRE): Lamda. Goodman. Kruskal'sTau-Y (Ty). Gamma. Eta etc.

Correlation and Regression: Zero-order correlation. Rank correlation. Partial and Multiple regressions. Scattered diagram. Regression line. Least Squares. Principle for Regression. Partial and Multiple Regression. Coefficient R2. Standard error estimation. Stepwise regression. Forward and backward regression.

Probability and Sampling: Simple probability sampling. Binomial Distribution. Different types of sampling. Sampling size and bias.

Tests: Inferences from single and two samples. Students' T' test. Z' test. etc.

Analysis of Variance (ANOVA): One way and two way analysis of Variance. F Test.

SOC 207: Early Social Thought

Plato (427-347 B.C.): Biographical sketch, Approach to knowledge, Method, Human nature, Family, Social stratification, Education, State Social change, etc.

Aristotle (384-322): Biographical sketch, Greek humanism, Ethics, Human nature, Politics, Family, Slavery and State.

St. Augustine (A.D. 354-430): Biographical sketch, Method, Human nature, Politics, Family, Social change, and Influence of Augustine.

Thomas Aquinas (A.D.1225-1275): Biographical sketch, Problems and methods, Politics, Economics, Family, Thomism.

Ibn Khaldun (1332-1406): Biographical sketch, Muslim civilization, The new science of history, Society, Social Solidarity, Politics, Economic, Family,

Renaissance and Reformation: Concepts of renaissance and reformation; Authority, reason, and experience; Human nature, Politics; Economics: Family; and The scientific revolution.

Machiaveli (1469-1527): Biographical sketch, Concept of State, Nature and Origin and development State.

Hobbes (1588-1679): Biographical sketch, Social Contract Theory and Thought, Rise of the State

John Locke (1632-1704): Biographical sketch, Emergence of the age of science, Cartesian rationalism, Locke's method, Human nature, Politics, Property, and Education.

GiambatistaVico (1668-1744): Biographical sketch, Methods of new science, Law of three ages, the unity of culture, Human nature, Government and law.

Rousseau (1712-1778): Biographical sketch, Social Contract Theory and Rise of the State.

SOC 208: Social Inequality

Concepts and Definitions: Social inequality. Forms of Social stratification (Slavery. Estate. Caste. Class. Status). Power. Strata. Rank. Hierarchy. Prestige. Determinants and dimensions of social inequality.

Theories: Aristotle to Rousseau. Functional theories: Durkheim, Kingsley Davis and Moore, Max Weber, and Parsons. Conflict theories: Marx, Dahrendorf, and Equilibrium approach of Lenski.

Social Classes: Approaches to the measurement of social classes: Marx, Weber and others.

Origin of Social Inequality: Ideas of primitive communism and egalitarian society. Ownership pattern and rise of social inequality. Hunting and gathering societies. Simple and advanced horticulture societies. Agrarian societies. Caste and social inequality. Class in industrial societies.

Racial and Ethnic Inequality: Concepts of Race. Ethnicity and minority group. Prejudice and discrimination. Patterns of race and ethnic relations and social inequality.

Gender and Social Inequality: Relative position on man and women in society and division of labor. Prejudice and discrimination. Biological, psychological and cultural evidences of social inequality, Feminist perspectives on gender inequality. Theories of sex role socialization: functionalism, symbolic interactions, and conflict.

Occupation and Social Status: Occupation defined. Occupation and stratification. Occupational mobility. Types and causes. Caste system.

SOC 209: Industrial Sociology

Introduction: Nature and scope of Industrial Sociology. Foundation of Industrial Sociology. Relationship with rural and urban sociology. Approaches of Industrial Sociology.

Industrialization: The pre-industrial and industrial revolution. Industrializing and industrial society. Structural and functional dimension of industrial society. Pre-conditions and major barriers of industrialization. Industrialization of Bangladesh.

The Social Structure of Industrial Society: Role differentiation and distribution. Internationalization of new values: rational work, discipline, and industrial bureaucracy. Industrial Management.

Problems of Industrial Society: Forces of stability and strains. Industrial conflict. Marginality and Individualization. Alienation and Anomie. Problems of employment and unemployment.

Social Organization of Industry: Industrial organization. Bureaucracy. Management and human relations. Hawthorne study. Industrial interest group. Organizational behavior.

Industrial Relations: Trends, issues and theories of industrial relations. Industrial conflict. Trade unionism. Collective bargaining. Psychological approach. Marxist approach of industrial relations.

Social Security: Health and medical care in industry. Problems of housing. Education and rehabilitation.

Industrialization in Bangladesh: Causes, trends, and problems of industrialization. Comparison with developing and developed countries.

SOC 210: Community, Communication, and Culture

Concepts and definition of Communication - Interpersonal, Group, Public and Mass communication; Emergence of Mass communication in modern days Communication world Communication theories: Linear model of communication and divergence model of communication, Magic bullet theories, Spiral of silence theories, Agenda setting theories, Media Gratification theories etc.

Communication format and functions: Understand the psyche of the society and culture, The environment in which the communication media exists, Communication media of different forms and their influence or impact in different norms and cultural level and situation of different societies. People's media habits and their access to different media in different cultural level of societies.

Culture and Globalization and media: Political implication of media and culture, Media conglomerates and the globalization of cultural markets, Commodification of culture, culture as a form of political resistance, Post colonial theory and the impact of free trade agreements on culture and cultural policy.

Media of different age: Age without media, Traditional or ancient media, Indigenous media of popular media, Alternative media, Mass media, Media of information age

Communication methods: Concepts and understanding of communication research; research design and procedure, steps of research project; Qualitative and quantitative research, survey and laboratory research and experiential design; Content analysis, participatory research, interviews, case studies, focus group discussion etc.

SOC 217: Religion, Ethnicity, Culture and Development in South Asia

The socio-cultural and political existence of South Asian countries is often challenged by religious and cultural intolerance in recent times, although they are theoretically multi-ethnic and multi-religious countries. As a result, the socio-cultural and philosophical foundation of ethnic minorities is often neglected in the political processes in the name of democracy and economic development. In other words, the cultural identity of the ethnic and religious minorities is controlled through the politics of social exclusion and isolation. In many cases, the notion of social exclusion and isolation between the majority and minority has even spread into the thinking of the rural people of these countries. The policy of social exclusion has been used mostly to maintain and control the politics within the countries of South Asia.

This course will examine how the democratic processes uphold or fail to uphold cultural diversity within the socio-cultural and political conditions of these countries. It will also explore how religious and cultural identities and the social and philosophical foundations of the ethnic communities are addressed in the political processes in South Asia. More specifically, this course will critically examine the issues of social inclusion and exclusion, the socio-political and historical contexts and the ethical and development practices of diverse ethnic communities and development.

SOC 218: Sociology of Gender

Course Outline:

Session 1: Social Construction of Gender: Basic concepts: Sex; Gender; Sexuality in mainstream sociology and in feminist ideas; Sociological Imagination: C. Wright Mills; Social construction of gender and sex: Feminism and Masculinity; concepts of LGBT

Session 2: Social Institutions and Gender: Gender roles in marriage and family; historical roles; contemporary roles; Global comparison of gender roles; parenting and gender parenthood transitions; Gender and Socialization: Patriarchy; sexism; gender role; and gender stereotype relationship; Gender identity and politics: Family; society and the state

Session 3: Patriarchy and Work Place: Gender and division of labor: glass ceiling; gender pay gap; Occupational segregation; double burden; occupational sexism; discrimination; Feminization of poverty

Session 4: Gender and Education: History of education; Gendered curriculum; Global educational systems and the role of gender

Session 5: Religion and Gender: Religion and cultural root of patriarchy and sexism; Gender segregation: dress code (Veil; and Hijab); Female subordination and oppression; virginity; and objectification

Session 6: Patriarchy; social structure; women and violence: Media; Gender and Violence: Sexualization and toxic culture; Hegemonic masculinity and violence; Family level: Infanticide; female genital mutation; foot binding; bride burning; wife battering;

Community level: Rape; sexual assault; sexual harassment; commercialized violence; sexual slavery; female labor exploitation; female migrant workers; women trafficking; prostitution; pornography; The state level: Violence in detention; War rape

SOC 219: Sociology of Race and Ethnicity

Course Contents:

Session 1: Understanding Race & Ethnicity: History; Basic concepts; Theories and definition; Rise of Race and Ethnicity; Prejudice and discrimination; Social construction of race and ethnicity

Session 2: Racism: Whiteness and white privilege; Racial segregation and historical legacy of racism; Racism and popular culture; Global racism; war and genocide; Social cognition theory and racism

Session 3: Ethnocentrism: Hellenism; Romanism; and Euro-centrism; Aryanism; Zionism; Arabism; Race; ethnicity; labor and power dynamics; Immigration; Symbolic ethnicity and multiracial identities: Asian Americans; Latino; Intersectionality: Gender; Race and ethnicity

Session 4: Race and Ethnicity in South Asia: Indigenous people in Asia; Invasion and Migration: Aryanization; Sanskritization; Arabicization; Persianization; Anglicization; Aryan-non Aryan conflict; Hindu Buddhist conflict; Hindu Muslim conflict; Colonial construction of caste identity in East Asia (Case from India); Race; Ethnicity and Minority problems in Bangladesh; Indigenous people in Bangladesh

SOC 220: Quantitative Research Methodology

Course Contents:

Session 1: Quantitative Research Design: Concepts and Variables; Research Questions; Hypothesis; Conceptual Framework; Theoretical Framework; Types of Research; Basic; Applied- Evaluation; Action; Social Impact Assessment; Exploratory; Descriptive; Explanatory

Session 2: Quantitative Measurement: Levels of Measurement; Reliability and Validity

Session 3: Sampling Strategies and Survey Method: Sampling; Techniques of survey

Session 4: Quantitative Data Collection: Data Collection Instruments and Field Administration

Session 5: Quantitative Data Analysis: Data: Coding; Cleaning and Editing; Data: Entry; Tabulation and Analysis; Measures of Central Tendency; Dispersion; Correlation and Chi-square

Session 6: Field Work and Research Monograph Writing: Introduction; Literature Review; Conceptual and Theoretical Framework; Methodology; Results; Discussion and Conclusion; References; Appendices

SOC 221: Social History and World Civilization

Session 1: Introduction of Social History: Scope and recent trends in social history; Relationship with history and Historical Sociology

Session 2: Perspectives and Techniques of Social History: Subaltern studies

Session 3: Classifying Societies: Karl Marx; Lenski

Session 4: Types of Societies: Hunting and Food gathering societies; Horticultural society; Agrarian society

Session 5: Birth of Civilizations: Indus Valley civilization; Babylonian civilization; Egyptian civilization; Chinese civilization; Aztec civilization and Maya civilization

Session 6: Rise and Fall of Greek and Roman civilizations

Session 7: Construction of the 'Orient'

Session 8: Coming of the Information Age: Post-industrial and Post-modern societies

SOC 301: Qualitative Research Methodology

The Foundations of Qualitative Research: Defining Qualitative Research. The historical development of Qualitative Research. Key methodological and philosophical issues in Qualitative Research.

The Applications of Qualitative Methods to Social Research: Theoretical and applied research. The functions of Qualitative Research. The functions of different Qualitative methods. Combining qualitative and quantitative methods.

Design Issues: Defining the research questions. Building around research settings and populations. Selecting the time frame for research. Choosing a data collection method. Resourcing and timetabling Quantitative Research methods.

Designing and Selecting Samples: Sampling strategies for Qualitative Research. Study populations. Samples frames. Designing a purposive sample. Implementing the sample design.

Designing Fieldwork Strategies and Materials: Structuring data collection. Designing topic guides. Incorporating other research instruments and materials. Preparing for Fieldwork and refining Fieldwork strategies.

In-Depth Interviews: The in-depth interview. The staging of an interview. Asking questions to achieve breadth and depth. Question formulation. Further techniques for achieving depth.

Focus Groups: Features and types of focus group. Group processes and the stages of a focus group. Conducting the discussion. Using the group process. Group composition and size. Practicalities in organizing the group.

Analysis: Practices, Principles and Processes. Traditions and approaches within Qualitative Analysis. Computer assisted Qualitative Methods. The key requirements of analytic tools.

Carrying Out Qualitative Analysis: Data management. Descriptive accounts. Explanatory accounts. Analysing group data.

Generalizing from Qualitative Research: Definitions of generalization. Approaches to generalizations. Reliability and validity. Generalizing from qualitative data.

Reporting and Presenting Qualitative Data: Challenges facing the qualitative reporter. Forms of research outputs. Writing a qualitative research report. Displaying Qualitative Evidence-some general features and principles. Oral presentations.

Prerequisite: SOC 204

SOC 302: Social Structure of Bangladesh

Introduction: Definition and theories of social structure. Importance of studying social structure. Nature and foundations of early civilizations in the sub-continent. Social structure of pre-British Bengal. Origin and evolution of Bengal village. Pattern of settlement. Distinctive feature of Bengal village. Self sufficient village economy and its critique. Growth of trade and commercial centers in Bengal. Rise of merchant Class. Cultural centers. Nature of cities.

British colonial rule and its impacts in Bengali: Permanent Settlement Act and new agrarian structure. Emergence of new class structure. Decline of indigenous economy. New education and legal systems. Emergence of new social class. Bengal Renaissance. Peasant movement.

Evolution of Social Structure since 1947. Neo-colonialism under Pakistan. language movement. Liberation War.

Changing pattern of Social Structure in Bangladesh. Land reform. Urbanization. Industrialization. New leadership. Power structure. Emerging social stratification.

Growth of Urban Centres, Major Characteristics of Social Structure of Bangladesh.

SOC 303: Urban Sociology

Introduction: Definition of urbanism and urbanization. Subject matter of Urban Sociology. Urban growth. Theoretical approaches to the study of urbanism: structural, behavioral, demographic and ecological approach.

Patterns of Historic Cities: Ancient cities, medieval cities, pre-industrial cities, industrial cities, colonial cities, modern mega cities.

World Urbanization: The Process of urbanization in the Western and Oriental societies. Impact of feudalism and capitalism. Industrial revolution and colonization on urbanization in the West and East. Pattern of third world urbanization. Pattern of Bangladesh urbanization.

Urban Institutions and Problems: Family and marriage. Education. Municipality. Local Government. Urban economic organization. Labor force market.

Neighborhood: Definition and approaches. Types of neighborhood. Functions of neighborhood. Social psychology of urban life.

Urban Problems: Urban Crime. Unrest and social control. Urban Poverty. Housing. Homelessness. Slums. Culture of Poverty. Prostitution.

Social Stratification and the Metropolis: Class differences and special location: wealthy, middle class, working class. Working poor. Ethnicity and residential segregation. Women and urban political economy. Women and the environment.

Theories of Urbanization: Theories of Louis Wirth, B.F. Hoselitz, Kingsley Davis and Hauser, Breese, Walton and Carns- P. Gutkind.

Theories of Growth of City: "Concentric Zone".

Theory of Burges; "Sector Model". Theory of Hoyt; "Multiple-Nuclei Model". Theory of Harris and Unman;

Urban Planning: Regional Planning. Urban Planning in Bangladesh.

SOC 304: Sociology of Environment

Introduction: Definition, scope and importance of environmental sociology. Concepts: ecology, ecosphere, ecosystem, species, population. Habitual and niche-food web. Interaction with man and environment. Social and physical environment.

Environmental Theories and Debates: Classical doctrines and geographic Determinism. Development of environmentalism. Ecocentrism versus techno centrism. Tragedy of common's doctrine. Blue print for survival. Limits of growth. Global 2000 Report. Bright global future. Stockholm and Rio.

Population Explosion and Environmental Disaster: Determinants and consequences of population growth. Population structure. Balance between population and resource management. North-south differences of population. Dynamics of ecological balance. Family planning.

Major Environmental Issues: Industrialization and urbanization. Land use. Water Pollution. Depletion of underground water level. River, water, and wetlands. Agriculture. Forest depletion and its impact. Fisheries and shrimp cultivation. Energy, flood, cyclone, earthquake, greenhouse effects, and Climate change.

Gender and Environment: Impact of environmental hazards upon men, women and Children. Response to hazards.

Management of Environmental Hazards and Disaster: Poverty alleviation, flood control, and drainage program. Cyclone management. Relief and rehabilitation. Aforestation. Restructuring of Industrial system.

International Politics and Environment: Rich world vs. poor world, Polluters and Sufferers. Problems of formulating international policies. International movement for saving the environment.

Government policies and their Implementation.

Environmental Laws and Justice

SOC 305: Medical Sociology

Introduction: Definition, subject matter and importance of medical sociology. Relation of medical sociology with other branches of sociology. Status of medical sociology in Bangladesh.

Basic Concepts in Medical Sociology: Disease, illness, health, sickness, medical pluralism, ethno medicine. Epidemiology.

Methods of Medical Sociology: Theories, models, paradigms and concepts of medical sociology-methods and problems in studying medical sociology.

Belief system associated disease and medicine: Ancient belief system, medieval belief system, and modern belief system. Present folk belief system and Bangladesh perspective.

Changing Pattern of Heath Seeking Behavior: Incubation prayer, exorcism, witchcraft, amulet, blowing breath on water, herbal medicine, homeopathic treatment, allopathic treatment, social medicine, and yoga.

Etiology of Illness: Germ and Bug theory. Epidemiological triad, Multicausation theory. Culture blaming approach.

Social Structure and Medical System: Medicine under capitalism and Socialism. Medical system of Bangladesh (Govt. and private).

Gender and Health: Medicalization of reproductive health. Gender- cultural ideology and different medical practices.

Drug Policy of Bangladesh: Salient features of drug policy of Bangladesh. Weakness of Bangladesh drug policy. Measures for improved drug policy.

Heath Policy and Primary Heath Care in Bangladesh: Salient features of health policy of Bangladesh. Weakness and its improvement measures. Existing health care facilities in Bangladesh. Role of NGOs and Gono Shasthya Kendra to offer health care facilities in rural Bangladesh.

Models of Health and Illness: Medical Model of Health and Illness, Social Model of Health and Illness. Dimensions, Determinants and Indicators of Health.

Remedial Measures: Evolution of Medicine, Ethno-medicine, Folk Medicine, Alternate Healing System in Cross Cultural Context.

Health Seeking Behavior: Health belief system, Health Service Utilization Model

Political Economy of Health: Doctor-Patient Relationship, Constraints on People's Access to Health Services.

SOC 306: Social Problem Analysis

Social Problem: Definition, nature, characteristics and classification. Approaches to the analysis of social problems.

Social Science and Social Technology: Definition, nature, characteristics, aims and functions. The role of a social science and social technology to analysis social problems. Social Work as a practice of social science.

Fundamental Concepts: Cultural conflict, class conflict, maladjustment of role and dignity, unequal distribution of wealth and opportunity, family disorganization.

Some Social Problems: Deviant and criminal behavior, drug addiction, slums and resultant problems, urban poverty, destitution and dependency, prostitution, over population, malnutrition, unemployment, suicide, violence, old age problem etc.

Introduction to New Technology and Modernization: Concepts and theory, influences of new technology and modernization.

Review of research reports on social problems, solutions of social problems.

Prerequisite SOC 104

SOC 307: Bangladesh Society and Culture

Introduction: Characteristics of urban and rural societies. Difference between urban and rural social structure of Bangladesh. Differential values, norms, rituals and beliefs.

Nature of Society: Concept of family. Community and society. Objectives of society. Relationships between individual and society. Urban and rural social institutions. Voluntary social welfare agencies and types of agencies. Social stratification. Concept of social stratification. Changes in stratification system and its impact on social life of Bangladesh. Importance of studying social stratification.

Culture of Bangladesh: Basic characteristics of Bangladesh culture. Urban and rural cultural differences, various sub-cultures. Cultural conflict. Tribes of Bangladesh. Tribal culture of Bangladesh. Folk Culture: Special features and their influences on the life and behavior of common people. Conflict of folk-culture with the modern one.

Social Institution of Bangladesh: Marriage. Property. Religion, Samaj, Informal power structure and Social Welfare.

Social Problems in Bangladesh: Poverty. Over population. Beggary. Illiteracy and ignorance. Superstitions. Unemployment. Prostitution. Drug addiction. Juvenile delinquencies. Repression on women.

Social Change: Theories of social change. Causes, trends, effects of cultural change of Bangladesh.

Cultural lag theory.

Historical Background of Cultural Change: Socio-economic conditions during the British period. Emergence of middle class, Renaissance of Bengal and contribution of various people.

SOC 308: Social Services in Bangladesh

Basic Concepts Related to Social Welfare: Social Problem. Social disorganization. Social anomie. Social security. Social assistance, and Social insurance, Social services.

Growth and Development of Social Welfare Services in Bangladesh: Government and Non-governmental Social Welfare Services.

Concept of Family Welfare: Growth and Development of family welfare services in Bangladesh. Family needs and problems. Social Work with families.

Concept of Women Welfare: Role and status of Women in Bangladesh. Impact of social change on role and status of women in Bangladesh. Women Welfare Services in Bangladesh. Needs of women development programs in Bangladesh.

Concept of Child Welfare: Needs of children physical, psychological, social and emotional hazard of children. Children welfare services in Bangladesh. Institutional care: maternal and child care, day care, baby home, community health education, adoption and foster care. Problems of socially, mentally, and physically handicapped children and special services for them. International convention on the rights of child.

Growth and Development of Youth: Needs of youth in the areas of family adjustment, marriage, employment, recreation etc. Impact of social change on the youth, roles of youth in development, policy and planning for youth welfare. The role of youth development, policy planning for youth welfare. The role of social worker in youth welfare.

Development of Services in Bangladesh: Bangladesh Probin Hitushy Shanga, SOS Shishu Pally, ACSR, UCEP, SWID. Prevention and correctional juvenile delinquency, disabled services and labor welfare in Bangladesh.

National Council of Social Welfare: Historical Background. Composition and functions. Growth in aid program of the government for voluntary agencies. Evaluation of activities of National Council of Social Welfare. Social Welfare program provided by the Directorate of Social Service.

SOC 309: Sociology of Education

Course Description:

The course examines how and why the education system perpetuates or challenges existing inequalities within society. It introduces students to sociological theories of education, examining the intersection between education, class, culture, gender, resistance and democracy.

Course Contents:

Session 1: Introduction: Concepts and definition of Sociology of Education, Scope of Sociology of Education, Emergence of Sociology of Education as a Sub-discipline within Sociology, Education and Colonialism

Session 2: Theoretical Perspectives: Sociological interpretations of Schooling: The Functional Perspective, Marxist and Neo-Marxist Theories of Education, Cultural Theories of Education, A Weberian Approach to Education, Cultural Capital and Pierre Bourdieu, Critical Pedagogy, Education, Modernization and Development, Indigenous Knowledge and the Education, Education, Work and the Labor Market, Power, Politics and Professionalization, Universal Education and Cultural Diversity, Culture as Pedagogy of Pleasure and Meaning, Formal Education and Non-formal Education

Session 3: Education, Class, Gender and Educational Practices: Social Class and Education, Participation of women in Science and Technology, Teaching for Democratic Citizenship, Feminist Pedagogy, Gender Development and Education

Session 4: Education, Curriculum Planning, Culture and Politics: Popular Culture and Public life, Curriculum Politics, Hegemony and Strategies, Art or Culture

Session 5: Pedagogy, Classroom and Education: Pedagogy and Classroom, Pedagogy and the Working Class Identity, Pedagogy and Ethnic Minorities, Education and Empowerment, Educational Media

Session 6: Education and Foreign Aid: Multilateral Organization and Bilateral Organizations, Non-governmental organizations

Session 7: Schooling in Developed and Developing Countries: Schooling in Asia, Schooling in Africa, Schooling in Canada and USA.

SOC 310: Sociology of Organization

Introduction: Definition, scope and methods of research on organization.

Organizations in Historical Perspectives: Organization in pre-capitalist society. Industrialism and organization. Complex organization.

Theoretical Models: Beginning of organizational models. Psychological, technological, cultural and functional system-action. Analysis of organization. Neo Marxist critique.

Structural Elements of Organization: Individual, dyad, groups, action, role status, position, ends, means-goals, norms, values, laws, customs, conventions, association, institutions and community, stratification and hierarchy.

Forms of Social Organization: Formal and Informal Organization. Closed and open organizations. Economic, political, cultural, educational and other types of organizations.

Technology and Organization: Organization and socio-technical system. Environment and organizational structure. Technology and alienation.

Bureaucracy: Nature and characteristics of bureaucracy. Function and dysfunction. Limits of Tylorism and Fordism.

Decision Making Process in the Organizational Resources: Power authority and organizational goal. Communication and the process of decision making. Control and autonomy.

Organizational Behavior: Behavioral model of human beings. Models of organizational behavior. Organizational culture.

Patterns of Interaction: Organizational role. Non compliance of roles. Types of conflict. Strategies. Conflict management.

Organization and Underdevelopment in the Developing Countries: Theories of organization. Underdevelopment and development.

Organizational Problems: Corruption. Industrial relations. Multinational corporation and developing countries.

SOC 311: Feminist Thought

Liberal Feminism: The roots. Historical development. Liberal Feminism in the eighteenth century: same education. Liberal Feminism in the nineteenth century: same civil rights and economic opportunities. Liberal Feminism in the twentieth century: pluses and minuses of treating women the same as men. Critiques of Liberal Feminism.

Marxist Feminism: Concepts, theories, feminist implications. Friedrich Engels. The Origin of the Family, Private Property, and the State. Family under capitalism. Socialization of domestic labor vs wages for housework. Critiques of Marxist Feminism.

Radical Feminism:

a) Reproduction and mothering: reproduction as the cause of women's oppression. The case for and against biological motherhood.

b) Gender and sexuality: androgyny as the solution to patriarchal imposition. Going beyond androgyny. Pornography. Lesbianism.

c) Critiques of Radical Feminism.

Psychoanalytic Feminism: Roots. Feminist critiques of Freud. Pursuing psychoanalysis in feminist directions: Freud's biological determinism. Dual parenting. Woman's morality.

Existentialist Feminism: Sartre's Being and Nothingness as backdrop to The Second Sex. Simone de Beauvoir: Existentialism for women. Destiny and history of women. Critiques of Existentialist Feminism.

Recent Feminist Theorising: Black Feminisms. Post-colonial Feminist Theory. Post-modern Feminist Theory.

SOC 312: Social Demography

Introduction: Concept of demography. Why study demography? Sources of population data. Population census. Registration of vital events. Sample survey.

Demographic Perspectives: The Malthusian perspective. The Marxist perspective. Other early modern population theories. The theory of demographic transition. Critique of demographic transition theory. Brief history of world population. Population growth of Bangladesh.

Population Theories: Mercantilist Theory, Malthusian Theory, Marxist View on Population, Optimum Population Theory

Fertility: Concept. Crude birth rate. General fertility rate. Age specific fertility rate. Total fertility rate. Social class and fertility. Gross reproductive rate. Net reproductive rate. Causes of high and low fertility. Determinants of fertility. Zero population growth.

Fertility Theories: Demographic Transition Theory (Davis-Blake Model, Thompson-Notestein Model), New Home Economic Theory (Schultz's Model, Caldwell's Intergenerational Wealth Flows Theory); Fertility Regulation Costs (Easterline Model), Measurement of Fertility.

Mortality: Components of mortality (lifespan, longevity). Causes of death. Crude death rate. Age specific death rate. Social class differentials in mortality. Sex differentials in mortality. Age differentials in mortality. Urban and rural differentials in mortality. Determinants of mortality, Measurement of Mortality

Migration: Definition. Types of migration: internal and international. Causes of migration. Characteristics of migrants. Where do people migrate? Consequences of migration. Theories of Migration (Everett Lee's Push-Pull Dichotomy, Peterson Greenwood Hypothesis, Lewis Model, Fei-Ranis Model). Rural-Urban Migration.

Population Structure: What is age/sex structure? Population pyramid. Stable and stationary population. Population projections. Impact of migration on the age/sex structure. Impact of mortality on the age/sex structure. Fertility determinants of the age/sex structure.

Population Growth and Economic Development: The debate: Population growth a stimulus to economic development. Population growth unrelated to economic development. Population growth detrimental to economic development. Population growth and food crisis.

Population Growth and Urbanization: Demographic components of urbanization. Impact of population process on urbanization. Impact of urbanization on the human condition.

Population Policy: What is population policy? Who needs a population policy? Family planning and beyond family planning. Population program of Bangladesh- its strengths and weaknesses. Nature, Objectives and Strategies of Population Policy with Reference to Bangladesh; Instruments of Population Control, Evaluation of Current Population Policy in Bangladesh.

SOC 313: Criminology

Introduction: Definition, nature, scope and importance of criminology. Relationships with other discipline, Emergence of criminology as a separate discipline

Research Methods in Criminology: Survey methods, Observation, Experimental and Quasi Experimental Methods, Agency Records, Content analysis and Secondary data, Case study.

Measuring Crime and Victimization: Crime known to police, Measuring crime through surveys, National Crime Victimization Survey, Surveys of offenders, Problems of official data

Sociology of Law: Theories of origin of Law. Penal code.

Crime and Criminals: Legal and sociological definition of crime, classification of crime, Characteristics of crime, crime immorality and sin

School of Criminology: Pre-Classical, Classical, Neo-Classical, Positive and Clinical school, Sociological School

Theories of Crime and Deviance: Biological theory: Lombroso, Ferri, Garofalo,

Psychological theory: Freud; Economic Theory: Crime and Poverty Sutherland's Theory of Differential Association, Social Disorganization, Social Control theory, Merton's Strain theory, Sub-culture theory, Deterrence and Rational Choice theory. The Labeling perspective of Crime and Delinquency

Penology: Police, Court, Probation and Parole, Corporal and Capital Punishment, Imprisonment. Correctional Institutions. Sutherland's Theory of Differential Association, Social Disorganization, Social Control theory, Merton's Strain theory, Sub-culture theory, Deterrence and Rational Choice theory

The Labeling perspective of Crime and Delinquency

White Color Crime: Definition, Typology of white color crime, Types of white color crime in Bangladesh and Measures to control white color crime in Bangladesh

Juvenile Delinquency: Definition, causes of juvenile delinquency, Controlling juvenile delinquency in Bangladesh

Crime in Bangladesh: Causes of Crime in Bangladesh, Poverty and Crime, Politics and Crime, Drug Abuse and Dug Trafficking, Women and Child Trafficking, Violence against Women, Religious Militancy, Cyber Crime, Money Laundering

Crime Prevention: Theories of Crime Prevention

SOC 314: Sociology of Aging

Concept of aging: Cross Cultural issues, Gerontology and its relationship with Sociology of of Aging, Historic respective of the Sociology and the Aged. The importance of Sociological work with the aged.

Areas of Sociological Interest in the Aging: The social consequences of physical aging, Long term care, community health and short-term health care. Malnutrition among older people, Managingchronics diseases and promoting well-being in old age. The challenge facing older women.

Methods and Strategies on Sociology of Aging: Social theories of aging. Engagement Theory, Activity Theory, Continuity Theory, Cognitive Theory, Exchange Theory, Aging Clock Theory, Death, Dying, Bereavement and Widowhood. The Disengagement Theory. Multiple-stress theory

Aging and social policy: Policies of Bangladesh and developed countries.

Demography of Aging: Health and aging, aging and family, Economy of aging

SOC 315: Principles of Economic Sociology

The classic in Economic Sociology: The role of interest in Social analysis, Classical economic sociology and its predecessors: Alexis de Tocqueville, Karl Marx, Max Weber, Emile Durkheim, Georg Simmel.

After the classic: Josep Schumpeter, Karl Polanyi, Talcott Parsons.

Contemporary Economic Sociology: New economic sociology, Mark Granovetter on Embeddedness, Contribution I: Using Structural Sociology and Network, Contribution II: Using Organization Theory, Contribution III: Using Cultural Sociology, Contribution IV: Building a Historical and Comparative Tradition in Economic Sociology, Contribution V: James Coleman and Interest- Based Sociology. Recent Development of Economic Sociology in Europe.

Economic Organization: On the Social organization of the Economy: Capitalism, Industrial Districts, Globalization,

Economic and Sociological Approach to Market: Economists on the market- Sociological perspective: The Market in Classical Political Economy(from Adam Smith to Marx), The marginalist Revolution: The creation of the modern concept of the market. The Austrian Schools: The market as a process. Keyne's Critique of mainstream view of markets. Industrial Organization and the concept of market structure. Post war developments in research on markets. Sociologists on Markets: Weber on Markets, Harrison White on the market, Markets as networks, Markets as Parts of fields (Bourdieu and Others), Prices and price Formation.

Politics and the Economy: The State and its Role in the Economy, The Economy in Public Choice and new Institutional Economics the View of the Classical Sociologist on the Economy, New Economy Sociology on the State and the Economy, Fiscal Sociology: Joseph Schumpeter's "The crisis of the tax State", Max Weber's Fiscal Sociology, and Fiscal Sociology Today.

Law and the Economy: Legal Foundation for Modern capitalism, Legal Institutions and Economic Sociology, and Law and Economics

Culture and Economic Development: Concept of Culture and the economy, Values and Norms to Economic Culture, Culture and Economic Development and Economic Culture and Modernization.

SOC 316: Globalization, Migration, Development and Refugee issues

Theories and approach: World system and global approaches. Understanding global migration Models of migration. Transition theories, the postmodernist view, the changing global migration. Regionalization the state in intern anal system, the typology of migrants. Globalization and its affect on the structure of societies.

Migration and its affect on rural and urban communities. The new immigration; Various pattern and citizenship. The historical background of Migration in Asia. The regional origins of Labor migration. Social and political consequences of Migration.

Migration: Migration histories of Bangladesh, an overview of migration in Bangladesh &its and impact and key issues. Biharies and Rohingya issues. Sociology of migration and immigration. Migration and migration policy in Asia. Gender and migration in Asia; Internal session migration, livelihood and vulnerability, Internal migration policies in Asia. Internal migration and the development nexus; the case of Bangladesh, migration to the Middle East Europe USA, Australia, migration in local context. Economic and social mobility, Migration, Kinship, marriages, force marriage issues. Migration and women in local economy.

Migration histories of Sylhet region, migration and dependency, history of migration, migration and production, impact of migration on infrastructure. Migration and its effect on non agricultural production, effect on employment occupational structure of migrants households, effects on social economic, demographic and political power.

SOC 317: Sociology of Science and Technology

Understanding Sociology of Science: Sociological Construction of Science and Technology Change and Development, Building Society and Technology.

Technology and Society: Technology and the Industrial Revolution, Role of technology in the rationalization of society

Theories of Technology and Social Change: Technological Determination, Social Constructivism, Institutionalism, Feminist Critiques

Science, Technology and Culture: Evolution of science and technology in culture, Cultural studies of Western science, Paradigmatic Thought in Eurocentric Science.

Science, Technology and Knowledge: Evolutionary Approach of Science and technology, Knowledge for Development and change.

Science, Technology, Society and Property Rights: Science, Creativity and Intellectual Property Rights.

Science, Biotechnology, Biodiversity and Indigenous Knowledge: Biotechnology, the Cultural and Symbolic Dimensions, Biodiversity and people's Science/indigenous knowledge, Genetic Modification, Genetic Modification, Biopollution and Biosafety and Future of Biodiversity.

Gender, Science and Technology: Science, Nature and gender, Technology and Gender needs, Technology inputs for women's enterprise, integrating gender in technological development,

Computer technology and Society: Community, Democracy, and the Nation State in Cyberspaces.

SOC 318: Sociology of Religion

Course Contents:

Session 1: Introduction to Sociology of Religion: Development of scientific study of Religion: Philosophical foundation; Scientific Revolution and Enlightenment; Social Foundation: American War of Independence; French Revolution; Industrial Revolution; Scope of Sociology of Religion: Social genesis of Religion; Beliefs; Practices; and Organizational forces; Basic concepts: Animatism; Animism; Ancestral Spirit; Deities; Prayers; Monotheism; Polytheism; Pantheism; Henotheism; Monolatry; Non-theism; Deism; Asceticism; Secularization; Sect and cult; Religious organization and religious specialist

Session 2: Classical Sociological Theories and Perspectives on Religion: Max Weber: Religion as Legitimation; Emile Durkheim: Religion as integration; Karl Marx: Religion as projection & illusion; Georg Simmel: Religion as Individuality; Sociability; Sigmund Freud: Religion as parental development; Peter Berger: Social constructionism

Session 3: Religion and Gender: Women's and Men's religious experience; Role of Women in religious organization and in religious groups; Feminism and religion: sexuality and family orientation

Session 4: Sociology of religion: Contemporary issues and debates: Secularization and religious revival; Religious fundamentalism; Unity among diversities: Interfaith dialogue (Islam; Hinduism; Buddhism; Judaism; Christianity); Future of religion: the state; politics; media and globalization; Religion and society in Bangladesh

SOC 319: Early Social Thought

Session 1: Introduction to Ancient Philosophy and Thoughts: A History of Western Philosophy by Bertrand Russell; Plato; Aristotle

Session 2: Medieval Philosophy and Thoughts: St. Augustine; Machiavelli; Ibn Khaldun

Session 3: Modern Philosophy and Social Thought: Thomas Hobbes; John Locke; Jean-Jacques-Rousseau; Class Presentation; Review Class

SOC 401: Classical Sociological Theories

Nature Classification and Construction of Theory in Sociology

Events Contributed to the Birth of Sociology: Renaissance, Enlightenment, and Reformation in Europe; French and industrial revolution.

Emergence of Sociology: Saint Simon and Utopian Socialists, Reaction to radicalism.

Auguste Comte (1767-1814). Biographical sketch, Comte's positivism, Coining of the term Sociology, Hierarchy of the sciences, Three stages of development, Social static and dynamics, Religion of humanity, and Family.

Herbert Spencer: Biographical sketch, Biological foundation, The evolutionary doctrine, Organic analogy: homogeneity to heterogeneity; The principles of noninterference.

Other pioneers: Le Play, Taylor and Morgan, Gumplowicz, Small, Sumner, Ward, Toennies, Simmel, etc.

Karl Marx (1818-183): Biographical sketch, Modes of production, Historical and dialectical materialism, Concept of man, Alienation and forms of property, Social formation, Class and class conflicts, Surplus value, Revolution, Dictatorship of proletariat, State, Socialism and communism.

Max Weber (1864-1920): Biographical sketch, Methodology, Ideal type, Economy and society, Protestantism and capitalism, Power-authority, and Bureaucracy.

V. Pareto (1848-1923): Psycho-analysis, Logico-experimental method, and Social system: its structure and dynamics. Circulation of Elites, Action.

E. Durkheim (1848-1923): Biographical sketch, Social facts and his methodology, Collective forces in social life, Social differentiation and division of labor, Social solidarity, suicide, and religion and society.

C.H.Cooley and W.I. Thomas: Cooley: Looking glass self, primary group, class, cast; Thomas: Situational definition and study of action, Individual and social disorganization, and Types of personality.

SOC 402: Sociology of Poverty

Definition of Poverty: Problems of definition. Absolute and relative poverty. Theories of poverty.

The Context of Poverty: Political context of poverty. Extent of poverty in Bangladesh. International comparison of poverty. Trends in urban and rural poverty.

Social Causes of Poverty: Social determinants of poverty. Underdevelopment, income distribution and poverty. Misdistribution of resources. Bad governance. Low level of production. Lack of access to technology.

Measurement of Poverty and Poverty Line: Quantitative measures. Qualitative measures. Concept of poverty line. Approaches to poverty line. Food ratio method. Relative Deprivation.

Effects of Poverty: Poverty cycle, depression, increased vulnerability to natural and social disaster, extremism, fatalism, hunger and starvation, human trafficking, high crime, corruption, political violence, low literacy, drug abuse, low life expectancy, and Increased discrimination.

Principles of Anti-Poverty Measures: Poverty alleviation vs. social policy measures. The role of distributive policies. The role of self help programs. The role of institutional structures. The informal sectors. Need of sustainability. Effects of anti-poverty policies.

Racism and Poverty: Racism and ethnic minorities. Inequality in industrial society. Disadvantage and deprivation. Underclass ethnic minorities. Inequality in colonial societies.

Racism, Ethnicity and Poverty: Debate over culture of poverty vs. Blaming the Victim

Population, Urbanization and Poverty: Demographic transition. Fertility and income distribution. Urbanization and poverty.

Households, Family and Poverty: Individual and households. Household size and structure. Equivalence scales. Life cycle changes. Intra-household transfer. Dependency. Ageing and poverty.

Poverty Alleviation Strategies in Bangladesh: Government initiatives. NGO interventions-Antipoverty programs, Failure and Success of Anti poverty programs. Local anti poverty strategies.

SOC 403: Political Sociology

Introduction: Definition, scope and importance of political sociology. Origin and development of political sociology. Its relationships with sociology, Political science and other social sciences. Methodological problems in Political Sociology. Approaches to sociological analysis of issues. Marxist-Functionalist-System theory.

Key Concepts of Political Sociology: Political culture, political ideology, political behavior, political change, political development, political movement, political socialization, political polarization, political modernization, political communication, political mobilization, political integration, political revolution, political consensus, political reform, political awareness, political upliftment, and political economy.

Theories Regarding the Origin of State: Khaldun, Hegel, Marx, Engels, Openheimer, Morgan, Lowie, Gumplowicz and Devy.

Factors in Making of the State: Major theoretical and empirical observations.

State, Institutions and Organizations, Their relationships: State and family. State and property. State and law. State and religion. State and education. State and bureaucracy. State and government. State and political party. State and economic system.

State in Transition: State in primitive, pastoral, agricultural and industrial societies. State in oriental and occidental societies. Forms of state and forms of government. Political system. Democracy and dictatorship. Authoritarianism. Welfare state. Dependent state.

Sociology of Modern State: Representation and electoral system. Political parties and social class. Political parties and pressure groups. Leadership and elite class. Military bureaucracy, technocracy and political bureaucracy. Power politics. Separation of power. Bases of power. Authority and Legitimacy.

Problems of Power: Political power at local, national and international levels.

Sociology of Political Change: Evolution and revolution. Political ideologies and political behavior. Contemporary social movements: liberalism, conservatism, fascism, socialism and communism: Social movements and problem of bureaucracy.

Political Sociology of Bangladesh: Political elites. Student Movements in political development. Role of professional and intellectual groups in political modernization. Role of military elites. Problems and prospects of institution of democracy in Bangladesh.

SOC 404: Marxist Sociology

Introduction: Concept of man. Marx as a sociologist

Dialectical Method: Hegel, Feurbach and Marx

Historical Materialism: Marxist conception of history. Teleology. Theory and practice. Importance in sociological analysis.

Alienation: Species being. Causes and process of alienation. Elimination of alienation.

Theory of Value as a Social Relation: Labor theory of value. Forms of property. Mode of production and relations of production. Concept of class and class struggle. Social stratification and its relevance to Bangladesh.

Concept of Commodity: Feurbach concept of fetishism. The fetish character of commodity (Marx).

Marx's Theory of the State: Emergence of state and law. The theory of revolution. Dictatorship of proletariat. Socialism. Communism, Marx on colonialism, imperialism, religion, ideology, and science.

SOC 405: Social Forestry

Concept of Forest: Definition. Relationship between forest and people. Relevance of forest to society.

Emergence of Social Forestry in Sociological Study: Definition. Objective of social forestry. Social forestry and environment. A new dimension in forestry.

Types of Social Forestry: Agro-forest, community forest, and homestead forest. Social forestry programs in selected countries: India, China, Tanzania and Bangladesh. GO and NGO roles in social forestry.

Social Forestry and Development: Social forestry and alleviation of forestry. Local resources, social structure and development perspectives in forestry development programs.

Forest Management Systems and Policies: Traditional forest management system. Weakness of the system. Changing direction in forest management policy. Present forest management policies of Bangladesh.

Rural Household Consumption and Social Forestry: Fuel, food, fodder, medicinal herbs, and construction materials. Relevance of all these to Bangladesh.

Social Forestry, Women and Development: Historical perspectives. Traditional relationships of forest with women. The anticipatory role of women in social forestry, such as planning, management, fuel collection, fodder gathering and conservatism activities.

Environment and Social Forestry: The Role of Social Forestry in balancing development and environment.

SOC 406: Sociology of Development

Definition: Indices of development. Human Development Index (HDI). Development and underdevelopment. Historical overview.

Theories of Modernization: Distinction between traditional and modern. Early modernization theories. Critique of modernization theory. Convergence theory.

Dependency Theories: Process of underdevelopment: Baran, Sweezy, and Frank. Citique of underdevelopment theories: Cardoso and Warren. World System Theory: Wallerstein. Neo Marxist Theories.

Institutional Patterns of Underdevelopment: Pre-capitalist economic formation. Capitalism and neo-colonialism. Military intervention and role of military bureaucracy.

Industrialization: Historical development of industries. Distinctive features of industrialization. Industrialization in developing societies. Theories of Harbin and kerr.

Food and Population: Growth of population and scarcity of food. Manpower utilization and underdeveloped agriculture.

Foreign Aid and Trade: AID and dependency: World Bank, IMF and WTO. Role of multinational and transnational corporations.

Globalization and Development: concept of globalization. Resource management. Crisis environment. Globalization from below: NGOs.

Sustainable development and globalization. Critique of development policies.

Development in Bangladesh: Development policy and strategy. Politics of development. Population program. Foreign AID, MNCs and NGOs.

SOC 407: Contemporary Sociological Theories

Introduction: Theory defined; Structure of Sociological theory: concepts, propositions, generalization and laws, Building blocks of theory, Sociological theory and problems of social order, and Schools of sociological theories.

Functinalism: Introduction, Intellectual roots: Comte, Spencer, Pareto, Durkheim, Radcliffe Brown, Malinowski, and Nadel.

Modern functionalism: Parsons: Systems of action, Pattern variables, Functional system problems, AGIL, Social change. Merton: Paradigm for functional analysis, Grand Theories, Theories of middle range, Clarifying functional analysis.

Neo-functionalism: J. Alexander

Conflict Theory: Introduction, Intellectual roots: Simmel, Marx, Weber, Chicago school. Marx: Theory of class conflict and critique of society, Economic basis of society. Economic, cultural and ideological basis of conflict. Evolution of classless society, Class society and state.

Conflict theory and analytical sociology: Dahrenforf: determinants of conflicts, social explanation, and conflict groups; Coser: the origin of conflict, consequences and functions of conflict; Collins: the nature of conflict, social institutions and balance of resources. Conclusion.

Symbolic Interactionism: Introduction. Intellectual roots: Freud, Simmel, Thomas and Znaniecki, Cooley. Mead: the self, self interaction, the development of self, symbolic meaning. Blumer: interpretation, basic premises, structure and process, methodology; Synthesis of Marx, Mead and Freud. Conclusion.

Ethnomethodology and Phenomenology: Introduction; Intellectual roots. Phenomenological connection: Husserl, Schutz, Weber, Berger Luckmann. Gerefinkel: ethno- methodology defined, Conducting ethnomethodological inquiry, ethnomethodological explanation, Ethnomethodology and symbolic interaction; Conclusion.

Critical Theorizing: Critical strains in Marx's thought; Frankfurt School: Lucacs, Horkheimer and Adorno; Marcus, Eric Fromm, Gramsci, and Althusser.

Sociological Theory of J. Habermas: Modernity. An Unfinished Project. The Rationalization of Life World, Civil Society and the Political Public Sphere.

Theories of Gender and Difference: Representation of gender: Early challenges to social science; Feminist methodology, Epistemologies and standpoint theories (Smith), Challenges to critical feminist theory. Black Feminist Thought: Patricia Hill Collins. Black skin, white Masks: Frantz Fanon.

Exchange Theorizing: Early exchange theory: Frazer, Malinowski, Levi-strauss, and Marx; Behavioristic exchange theory: Homans; Dialectic exchange theory: Blau.

Structuralist Theorizing: Early structuralist theory: Marx Durkheim, Simmel, and Levi-Strauss. Structuration theory: Giddens; Cultural structuralist theory: Bourdieu.

Post-modern Theory: Modernity. Post-modern critique of science. Economic post-modernism and Cultural post-modernism.

Current Trends in Sociological Theories: Emerging trends in mainstream and substantive theories, Status of theory in Bangladesh sociology.

Contemporary Feminist Theory: (Mary Wollstonecraft, Kate Millet, Juliet Mitchell, Karen Warren, Jessie Bernard, Vandana Shiva)

SOC 408: Sociology of Gender Planning and Development

Social Construction of Gender: Male dominance, female subordination. Ideology of domesticity, private and public division. Parda: Honour and shame. Control and subordination of women through religion, patriarchy, class, sexuality. Images of ideal wifehood, daughterhood, motherhood. Representation of women in media. Pornography. Trafficking in women and children. Politics of reproduction.

Gender Theories: Liberal, Radical, Socialist, Marxixt, Psychoanalytic, Externalist, Post-modern, Black, Third World and Eco-feminism

Social Organization of Gender and Planning: Sexual division of labour and capitalism. Differentiation and devaluation of women's work. Discrimination at work and lower wages. Gender Planning and Work.

Status of Women in the Family: Socialisation as women. Life cycle as daughter, wife, mother. Marriage, divorce, widowhood. Number of children, fertility, son preference, birth control. Family, access to resources, decision making, division of work, economic contribution, role conflict. Dowry, domesticity, inheritance. Discrimination regarding access to resources. Social construction of sexuality. Domestic violence.

Legal Status of Women: Constitutional rights. International law. Industrial labor employment law. Property law, penal laws. Limited access to law. Traditional salish and fatwa. Legal aid system.

Developmental Approach: Women in Development (WID). Women and Development (WAD). Gender and Development (GAD). Women and Human Rights. UN initiatives. Impact of globalization. NGO programs for women. CEDAW, From Beijing +5 to Beijing +15.

Women's Movement: Suffragette movement (Emmeline Pankhurst). Women's organizations. Resistance against male oppression.

NGO Efforts towards Women Development: Role of leading NGOs towards women empowerment and development: Grameen Bank, GonoShashthaya, BRAC, ASA, Proshika.

Women Scenario in Bangladesh: Economic-social, legal and political status. Empowerment of women in Bangladesh. Implementation of UN Charter.

SOC 409: Sociology of Mass Communication

Communication Concept: Definition. Taking Media Seriously. Mass communication as a subject-matter of sociology.

Theoretical Perspectives of Mass Communication: Marxist perspectives. Functionalist theory. Critical theory. Recent Approaches to the Study of Mass Communication: Media Hegemony. Media Elite Relationship. Manufacturing Consent Model of Herman and Chomsky.

Media Organizations: Political economy of media organization. Corporate take-over and control of global ideology.

Media Messages: Contents of the messages. Manifest and latent goals of messages. Producers of messages. Impact of messages.

Media Processes: News casting as propaganda. Deconstructing Television/ Radio. Advertising: Selling Consumerism. Film and Society. Internet

Effects of Mass Media: Theories of media effects. Media campaign. Public opinion. Diffusion of knowledge in developing countries. Violence and Media / Censorship

Media in Society: Media and Minorities. Gendered Media

Media Policy: Role of media in social change and development. Media imperialism and conflict. Present role of media in Bangladesh.

SOC 410: Community Development Organizations and Social Change

Community: Concept; Characteristics; Functions; Community power structure; Leadership pattern and community problems.

Understanding Underdevelopment of the Community: The nature of underdevelopment, the causes of underdevelopment.

Community Organization: Concept, Characteristics, Objectives, Principles, Approaches, Types, Scope and importance of Community Organization in Bangladesh. Methods and skills in community organization.

Community Organizations Development: Concept, Objectives, Principles, Approches, and Historical background. Community Development and related terms: land tenure system, rural power structure. Roles of development workers.

Methods and Techniques of Community Development: Methods of assessing community needs and planning. Communication methods; Co-ordination method; self help methods; methods of mobilization resources.

Development Theories and Development Organizations: Trends in development theory, dilemmas of development discourse, development organization's roles and strategies, people's organizations, and people's social movement.

Governance, Democracy and Development: Democracy and emancipatory movement, Governance Approach to development and towards a democratic development.

Professionalism, Paradigms and Development: Development paradigms and professions, polar paradigms and the new development paradigm.

People, Power and Social Justice: Social mobilization, empowerment, citizen's rights, education, people centered development and role of development agencies.

Managing Development, Procedures and Choices: Non-Government Organizations, people-centered development, NGO's priorities and activities.

Development Organizations and Social Transformation: Non-Governmental Organizations, Civil Society and Indigenous Movement; Making a Difference: subaltern movement, social reconstruction, politics of empowerment, asset-based community development and organizational learning and grassroots community development agencies.

Governance and Development Organizations: Participatory management, planning, community-based organizations, community participation and politics.

International Organizations and Development: Bilateral organizations, Multilateral organizations; partnerships and cooperation.

Suggested/Recommended Readings:

Abdi, A and Kapoor, D (eds), Global Perspectives on Adult Education, Plagrave Macmillan, New York, 2009.

Chambers, R, Challenging the Professions: Frontiers for Rural Development, Intermediate Technology Publications, London, 1993.

Chambers, R., Whose Reality Counts? Intermediate Technology Publications, London, 1999.

Edwars, M and Hulme, D., Making a Difference: NGOs and Development in a Changing World, Save the Children, London, 1992.

Hall, B., Global Civil Society: Theorizing a Changing World, Governance, Volume XXXIII, No. 1-2, pp 10-32, 2000.

Kapoor, D., NGO partnerships and the taming of the grassroots in rural India, devolvement in Practice. Volume 15, No. 2, PP.210-215, 2005.

Kapoor, D and Jordan (eds), S., Education, Participatory Action Research, and Social Change Palgrave Macmillan, 2009.

Korten, D.C., Getting to the 21st Century: Voluntary Action and the global Agenda, Kumarian Press, Connecticut, USA 1990.

Karen K., Kirst Ashman & Grafton H. Hull, Generalist Practice with Organizations and Communities, Belmont, Wadswort Publishing Co. 2005.

Neil, Betten and Michael J. Austin, The Roots of Community Organizing, 1917-1939, Philadelphia, Temple University Press, 1990.

Rahman, A., Participatory Development Toward Liberation or Cooption in Community Empowerment. Zed Books, London, 1995.

SOC 411: Human Rights and Social Justice

Course Contents:

Session 1: Introducing Human Rights and Social Justice: Distinction between classical and social rights; Classic: Non-intervention of state; Social: Active intervention by the state; Type: Civil; Political; Economic; Social and Cultural rights; fundamental and basic rights; Other classifications: Freedom; Civil liberties; Individual and collective rights; first; second and third generation rights.

Session 2: Social Justice: Religious perspectives: Hinduism; Judaism; Christianity and Islam

Session 3: Social Justice Movements: Liberation Theology; Health Care; Education; Ecology and Environment

Session 4: Theories of Social Justice: Utilitarianism; Self-Perfectionism; Marxism; Existentialism; John Rawl's; Libertarianism; Ambedkarism

SOC 412: Social Interventions and Practices

Field Work in Social Interventions: Meaning, purpose, types, and scope.

Use of Theory in Field Work: Field work analysis model, problems and prospects of content of field work, and agencies of field work.

Investigation of Social Work: Meaning and stages of indigenization of social work, problems and prospects of indigenization of social work in Bangladesh, developing indigenous reading materials.

Field Practice Setting: Development NGOs and Government Program in medical, psychiatric correctional and community settings, and school of Social Work.

Professional Code of Ethics: Concept, ethical objectives and principles, ethical standard and responsibilities of social workers to the clients, colleagues settings, social workers professional self and personal self and the society.

Procedures of Field Work Practice: Formulation of Assignment, case management, preparing case study, supervision and monitoring, daily work process, research, report writing, and self evaluation.

Suggested/Recommended Readings:

Facis, Manis, Field Practice in Social Work Education, Sultana Press, California, 1972.

Grinnell, Richard M. and Yvonne, A. Unrau, Social Work Reacharch and Evaluation: Foundations of Evidence-Based Practice, 8th ed, Oxford, UK; New York, NY: Oxford University Press, 2008.

Hanvey, C. & Philpot, T., Practicing Social Work, London, Routledge, 1994.

Hepworth Rooney, Strom-Gottfried & Larsen, Direct Social Work Practice: Theory and Skills, 7th ed, Cengage, 2006.

Jansson, Brauce S., Social Policy From Theory to Practice; Comparative Analysis, London, Publishing Company, 1994.

Kapoor, D and Jordan (eds), S., Education, Participatory Action Research, and Social Change, Palgrave Macmillan, 2009.

Statham, Daphne, Managing Front Line Practice in Social Work, New York, Jessica Kingsley Publishers, 2004.

Singh, R.R., Field Work in Social Work Education: A Perspective for Human Service Professions, Concept Publishing Company, New Delhi, 1985.

SOC 413: Research Monograph

Credits : 6

A student will prepare a research monograph on a subject of her/his choice with the approval of the department and teacher supervisor. The research monograph should be completed before the semester's final examination. It will be worth 6 credit hours.

SOC 414: Practicum/Internship

Credits : 6

Although internship is not a common practice in sociology, we intend to introduce it in the program in order to provide reflective learning environment and to practice community interaction for the benefit of the students. This will help them apply their newly gained theoretical knowledge and understanding in the country and beyond.

SOC 415: Women; Society and Development

Course Contents:

Session 1: Basic Concepts and Issues: Sex and Gender; Patriarchy; Masculinity and Femininity; Gender division of labor; Gender roles and Gender needs; Gender blind; Gender Awareness; Gender responsiveness; Sex /Gender Segregated data; Gender Equality; Gender Equity;

Session 2: Gender Development Approaches: Women in Development (WID); Women and Development (WAD); Gender and Development (GAD); Women; Environment and Development (WED)

Session 3: Gender Planning and Analytical Tools: Gender Analysis Tools and Frameworks; Gender planning and gender mainstreaming; National Women Development Policy-2011 & National Plan of Action-2013

Session 4: Women and Development Policies in Bangladesh: Achievements and Challenges: Women development in Bangladesh: Role of UN and NGOs; International Convention- CEDWA; BPFA; Millennium Development Goals (MDGs) and Sustainable Development Goals (SDGs); Women's Constitutional Rights

SOC 416: Social Changes in Bangladesh

Course Contents:

Session 1: Basic Concepts of Social Change: Definition: social change as distinguished from other concepts; Evolution; Development; Progress; Revolution; and Decay; The nature of Social Change: Small scale vs large scale; structural vs nonstructural; major vs minor; basic vs non basic

Session 2: Theories of Social Change: Classical: Marx; Durkheim; Weber; Tonnies; Contemporary: Harvey; Giddens; Beck; Bauman

Session 3: Social Change in Bangladesh: Pre-colonial: Aryanization; Sanskitization; Islamization; Marx: Asiatic Mode of Production; Weber: Irrigation Civilization; Wittfogel: Oriental despotism; Colonial: Anglicization; Christianization; Land Reform: Permanent settlement act of 1793; Educational Reform: Modern English Language Education; Legal and Administrative Reform: Introduction of Roman Law and bureaucratic administration; Capitalism; urbanization and industrialization; Rise of new class structure and Muslim nationalism; Nationalism and emergence of East Pakistan; Post-colonial: emergence of Bengali nationalism and Bangladesh; Development of neo-colonialism; Embedded dependency: WB; IMF; WTO; SAP; Rise of comprador bourgeoisie: foreign aids; FDI; NGOs; CSs; Rise of lumpen bourgeoisie: lumpen development; neo-liberalism; RMGs; Real state

STA 102: Statistics and Probability

Introduction: Nature and scope, nature of statistical data, Attributes and variables, Discrete and continuous variables, Methods of data collection, Tabulation, graphs and diagrams; Measure of location: characteristics of an ideal measure, Arithmetic mean, Geometric mean, Harmonic mean, Median, Mode, Quartiles, Deciles, Deciles, Percentiles; Measure of dispersion: Absolute measure, Relative measure, Range, Standard deviation, Mean deviation, Quartile deviation, Co-efficient of dispersion, Co-efficient of variation, Skewness and kurtosis; Regression and correlation: relation between variables, Fitting of regression lines, Simple correlation, multiple correlation and regression; Theory of probability; Theorems of total, compound and conditional probability, Random variables Bayes theorem, Discrete and continuous random variables, Probability function, Expectation of sum and products, Concept of Binomial, Poisson and Normal distribution, Random process, Auto correlation function of a random process, multiple random process, Basic concepts of discrete and continuous probability distributions, Markov process, Queuing process; Sampling techniques; Test of significance: Test of means, Variance, Correlation coefficients and regression coefficients.

Credits: 3; Pre-requisites: None.

Recommended Textbook: Probability & Statistics for Engineering and the Sciences, J.L. Devore, Prentice Hall.

Reference Book: Applied Statistics & Probability for Engineers, D.C. Montgomery and G.C. Runger, John Wiley and Sons.

STA 208: Statistics for Biologists

Nature and Scope, Nature of Statistical Data, Attributes and Variables, Discrete and Continuous Variables, Method of Data Collection, Tabulation, Graphs and Diagrams Measure of Location: characteristics of an ideal measure, Arithmetic mean, Geometric Mean, Harmonic mean, Median, Mode , Quartiles, Deciles, Percentiles; Measures of Dispersion: Absolute measure, Relative measure, Range, Standard Deviation, Mean Deviation, Quartile Deviation, Co-efficient of Dispersion, Co-efficient of Variation, Skewness and Kurtosis; Regression and correlation, multiple correlation and regression; Theory of Probability; Theorems of total, compound and conditional probability, Random Variables, Bayes Theorem, Discrete and Continuous random variables, Probability function, Expectation of sum and products, concept of Binomial, Poisson and Normal Distribution, Random process, Auto Correlation function of a random process, multiple random process, Basic concept of Discrete and Continuous Probability Distributions, Markov Process, Queuing Process; Sampling techniques; Test of significance: Means, Variance, Correlation coefficients and regression coefficients.

Credits 3; Pre-requisite: MAT 101

References:

Daniel, WW (2010). Biostatistics- Basic Concepts and Methodology for the Health Sciences, 9th ed. John Wiley & Sons.

Campbell, R.C. (1989). *Statistics for Biologists*, 3rd edition. Cambridge University Press.

Mendenhall, W., Beaver, R. J. & Beaver, B. M. (2013). *Introduction to Probability and Statistics, 14th ed*. Duxbury: Thomson Brooks/Cole.

Ross, S.M. (2010). Introductory Statistics, 3rd Edition. Elsevier Inc.