UNDERGRADUATE BULLETIN 2008-2009

An institution that promotes eastern culture and values and meaningfully blends eastern and western thought and innovation

EAST WEST UNIVERSITY

excellence in education

UNDERGRADUATE BULLETIN 2008-2009

(A compilation of Information on EWU)

THE EAST WEST UNIVERSITY

UNDERGRADUATE BULLETIN 2008-2009
The East West University

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University Profile

Mission Statement

In keeping with its name, East West University, rated among the top private universities of Bangladesh, is an institution that promotes eastern culture and values, and meaningfully blends eastern and western thought and innovation. As an institution of higher learning that promotes and inculcates ethical standards, values and norms, East West University (EWU) is committed to the ideals of equal opportunity, transparency, and non-discrimination.

The primary mission of EWU is to provide, at a reasonable cost, tertiary education characterized by academic excellence in a range of subjects that are particularly relevant to current and anticipated societal needs. Central to the university's mission is its intention to provide students with opportunities, resources and expertise to achieve academic, personal and career goals within a stimulating and supportive environment. EWU is striving not only to maintain high quality in both instruction and research, it is also rendering community service through dissemination of information, organization of training programs and other activities. Sensitive to the needs of its students and staff, EWU is committed to providing a humane, 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 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). East West University is its first major project. Members of the Board of Directors of the University are: Mr. Jalaluddin Ahmed, Mr. S.M. Nousher Ali, Mr. Farooque B. Chaudhury, Dr. Rafiqul Huda Chaudhury, Mr. Syed Manzur Elahi, Dr. Mohammed Farashuddin, Mr. Mohammed Zahidul Haque R.Ph., Dr. Saidur Rahman Lasker, Dr. Muhammad A. Mannan, Professor M. Mosleh-Uddin, Mr. Shelley A. Mubdi, Mr. M.A. Mumin, Dr. Khalil Rahman, Mr. H.N. Ashequr Rahman and Mrs. Razia Samad.

After being accorded permission by the Government under the Private University Act (Act 34) of 1992, East West University was launched in 1996. Classes started in September 1996 with 6 faculty members and 20 students in the present campus located at 43, Mohakhali Commercial Area, Dhaka. Today there are over 215 faculty members and approximately 5500 students enrolled through a process of selection.

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 Bangladesh University Grants Commission. 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

EWU has also entered into collaboration agreements with a number of other well-known universities in the USA, UK and Australia.

Location

The temporary campus is located at 41, 43, 44, 45, 46 and 49 Mohakhali C/A, Dhaka. It consists of 6 (six) buildings-3 (three) twelve-storied, 1 (one) fifteen-storied, 1 (one) seven-storied and 1 (one) six-storied-with approximately 1,85,240 (one lakh eighty-five thousand two hundred and forty) sq.ft. of space. The campus is situated in the heart of the city and can be easily accessed by all modes of public transport.

With a view to building its own campus, EWU has purchased 555.75 decimals of land at Mouja Vadham, P.S. Tongi, District Gazipur. It has also received an allotment of 1 (one) bigha of land in Uttara from RAJUK. The university has purchased a total of 7.4 bigha land at Aftabnagar, Rampura on the Progoti Sarani adjacent to BTV. The construction work has already started this year. The University intends to move to its own campus by Fall 2010.

Faculties

There are currently three academic Faculties :

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

There are 8 (eight) 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:

- Bachelor of Business Administration (BBA) (Majors in Accounting, Marketing, Finance, Management, International Business, Human Resource Management (HRM) & Management Information System (MIS)
- B.S.S. in Economics
- B.A. in English
- B.Sc. in Computer Science
- B.Sc. in Computer Science and Engineering
- B.Sc. in Electronic & Telecommunication Engineering
- B.Sc. in Information and Communications Engineering
- B.Sc. in Electrical and Electronic Engineering
- B. Pharm (Bachelor of Pharmacy)

EWU plans to offer the following Bachelor's degree programs in the near future:

- Nursing
- Law
- Journalism
- Health Management
- Management Information System (MIS)
- Population Sciences
- Applied Physics and Electronics
- Biomedical Engineering

EWU also offers the following Graduate (Masters) Degrees:

- MBA Regular and Executive
- Master of Arts in English (MA in English)
- Master of Bank Management (MBM)
- Master in Development Studies (MDS)
- Master of Laws (LLM)
- Master of Computer Applications (MCA)
- Master of Science in Computer Science and Engineering (MS in CSE)
- Master of Science in Telecommunications Engineering (MS in TE)
- Master of Population Reproductive Health, Gender and Development (MPRHGD)
- M. Pharm. (Under process of approval)

Semesters

All programs (except B Pharm) operate on a 3-semester per year system.

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 Sept)

The B.Pharm Program follows a two-semester system:

Spring Semester (January-June) and Fall Semester (July-December).

Class Meetings

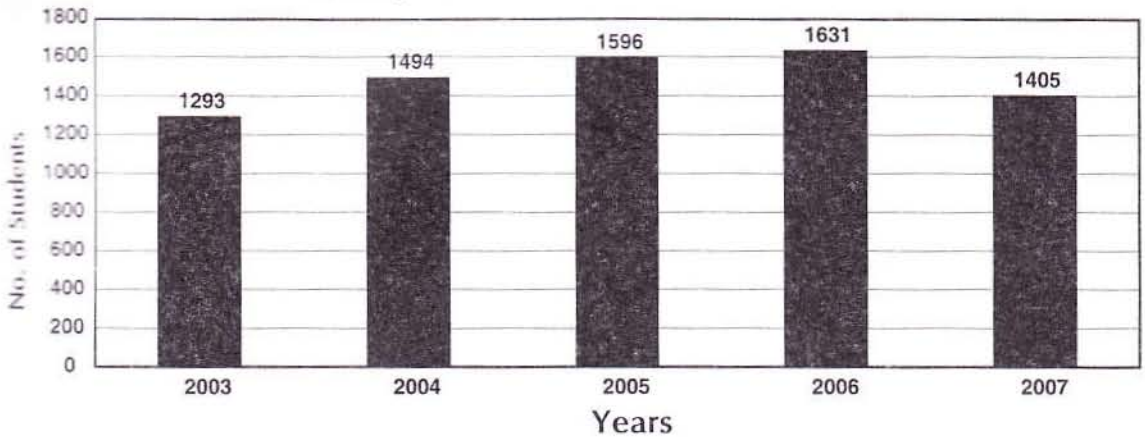
Classes are held from Sunday through Thursday. For each 3-credit course, there are 2 (two) classes per week, each of one and a half hour duration. For 1 credit of lab, 2 hours of lab work per week is assigned. Four class slots available in a week are:

Slot	Day
ST	Sunday, Tuesday
SR	Sunday, Thursday
TR	Tuesday, Thursday
MW	Monday, Wednesday

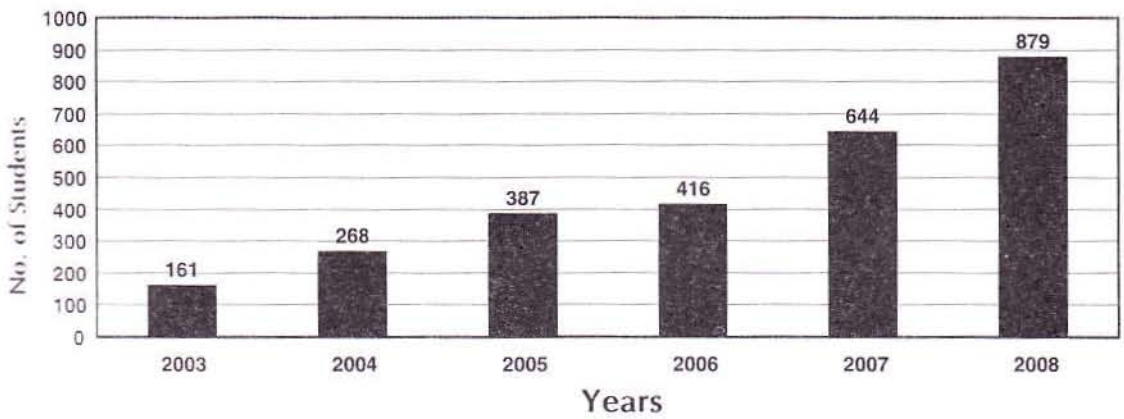
If classes cannot be held as scheduled due to unavoidable reasons, make-up classes are arranged to ensure that there is no loss class or session jam.

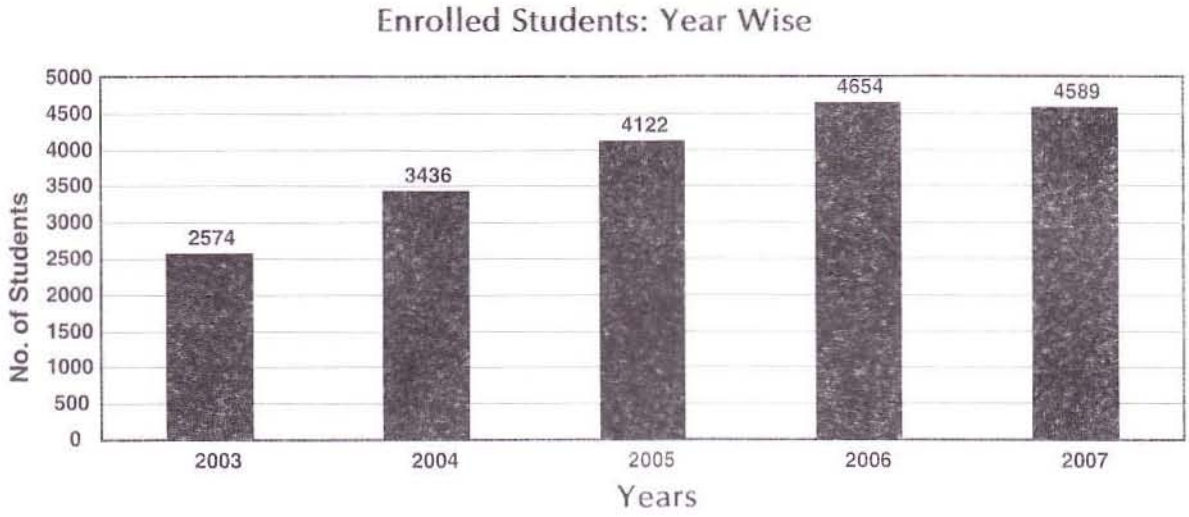
East West University (EWU) has achieved remarkable success within a short period of time since its inception. According to the 'Webometrics' survey report, East West University has been ranked as the number one among the private universities of Bangladesh in July 2007 and in July 2008. It was also ranked as the second best private University of Bangladesh by the same organization in January 2008. 'Webometrics' is a European Union funded Spain based research organization. East West University, which had its humble beginning in 1996 with only 20 students and 6 faculty members, is now having around 5,500 students and 215 Faculty Members. This fact bears the testimony of its steady and significant growth towards promoting the cause of quality education in the field of higher academic sphere of this country. It has already produced 2,851 graduates both from Undergraduate and Graduate programs. A trend of Dynamic Growth of EWU has been illustrated below:

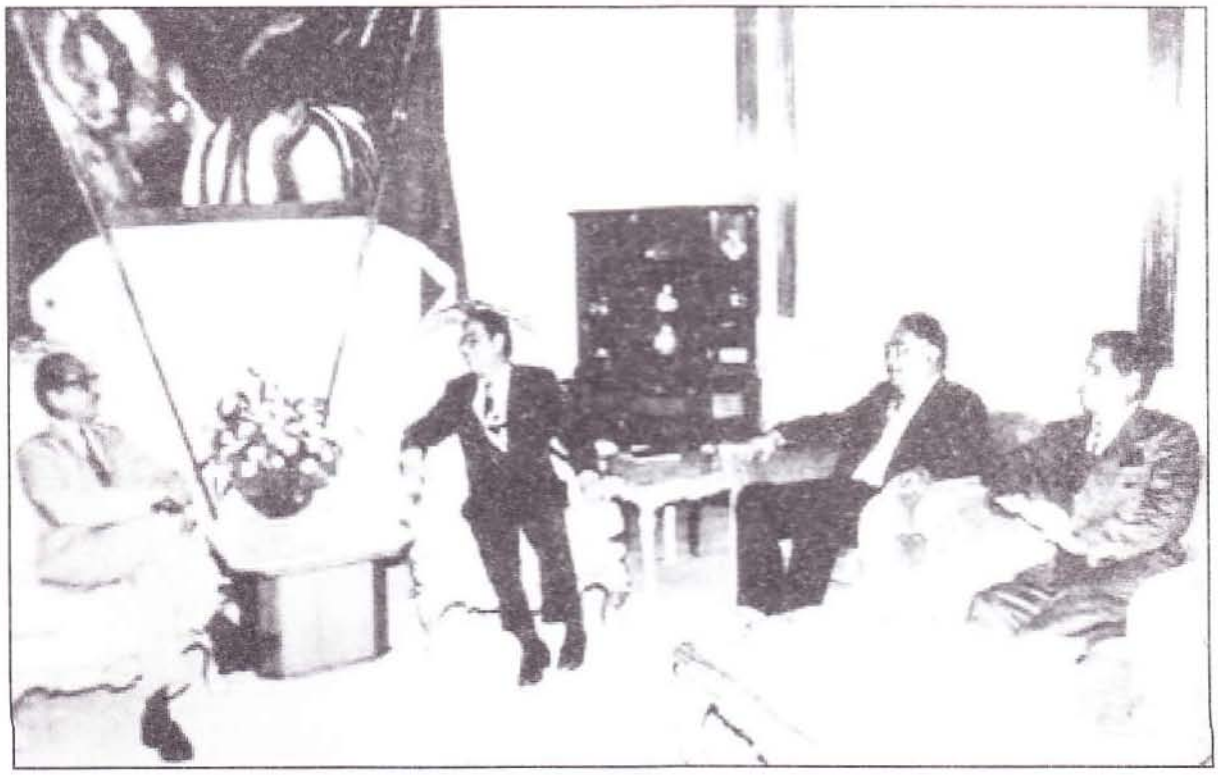
Newly Admitted Students: Year Wise



Graduating Students: Year Wise







Dr. Mohammed Farashuddin, Mr. Syed Manzur Elahi and
Mr. H.N. Ashequr Rahman with former President Justice Shahabuddin Ahmed

Students Information:
Semester Wise (From Spring 2003 - Summer 2008)

Programs	2003 Spirng		2003 Summer		2003 Fall		2004 Spirng		2004 Summer		2004 Fall		2005 Spirng		2005 Summer	
Undergraduate	Admitted	Enrolled	Admitted	Enrolled	Admitted	Enrolled	Admitted	Enrolled	Admitted	Enrolled	Admitted	Enrolled	Admitted	Enrolled	Admitted	Enrolled
BBA	217	991	300	1254	192	1344	214	1503	334	1709	182	1844	242	1952	287	2181
CSC	3	177	8	156	2	127	6	113	6	93	10	97	1	74	2	75
ECO					5	5	14	18	15	30	7	31	20	50	21	64
CSE	64	377	38	417	31	413	48	440	28	458	42	465	28	449	32	439
ENG	21	72	26	96	35	118	33	134	36	150	24	164	24	171	24	185
ICE	8	115	13	122	18	121	24	143	35	172	23	192	13	184	29	198
ETE																
PHRM			25	22	23	42	30	68	39	103	41	142	44	177	100	270
EEE					3	3		3	6	9	4	11	17	30	37	66
Total	**313**	**1732**	**410**	**2067**	**309**	**2173**	**369**	**2422**	**499**	**2724**	**333**	**2946**	**389**	**3087**	**532**	**3478**
Graduate																
MBA	68	275	75	310	83	363	87	404	78	424	77	428	92	446	92	457
EMBA	9	23	2	18	7	19	6	27	12	30	14	39	20	55	36	79
MA in ENG	4	8	9	17	4	19	8	22	4	20	7	23	5	24	8	25
MBM													11	10	8	17
MS CSE															8	8
MDS																
MS in TEL																
Total	**81**	**306**	**86**	**345**	**94**	**401**	**101**	**453**	**94**	**474**	**98**	**490**	**128**	**535**	**152**	**586**
Total	394	2038	496	2412	403	2574	470	2875	593	3198	431	3436	517	3622	684	4064

Programs	2005 Fall		2006 Spring		2006 Summer		2006 Fall		Spring 2007		Summer 2007		Fall 2007		Spring 2008		Summer 2008	
Undergraduate	Admitted	Enrolled	Admitted	Enrolled	Admitted	Enrolled	Admitted	Enrolled	Admitted	Enrolled	Admitted	Enrolled	Admitted	Enrolled	Admitted	Enrolled	Admitted	Enrolled
BBA	143	2196	183	2310	271	2453	121	2358	153	2335	200	2372	73	2131	203	2136	291	2201
CSC	2	63		61	2	52	2	43	1	31		23		16	1	12		4
ECO	13	71	12	81	31	120	18	109	12	112	27	135	8	122	13	123	51	157
CSE	14	407	15	370	14	358	7	290	10	255	11	228	5	178	16	156	40	161
ENG	14	185	13	188	30	207	27	219	22	228	35	251	17	226	24	235	62	267
ICE	16	201	28	211	37	229	11	223	20	218	29	233	1	227	10	212		193
ETE													10	10	17	27	34	56
PHRM	30	299	50	345	119	471	27	481	67	548		132	77	611	79	620		175
EEE	15	79	31	117	53	153	15	155	32	182	42	209	15	217	78	297	74	337
Total	**247**	**3501**	**332**	**3683**	**557**	**4043**	**228**	**3878**	**317**	**3909**	**344**	**3583**	**206**	**3738**	**441**	**3818**	**552**	**3551**
Graduate																		
MBA	79	463	76	460	85	459	70	446	63	449	85	445	78	418	95	449	121	485
EMBA	32	93	31	108	37	140	44	159	37	169	44	194	36	202	53	228	58	241
MA in ENG	8	23	17	38	12	43	8	49	9	48	13	44	15	41	16	51	25	65
MBM	6	15	12	23	6	28	9	30	9	35		27	10	32	5	30	14	42
MS CSE	1	8	6	15	6	12	8	18	6	17	12	25	11	32	4	24	8	31
MDS	22	19	3	20	12	27	5	24	8	20	16	30	17	45	16	45	16	54
MS in TEL			28	22	22	41	17	50	16	57	30	78	23	81	23	86	24	90
Total	**148**	**621**	**173**	**686**	**180**	**750**	**161**	**776**	**148**	**795**	**200**	**843**	**190**	**851**	**212**	**913**	**266**	**1008**
Total	395	4122	505	4369	737	4793	389	4654	465	4704	544	4426	396	4589	653	4731	818	4559

Non-Discrimination

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.

Disclaimer

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.

East West University does not accept any responsibility for loss or damage suffered or incurred by any student as a result of suspension or termination of services owing to strikes, lockouts, riots, weather, or any other cause beyond reasonable control of the University.

Merit Scholarship Awarding Ceremony Summer 2008

University Administration

President, Board of Directors, EWU	Mr. Jalaluddin Ahmed, MS in Public Health (MSPH)
Vice Chancellor	Professor Mohammed Sharif, Ph.D.
Pro-Vice Chancellor	Professor Md. Kamrul Hasan, , Ph.D.
Treasurer	Professor Md. Entazul Huque, Ph.D.
Registrar	Colonel Shah Murtoza Ali (Retd), M.Sc, PGDPM
Adviser	Professor Nurul Islam
Dean of the Faculty of Business and Economics	Professor Tanbir Ahmed Chowdhury, Ph.D.
Dean of the Faculty of Liberal Arts & Social Sciences (Acting)	Professor Tanbir Ahmed Chowdhury, Ph.D.
Dean of the Faculty of Sciences and Engineering	Professor Anisul Haque, Ph.D.
Joint Registrar	Mr. Mashfiqur Rahman, MBA
Assistant Registrars	Mr. Shafik Waes, MSS
	Mr. Mohammad Mosharrof Hussain Mridha, MBA
Admission Officer	Mr. Md. Nurul Islam, M. A.
Registration Officers	Mr. Hafijur Rahman, MSS
	Mr. Morarjee Deshai Barman, MA
Controller of Finance & Accounts	Mr. S A Satter, M. Com. (Accounting)
Deputy Chief, Admin & Logistics	Mr. Sk. Ruhul Amin, B.Com.
Chief, Internal Audit Unit	Mr. Mohammad Eklas Uddin, M.Com.
Secretary to the Board of Directors	Major Mohammad Nurul Islam (Retd), psc.G+
Systems Manager	Mr. Mohammed Samdad Tanveer, MBA

Chairpersons

Department of Business Administration	Professor Tanbir Ahmed Chowdhury, Ph.D.
Department of Economics	Professor Muhammad Sirajul Haque, Ph.D.
Department of English	Mr. Harunur Rashid Khan, M. A.
Department of Social Sciences	Dr. Bijoy P. Barua, Ph.D.
Department of Electronics & Communications Engineering	Professor Mohamed Ruhul Amin, Ph.D.
Department of Computer Science & Engineering	Dr. Mohammad Ghulam Rahman, Ph.D.
Department of Electrical and Electronic Engineering	Professor Anisul Haque, Ph.D.
Department of Pharmacy	Professor Muniruddin Ahmed, Ph.D. (Advisor & Acting Chairperson)
Coordinator: MBA/EMBA & MBM Programs	Professor Nazrul Islam, Ph.D.

Others

Head: Career Counseling Center	Mr. S. I. Nusrat A Chaudhury, MBA
Proctor	Ms. Anindita Paul, M.Sc
Medical Officer	Dr. Arshad Hossain, MBBS
Medical Officer	Dr. Farida Begum, MBBS

EWU Academic Departments

Faculty of Business and Economics

1. **Department of Business Administration**
   a. **Undergraduate Program**
      Bachelor of Business Administration (BBA) - 123 Credits
   b. **Graduate Programs**
      Master of Business Administration (MBA) - 60 Credits
      Master of Business Administration, Executive Program (EMBA) - 42 Credits

2. **Department of Economics**
   a. **Undergraduate Program**
      Bachelor of Social Science (Economics) - 123 Credits
   b. **Graduate Programs**
      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 Economics - 30 credits (under preparation)

Faculty of Liberal Arts and Social Sciences

1. **Department of English**
   a. **Undergraduate Program**
      BA in English - 123 credits
   b. **Graduate Program**
      MA in English - 36 credits/ 45 credits

2. **Department of Law**
   Graduate Program
   Master of Laws (LLM) - 24/30 credits

3. **Department of Social Sciences**

Faculty of Sciences and Engineering

1. **Department of Electronics & Communications Engineering**
   a. **Undergraduate Programs**
      B.Sc. in Electronic & Telecommunication Engineering (ETE) - 140 credits
      B.Sc. in Information and Communications Engineering (ICE) - 140 credits
   b. **Graduate Program**
      Master of Science in Telocommunication Engineering (MS in TE) - 35 credits

2. **Department of Computer Science & Engineering**
   a. **Undergraduate Programs**
      B.Sc. in Computer Science (CSC) - 130 credits
      B.Sc. in Computer Science & Engineering (CSE) - 143 credits
   b. **Graduate Programs**
      Master of Computer Applications (MCA) - 60 credits
      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) - 146 credits

4. Department of Pharmacy
   a. **Undergraduate Program**
      Bachelor of Pharmacy (B. Pharm) - 158 credits
   b. **Graduate Program**
      Master of Pharmacy (M. Pharm) - 36 credits (Under process of approval)

Graduation Requirements

Graduation Requirements for Undergraduate Programs

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

1. Credit completion requirement for:
   a. BA in English - a minimum of 123 credit
   b. BBA - a minimum of 123 credit
   c. BSS in Economics - a minimum of 123 credit
   d. BSc. in Computer Science - 130 credits
   e. BSc. in CSE - 143 credits
   f. BSc. in ETE- 140 credits
   g. BSc. in ICE - 140 credits
   h. BSc in EEE - 146 credits and
   i. B. Pharm - 158 credits

Residency requirement requires that at least 50% 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 BBA 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 Registrar 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.

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. Undergraduate students are allowed up to seven (7) years from the date of admission to complete their degree requirements. University also reserves the right to cancel a degree which has already been awarded, if any fraud of 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 department other than his/her own. Students doing minor must complete a minimum of seven courses of which at least four courses must be clean. 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 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 412, EEE 109, EEE 204, EEE 251, EEE 255
Group B: Any two from the following courses:
CSE 410, CSE 432, 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 BBA 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 credit (123 credit + 9 credit). Students interested to do double major are advised to inform the department through their respective advisors prior choosing the open elective courses.

Convocation 2008: A group of Graduates with His Excellency, Professor Dr. Iajuddin Ahmed, Honourable President of the People's Republic of Bangladesh and Chancellor of East West University and other Dignitaries

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 Program offers MBA, EMBA & MBM Programs. The contemporary and innovative curriculum of BBA 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 the recent development in business as well as the areas that have traditionally formed the core of the business discipline.

Program Mission

The primary mission of the BBA program of EWU is to enhance the capabilities of students and to train them as efficient and effective leaders in diverse areas of business. It intends to provide students with an integrated and practical knowledge to understand and manage current and anticipated business challenges in a socially responsible manner.

Program Objective

The BBA program at EWU is designed as to provide the students with opportunities and expertise to achieve a successful career goal. More specifically, a graduate of Business Administration is expected to attain a high level of skill to be able to:

- Assess local and global business, geopolitical, legal and economic environment and changes taking place thereto.
- Understand the importance of and formulate if it is needed, strategic goals of business organization.
- Design and implement plans at various levels to achieve strategies goals.
- Perform efficiently and effectively the marketing, operations, finance, accounting, HRM and MIS functions of a business organization.
- Provide leadership in the work setting for maximum results.
- Acquire interpersonal communication skills.

Present Status and Future Direction

At present the BBA program at EWU offers concentration in seven areas: Accounting, International Business, Management Information System, Finance, Marketing, Management, and Human Resources Management. To qualify for the BBA 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, three are Open Elective Courses six Concentration Courses and internship/project work. Students may be allowed to do concentration in two areas. Students 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. Notable among these are 'Know the Success Story: Meet the Personality Behind Success' program where renowned business leaders of the country are invited to speak before our students. Seminars are organized regularly where company executives are invited as guest speakers.

Total number of students currently enrolled in the BBA program is about 3500. The number of applicants seeking admission into the BBA program of EWU has been increasing at a very high rate. The acceptance rate in the last two semesters was about 20 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 950 students graduated from this department. A sizeable number of them are now working with reputation in very prestigious organizations like British American Tobacco Co Ltd., Unilever (Bd.) Ltd., Standard Chartered Bank, Grameen Phone Ltd., ADCOM, Banglalink etc.

The main strength of the BBA program at EWU lies in its highly skilled and dedicated faculty members. We have the highest number of full-time faculty members among all private universities of the country. At present 14 out of our 50 faculty members are Ph.D. holders from reputed universities. We have been continuously striving to maintain a reasonably high teacher-student ratio.

The courses that are offered for BBA 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
ENG 100	Spoken English	3
ENG 101	Basic English	3
ENG 102	Composition and Communication Skills	3
GEN 201	Bangladesh Studies	3
MAT 110	Mathematics for Business and Economics I	3
STA 101	Introduction to Statistics	3
Optional General Education Courses		9
Choose any three courses from the following		
BUS 321	Business for Engineering & Technology	3
CSE 102	Introduction to Computers II	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 206	Introduction to Sociology	3
GEN 207	Industrial Psychology	3
GEN 208	Introduction to Philosophy	3
GEN 209	Social Psychology	3
GEN 210	International Relation	3
GEN211	Concepts of Journalism & Media Studies	3
GEN212	Women in Development	3
GEN213	Introduction to German Language	3
GEN214	Intensive German Language Course II	3
GEN301	Principles of Public Relations	3
GEN302	Development Studies	3
GEN303	Globalization and Social Identity	3
MAT100	College Mathematics (Compulsory for those students who have no mathematics in HSC or equivalent level)	
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
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
STA 217	Statistics for Business and Economics	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 Management	3

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 Business 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
HRM414	Industrial Relations	3

Choose any three courses from the following		
HRM415	Training and Development	3
HRM416	Strategic Human Resource Management	3
HRM417	Human Resource Information System	3
HRM418	Job Analysis and Performance Appraisal	3
HRM419	Leadership, Power and Influence	3
HRM420	Organization Development	3

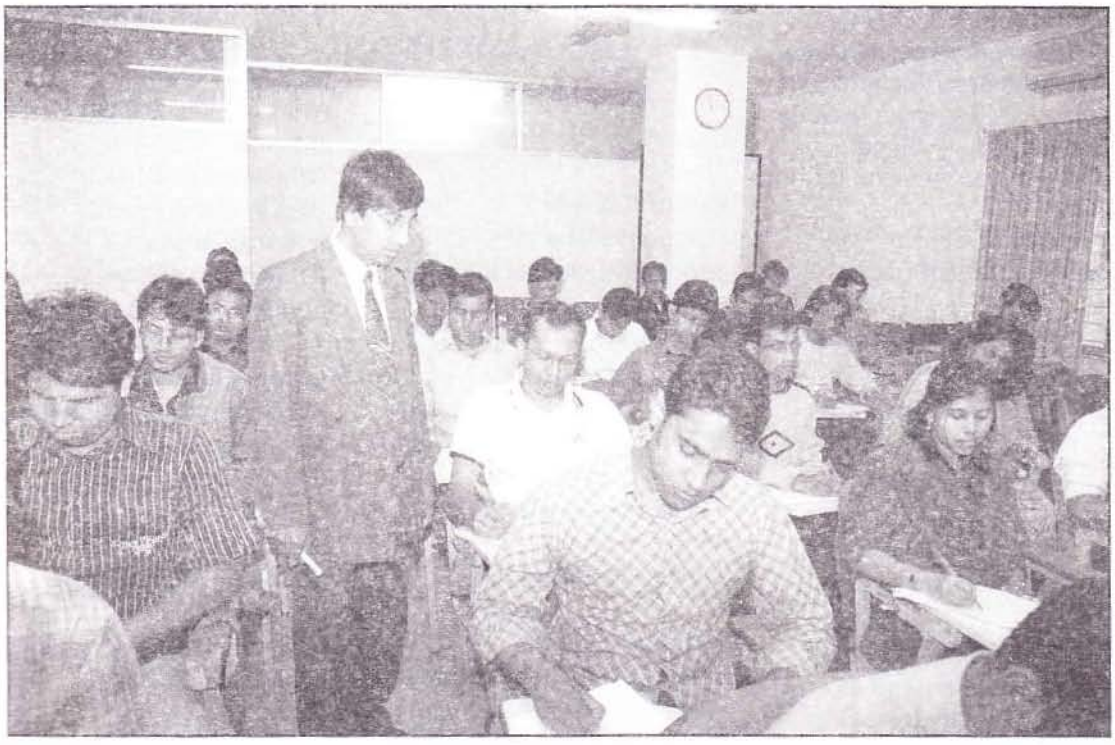
Open Electives **9**

Students must take three 300/400 level courses as open electives to qualify for the BBA degree. Students can choose any 300/400 level course from BA, and/or CSE, and/or ICE, and/or ENG 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-BBA students		**51**
Required core courses		**33**
MAT 110	Mathematics for Business and Economics I	3
STA 101	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
STA 217	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 251		**3**
Major courses		
ACT/FIN/ITB/MGT/MIS/MKT/HRM		**15**



A Class in Progress

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Department of Economics

The Department of Economics at East West University is aiming to be a very strong and resourceful Economics department in Bangladesh. It has a formidable teaching faculty comprising of highly qualified and experienced professors as well as bright young economists. Research is of high priority in the department.

Economics is also the most vibrant of all social sciences in modern history. Learning Economics has always been most fascinating for brilliant students. Its academic challenges is the envy of most other sciences. At East West University, the BSS program in Economics is designed to meet the challenges of modern time. 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 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.

The Department also offers a multidisciplinary program at the graduate level. The Master in Bank Management is designed to produce the 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 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 in Economics and Law, the Master in Public Policy, and Master in Economics.

Visiting Faculty

The Department strongly believes in academic interactions with other economics departments at home and abroad. As such, 20 percent or so 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 Economics - 30 credits (under preparation)

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.

Bachelor of Social Science (BSS) in Economics

Minimum Requirement 123 Credits

Course	Title	Credit
General Education Requirements		**33**
Compulsory General Education Courses		**24**
BUS 101	Introduction to Business	3
CSE 101	Introduction to Computers I	3
ENG 100	Spoken English	3
ENG 101	Basic English	3
ENG 102	Composition and communication skills	3
GEN 201	Bangladesh Studies	3
MAT 110	Mathematics For Business and Economics I	3
STA 101	Introduction to Statistics	3
Optional General Education Courses		**9**
Choose three courses from		
CSE 102	Introduction to Computers II	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 206	Introduction to Sociology	3
GEN 207	Industrial Psychology	3
GEN208	Introduction to Philosophy	3
GEN 209	Social Psychology	3
GEN 210	International Relation	3
GEN 211	Concepts of Journalism & Media Studies	3
GEN 213	Introduction to German Language	3
GEN 219	Social Anthropology and Ethnology	3
GEN 220	Principles of Public Health	3
MAT 100	College Mathematics (Compulsory for those students who have no mathematics in HSC or equivalent level)	3
Core Requirements		**54**
ECO 101	Principles of Microeconomics	3
ECO 102	Principles of 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
STA 217	Statistics For Business And Economics	3
Open Elective Courses		**36**
NOTE 1	**At least 15 credits must be from ECO 3XX/ 4XX level**	
NOTE 2	**Students Must Complete BUS 231**	
NOTE 3	**Students May Choose 18 Credits of 3XX / 4XX Courses from any undergraduate discipline**	
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 357	Mathematical Economics	3
ECO 382	Economic Valuation of Environment	3
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 460	Managerial 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 491	Welfare Economics	3
ECO 492	Law and Economics	3
MAT 407	Advanced Calculus	3
MAT 470	Real Analysis	3

Course	Title	Credit
STA 427	Mathematical Statistics	3

Second Major in Economics

A second major in Economics is open to all undergraduate students in EWU who are enrolled in BSS Economics students. Once a student earns a second major his/her degree will have a suffix Economics, like BBA (Marketing and Economics), B.Sc (Pharmacy and Economics), etc.

The following curriculums for completing a second major for non-Economics undergraduate student in EWU.

a) Compulsory Credits	39
b) ECO 3XX/ECO 4XX level credits	06
Total Credit Requirement	45

Economics Courses

Required Compulsory Courses	39

Course	Title	Credit
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 and Economics I	3
STA 101	Introduction to Statistics	3
ECO 301	Intermediate Microeconomic Theory I	3
ECO 302	Intermediate Macroeconomic Theory I	3
ECO 467	Intermediate Microeconomic Theory II	3
ECO 465	Basic Econometric	3
ECO 477	Intermediate Macroeconomic Theory II	3
MAT 211	Mathematics for Business and Economics II	3
STA 217	Statistics For Business And Economics	3

Elective Courses: (Any two from ECO 3XX OR ECO 4XX level courses) 06 Credits

EWU Students in a Career Session with Grameen Phone

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M.S. in Economics (Investment Model)
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M.Phil. in Economics
University of Dhaka

Department of English

English Department makes a balanced combination of literature studies and applied linguistics. It acquaints students, on one hand, with the British, American, and world literatures written in English and on the other, linguistics and language teaching. In order to keep students abreast of the new developments in their disciplines, the Department constantly upgrades its syllabi and curricula.

English Department is among the oldest departments of East West University. Started in August 1996, it now has 17 full-time and 3 part-time faculty members. The Department currently offers a wide variety of undergraduate and graduate courses the in English language, linguistics and literature to about 400 students as well as a number of compulsory 'service' courses to students of other departments of the university. At this point, 120 students have received the BA degrees and 55 students have graduated with the MA in English degree from the department.

Mission

Different ways of looking at literature, literary history, language, and culture are fostered by the diversity of the department. However, literacy is not the only goal of the English major, but also the starting point for a lifetime of engagement in professions that need literate employees. English graduates are people who read and think and know how to communicate effectively. Therefore, English majors work in such diverse fields as teaching and education, law, editing and publishing, advertising and marketing, freelance and technical writing, research, corporate communications, and government and public service. Extensive writing is required in virtually all English courses, with the expectation that English majors will learn to turn research and critical thinking into cogent arguments expressed in a clear and interesting style. This focus on critical reading, analytical reasoning, and lucid writing is central to the mission of the department. In addition to the responsibility of teaching English to all East West students and making a difference, the department, as a liberal arts discipline, has the mission to foster humanist values, sensibility and ethics in students at large.

Faculty

The Department plays a key role in the University's academic life. Comprising faculty members, experienced and young, the department offers excellent teaching and research atmosphere in applied linguistics, language learning and teaching and literature studies. The fact that many of the teaching staff have international exposures from North America, Britain, Australia, Malaysia or India, and are at the fore-front of some of the best research work at home, certainly speaks volumes of the quality, variety and ability of the department. All of this makes the English department a stimulating and exciting place to be in. At the same time, it is a very welcoming department, where teachers are helpful, friendly and approachable.

Academic Life

The department of English is a modern, vibrant and innovative place where students can choose from a diverse range of courses. Students are encouraged to take part in the weekly departmental seminars. In addition, students may join research workshops inside the department which provide them with supportive forum for research and new ideas. The department organizes international conferences annually which can, among other things, help students experience and learn from paper presentation on latest issues. Most recently, the department organized an international conference "Passages: English Studies in the Region" in April, 2006. The department is committed to providing state-of-the-art teaching and learning facilities. It has a multimedia language lab, a seminar and reading room, online laboratories and a well-stocked library. Lastly, it's not all work and no play at the department! The Department guides the Debating Club, the English Conversation Club and the Poetry and Drama Club to organize a full-range of co-curricular activities.

Towards a bright future

The Department offers one of the most comprehensive undergraduate degree schemes in the country. Courses have been designed with the employers' needs in mind, and a unique Bangladeshi perspective. The teachers are committed to ensuring that students develop the range of transferable skills that will equip them for the work. The curriculum objectives include:

- To produce English majors who can read, think, and write about questions that demand judicious assessment of textual and historical evidence as well as informed aesthetic and ethical judgment.

- To produce graduates who can thrive in professions like publishing, journalism, teaching and advertising.

- To promote liberal humanitarian values through the study of literature, cultural and postcolonial studies.

- To equip students with communication skills to pursue careers in law, banking, accountancy, business management, librarianship, commerce, computing, archive studies, the media and the civil service.

- To prepare students for other specialized career paths ranging from education or management to speech recognition technologies.

- To train students as course curriculum designers for English language programs in the country so that they can produce culture and context-sensitive ELT materials.

- To enable students to design and assess English language tests of different types and levels efficiently.

- To develop translation skills (for translating our literature into English and translating foreign literature, textbooks on different subjects from English to Bangla).

- To impart training in creative writing in English so that through their own creative writing English graduates can familiarize foreign nationals with our culture.

- Overall, to develop well-rounded communication skills in English to succeed in professions nationally and internationally.

Program Structure

To Complete the BA in English degree at EWU a student has to successfully complete at least 123 credits. Courses mainly range from the 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 in the following page.

Bachelor of Arts (BA) in English

Minimum Requirement 123 Credits

Course	Title	Credit
1.General Requirements		**33**
Compulsory General Education Courses		**18**
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 201:	Bangladesh Studies	3
Optional General Education Courses		**15**
Choose five courses from		
CSE 102:	Introduction to Computers	3
GEN 202:	Eastern Culture & Heritage	3
GEN 203:	Ecological System and Environment	3
GEN 205:	Introduction to Psychology (Compulsory for English Dept. Students)	3
GEN 206:	Introduction to Sociology (Compulsory for English Dept. Students)	3
GEN 207:	Industrial Psychology	3
GEN 208:	Introduction to Philosophy (Compulsory for English Dept. Students)	3
GEN 209:	Social Psychology	3
GEN 210:	International Relations	3
GEN 211:	Concept of Journalism and Media (Compulsory for English Dept. Students)	3

2. Core Requirements		**60**
ENG 145	Introduction to Linguistics Prerequisite: None	3
ENG 154	English Phonetics and Phonology Prerequisite: ENG 145	3
ENG 155	Improving Reading and Writing Skills Prerequisite: ENG 102	3
ENG 191	Introduction to Literature: Fiction and Non-Fiction Prose, Prerequisite: None	3
This course is the prerequisite for all literature courses.		
ENG 192	Introduction to Literature: Poetry and Drama Prerequisite ENG 191	3
ENG 205	History of the English Language Prerequisite: ENG 102	3
ENG 207	Psycholinguistics Prerequisite: ENG 145	3
ENG 208	Sociolinguistics Prerequisite: ENG 145	3
ENG 209	Political and Social History of England Prerequisite: None	3
ENG 230	Nineteenth Century Novel Prerequisite: ENG 191	3
ENG 245	Romantic Poetry Pre-requisite: ENG 192	3
ENG 301	Elizabethan and Restoration Drama Prerequisite: ENG 192	3
ENG 306	Methodology of Language Teaching Prerequisite: ENG 145	3
ENG 309	Advanced Reading and Writing Prerequisite: ENG 155	3
ENG 310	Shakespeare Prerequisite: ENG 301+ at least 8 other courses	3
ENG 315	Seventeenth and Eighteenth Century Poetry Prerequisite: ENG 191	3
ENG 403	Modern Novel Prerequisite: ENG 230	3
ENG 412	Techniques of Teaching English Language Skills Prerequisite: ENG 145 and ENG 306	3
ENG 426	American Literature (Modern to Contemporary) Prerequisite: ENG 420 + at least 8 other literature courses	3
ENG 438	Literary Criticism Prerequisite: Completion of at least 10 literature courses	3

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 Prerequisite: ENG 191 + ENG 192	3
ENG 213	English Satire Prerequisite: ENG 191 + ENG 192	3
ENG 222	Introduction to Bangla Literature Prerequisite: ENG 191 + ENG 192	3
ENG 320	Victorian Prose and Poetry Prerequisite: ENG 191 + ENG 192 + ENG 245	3

Course	Title	Credit
ENG 330	English Prose from Bacon to Swift Prerequisite: ENG 191	3
ENG 340	Eighteenth Century Fiction Prerequisite 192	3
ENG 410	Continental Literature Prerequisite: Completion of at least 10 literature courses	3
ENG 420	American Literature (1620-1891) Prerequisite: - ENG 191 + at least 4 other literature courses	3
ENG 423	Old and Middle English Prerequisite: ENG 191 + any 4 other literature courses	3
ENG 424	Classics in Translation Prerequisite: ENG 191 + 4 other literature courses	3
ENG 430	Cultural Studies Prerequisite: Completion of at least 10 literature courses	3
ENG 435	Postcolonial Theory and Literature Prerequisite: Completion of at least 12 literature courses	3
ENG440	Literary Theory Prerequisite: ENG 438	3
ENG445	Modern Poetry Prerequisite: ENG 320	3
ENG450	Modern Drama Prerequisite: ENG 301 + ENG 310	3
ENG452	Contemporary Literature in English Prerequisite: 5 Literature courses	3
ENG455	Comparative Literature Prerequisite: Completion of at least 12 literature courses	3
ENG458	Feminist Readings of Literature Prerequisite: 6 literature courses	3

Concentration B: ELT/Applied Linguistics		
ENG 200	Advanced Oral Communication Skills (Open elective)	3
ENG 201	Theories of Writing Prerequisite: ENG 309	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

Course	Title	Credit
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 155 + ENG 309 and at least 5 literature courses	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: ENG 145, ENG 207 and ENG 306	3
ENG 414	Research Methodology in ELT Prerequisite: ENG 204 +ENG 207 + ENG 303 + ENG 306 & ENG 335	3
ENG 415	Language Policy and Planning Prerequisite: ENG 208	3
ENG 417	Problems & Prospects of ELT in Bangladesh. Prerequisite: ENG 145, ENG 303, ENG 306, ENG 413	3
ENG 422	Bilingualism and EFL/ESL Prerequisite: ENG 208	3
ENG 436	ELT Research Project (3 Credits) Prerequisite: ENG 414	3
ENG 451	Computer Assisted Language Learning /Teaching(CALL/CALT) Prerequisite: 4 ELT/Applied Linguistics courses	3

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Exchange of Crests during a visit of National Defence College (NDC) at EWU

Department of Social Sciences

The Department of Social Sciences has been playing a key role at the East West University since its establishment on June 1, 2005. With more than fourteen members of academic staff, it has a strong research base, with interests spanning a wide area of theoretical and applied issues. The Department is interdisciplinary in nature. Students of all undergraduate programs and departments at EWU are required to complete 12 credits of their total credit requirement through the following courses. The Department plans to offer minor in one or more disciplines in the social sciences and is set to become a full-fledged degree awarding department in the near future.

The academic mission of the Department of Social Sciences is to promote eastern and western values in its courses. The courses are structured to provide a solid foundation of social science principles while allowing choice in order to appeal to a wide spectrum of interests. The Department has a reputation for high quality teaching and personal attention to students. Faculty members in the Department are committed to the interdisciplinary ethos and culture.

The specific objectives of the Department of Social Sciences are to:

- Help students develop analytical and critical thinking skills
- Guide students in doing social research
- Promote interdisciplinary and cross-disciplinary forms of instruction
- Empower students to function in a diverse, global society

The Department of Social Sciences provides an environment that fosters creativity, individuality and scholarship. It endeavors to promote an appreciation for and understanding of the events, ideas, and forces that shape the world.

The Department offers courses in the following twenty-one academic areas:

Compulsory General Education Courses

Course	Title	Pre Requisite	Credits
GEN 201	Bangladesh Studies	ENG 102	3

Optional General Education Courses

GEN 202	Eastern Culture and Heritage	None	3
GEN 203	Ecological System and Environment	None	3
GEN 204	Western Thought	None	3
GEN 205	Introduction to Psychology	ENG 102	3
GEN 206	Introduction to Sociology	None	3
GEN 207	Industrial Psychology	ENG 102	3
GEN 208	Introduction to Philosophy	None	3
GEN 209	Social Psychology	ENG 102	3
GEN 210	International Relations	ENG 102	3
GEN 211	Concepts of Journalism & Media Studies	ENG 102	3
GEN 212	Women in Development	ENG 101	3
GEN 213	Introduction to German Language	None	3
GEN 214	Development Studies	ENG 102	3
GEN 215	Introduction to French Language	None	3
GEN 216	Introduction to Spanish Language	None	3
GEN 217	Introduction to Chinese Language	None	3
GEN 218	Introduction to Arabic Language	None	3
GEN 219	Social Anthropology and Ethnology	None	3
GEN 220	Principles of Public Relations	ENG 102	3
GEN 221	Globalization and Social Identity	ENG 102	3
GEN 222	Religion, Ethnicity, Culture and Development in South Asia	ENG 102, GEN 206	3
GEN 223	Contemporary Security Studies in Asia-Pacific	ENG 102, GEN 210	3
GEN 239	Professional Ethics	ENG 102	3

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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 and is relatively a new department of the university. The ECE Department offers the core and some elective courses of the undergraduate and graduate programs of the Department and the basic science courses, e.g., Mathematics, Physics and Statistics Courses for different undergraduate degree programs under the faculty of Sciences & Engineering of the university.

Telecommunication Engineering is the most exciting frontier in engineering in recent years. Our civilizations now depend absolutely upon telecommunication engineering. The Internet and World Wide Web are perhaps the most visible applications of this subject. Applications include satellite communication, next generation mobile phones, digital high definition television, and many more.
Graduates with a degree in Information Electronic/Telecommunication Engineering 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),
M.S. in Telecommunication Engineering (TE).

B.Sc. in Electronic & Telecommunication Engineering (ETE)

B.Sc. in ETE is a four years program. The purpose of the B.Sc. degree in Electronic & Telecommunication Engineering (ETE) at East West is to produce competent engineers who are highly trained in both electronic and telecommunication engineering to meet the needs of our expanding industrial society. Graduates from this subject will play an effective role in research and development in various electronics as well as in telecommunication industries. The undergraduate degree course in ETE prepares students who will have expertise in telecommunications technology, basic sciences and electronic engineering.

B.Sc. in Information & Communications Engineering (ICE)

B.Sc. in ICE is also a four years program. ICE is a similar program to the ETE program. However, these are not exactly the same programs. In the case of ETE program, the majority of the engineering core courses of the curriculum are from basic electronic engineering and telecommunication engineering. In the elective modules, a student has flexibility to choose advanced courses either in electronic engineering or in telecommunication engineering. However, on the other hand, majority of the core courses of the ICE program are from computer systems engineering and telecommunication engineering. In the elective modules, a student has flexibility to choose advanced courses either in computer system engineering or in telecommunication engineering.

Program Mission

The purpose of the B.Sc. degree in ICE and ETE at East West is to produce competent engineers who are highly trained in both electronic and telecommunication engineering to meet the needs of our expanding industrial society. Graduates from this subject will play an effective role in research and development in various electronics as well as in telecommunication industries. The undergraduate degree course in ETE prepares students who will have expertise in telecommunication engineering, basic sciences and electronic engineering whereas undergraduate degree course in ICE prepares students to become experts in computer systems, basic science and telecommunication engineering.

Educational Objectives

The Educational Objectives of the B. Sc. in ETE/ICE programs are consistent with other similar Engineering curricula of the country. The mission statement has a preamble followed by declarations of four interconnected commitments: to students, to faculty, to alumni, and to the country, with the understanding that the latter two include industry. There are four Program Educational Objectives for the undergraduate ETE program:

- **Depth.** To provide students with understanding of the fundamental knowledge prerequisite for the practice of, or for advanced study in, information/electronic/telecommunication engineering, including its scientific principles, rigorous analysis, and creative design.
- **Breadth.** To provide students with the broad education, including knowledge of important current issues in engineering with emphasis on information, electronic and telecommunication engineering, necessary for productive careers in the public or private sectors, or for the pursuit of graduate education.
- **Professionalism.** To develop skills for clear communication and responsible teamwork, and to inculcate professional attitudes and ethics, so that students are prepared for the complex modern work environment and for lifelong learning.
- **Learning Environment.** To provide an environment that enables students to pursue their goals in an innovative program that is rigorous and challenging, open and supportive.

Outcomes

To prepare the student for the Program Educational Objectives to be achieved, a set of Program Outcomes, that is, statements that describe what students are expected to know and are able to do by the time of graduation, have been adopted. These Outcomes, and the applicable Program Criteria, are:

- Ability to apply knowledge of mathematics, science, and engineering
- Ability to design and conduct experiments as well as analyze and interpret data
- Ability to design a system to meet desired needs
- Ability to function on multidisciplinary teams
- Ability to identify, formulate, and solve engineering problems
- Understanding of professional and ethical responsibility
- Knowledge of contemporary issues
- Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice
- Knowledge of mathematics, and basic sciences, necessary to carry out analysis and design appropriate to information, electronic and telecommunication engineering

It should be mentioned here that this exciting era of telecommunication engineering has been possible because of the advancement of the modern electronic engineering. Therefore, an integrated approach for understanding information, electronic and telecommunication is very important.

This curricula for the undergraduate degree programs are based on the believe that in a discipline that is changing at a rapid pace, it is necessary to provide the students with intellectual rather than only technical skills. Accordingly, the curriculum is based on a broad coverage of the disciplines of electronic, computer and telecommunication engineering. The program is designed to equip its graduates for careers in the design, development and management of information networks as well as many other basic electronic devices. The objective of the courses is to provide our engineering graduates with the disciplines and skills needed to design modern electronic and communication systems. Information/Electronic/ Telecommunication Engineering and the closely related area of Computer Systems Engineering (CSE) are projected to have strong and accelerating employment growth for the foreseeable future. Career prospects for the graduates in this field are excellent.

Responsibilities of the B.Sc. in ICE and B.Sc. in ETE Graduates

ICE and ETE engineers are responsible for the planning and design, commissioning, performance monitoring, optimization and management of complex telecommunication systems. The graduates can also take part in developing sophisticated electronic devices and systems. Some important activities of these engineers are

- Management of engineering teams
- Developing basic and advanced electronic devices and systems
- Design and implementation of telecommunication equipments like modems, switches, routers and radio links
- Developing real-time computer systems including imbedded computer systems and their software

- Building and testing prototypes of new equipment including integrated circuit components
- Predicting telecommunication systems performance based on simulation of real-life environment
- Taking action to optimize the performance of telecommunication systems
- Providing technical support to marketing or customer service staff and telecommunication technicians
- Providing training for technical and engineering staff once new systems have been installed
- Supervising special research projects on next generation telecommunication systems

Employment Opportunities for the ICE and ETE Graduates

- Mobile operators, for example: BanglaLink, GrameenPhone, AKTEL, City Cell, TeleTalk, Warid, etc. and other relevant multinational companies abroad
- BTTB; the graduates can complete BCS examination for relevant government jobs
- Military EME corpse
- 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 for electronic, computer science and telecommunication related courses.

Visitor's Program

The department has been hosting both long-time as well as short-time Teaching/Research stays of foreign and local experienced Research Scientists and Professors. For example, Dr. Rupa Mitra, Professor of Minnesota State University visited ECE Department as a Fulbright Scholar from Fall (September-December) semester 2006 to Spring (January-April) semester 2007. Dr. Rupa Mitra is a Biostatistician. In the Fall semester 2007, Dr. Prasanta Chatterjee, Reader of Mathematics, Visva Varati University, India, has visited ECE Department for two weeks. Dr. Prasanta Chatterjee is an expert in Nonlinear Plasma Dynamics. We have intention to invite visitors in the fields of Electronic and Telecommunication in the near future.

Research Activities under ECE Department

The present research activities of the Department include research work in the fields of Wireless & Mobile Communication, Communication Networks, Optical Communication, Teletraffic Engineering, Digital Signal Processing, Telemedicine, Signal, Image & Multimedia Processing, Materials Science, Plasma Physics, Lattice Theory, and Game Theory.

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, Aktel, BTTB, TeleTalk, Citycell, Warid Telecom, 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 conducted by faculty members, senior B.Sc. and M.S. students and the visitors.

Workshops & Seminars

ECE department regularly organizes various workshops on different telecom related topics. Top level individuals from various Telecom industries are usually invited to give talk in the seminars.

Study Tours & Field Trips

ECE dept. organizes study tours and field trips with the help of different organizations for its students to give them the real life flavor of Telecom industries - for example, tour to BTTB exchange, BTS rooms of various mobile operators, etc.

EWU Telecom Club (EWUTC)

The club is run under the Dept. of ECE. It is a club which keeps pace with Telecom-related events. It organizes workshops, seminars, study tours, picnics, parties etc. The EWUTC involves the students in various extra curricular activities. It also maintains its own website; the address is "www.ewutc.com".

Curriculum for the B.Sc. in Electronic & Telecommunication Engineering (ETE) Program

Minimum Requirement 140 Credits

Total minimum credit hours of the curriculum are 140 and the credit distributions are described below:

A Language & General Education Requirements	21C
B Mathematics & Basic Sciences	26C
C ETE Core (including Optional Core)	68C
D ETE Technical Electives (Depth as well as Breadth)	18C
E Inter-disciplinary Engineering Requirement	07C
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 201 - Bangladesh Studies	3
Total	9

(ii) Optional General Education Courses (2 courses, OPT001 and OPT002) (Choose course GEN 239 and one other course - 3+3=6 credit hours)

Course Number & Name	Credit Hours
GEN 202 - Eastern Culture & Heritage	3
GEN 203 - Ecological System & Environment	3
GEN 204 - Western Thought	3
GEN 205 - 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	3
GEN 2XX - Any other GEN course approved by the University	3
Total	6

(iii) Optional Courses from Business & Economics (2 courses, OPT003 and OPT004)
(Choose any two courses - 3+3=6 credit hours)

Course Number & Name	Credit Hours
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
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
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 (including two Optional Core Courses, ETE 219 and ETE 441); a total of 68C.

Course Number and Name	Credit Hours
ETE 101 - Introduction to Telecommunication Engineering	1
ETE 105 - Computer Fundamentals & Programming Language	4
ETE 107 - Electrical Circuits - I	4
ETE 207 - Electrical Circuits - II	4
ETE 212 - Electronic Circuits - I	4
ETE 214 - Electronic Circuits - II	4
ETE 216 - Signals & Systems	3
ETE 219 - Electronic Properties of Materials	3
ETE 302 - Computer Communications & Networks	4
ETE 310 - Electromagnetic Theory	3
ETE 311 - Digital Electronics	4
ETE 312 - Communication Theory	3
ETE 314 - Digital Communications	4
ETE 316 - Microprocessors & Interfacing	4
ETE 322 - Digital Signal Processing	4
ETE 350 - Information Theory & Coding	3
ETE 399 - Design & Simulation	1
ETE 420 - Control Systems	4
ETE 441 - Wireless & Mobile Communications	3
ETE 498 - Research Project / Industrial Training	4
Total	**68**

D. ETE Technical Electives (TEE001-TEE006)

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 six courses (TEE001 - TEE006), taking four courses from any one of the first two groups (GROUP A and GROUP B) and two courses from any other groups except the preferred one.
(Areas of Concentration: 4 courses with minimum 12C, Other Areas: 2 courses with minimum 6C).

(a) Group A (Electronics Engineering)

Course Number & Name	Credit Hours
ETE 400 - Semiconductor Devices	3
ETE 401 - VLSI Circuit Design	4
ETE 403 - Optoelectronics	4
ETE 405 - Advanced Digital Logic Design	4
ETE 407 - Quantum Theory for Semiconductor Devices	3
ETE 409 - Semiconductor Processing & Fabrication	3
ETE 411 - Analog Integrated Circuits	4

(b) Group B (Telecommunications Engineering)

Course Number & Name	Credit Hours
ETE 430 - RF & Microwave Engineering	4
ETE 442 - Optical Fiber Communications	4
ETE 444 - Telecommunication Networks & Switching	3
ETE 452 - Multimedia Communications	3
ETE 456 - Wireless Networks	4
ETE 457 - Telecommunication Network Planning & Optimization	3
ETE 458 - Intelligent Networks	3

(c) Group C (General)

Course Number & Name	Credit Hours
ETE 413 - Introduction to Nanotechnology	3
ETE 415 - Power Electronics	4
ETE 418 - Introduction to Embedded Systems	4
ETE 419 - Biomedical Electronics	4
ETE 450 - Communications & Network Security	4
ETE 460 - Foundations of TCP/IP	4
ETE 461 - Object Oriented Programming	4
ETE 463 - Data Structure & Algorithm	3
ETE 467 - Computer Organization & Operating Systems	3
ETE 470 - Applied Numerical Methods	4
ETE 472 - Speech & Image Processing	4
ETE 475 - Artificial Intelligence & Expert Systems	3
ETE 477 - Neural Networks & Applications	3
ETE 479 - Robotic Engineering	4

E. Inter-disciplinary Engineering Requirements

This elective requirement is compulsory. A student has to take one course in CSE and one course from engineering disciplines other than CSE, EEE, and ETE. Two courses, 3+4=7 Credit hours.

(i) Choose one course from the following non EEE/ETE/CSE engineering courses (IDE001)
(One course - 3 credit hours)

Course Number & Name	Credit Hours
ETE 261 - Introduction to Bioengineering	3
ETE 281 - Introduction to Environmental Engineering	3
Total	3

(ii) The following course has been selected from the CSE discipline (IDE002) (One course - 4 credit hours)

Course Number & Name	Credit Hours
ETE 465 - Database Systems, Software Analysis & Design	4
Total	4

F. Flow-Chart

Year-wise flow-chart showing the sequence of courses to be followed by a student of ETE undergraduate program during the four-year study at EWU

YEAR / SEM	YEAR 1	Pre-req	YEAR 2	Pre-req	YEAR 3	Pre-req	YEAR 4	Pre-req
SEM 1	**ENG101(3)** **ETE101(1)** **MAT101(3)** **PHY109(4)**	None None None None	**ETE207(4)** **MAT205(3)** **OPT001(3)** **STA102(3)**	ETE107 MAT102 ENG102 MAT102	**ETE219(3)** **ETE302(4)** **ETE311(4)**	PHY209 ETE216 ETE212	**ETE399(1)** **IDE002(4)** **ETE420(4)** **TEE001(3/4)**	None None ETE216
SEM 2	**ENG102(3)** **ETE105(4)** **MAT102(3)**	ENG101 MA101 MAT101	**ETE212(4)** **OPT002(3)** **PHY209(3)**	ETE207 ENG102 PHY109	**OPT004(3)** **ETE310(3)** **ETE312(3)** **ETE316(4)**	ENG102 PHY209 ETE216 ETE311	**TEE002(3/4)** **TEE003(3/4)** **TEE004(3/4)** **ETE 498 (1)**	
SEM 3	**CHE109(4)** **ETE 107(4)** **GEN201(3)** **MAT104(3)**	MAT101 MAT102 ENG102 MAT101	**ETE214(4)** **ETE216(3)** **IDE001(3)** **OPT003(3)**	ETE212 ETE212 None ENG102	**ETE314(4)** **ETE322(4)** **ETE350(3)**	ETE312 ETE216 ETE312	**TEE005(3/4)** **TEE006(3/4)** **ETE498(3)**	
Credits	**35C**		**36C**		**35C**		**34 - 40C**	**140C-146C**

Legend: OPT001, OPT002; Two Optional General Education Courses
OPT003, OPT004; Two Optional Courses from Business & Economics
TEE001 - TEE 006; Six Technical Elective Courses
IDE 001, IDE 002; Two Inter-Disciplinary Engineering Courses

N.B. The course ETE 498 (Research Project/Industrial Training) is spread over two semesters. Although the registration for this course will be done in SEM 2 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 SEM 2 of 4th year.

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

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	23C
C	ICE Core	82C
D	Technical Electives	14C
	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 201 - Bangladesh Studies	3
Total	9

(ii) Optional General Education Courses (any two courses - 6 credit hours)

Course Number & Name	Credit Hours
GEN 202 - Eastern Culture & Heritage	3
GEN 203 - Ecological System & Environment	3
GEN 204 - Western Thought	3
GEN 205 - 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
Total	**6**

(iii) Optional Courses from Business & Economics (any two courses - 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
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 23 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 101 - Physics - I	4
PHY 102 - Physics - II	4
STA 102 - Probability and Statistics	3
Total	23

C. Information & Communication Engineering Core

These courses stress fundamental Information & Communication Engineering concepts (a total of 82 credit hours).

Course Number and Name	Credit Hours
ICE 101 - Introduction to Telecommunication Engineering	3
ICE 105 - Computer Fundamentals & Programming Language	4
ICE 107 - Object Oriented Programming	4
ICE 109 - Electrical Circuits	4
ICE 207 - Data Structures	4
ICE 209 - Signals & Systems	3
ICE 251 - Electronic Circuits	4
ICE 245 - Algorithms	4
ICE 275 - Operating Systems	3
ICE 301 - Database Systems, Software Analysis & Design	4
ICE 302 - Computer Communications & Networks	4
ICE 310 - Electromagnetic Theory	3
ICE 311 - Digital Electronics	4
ICE 312 - Communications Theory	3
ICE 314 - Digital Communications	4
ICE 316 - Microprocessors & Interfacing	4
ICE 322 - Digital Signal Processing	4
ICE 350 - Information Theory & Coding	3
ICE 441 - Wireless & Mobile Communications	4
ICE 444 - Telecommunication Networks & Switching	3

ICE 497 - Engineering Ethics	3
ICE 498 - Research Project / Industrial Training	6
Total	**82**

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 four courses with a minimum of 14 credit hours from these Elective Modules.

Course Number & Name	Credit Hours
ICE 401 - VLSI Circuit Design	4
ICE 431 - RF & Microwave Engineering	4
ICE 442 - Optical Fiber Communications	4
ICE 446 - Satellite Communications	3
ICE 450 - Communications & Network Security	4
ICE 452 - Multimedia Communications	4
ICE 454 - Antenna Engineering	4
ICE 456 - Wireless Networks	4
ICE 457 - Telecommunication Network Planning & Optimization	3
ICE 458 - Intelligent Networks	4
ICE 459 - Teletraffic Theory	3
ICE 460 - Foundations of TCP/IP	4
ICE 469 - Computer Architecture	4
ICE 470 - Applied Numerical Methods	4
ICE 471 - Network Programming	4
ICE 472 - Speech & Image Processing	4
ICE 473 - Introduction to Control Systems	4
ICE 474 - Computer Graphics & Visualizations	4
ICE 475 - Artificial Intelligence & Expert Systems	3
ICE 477 - Neural Networks & Applications	3
ICE 479 - Robotic Engineering	3
ICE 481 - Telecommunications Systems Design	4
ICE 482 - Design of Real Time Systems	4
Total	**14**

In the above Elective Modules, a student can choose any 3rd/ 4th year course/courses from CSE/ETE/EEE undergraduate programs not included/equivalent in the above Core or Elective Modules of the ICE program.

E. Flowchart for Undergraduate ICE Courses

Flow-Chart for Courses to be followed during the FOUR YEARS of the Undergraduate Program of ICE (Numbers in parentheses indicate Credit Hours)

	Year I		Year II		Year III		Year IV	
	Course	Prereq	Course	Prereq	Course	Prereq	Course	Prereq
SEM 1	ENG 101 (3) ICE 101 (3) MAT 101(3)	None None None	ICE 107 (4) ICE 209 (3) MAT205(3) OPT001(3)	ICE 105 ICE 109 MAT 104 ENG 102	ICE 275 (3) ICE 310 (3) ICE 311 (4) OPT 004 (3)	ICE 245 PHY209 ICE 251 ENG 102	ICE 322 (4) ICE 441 (4) ICE 497 (3) ECT 001 (3/4)	ICE 312 ICE 314 None
SEM 2	ENG 102 (3) ICE 105 (4) MAT 102 (3) PHY 101 (4)	ENG 101 ICE 101 MAT 101 MAT 101	ICE 207 (4) OPT 002 (3) PHY 102 (4)	ICE 107 ENG 102 MAT205	ICE 301 (4) ICE 302 (4) ICE 312 (3)	ICE 275 ICE 209 ICE 209	ICE 444 (3) ECT 002 (3/4) ICE 498 (3)	ICE 314
SEM 3	GEN 201(3) ICE 109 (4) MAT104(3) STA 102 (3)	ENG102 MAT102 MAT101 MAT101	ICE 245 (4) ICE 251 (4) OPT 003(3)	ICE 207 ICE 109 ENG 102	ICE 314 (4) ICE 316 (4) ICE 350 (3)	ICE 312 ICE 311 ICE 312	ECT 003 (3/4) ECT 004 (3/4) ICE 498 (3)	
Total Cr.	36 Credits		35 Credits		35 Credits		34 - 36 Credits	

Legends: OPT 001 & OPT 002 : Any two optional General Education Courses approved by the University.
OPT 003 & OPT 004 : Any two optional Courses from Non-Engineering Departments.
ECT 001 - ECT 004 : Any four Elective Courses prescribed in the Curriculum.

N.B. The course ICE 498 (Research Project/Industrial Training) is spread over two semesters. Although the registration for this course will be done in SEM 2 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 SEM 2 of 4th year.

Faculty Members of the Department of Electronics and Communications Engineering

We have a very good and experienced faculty team and we are very proud of it. The quality of teaching and research by the faculty members of ECE Department is very high. The list of the faculty members is given below:

Professor

Mohammad Ali Asgar
M.Sc., University of Dhaka, 1962, Physics; Ph.D., University of Southampton, U.K., 1970, Solid State Physics. Research Area: Condensed Matter Physics.

A. S. A. Noor
M.Sc., University of Rajshahi, 1970, Mathematics; Ph.D., Flinders University of S. A., Australia, 1980, Lattice Theory. Research Area: Lattice Theory.

M. Ruhul Amin
M.Sc., Jahangirnagar University, 1986, Physics; PhD, University of St Andrews, U.K., 1990, Theoretical Plasma Physics. Research Areas: Communications Engineering; Plasma Physics.

Associate Professor

M. Mofazzal Hossain
M. Sc., Kanazawa University, Japan, 2000, EEE; Ph.D., Kanazawa University, Japan, 2003, EEE; Research Area: Plasma Technology

Assistant Professor

G. Mandal
M.Sc. Jahangirnagar University, 1990, Physics; Ph.D. University of Pune, India, 2003, Atmospheric Physics. Research Area: Plasma Physics.

Ramit Azad
M.Sc., Kharkov State University, 1996, Physics; Ph.D., Peoples Friendship University of Russia, Moscow, Russia, 2001, Theoretical Physics. Research Area: Theoretical Physics.

Mohammed Ameer Ali
B.Sc., Bangladesh University of Engineering & Technology, 2001, Computer Science & Engineering; Ph.D., Monash University, Australia, 2006, Information Engineering. Research Area: Image Processing, Telemedicine.

Anindita Paul
M.Sc, Jahangirnagar University, 1998, Mathematics; M.Phil, BUET, 2005, Mathematics; Game Theory. Research Area: Applied Mathematics.

Mustafa Mahmud Hussain
M.Sc., King's College, University of London, U.K., 2003, Telecommunications Engineering. Research Area: Wireless Communications.

KC Amanul Alam
M. Sc. University of Dhaka, 1991, Applied Mathematics M.Phil. University of Dhaka, 1996, Applied Mathematics Ph.D., Tokeyo University of Agriculture and Techcnology, 2004, Mechanical Engineer

Senior Lecturer

Kazi Khaled Al-Zahid
M.Sc., Waseda University, Tokyo, Japan, 2005, Telecommunications Engineering. Research Area: Information Technology. (On Study Leave)

M. Rakibul Hasan
M.Sc., London Metropolitan University, U.K., 2003, Software Engineering. Research Area: Electronics. (On Study Leave)

Lecturer

Sarwar Jahan
M.E., University of Technology Sydney, 2005, Telecommunications Engineering. Research Area: Wireless Communications.

Mahmud Hasan
M.Sc., Jahangirnagar University, Bangladesh, 1997, Physics. Research Area: Theoretical Physics.
(On Study Leave)

Imtiaz Khan
M.Sc., East West University, 2006, Telecommunication Engineering. Research Area: Information Technology.

Sabiha Rahman Juthy
M.Sc. Royal Institute of Technology, Stockholm, Sweden, 2007, Information Technology. Research Area: Information Technology.

Md. Asif Hossain
M.Sc., East West University, 2007, Telecommunications Engineering
Research Area: Wireless Communications and Networks

Research Lecturer

Md. Maksud Alam
B.Sc. Engineering, Chittagong University of Engineering and Technology, 2006, EEE
Research Area: Electrical Engineering

Adjunct Faculty

Ajit Kumar Majumder
M.Sc, Jahangirnagar University, 1982, Statistics; M.S., Victoria University, Canada, 1988, Statistics; Ph.D., Monash University, Australia, 1999, Econometrics; Professor. Research Area: Econometrics.

M. Rafiqul Matin
M.Sc., Bangladesh University of Engineering & Technology, 1991, Electrical & Electronic Engineering; MBA, North South University, Bangladesh, 2003; Associate Professor. Research Area: Telecommunication Switching & Networks.

Imdadul Islam
M.Sc., Bangladesh University of Engineering & Technology, 1998, Electrical & Electronic Engineering; Associate Professor. Research Area: Communications Engineering.

Md. Habibur Rahman
M.Sc., University of Dhaka, 1996, Applied Physics & Electronics; Ph.D., Kitami Institute of Technology, Japan, 2006, Power Systems Engineering; Associate Professor. Research Area: Power Systems Engineering.

Department of Computer Science and Engineering

Introduction

Department of Computer Science and Engineering at EWU, since its inception, has been offering undergraduate program in Computer Science. The Department later introduced Computer Science and Engineering with more focus on ICT industry. Computer Science and Engineering (CSE) program delivers the fundamental skills needed to become a Computer Engineer. The degree is designed for a wide range of students, including those who wish to pursue a career in software engineering or computer programming based on strong technical competence in software system design and interfacing, and also those who wish to move on to pursue higher degrees in the computing and information technology area. The CSE department has strong inclination towards research and development; students always participate as co-authors with faculty members in publication of journal papers of international standard. Besides, the CSE department hosts seminars and talks on research areas in order to create interest among students and to prepare them for joint research initiatives in the future on regular basis.

Goal

The goal of the B.Sc. in Computer Science and Engineering is to give the students a wide and in depth knowledge of the subject domain, so that they can adapt and evolve to match the skills required in modern ICT industries.

Objectives

The principal objectives of the program are:

- to ensure that every graduate is thoroughly familiar with the fundamental principles of modern computer science and computing systems in general
- to show how these principles relate to software, hardware and system design
- to make students familiar with at least one significant area of applications of computers.
- to familiarize graduates with the ability to comprehend a variety of problem solving algorithms and master in several programming languages for implementing these algorithms
- to promote understanding of hardware and/or software systems and to skill the students to make informed choices of software and hardware for a variety of problems; and
- to provide an understanding of the role that human factors play in implementing computer-based systems.

Vision and Prospect

- Research and developments for the nation building (in-house & joint)
- Quality teaching and learning environment
- Industry academia collaborations
- Incubation of real-life developments
- Partnership with ICT leaders around the globe
- Deliver course lessons with industry focus
- Nurture creativity and innovations

Strengths of the Department

- Quality teaching
- State of the art laboratories
- Industry focused curricula
- Industry academia collaboration initiatives
- Online journals and reading materials
- High speed internet connectivity
- Project lab

Major Developments and Progresses

- Development of East West University Management Information System (MIS) to create autonomy of the registration process to broad range of service operations to support Enterprise Resource Planning (ERP)
- Development of Virtual Class Room facility for online knowledge dissemination
- Campus wide fiber optic backbone infrastructure with VSAT
- Computer Lab, Digital Lab, Electronics Lab, Physics Lab, Optics Lab, Telecommunication Lab, Interfacing Lab, and VLSI Lab
- Incubation of Software Development Center (SDC), the only member of BASIS from academic community in Bangladesh
- Partnership with Microsoft Bangladesh Ltd in MSDNAA Networks

- Partnership with BASIS in SoftExpo2004, SoftExpo2005
- Hosted 4th International Conference on Computer and Information Technology (ICCIT) 2002
- Hosted 1st National Competition in Informatics Olympiad 2004
- Hosted 1st Microsoft .Net Curriculum 2005 workshop with Microsoft Bangladesh Limited
- Hosted important seminars, tech-talks, workshops on ITES, CMM, SQA, SDLC and other important IT areas
- Ranked within top 10 in Regional ACM ICPC held in BUET and Bombay IIT
- Ranked within top 10 in National Computer Programming Contest
- Ranked within top 10 in AIUB Programming Contest
- Hosted East West University Inter-University Programming Contest 2006
- Hosted ACM ICPC Dhaka Regional Contest 2007
- Ranked 2nd runner up in ACM ICPC Dhaka Regional Contest 2007
- A team from the department is selected for ACM ICPC 2008 world final in Canada

Program Structure

Bachelor of Science (B.Sc.) in Computer Science

Minimum Requirement 130 Credits

1. General Education Requirements **21 Credits**

a. Compulsory GEN (3 courses) (ENG101, ENG102, GEN201) **9 credits**

b. Optional GEN (2 courses) (GEN 2XX) **6 credits**

c. Optional Non-Computer Science from other dept. **6 credits**

2. Core Requirements **97 credits**
3. Elective Requirements **9 credits**
4. Project/Internship **3 credits**

Bachelor of Science (B.Sc.) in Computer Science and Engineering

Minimum Requirement 143 Credits

1. General Education Requirements **21 Credits**

a. Compulsory GEN (3 courses) (ENG101, ENG102, GEN201) **9 credits**

b. Optional GEN (2 courses) (GEN 2XX) **6 credits**

c. Optional Non-Computer Science from other dept. **6 credits**

2. Core Requirements **110 credits**
3. Elective Requirements **9 credits**
4. Project/Internship **3 credits**

Faculty Members and Students in a Seminar at EWU Auditorium

Bachelor of Science (B.Sc.) in Computer Science

Minimum Requirement 130 Credits

Course	Title	Credit
General Requirements		**15**
Compulsory General Education Courses		**9**
ENG 101	Basic English	3
ENG 102	Composition and Communication skills	3
GEN 201	Bangladesh Studies	3
Optional	**General Education Courses** (choose any two)	**6**
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 206	Introduction to Sociology	3
GEN 207	Industrial Psychology	3
GEN 208	Introduction to Philosophy	3
GEN 209	Social Psychology	3
GEN 210	International Relation	3
GEN 211	Concept of Journalism & Media Study	3
GEN 212	Women in Development	3
GEN 213	Introduction to German Language	3
GEN 214	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 219	Introduction to Social Anthropology & Ethnology	3
GEN 220	Principles of Public Relations	3
GEN 221	Globalization and Social Identity	3
Core Requirements		**97**
CSE 105	Structured Programming	4
CSE 107	Object Oriented Programming	4
CSE 205	Discrete Mathematics	3
CSE 207	Data Structure	4
CSE 225	Numerical Methods	4
CSE 245	Algorithms	4
CSE 252	Basic Electronics	4
CSE 255	Digital Logic Design	4
CSE 275	Operating Systems	3
CSE 301	Database Systems	4
CSE 350	Data Communications	3
CSE 360	Computer Architecture	4
CSE 405	Computer Networks	4
CSE 409	Systems Programming	3
CSE 410	Artificial Intelligence	3
CSE 411	Software Engineering	3
CSE 412	Programming with JAVA	4
CSE 420	Computer Graphics	3
CSE 430	Compiler Design	3
CSE 435	Software Quality Assurance	3
CSE 498	Social and Professional Issues in Computing	3
MAT 101	Calculus I	3
MAT 102	Calculus II	3
MAT 104	Co-ordinate Geometry and Vector Analysis	3
MAT 201	Linear Algebra	3
STA 102	Statistics and Probability	3
PHY 101	Physics I	4
PHY 102	Physics II	4
Elective Courses		**15**
From Computer Science/Engineering Courses	(choose any three)	**9**
CSE 401	Information System Analysis and Design	3
CSE 413	Automata Theory and Theory of Computations	3
CSE 415	Software Development Project	3
CSE 422	Simulation and Modeling	3
CSE 433	Wireless Programming	3
CSE 434	Advanced Enterprise Application Design & Development	3
CSE 436	Multimedia Design and Development	3
CSE 444	Fault Tolerant Computing	3
CSE 452	Distributed Systems and Algorithms	3
CSE 460	Programming Language Principles	3
CSE 464	Advanced Database System	3
CSE 470	Expert System	3
CSE 474	Pattern Recognition	3
CSE 476	Neural Networks	3
CSE 478	Stochastic Processes	3
CSE 480	Web Database Programming	3
CSE 482	Parallel Computation	3

From Non Computer Science/Engineering		
	Courses (choose any two)	**6**
ACT 101	Financial Accounting	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
MGT 337	Production Operations Management	3
MIS 101	Introduction to Management Information System	3
MKT 101	Principles of Marketing	3
MKT 201	Marketing Management	3
BUS 321	Business for Engineering and Technology	3
Project/Internship		**3**
CSC 499	Project / Internship	3

Flow Chart

Flowchart for courses to be followed during the four years of the undergraduate program of CSC (Numbers in parentheses indicate credit hours)

	Year I		Year II		Year III		Year IV	
	Course	Prereq	Course	Prereq	Course	Prereq	Course	Prereq
Sem 1	ENG101(3)		GEN201(3)	ENG102	CSE255(3+1)		CSE411(3)	CSE245, CSE301
	PHY101(3+1)		CSE205(3)	MAT101	CSE275(3)	CSE207	CSE412(3+1)	CSE301
	MAT101(3)		STA102(3)		OCOD1(3)		CSE410(3)	CSE207
Sem 2	CSE105(3+1)		CSE207(3+1)	CSE107	CSE301(3+1)	CSE107	OCSE-2(3)	
	MAT102(3)	MAT101	MAT201(3)	MAT102	CSE350(3)	MAT102, CSE251	CSE420(3)	CSE245
	ENG102(3)	ENG101	OGEN-1(3)		CSE360(3+1)	CSE255	CSE499(3)*	
			CSE225(3+1)	CSE107	OCOD2(3)		CSE498(3)	
Sem 3	CSE107(3+1)	CSE105	CSE245(3+1)	CSE207	CSE405(3+1)	CSE245, CSE350	OCSE-3(3)	
	MAT104(3)	MAT101	OGEN-2(3)		CSE409(3)	CSE107	CSE430(3)	CSE245
	PHY102(3+1)	PHY101	CSE252(3+1)	CSE109	OCSE-1(3)		CSE435(3)	CSE412
Total Credits	31 Credits		34 Credits		34 Credits		31 Credits	

Legends:

OGEN: Optional General courses approved by EWU

OCOD: Optional Non Computer Science/Engineering courses approved by EWU

OCSE: Optional Computer Science/Engineering courses approved by EWU

* CSE499 (project/internship) is spread over two semesters. Although regular students' registration for CSE499 will be done in Year IV Sem 2, the grades for this course will be assigned at/after the end of Year IV Sem 3 based on the satisfactory completion of the project. Grade X (continuation) will be assigned at the end of Year IV Sem 2.

Bachelor of Science (B.Sc.) in Computer Science and Engineering

Minimum Requirement 143 Credits

Course	Title	Credit
General Requirements		15
Compulsory General Education Courses		9
ENG 101	Basic English	3
ENG 102	Composition and Communication skills	3
GEN 201	Bangladesh Studies	3
Optional General Education Courses		
	(choose any two)	6
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 206	Introduction to Sociology	3
GEN 207	Industrial Psychology	3
GEN 208	Introduction to Philosophy	3
GEN 209	Social Psychology	3
GEN 210	International Relation	3
GEN 211	Concept of Journalism & Media Study	3
GEN 212	Women in Development	3
GEN 213	Introduction to German Language	3
GEN 214	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 219	Introduction to Social Anthropology & Ethnology	3
GEN 220	Principles of Public Relations	3
GEN 221	Globalization and Social Identity	3
Core Requirements		110
CSE 105	Structured Programming	4
CSE 107	Object Oriented Programming	4
CSE109	Electrical Circuits	4
CSE 205	Discrete Mathematics	3
CSE 207	Data Structure	4
CSE 225	Numerical Methods	4
CSE 245	Algorithms	4
CSE 251	Electronic Devices and Circuits	4
CSE 255	Digital Logic Design	4
CSE 275	Operating Systems	3
CSE 301	Database Systems	4
CSE 350	Data Communications	3
CSE 352	Introduction to Wireless System	3
CSE 360	Computer Architecture	4
CSE 380	Digital Electronics	4
CSE 405	Computer Networks	4
CSE 410	Artificial Intelligence	3
CSE 411	Software Engineering	3
CSE 412	Programming with JAVA	4
CSE 430	Compiler Design	3
CSE 432	Digital Signal Processing	4
CSE 442	Microprocessors and Microcomputers	4
CSE 498	Social and Professional Issues in Computing	3
MAT 101	Calculus I	3
MAT 102	Calculus II	3
MAT 104	Co-ordinate Geometry and Vector Analysis	3
MAT 201	Linear Algebra	3
MAT 301	Mathematics for Engineers	3
STA 102	Statistics and Probability	3
PHY 101	Physics I	4
PHY 102	Physics II	4
Elective Courses		15
From Computer Science/Engineering Courses		
	(choose any three)	9
CSE 401	Information System Analysis and Design	3
CSE 409	System Programming	3
CSE 413	Automata Theory and Theory of Computations	3
CSE 415	Software Development Project	3
CSE 420	Computer Graphics	3
CSE 422	Simulation and Modeling	3
CSE 433	Wireless Programming	3
CSE 434	Advanced Enterprise Application Design & Development	3
CSE 435	Software Quality Assurance	3
CSE 436	Multimedia Design and Development	3
CSE 437	Advanced Computer Architecture	3
CSE 438	Digital Image Processing	3
CSE 439	Digital Computer Design	3

CSE 444	Fault Tolerant Computing	3
CSE 452	Distributed Systems and Algorithms	3
CSE 460	Programming Language Principles	3
CSE 464	Advanced Database System	3
CSE 470	Expert System	3
CSE 474	Pattern Recognition	3
CSE 476	Neural Networks	3
CSE 478	Stochastic Processes	3
CSE 480	Web Database Programming	3
CSE 482	Parallel Computation	3
CSE 484	Computational Geometry	3
CSE 490	VLSI Design	3
CSE 492	Robotics	3

From Non Computer Science/Engineering Courses

	(choose any two)	6
ACT 101	Financial Accounting	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
MGT 337	Production Operations Management	3
MIS 101	Introduction to Management Information System	3
MKT 101	Principles of Marketing	3
MKT 201	Marketing Management	3
BUS 321	Business for Engineering and Technology	3

Flow Chart

Flowchart for courses to be followed during the four years of the undergraduate program of CSE (Numbers in parentheses indicate credit hours)

	Year I		Year II		Year III		Year IV	
	Course	Prereq	Course	Prereq	Course	Prereq	Course	Prereq
Sem 1	ENG101(3)		GEN201 (3)	ENG102	CSE255(3+1)		CSE405(3+1)	CSE245, CSE350
	PHY101(3+1)		CSE205(3)	MAT101	CSE275(3)	CSE207	CSE410(3)	CSE207
	MAT101(3)		STA102(3)		OCOD-1(3)		CSE411(3)	CSE245, CSE301
							CSE412(3+1)	CSE301
Sem 2	CSE105(3+1)		CSE207 (3+1)	CSE107	CSE301(3+1)	CSE107	OCSE-2(3)	
	PHY102(3+1)	PHY101	MAT201(3)	MAT102	CSE350(3)	MAT102 CSE251	OCSE-3(3)	
	MAT102(3)	MAT101	OGEN-1(3)		CSE360(3+1)	CSE255	CSE499(3)*	
	ENG102(3)	ENG101	CSE225(3+1)	CSE107	MAT301(3)	MAT102	CSE498(3)	
Sem 3	CSE107(3+1)	CSE105	CSE245(3+1)	CSE207	CSE352(3)	MAT102, CSE350	CSE430(3)	CSE245
	MAT104(3)	MAT101	OGEN-2(3)		CSE380(3+1)	CSE251, CSE255	CSE432(3+1)	MAT301, CSE205, CSE251
	CSE109(3+1)		CSE251(3+1)	CSE109	OCOD-2(3)		CSE442(3+1)	CSE255, CSE380
					OCSE-1(3)			
Total Credits	35 Credits		34 Credits		37 Credits		37 Credits	

Legends:

OGEN: Optional General courses approved by EWU

OCOD: Optional Non Computer Science/Engineering courses approved by EWU

OCSE: Optional Computer Science/Engineering courses approved by EWU

* CSE499 (project/internship) is spread over two semesters. Although regular students' registration for CSE499 will be done in Year IV Sem 2, the grades for this course will be assigned at/after the end of Year IV Sem 3 based on the satisfactory completion of the project. Grade X (continuation) will be assigned at the end of Year IV Sem 2.

Faculty Members of the Department of Computer Science and Engineering

Professor

Md. Mozammel Huq Azad Khan
Ph.D. in Computer Science & Engineering
(Bangladesh University of Engineering & Technology)

Assistant Professor

Mohammad Ghulam Rahman
Ph.D. in Information and Communication Engineering
(University of Tokyo, Japan)

Senior Lecturer

Nawab Yousuf Ali
M.Sc. in Computer Engineering
(Lvov Polytechnic Institute, Lvov Ukraine, USSR)

Ahsanullah M Dewan
M.Sc. in Information Technology
(University of New South Wales, Australia)

Waheem Islam
M.Sc. in Computer Science
(University of Dhaka)

Firoz Anwar
M.Engg. in Computer Science
(University of New South Wales, Australia)

Syed Murtuza Baker
MS in Information Technology
(Institute of Information Technology, IIT)
(University of Dhaka)

Lecturer

Taskeed Jabid
B.Sc. in Computer Science
(East West University, Dhaka)

Anisur Rahman
M.Sc. in Computer Information System
(University of Phoenix, USA)

Sazia Mahfuz
M.Sc. in Computer Science
(University of Dhaka)

Shaila Sharmeen
M.S. in Telecommunication
(University of New South Wales, Australia)

Adjunct Faculty

Quazi Deen Mohd. Khosru
Ph.D. in Electronic Engineering
(Osaka University, Osaka, Japan)

Md. Saidur Rahman
Ph.D. in System Information Science
(Tohoku University, Sendai, Japan)

Mohammad Zahidur Rahman
Ph.D. in E-Commerce & E-Auction
(University of Malaya, Malaysia)

Mohammad Shorif Uddin
D.Engg. in Information Engineering
(Kyoto Institute of Technology, Japan)

Fakhruz Zaman
MBA in Financial Management
(University of Dhaka)

Department of Electrical and Electronic Engineering (EEE)

The involvement of electrical and electronic technologies in modern mundane civilization is inextricable. All aspects of this engineering branch play vital roles in ameliorating the quality of living. The electrical and electronic engineering is therefore recognized as one of the most important disciplines of engineering. This is actually an applied science that combines the applications of physics, chemistry and mathematics. Due to the dependency of other fields of science and technology on it, the Electrical and Electronic Engineering education is directed towards the development of solid foundations of the students that will enable them to endeavor almost all the important branches of modern science. Hence the opportunity and aspiration of electrical and electronic engineering is virtually unlimited.

The Department of Electrical and Electronic Engineering (EEE) at East West University is offering B. Sc. in Electrical and Electronic Engineering with an ambition to develop competent personnel in this field. The degree is designed to prepare its graduates to contribute in all important fields of electrical and electronic engineering, namely solid state electronics, telecommunications, computer engineering, control and drives, power system etc. The curriculum involves primarily the study of a number of core courses of electrical and electronic engineering, along with some courses from specialized areas. To ensure a comprehensive grasp on the theories of electrical and electronic engineering, a number of courses on mathematics, physics and chemistry have been included in the curriculum. Today's employers require Electrical and Electronic engineers to be good team players with excellent communication skills. Increasing the ethical and moral standards of the engineers is also getting higher priority in the industry.

Therefore, the curriculum also emphasizes communication skills and social and ethical awareness through English and Humanities courses.

Program Objectives/Highlights of the Program

The principal objectives/highlights of the program are as follows:

- To provide students with solid foundation of mathematics and physics.
- To provide understanding of electrical and electronic circuits and system.
- To provide understanding of electromagnetic theory and electronic properties of materials.
- To provide understanding of analog and digital signal processing.
- To provide understanding of modern communication engineering.
- To provide understanding of electrical machines, drives, power system and control.
- To provide understanding of digital electronics and microprocessor based systems.
- To provide fundamentals of programming and numerical techniques.
- To provide improved communication skill and a better understanding of social and ethical issues.

B.Sc. in Electrical & Electronic Engineering

Minimum Requirement 146 Credits

The credit distribution is given below:

A.	General Education Requirement	21 credits
B.	Core Requirement	104 credits
C.	Elective Requirement	18-24 credits
D.	Project/Industrial Training	3 credits
	Total	**146-152 credits**

A. General Education Requirement		**21 credits**
(i)	Compulsory General Education Courses	12 credits
ENG 101	Basic English	3+0 = 3
ENG 102	Composition and Communication Skills	3+0 = 3
GEN 201	Bangladesh Studies	3+0 = 3
BUS 321	Business for Engineering and Technology	3+0 = 3

(ii) Optional General Education Courses (any two courses from the following)		**6 credits**
GEN 202	Eastern Culture and Heritage	3+0 = 3
GEN 203	Ecological System and Environment	3+0 = 3
GEN 204	Western Thought	3+0 = 3
GEN 205	Introduction to Psychology	3+0 = 3
GEN 206	Introduction to Sociology	3+0 = 3
GEN 207	Industrial Psychology	3+0 = 3
GEN 208	Introduction to Philosophy	3+0 = 3
GEN 209	Social Psychology	3+0 = 3
GEN 210	International Relations	3+0 = 3
GEN 211	Concepts of Journalism and Media Studies	3+0 = 3
GEN 212	Women in Development	3+0 = 3
GEN 2XX	Any Other General Courses	3+0 = 3

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

B. Core Courses		**104 credits**
EEE 101	Electrical Circuits I	3+1 = 4
EEE 102	Electronic Circuits I	3+1 = 4
CSE 105	Structured Programming	3+1 = 4
EEE 200	Electrical Services Design	0+1 = 1
EEE 201	Electrical Circuits II	3+1 = 4
EEE 202	Electronic Circuits II	3+1 = 4
EEE 203	Numerical Analysis for Electrical Engineering	3+1 = 4
EEE 204	Electrical Measurement and Instrumentation	3+1 = 4
EEE 301	Electrical Machines I	3+0 = 3
EEE 302	Digital Logic Design	3+1 = 4
EEE 303	Signals and Systems	3+0 = 3
EEE 304	Electrical Machines II	3+1 = 4
EEE 305	Electromagnetic Fields and Waves	3+0 = 3
EEE 306	Power System Engineering	3+0 = 3
EEE 307	Telecommunication Engineering I	3+1 = 4
EEE 308	Electronic Properties of Materials	3+0 = 3
EEE 309	Digital Signal Processing	3+1 = 4
EEE 310	Electronic Circuits III	3+0 = 3
EEE 401	Microprocessors and Interfacing	3+1 = 4
EEE 402	Control Systems	3+1 = 4
EEE 404	Engineering and Professional Ethics	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 201	Linear Algebra	3+0 = 3
MAT 301	Complex Variables and Mathematical Transforms	3+0 = 3
PHY 101	Physics I (Mechanics, Waves and Thermodynamics)	3+1 = 4
PHY 102	Physics II (Electricity, Magnetism and Physical Optics)	3+1 = 4
STA 102	Statistics and Probability	3+0 = 3

C. Elective Courses **18-24 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.

GROUP A (Electronics)		
EEE 403	Semiconductor Devices	3+0 = 3
EEE 411	Quantum Phenomena in Nanostructures	3+0 = 3
EEE 412	Theory of Semiconductor Devices	3+0 = 3
EEE 413	Fundamentals of Nanotechnology	3+0 = 3
EEE 414	Optoelectronics	3+0 = 3
EEE 415	Semiconductor Processing and Fabrication	3+0 = 3
EEE 416	VLSI Circuits and Systems	3+1 = 4

EEE 418	Analog Integrated Circuits	3+0 = 3
EEE 419	Biomedical Electronics	3+0 = 3

GROUP B (Communication Engineering)		
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 424	Fiber Optics	3+1 = 4
EEE 425	Digital Image Processing	3+0 = 3
EEE 426	Telecommunication Engineering II	3+0 = 3

GROUP C (Computer Engineering)		
EEE 431	Advanced Logic Design	3+0 = 3
EEE 432	Microprocessor Based System Design	3+1 = 4
EEE 433	Computer Networks	3+1 = 4
EEE 434	Computer Architecture	3+1 = 4
CSE 435	Multimedia System Design	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 443	Special Machines	3+0 = 3
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

D. Project Work/Industrial Training		3 credits
Choose any ONE course from		
EEE 498[1]	Project Work	3+0 = 3
EEE 499	Industrial Training	3+0 = 3

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	
SEM I	PHY 101 MAT 101 EEE 101	(4) (3) (4)	GEN 201 OGEC-I MAT 102 EEE 102	(3) (3) (3) (4)	ONEC -I EEE 200 EEE 302 EEE 303	(3) (1) (4) (3)	EEE 401 EEE 402 ELTV I	(4) (4) (3/4)
(Total)		(11)		(13)		(11)		(11/12)
SEM II	ENG 101 MAT 104 CHE 101 EEE 201	(3) (3) (4) (4)	MAT 201 EEE 202 EEE 203	(3) (4) (4)	BUS 321 EEE 304 EEE 305 EEE 306	(3) (4) (3) (3)	ELTV II ELTV III ELTV IV EEE 498[1]/ EEE 499	(3/4) (3/4) (3/4) (3)
(Total)		(14)		(11)		(13)		(12-15)
SEM III	ENG 102 PHY 102 STA 102 CSE 105	(3) (4) (3) (4)	OGEC-II MAT 301 EEE 204 EEE 301	(3) (3) (4) (3)	EEE 307 EEE 308 EEE309 EEE 301	(4) (3) (4) (3)	EEE 404 ELTV V ELTV VI	(3) (3/4) (3/4)
(Total)		(14)		(13)		(14)		(9-12)

Legends

OGEC : Optional General Education Courses (any two from GEN 202 to GEN 212)

ONEC : Optional Courses from non-Engineering courses

ELTV : Elective Courses

[1]EEE 498 (Project Work) is spread over two semesters. Although the registration for EEE 498 will be done in SEM II, the grades for this course will be assigned at the end of SEM III. Grade X (Continuation) will be assigned at the end of SEM II.

Faculty Members of the Department of Electrical and Electronic Engineering (EEE)

Professor

Anisul Haque
Ph.D., Electrical and Computer Engineering, Clarkson University, USA,
M.S., Electrical Engineering, Texas A & M University, USA,
M.Sc.(Engg.), Electrical and Electronic Engineering, Bangladesh University of Engineering and Technology,
B.Sc.(Engg.), Electrical and Electronic Engineering, Bangladesh University of Engineering and Technology.

Associate professor

Md Ishfaqur Raza
Ph.D., Electrical Engineering, University of Missouri-Rolla, USA,
M.S., Electrical Engineering, University of Missouri-Rolla, USA,
B.Sc.(Engg.), Electrical and Electronic Engineering, Bangladesh University of Engineering and Technology.

Assistant professor

Mohammad Ghulam Rahman
Ph.D., Informataion and Communication Engineering, University of Tokyo, Japan,
M.E., Telecommunications, Asian Institute of Technology, Thailand,
B.Sc.(Engg.), Electrical and Electronic Engineering, Bangladesh University of Engineering and Technology.

Khairul Alam
Ph.D., Electrical Engineering, University of California, Riverside, USA,
M.Sc.(Engg.), Electrical and Electronic Engineering, Bangladesh University of Engineering and Technology,
B.Sc.(Engg.), Electrical and Electronic Engineering, Bangladesh University of Engineering and Technology.

Senior Lecturer

Sharmin Rowshan Ara
M.Sc., Electrical and Computer Engineering, Southern Illinois University, USA,
B.Sc.(Engg.), Electrical and Electronic Engineering, Bangladesh University of Engineering and Technology.

Lecturer

Tahseen Kamal
M.Sc., Computer Science and Engineering, East West University,
B.Sc., Computer Science and ngineering, East West University.

Research Lecturer

Muhammad Ahosan-Ul-Karim
B.Sc.(Engg.), Electrical and Electronic Engineering, Bangladesh University of Engineering and Techonology, Dhaka.

S. M. Salauddin
B.Sc. (Engg.), Electrical and Electronic Engineering, Bangladesh University of Engineering and Techonology, Dhaka.

Md. Abu Abdullah
B.Sc. (Engg.), Electrical and Electronic Engineering, Bangladesh University of Engineering and Techonology, Dhaka.

Department of Pharmacy

Introduction:

The global demand of Pharmacy graduates in the academic and research institutions, pharmaceutical industries, hospitals and other health related fields is increasing in 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 on 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 with 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.

Status

Pharmacy department, with its accreditation from Bangladesh Pharmacy Council is now in full operation with Bachelor of Pharmacy (B. Pharm.) course. The University is now about to introduce the evening course in Master of Pharmacy (M. Pharm.) in Pharmaceutical Technology.

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 of 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
- BIRDEM: Bangladesh Institute of Research and Rehabilitation in Diabetes, Endocrine and Metabolic Disorders
- ICDDR, B (International Centre for Diarrhoeal Disease Research, Bangladesh), Mohakhali, Dhaka, Bangladesh
- NICVD: National Institute of Cardiovascular diseases, Dhaka, Bangladesh
- Life Science Institutes of Jahangirnagar University, Dhaka, Bangladesh
- Institute of Child health, Mirpur, Dhaka, Bangladesh
- Institute of Public Health, Mohakhali, Dhaka, Bangladesh

Program

The Bachelor of Pharmacy of East West University is a four year program divided into 8 semesters (2 semesters per year) requiring completion of 158 credits. The Master of Pharmacy program is going to be offered within short time.

Accreditation by Pharmacy Council

Department of Pharmacy of EWU is accredited by the Pharmacy Council of Bangladesh.

Laboratory

There are 21 laboratory courses and a research project to be carried out by undergraduate students of pharmacy department. Current laboratory facilities of Pharmacy department include advance instruments like UV-visible spectrophotometer, thermocycler for PCR, ELISA, high resolution microscope, fundamental chromatographic instruments, and necessary equipments for microbiological experiments, pharmaceutics and pharmacology. Separate laboratory arrangements are available for both faculty members and students for conducting research.

Admission Requirements

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

The courses offered for the Bachelor of Pharmacy (B. Pharm) degree are listed on the next page.

Faculty Members in a Seminar at EWU Conference Room

Bachelor of Pharmacy
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**

Course	Title	Credit
A. Compulsory General Education Requirement		**18**
PHY 100	Introductory Physics	3
MAT 100	Mathematics	3
ENG 101	Basic English	3
ENG 102	Composition and Communication Skills	3
GEN 201	Bangladesh Studies	3
GEN 207	Industrial Psychology	3
B. Core Requirement		**140**
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

Faculty Members of the Department of Pharmacy

Advisor and Professor

Muniruddin Ahmed
Ph.D. in Pharmacy
(Free University, Berlin, Germany)

Professor

Syed Akhter Hossain
Ph.D. in Applied Bio-Chemistry
(University of Nottingham, UK)

Associate Professor

A. Z. M Ruhul Momen
Ph.D. in Bio-organic and Bio-analytical Chemistry
(Niigata University, Japan)

Sufia Islam
Ph.D. in Pharmacology
(University of Dhaka in collaboration with
CNRS, Paris, France)

Assistant Professor

Biplab Kumar Das
Ph.D. in Synthetic Organic/Bio-organic Chemistry
(Toyama Medical and Pharmaceutical
University, Japan)

Shamsun Nahar Khan
Ph.D. in Chemistry and Biochemistry
International Center for Chemical and Biological
Sciences, H.E.J. Research Institute of Chemistry
(University of Karachi, Pakistan)

Senior Lecturer

Sukumar Bepary
Master of Pharmacy
(University of Dhaka)
(On Study Leave)

Lecturer

Farhana Rizwan
Master of Pharmacy
(University of Science and Technology, Chittagong)

Atiqul Haque Pathan
Master of Pharmacy
(University of Dhaka)

Abu Taiab Md. Jamaluddin
Master of Pharmacy
(University of Dhaka)

Muhammad Asaduzzaman
Master of Pharmacy
(University of Dhaka)

Chandra Shekhar Biswas
Master of Pharmacy
(University of Dhaka)

Rumana Mowla
Master of Pharmacy
(University of Dhaka)

Apurba Sarker Apu
Master of Pharmacy
(University of Dhaka)

Md. Zakiur Rahman
Master of Pharmacy
(University of Dhaka)

Md. Abdul Muhit
Master of Pharmacy
(University of Dhaka)

Adjunct Faculty

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Tofail Ahmed Chowdhury
Professor
Ph.D.
(University of Dhaka)

A B M Faroque
Professor
Master of Pharmacy
(University of Dhaka)

Abu Shara Shamsur Rouf
Professor
D. Pharm from Faculty of Pharmaceutical
Sciences (Okayama University, Japan)

M. Aftab Uddin
Professor
Ph.D. in Pharmaceutical Sciences
(University of Tokyo, Japan)

Mohammad Shawkat Ali
Associate Professor
Ph.D. in Natural Product Chemistry
(Toyoyama Pharmaceutical University, Japan)

Md. Rezaul Islam
M. Pharm. in Clinical Pharmacy
(University of Sains, Malaysia)

Kohinoor Biswas
M.Pharm.
(University of Dhaka)
MBA in Marketing
(IBA, University of Dhaka)

Undergraduate Studies

Admission

Prospective students should obtain an EWU Admission Forms by paying in cash or by sending a bank draft of Taka 600 to the Registrar's Office. They should return the completed application form along with the required documents like Certificates, Mark Certificates/transcripts and Testimonials of SSC/'O' Level/equivalent and HSC/'A' Level/equivalent and Testimonials etc. (attested by the 1st Class Gazetted Officer) to the Registrar's Office within the stipulated time. All correspondence and inquiries concerning admission to the university should be addressed to the Registrar's Office.

Students 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 and those intending to study pharmacy are required to have competence in HSC or A level Physics, Chemistry and Mathematics and Biology in SSC and or HSC level, while others are required to have reasonable proficiency in SSC-level Mathematics. Those who seek admission in BA (English) program are exempted from the Math Test.

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 in the university website.

Admission Requirements

Minimum qualifications for admission to undergraduate programs are as follows:

1. Minimum GPA of 3.00 in both SSC and HSC Examinations. Or, At least one first division either in SSC or in HSC. No third division is allowed.

2. University of London & Cambridge GCE "O" level in four subjects with a minimum GPA of 3.00 and "A" Level in two subjects with a minimum GPA of 3.00 (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.

Admission Test is waived for the candidates securing a minimum score of 1100 in the Scholastic Aptitude Test (SAT).

Admission test will also be waived for the students securing GPA of 5.0 (excluding 4th subject marks) in the most recent HSC Examination; or the students securing 6 (six) A's in "O" level and 2 (two) A's in "A" level.

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

Admission Requirements for Foreign Students

Foreign Students particularly who come from other systems like 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:

Must be 12 years of schooling.

SAT score of 1100 or

Upper 50% marks/grade of their own education system.

An equivalence committee will assess and recommend for satisfactory grade for the applicants who seek admission in EWU with US High School Diploma or who come from other systems.

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

Application forms are available in the website, as well as at EWU Admissions Office at 43 Mohakhali, Dhaka 1212 for Tk 600. Students can receive application forms by mail through writing to the office of the Registrar along with a bank draft or money order for Tk 600 in favor of East West University. However, it is preferable that the students/guardians collect application forms personally. The fee of the Admission Form for the Foreign Students is $10.00 payable in International Money Order in favor of EWU.

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 detail 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 on 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 better 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 quiz and assignments. The course information given by the faculty member at 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

To provide an environment of continuous academic advisory support to student who requires it, especially with respect to adapting into the EWU academic programme, selecting a programme of study, and determining the suitability of subject to be registered,

(1) 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.

(2) It is the responsibility of the Advisor to provide advisory support 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 theserequirements.

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. 11,000 is applicable in such cases.

Tuition and Other Fees

The current fee structure is as follows:

1. Admission Fee: (one-time & non refundable) Tk. 11,000.

2. Course Fee: Tk. 2,420 per credit hour for English & Economics courses and Tk. 3,300 for all other courses.

3. Laboratory Fee:Tk. 2,500 per semester for students of Science Faculties. For the students of the department of Pharmacy this fee is Tk. 3,750 and Tk. 1,000 per semester for students of other Faculties. (payable in every semester & is non refundable)

4. Student Activity Fee: Tk. 500 per semester for all undergraduate students. For the students of the department of Pharmacy this fee is Tk. 750 (payable in every semester & is non refundable).

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

Total estimated fees for graduation will be as follows:

	BBA	CSC	CSE	ICE	EEE	ETE	B.Pharm	Economics	English
Charges for General Education Courses	100,980.00	44,220.00	44,220.00	64,020.00	64,020.00	64,020.00	54,120.00	100,980.00	100,980.00
Charges for Core, Concentration, Elective etc. Courses	291,270.00	379,500.00	422,400.00	392,700.00	412,500.00	392,700.00	462,000.00	233,640.00	217,800.00
Admission Fee	11,000.00	11,000.00	11,000.00	11,000.00	11,000.00	11,000.00	11,000.00	11,000.00	11,000.00
Lab & Activities Fee	18,000.00	36,000.00	36,000.00	36,000.00	36,000.00	36,000.00	36,000.00	18,000.00	18,000.00
Total	**421,700.00**	**470,720.00**	**513,620.00**	**503,720.00**	**523,520.00**	**503,720.00**	**563,120.00**	**363,620.00**	**347,780.00**

The university also offers remedial (non-credit) courses in English, for which a fee of Tk 2,750 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.7,260 for this course during subsequent registration.

Students must pay semester fees in full on the day of registration. 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. All dues are expected to be paid within the deadline.

A fee of Tk. 500.00 is charged for the official transcript.

East West University Disciplinary Code For Students, 2008

1. **Short Title:** This code in short will be called 'The East West University Disciplinary Code for Students, 2008'. This will supersede the previous 'Code of Conduct of Students' of East West University and or any other rules/regulations for the time in force in this regard; But all or any action taken thereunder before the commencement of this code, shall remain valid for all purposes.

2. **Extent of Application:** This code will be applicable to all matters of conduct and discipline of the students of East West University within own or rented premises/campus of the university or at any other place/places specified by the university authority through notification as and when necessary or in place or places where any activity/programme sponsored by the university takes place.

3. **Commencement of the Code:** This code shall come into force on and from the date to be notified by the university authority through office order/circular.

4. **Definitions:** Unless otherwise mentioned in the context, the following terms shall have their usual meaning mentioned against each:

a. **University** means East West University;

b. **Vice Chancellor** means the Vice Chancellor of East West University;

c. **Registrar** means the Registrar of East West University;

d. **Proctor** means the Proctor of East West University;

e. **Code** means The East West University Disciplinary Code for Students, 2008;

f. **Premises/campus** means the premises/campus of the university (own or rented) and adjacent areas thereof or as notified by the university authority;

g. **Academic Offence** means any offence committed or attempted to commit or abetting other(s) to commit, in the examination hall(s) or class room(s) or in any other place(s) of academic pursuit relating to examinations/academic classes/assignments etc.

h. **Social Misconduct** means commission of or attempt to commit or abetting/aiding others to commit, the offence(s) pertaining to moral turpitude/nuisance or prejudicial to social or ethical norms/customs or detrimental to safety, security or interest of men and materials.

i. **Disciplinary** Committee means the Disciplinary Committee of East West University.

j. **Board of Directors** means the Board of Directors of East West University.

5. Academic Offences and Punishments Thereof:

Sl. #	Particulars of Offences	Punishments
a.	To communicate or attempt to communicate verbally by a student with any other examinee or examinees in the examination hall.	Forthwith expulsion from the examination of that course/paper/ subject concerned.
b.	Possession of any written unauthorized chit/paper/book(s)/ materials/means etc. related to the subject of examination, at anytime during the examination.	(i) Forthwith expulsion from the examination hall. (ii) Cancellation of the examination of the concerned course/ paper/subject. (iii) Expulsion from the university for one or two years or 3 to 6 semesters (depending on the nature and gravity of the offence).
c.	Copying or attempt to copy from other examinee(s) or resorting to any other unfairmeans.	(i) Forthwith expulsion from the examination hall. (ii) Cancellation of the examination of the concerned course/ paper/subject. (iii) Expulsion from the university for one or two years or 3 to 6 semesters (depending on the nature and gravity of the offence).
d.	Arrogant behaviour or use of insolent or indecent language to any person in the exam hall.	(i) Forthwith expulsion from the examination hall and debarring from sitting in the examinations of the remaining papers/ courses/ subjects. (ii) Expulsion from the university forever.
e.	Unauthorized possession of or attempt to possess examination script or question(s) anytime before the specified time of a particular examination.	(i) Debarring the concerned examinee(s) from siting in any examination of the remaining courses/papers. (ii) Expulsion from the university for one or two years or 3 to 6 semesters (depending on the nature and gravity of the offence).
f.	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).	Cancellation of the examination of that paper/course/subject (as the case may be).
g.	Appearing in the examination through a proxy or becoming a proxy for any examinee.	Cancellation of examination(s) of all papers/courses/subjects and expulsion from the university forever.
h.	Collecting or attempting to collect from outside, any exam related materials.	Cancellation of all examinations and expulsion from the university for one or two years or 3 to 6 semesters (depending on the nature and gravity of the offence).
i.	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.	(i) Seizure of cell-phone or electronic devices concerned or unauthorized material. (ii) Cancellation of examination in that paper/ course/subject. (iii) Expulsion from the university for one or two years or 3 to 6 semesters (depending on the nature and gravity of the offence).
j.	Academic offences in any other cases:	Reprimand/Cancellation of examination in any or all subjects/ papers/courses or expulsion for 2 to 4 semesters (depending on the nature and gravity of the offence).

6. Other Offences

a. Social Misconduct:

(i) Abusive or disorderly conduct.

(ii) Sexual harassment.

(iii) Physical assault or attempt to assault or abatement thereof, in any form.

(iv) Verbal/mental/physical harassment.

(v) Participation in any activity that may harm or disrupt any class or programme or function of the university.

(vi) Indecent exposure, Teasing and all kinds of obscenity.

(vii) Ragging of any kinds.

(viii) Act of harming or attempt to harm anybody or property/image thereof by any means including electronic media.

b. Property Damage

(i) Willful damage or destruction of the university property anywhere or any other property within the university campus.

(ii) Causing or attempt to cause willful loss to anybody within the university campus/premises.

c. Dangers to health and Safety

(i) Smoking anywhere inside university buildings.

(ii) Possession or use of alcoholic drinks, or any form of intoxicants.

(iii) Possession of sharp or lethal weapons, fire arms or explosives or involvement therewith.

d. Offence Related to Drugs:

Possession, use, transfer of or trafficking with all kinds of unauthorized drugs and dealing therewith.

e. Disobedience to lawful authority:

(i) Disobedience to, interference with, resistance to or failure to comply with the direction of an authorized university personnel.

(ii) Unauthorized entry anywhere within the university premises/campus.

f. Forgery: Possession, use, or submission of, and or dealing with, any forged/ false certificate or any other forged/false documents/papers.

g. Theft: Theft of university funds, properties and personal belongings of university students and employees.

h. Offences Not covered above: Commission of or attempt to commit or abetting others to commit any offence mentioned in the Penal Code of Bangladesh other than those mentioned above.

7. Punishments for other offences: Any or combination of two or more of the following punishments, according to nature and gravity of the offences, may be imposed through the procedure mentioned in para-9 of this code:

a. Warning, reprimand or severe reprimand.
b. Expulsion for any number of semesters or forever.
c. Fine
d. Recovery of compensation for property damage or causing willful loss to anybody/institution/organization.
e. Cancellation of Degree(s) awarded by this university (where applicable).

8. Procedure to be Adopted for Imposing Punishment in case of Academic Offences:

a. As soon as any academic offence happens, the Invigilator/Hall Proctor or any other university staff involved with an examination shall immediately submit a written offence report together with the evidence thereof, to the Vice Chancellor through the Registrar.

b. Then the Registrar will issue a `Show Cause Notice' to the individual concerned giving at least 7 days time.

c. After the expiry of the notice period, the Registrar as the Member Secretary of the Disciplinary Committee, will convene a meeting of the Disciplinary Committee in consultation with the President of the Committee.

d. The Registrar will produce before the Disciplinary Committee the aforesaid written offence report along with the evidence thereof and also the written reply of the accused to the Show Cause Notice (if any).

e. If the accused so requests, the Disciplinary Committee meeting will allow him hearing in person. After deliberation on the offence report, evidence, reply to show Cause Notice and personal hearing given to the accused, if the meeting finds the accused guilty, it will award any or combination of punishments mentioned against that offence in para-5 above.

f. The Registrar will then send the Minutes of the Meeting of the Disciplinary Committee to the Academic

Council and or the Board of Directors (as and when applicable) for approval. After approval, the Registrar will communicate the punishment to the accused and his parents/guardian, as soon as possible.

9. Procedure to be followed for Imposing Punishments in case of Offences other than Academic Offences:

a. Any offence mentioned in para-6 above, shall be reported to the Proctor.

b. Proctor after preliminary Investigation (if prima-facie is established) will report the case to the Registrar along with available evidence.

c. The remaining procedure will be same as that mentioned in para-8 (b to f).

10. Punishment for Other Offences will be dealt with as per the procedure mentioned in para-9 above without prejudice to the university's right to initiate further legal proceedings under The Code of Criminal Procedure, 1989' (read with subsequent amendments).

11. The Instructions shown in Annexure `A' to this code shall remain printed on the cover page of the Examination Answer Script. Violation of any instruction will be an offence under this code and shall be dealt with as the Academic Offence under para-8 of this code.

ANNEXURE `A' to the Code

(Following to be printed on the cover page of Answer Script)

EAST WEST UNIVERSITY
Instructions for Students

1. Cell phone or any other unauthorized electronic devices are not allowed in the examination hall.

2. Student shall not be allowed to sit for the examination, if he/she is late by 30 minutes or more since the beginning of the examination.

3. No examinee shall be allowed to leave the examination hall/submit answer script within 45 minutes after the start of the examination.

4. No examinee is allowed to go out for any reason within the first hour of the start of the examination.

5. No examinee is allowed to borrow/lend any material within the examination hall.

6. In the examination hall students shall not keep their bags, purses etc. with them nor shall have any paper related to the subject, not approved by the invigilator, with them.

7. Pencil is not allowed for writing in the answer script. Pencil may be used for drawing figures in the examination.

8. Students are not allowed to wear caps in the examination hall except for religious or medical reasons.

9. Students are not allowed to wear sunglasses in the examination hall except for medical reasons.

Any form of unfair means or cheating (verbal communication, visual copying, unauthorized chit etc.) in the examination is a punishable offence.

Academic Discipline

Any act of indiscipline, offence, or grievance committed by a student may be reported to the Proctor of EWU in writing by a student or staff/faculty for necessary action.
A Discipline Committee will act independently to ascertain facts and submit a report of the findings with recommendations for necessary action.
All students will receive photo identification cards with a student number. Students must display their ID cards when on campus. This is required for their own safety and the protection of the campus from unauthorized visitors. These cards will be used for various purposes such as entering campus, attending classes, using the library, and in accessing computers in computer labs.

Facilities & Amenities

Computing and Lab Facilities at East West University

(a) Internet and Computing Facilities

Information and Communications Services (ICS) supports a total of 635+ computers along with computer related equipment of the all-functional departments/sections of the University.

To support the hands-on-lab practices for different computation intensive courses, EWU has established 7 (seven) Computer Labs equipped with more than 280 computers and printers of various ranges. The operating support systems are Windows, Linux, Solaries, etc. The programming languages and packages support include C/C++, Java, Fortran, Oracle, MatLab, Visual BASIC, SPSS, MS-SQL Server, MySQL, PHP, .NET etc through Information & Communications Services (ICS) section. ICS works directly under the office of the Vice Chancellor to facilitate computer lab facilities to the students and to maintain the computer hardware, software, multi-media systems, networking systems, email service of the University.

East West University has internet facility of 4.5 Mbps band width including 512 Kbps VSAT back up and ICS maintains the service for smooth continuation of internal connectivity. ICS also provides in-house training to employees of the University for improving computing skills.

(b) Lab Facilities

The science and engineering education programmes at East West University puts strong emphasis on hands-on-experiences of students in labs. University labs play a central role in supporting faculty and student research. For these reasons, the university is committed to developing and maintaining state-of-the-art labs for students and faculty members. East West University has developed one of the best lab facilities in the country for computer science and engineering, information and communication engineering, electrical and electronic engineering, electronics and telecommunication engineering and pharmacy programs. The engineering labs are shared by the three engineering departments, namely, Computer Science and Engineering (CSE) department, Electronics and Communications Engineering (ECE) department, and Electrical and Electronic Engineering (EEE) department. Pharmacy labs are used by students and faculty members of the Pharmacy department as well as by engineering students for their chemistry courses. The following is a description of the labs within the faculty of sciences and engineering. Each lab contains sufficient equipment to allow students to conduct experiments in small groups.

Electrical Circuits and Machines Lab: This lab has state-of-the-art Lab-Volt electro-mechanical training systems that allow experiments on DC machines, transformers, induction motors, and synchronous machines. This laboratory also has inductor, capacitor, and resistor banks, single and three phase variable AC power sources, DC power supplies, oscilloscopes, signal generators and various types of measuring instruments to enable students to conduct experiments on electrical circuits. In addition, the electrical circuits and machines laboratory houses modern high frequency signal generators, high frequency digital storage oscilloscopes, true RMS (AC+DC) volt and current meters, and a LCR meter with computer interface to facilitate research.

Electronics Lab: Work related to electronics and power electronics courses is performed in this lab. It is equipped with modern digital storage oscilloscopes, analog and digital trainer boards, signal generators, DC power supplies and all types of IC chips, transistors and other semiconductor devices.

VLSI Lab: Design and simulation type lab work is performed in the VLSI lab. The VLSI laboratory has more than 40 state-of-the-art dual core workstations and 2 servers running on both MS Windows and Linux platforms. A wide range of engineering and design software tools, including Matlab, PSpice, ADS, and Cadence design package are available in this lab. Cadence and ADS are advanced industry standard EDA tools used in design and research worldwide.

Digital Systems Lab: The Digital Systems lab is housed with equipments that range from digital

storage oscilloscopes, digital trainer boards, micro-controllers, interfacing adapters, data acquisition cards and other supporting peripherals. The lab also provides hardware devices for FPGA design. Projects related to digital logic design, computer interfaces and embedded systems are pursued in this lab.

Telecommunication lab: The purpose of the Telecommunication lab is primarily to offer hands-on experience to students for training and research by providing practical demonstrations and exercises for courses in communications. The TIMS equipment set constitutes an important part of this lab. This set consists of TIMS-301 basic system, PC based virtual instruments, TIMS-Interactices for simulation, and Emona TIMS advanced modules. The lab also contains microwave trainers, DSP trainers, cellular mobile trainers, analog communication trainers, digital communication trainers and optical fiber communication trainers. The university is in the process of procuring additional equipment for experiments in RF, antenna and microwave, and telecommunication switching and signaling.

Computer Communications and Networking Lab: This lab has been established recently. The lab is equipped with one high performance server, twenty work stations, switches, routers, networking kits, radio equipment for short distance indoor and outdoor wireless networks, point-point XDSL/VDSL/HDSL and other supporting instruments.

Physics Lab: The Physics Laboratory is equipped with modern instruments for everyday physics experiments. The dark room facility helps students in carrying out optical experiments.

Pharmacy Labs: The university has six labs for performing experiments for students and faculty members of the Pharmacy department. In addition to supporting the lab requirements of pharmacy courses, these labs also provide necessary infrastructures for research activities. Those labs are equipped with instruments like Tablet dissolution apparatus, Tablet disintegration tester, High resolution centrifuge, Gel electrophoresis apparatus, Refractometer, Polarimeter, Karl Fisher water determination apparatus, Rotary evaporator, Freeze drier, Carbon dioxide incubator, Single punch tablet machine, Capsule filling machine, UV-Visible spectrophotometer, Thermocycler for PCR, ELISA, High resolution microscope, fundamental chromatographic instruments, as well as other supporting equipments.

The EWU Center for Research and Training (EWUCRT)

The primary objective of the center is to create knowledge through academic and applied research and disseminate acquired knowledge through training and publication. CRT operates through a Research Committee comprising of representatives from the Board, Deans and Chairs of the Academic Department. The current Chairperson of the Center is Dr. Rafiqul Huda Chaudhury.

CRT publishes the EWU Journal, a bi-annual publication of multi-disciplinary research papers following a rigorous process of strict reviews. CRT also publishes Working Papers, Occasional Papers and Annual Research Abstracts to publicize and record the academic contributions made by the faculty members of EWU.
In addition, CRT works with government and private institutions at national and international levels to facilitate academic exchanges.

In 2006, CRT funded two research projects through a competitive grant. These research projects are a) Students' Mistakes and Errors in English Writing: Implications for Pedagogy by Harunur Rashid Khan and Md. Zahid Akter of the Department of English and b) Multimedia Courseware Development by Syed Akhter Hossain of the Department of Computer Science.

Seminars

Multimedia Courseware Development - Syed Akhter Hossain, Department of Computer Science, June 6, 2006.

Students' Mistakes and Errors in English Writing: Implications for Pedagogy - Harunur Rashid Khan and Md. Zahid Akter of the Department of English, June 06, 2006.

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Current status of students who had completed or dropped out from undergraduate programs at EWU by Ms. Jahida Gulshan and Mr.Ahmed Taneem Muzaffar of the Department of Economics, August 1, 2006.

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 bring in the presence of the WorldWide Web. SDC believes in simplicity and efficiency.

This century has already witnessed a new paradigm of information technology where objects are embedded as living and exciting parts of the worldwide web. SDC intends to integrate object-oriented programming (OOP) concept with the World Wide Web by providing unique software development services along with training and mentoring programs of global IT standard.

Software Development Center believes in quality as the first principle both in software development and in training and mentoring through prominent academics and industry experts from home and abroad.

Career and Employment

The Career Counseling Center provides appropriate guidance to students about future career plans. The center liaisons with prospective employers and arranges internships and part-time jobs for students and graduates.

The Career Counseling Center works to place students with leading business organizations of the country who can expand their activities by utilizing fresh minds imbued with modern skills and expertise. As a forerunner among private universities in Bangladesh it is a place that endeavors not only to ensure excellence in education but also to help students find suitable careers. The center organizes job fairs, workshops and seminars on a regular basis for career-seeking individuals, participating companies, and potential employing bodies to facilitate interaction and getting to know each other's needs and priorities. Besides, the largest job portal in Bangladesh, BDJobs.com, has established a linkage with the Career Counseling Center to extend job services to East West University graduates.

East West University Library

Since its inception in 1996, East West University Library has been an integral part of the University and has been designed to meet the information, research, and curriculum needs of its students, faculty and staff members for research and development activities. It is growing steadily with the university and is constantly serving the vibrant community of students and faculty.

To meet the growing demand of an ever increasing number of users, professionally trained library personnel have taken on the responsibility for taking care of the multifarious contents, including the selection, processing, and organization of materials and the delivery of information, instructions, and loan services.

Resources in the Library

The general collection consists of approximately 16,000 volumes, primarily scholarly monographs, periodicals, text books, magazines, newsletters, related reference books, dissertations, pure reference books, reports, CD-ROMs (1,110), audio-cassettes (135 copies), journals (print copy 39 titles), maps (06 rare item), on-line journals (06 databases; 2,573 Journals), statistical publications, as well as current daily newspapers (16) and periodicals. Books and periodicals relate to the fields of Business Studies, Economics, Liberal Arts, Social Sciences, Electrical and Electronics Engineering, Physics, Pharmacy, Computer Science, Mathematics, English Language and Literature and Bangladesh Studies.

Books are placed in open stacks for convenience and consultation. EWU Library maintains open access shelves to give enough choice to users for selection of desired materials. Users can also go directly to stacks and look for their required materials. Library personnel are ready to assist in locating information, answer on-the-spot queries, guide and provide instruction in the use of the catalogue, databases, resources, indexes, and abstracts, whenever needed.

Physical Facilities in the Library

EWU library is situated on approximately 10,500 sq ft of space spread over 3 (three) floors located at the Foundation Building. The Library can accommodate over 250 students at a time in its well-furnished reading rooms. Almost 2,000 users use this library daily and 800 students make transactions per day. On the ground floor there is a large pigeonhole area for temporary storage purposes which can accommodate about 450 bags and other personal belongings at a time.

Library Services

Library Services include, besides general services, Current Awareness Services (CAS), inter-library loan services, access to electronic resources, borrowing facilities, photocopy services, reference and referral services, guiding students how to get desired library materials, providing print copy journals and daily newspapers, news clipping services, searching and browsing publications through the Internet, access to in-house and international databases, i.e. ACM (Association for Computing Machinery) Portal Digital Library, AGORA (Access to Global Online Research in Agriculture), HINARI (Health InterNetwork Access to Research Initiative), JSTOR (Business collections, Language and Literature collections), OUP (Oxford University Press), IEEE (Institute of Electrical and Electronics Engineers)

Library Automation

EWU Library is completely automated and uses its own library management software EWULIBMIS, which has been developed by the EWU Software Development Center. This software comprises of an online catalogue and issue/circulation based on barcodes and search as well as other useful features. The most exciting part of the automation is the web component. Students and faculty members use the web module for study and research purposes.

The Library has a website that is designed to provide online reservation by faculty members for a period of 72 hours, and for searching library collections and getting instant bibliographical data of respective library materials. Users will also find a users' guide with all the rules and regulations of using the library on the website.

Corporate Membership

EWU Library is a corporate member of the British Council, Dhaka and Sir Archer K. Blood Library (American Information Center), Dhaka. Membership facilities like borrowing, Online Public Access Catalogue (OPAC), photocopying services, reference services, internet access and access to online journals are available in the respective premises.

Library Hours

Sunday through Thursday: 8:30 am - 10:00 pm (without any break)
Friday: 8.30 am - 5.30 pm (with a break from 1:00-3:00 pm)
Closed: Saturdays, government holidays and days stipulated on EWU academic calendar.

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 & Female Common Rooms with indoor game facilities and television.

Student Clubs

In addition to academic work, opportunities for co-curricular and extra curricular activities abound for students - the objective being to help students to develop all-rounded personalities. The university has a range of students clubs to promote various activities in different areas. These include:

1. Environmental and Social Club
2. Business Club
3. Debating Club
4. Cine and Photography Club
5. MBA Club
6. Computer Club
7. Cultural Club
8. Sports Club
9. Rotaract Club of East West University
10. English Conversation Club
11. The English Poetry and Drama Club
12. Pharmacy Club
13. Natural Science Club
14. Electronics Club
15. Programmers Club
16. Financial Analysis & Research Club
17. Telecommunications Club
18. Creative Marketing Club
19. Junior Economists Forum

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 C 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 fifty percent (50%) 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.

Mr. Jalaluddin Ahmed, President, Board of Directors East West University
Inaugurates the Construction Work of EWU Permanent Campus
at Aftabnagar, Rampura

Course Registration

Course Registration On-Line

The Admission 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 in 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 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. Students must register for a minimum of 3 (three) courses (9 Credits) every semester.

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. Students who are advised for a semester but their registration is cancelled due to both non-attendance and non-payment of dues, a penalty of 15 % of their total tuition of the respective semester will be charged.

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.

Examination Rules & 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
	I** Incomplete	0.0
	P*** Pass	0.0
	R** Repeat	0.0
	S*** Satisfactory	0.0
	W** Withdrawal	0.0

* Credits for courses with this grade do not apply towards graduation but used 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 required towards graduation but are not used for the calculation of the grade point average.

The exact cut off points for assigning letter grades are at the discretion of individual instructors. The same applies to the assignment of '+' or '-' after a letter grade. This is meant to give more flexibility so that shades of performance can be '+'and '-' distinguished and rewarded with the value of 0.3 grade point by the grades.

Grade Report

Grade Reports are recorded and prepared by the Registrar's Office 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 semesters will be placed on probation for the next two semesters. Failure to raise their CGPA to at least 2 after the probation period 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 after the first two 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. Once dismissed for scholastic failure, a student is ineligible to enroll in further courses, and re-admission to the university is not allowed.

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 Registrar 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.

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

Students with a grade of "C" or below will be allowed to retake the course only once. In these cases, the better of the two grades will be used to calculate the GPA and CGPA and the other grade will appear as "R" on the grade report.

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 semesters 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, immediate after the leave period. A leave of absence is granted through the Dean of Concerned Faculty. 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.

Absence from Examinations

In the case where a student has been absent from the 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 standings. 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 Aids

Since its inception, East West University has been awarding merit scholarships and need-based financial assistance to deserving students. Every year the university distributes at least 9% of its total earnings among 20% or more of its regular students. Such scholarships/financial assistance are not available to those students who have already spent the normal 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). No student of the university is entitled to benefit from more than one scholarship/financial aid facility at any point of time.

According to the provision of the Private University Act, 1992, private universities are required to provide scholarships to 5 (five) percent of its enrolled poor but meritorious students. Since its inception, the founders of East West University have adopted a policy of not paying any profit or dividend to themselves but to use a good part of its operating surplus towards nurturing merit and providing financial support to those in need. In the last twelve years, the scholarship and financial aid policy adopted by East West University has become a source of great encouragement to meritorious but financially constrained students. The academic world has greeted this policy pursued by East West University enthusiastically.

Benefits to students are awarded in the following forms:

1. Merit Scholarships

EWU has generous merit scholarships/financial aid programs. Taka three crore twenty-four lakhs was awarded to 1,168 students in 2007. Full-year tuition waiver merit scholarships (for a maximum of one-fourth of the total credit requirement of the program for undergraduate students) are awarded to:

(i) Top scorers in the undergraduate admission test with a minimum score of 75% marks: three (3) from the Faculty of Business and Economics, and one (1) each from the Faculty of Sciences & Engineering and the Faculty of Liberal Arts and Social Sciences. Top scorers in the graduate admission test with a minimum score of 75% marks: one each in MBA and Telecommunication Engineering, provided that at lease 20 students get admitted to the program.

(ii) Students securing GPA of 5.0 in the most recent HSC Examination (excluding 4th subject marks);

(iii) Students securing GPA 5.00 in the most recent HSC Examination (this will be applicable only for six students from six divisions who are from poor financial background);

(iv) Students securing 6 (six) A's in "O" levels and 2 (two) A's in "A" levels;

(v) A committee will assess and recommend for Scholarship/Financial Aid etc. for foreign students and the students from other systems.

(vi) Top 10% students of each batch of each department of undergraduate programs who have **completed at least one-fourth of the total credit requirement of the program** during the immediate past year with a CGPA of 3.97 and above will get full-tuition free Merit Scholarship for equal number of credits to be adjusted in the next three consecutive semesters and those with CGPA of 3.90 to CGPA 3.96 will get half-tuition free Merit Scholarship for equal number of credits to be adjusted in the next three consecutive semesters.

In cases of batches with 6 or less students fulfilling the Scholarship requirement (i.e., completed at least one-fourth of the degree requirement with GCPA 3.90 or better), are entitled to receive one scholarship. The award will go to the best performer among students securing CGPA 3.90 or better. 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 requirement (vi) above. To avail 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 five courses) The Merit Scholarship will be discontinued if any student of the undergraduate or graduate program violates the East West University Disciplinary Code for Students, 2008 and/or if his/her CGPA falls below 3.50.

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
B.Sc. in Electronic & Telecommunication Engineering	35
B.Sc. in Information and Communications Engineering	35
B.Sc. in Computer Science	33
B.Sc. in Computer Science & Engineering	36
B.Sc. in Electrical and Electronic Engineering	37
Bachelor of Pharmacy	40

2. Directors' Scholarships

Each of the fifteen Founder Directors of the university, at a point of time, awards two full-tuition scholarships to two students or splits the scholarships into half or quarter tuition waiver/scholarships. This is renewable at the discretion of the Founder Director concerned unless the recipient scholar performs poorly.

3. Financial Aid

(a) General

At the beginning of each semester, the university considers applications on prescribed forms for the granting of financial aid 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 2.70 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.

(b) Family Concession

When two siblings (brother/sister with the same parents) study simultaneously at East West University, the second sibling is entitled to a half-tuition waiver. However, both must be admitted full-time into regular programs. The benefit commences on the date of admission of the second sibling and ceases on the discontinuation of the study of any one of them, after his/her graduation or for any other reason. This benefit may extend up to the third sibling under the above-mentioned conditions. A merit scholarship awardee cannot qualify to get the benefit for siblings or other similar benefits.

If either of the siblings maintains a minimum CGPA of 2.70, while the other maintains a minimum passing CGPA (2.00 for Undergraduate Programs, 2.50 for Graduate Programs, 2.30 for MA in English) the sibling benefit will be awarded and continued for the one who maintains the CGPA of 2.70.

In case of the newly admitted students, if the first sibling could maintain the minimum CGPA of 2.70 the sibling benefit would be awarded to the second sibling provided the first sibling is not currently receiving any merit scholarship/financial aid from the EWU.

(c) Freedom Fighters' Scholarship

As a mark of respect to the valiant freedom fighters of the War of Independence, the university considers 50% tuition waiver scholarship to the wards of financially needy freedom fighters subject to the fulfillment of the following requirements:

The candidate must qualify in the EWU admission test; The average GPA of the candidate in SSC & HSC must not be below 4.0; The candidate must provide proof that his/her parent was a freedom fighter. 50% Tuition Fee waiver will then be continued provided that the CGPA in each semester remains 2.70 or above.

To avail 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 five courses) Financial Aid is discontinued if any student of undergraduate or graduate program violates the East West University Disciplinary Code for Students, 2008 and/or if his/her CGPA falls below 2.70. The same is applicable for the beneficiaries of siblings and other similar cases and for Freedom Fighters' Scholarship.

4. The Medha Lalon Fund

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 on regular components such as the merit scholarships and financial aid. 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 aid 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,.

The following scholarships are currently being offered under the Medha Lalon Fund scheme:

1 Sujat Ali Mazumder Scholarship	Tk. 35,000 a year
2 Anjuman Ara Begum Scholarship	Tk. 35,000 a year
3 S.M. Sahiruddin Scholarship	Tk. 35,000 a year
4 Rowshan Ara Begum Scholarship	Tk. 35,000 a year
5 Sanuwar Bakht Chaudhury Scholarship	Tk. 35,000 a year
6 Sofia Khatun Scholarship	Tk. 35,000 a year
7 Lutful Bari Md. Munsur Chaudhury Scholarship	Tk. 35,000 a year
8 Shamsunnessa Begum Scholarship	Tk. 35,000 a year
9 Sherifa Chowdhury Scholarship	Tk. 35,000 a year
10 Sherifunnesa Begum Scholarship	Tk. 35,000 a year
11 M. Mahtabuddin Scholarship	Tk. 35,000 a year
12 Chamak Chand Scholarship	Tk. 35,000 a year
13 M. Sujat Ali Scholarship	Tk. 35,000 a year
14 Shakina Khatun Scholarship	Tk. 35,000 a year
15 Mujibur Rahman Lasker Scholarship	Tk. 35,000 a year
16 Khodeza Abu Taher Scholarship	Tk. 35,000 a year
17 Moulvi Muhammad Shamsher Ali Scholarship	Tk. 35,000 a year
18 Momena Khatun Scholarship	Tk. 35,000 a year
19 Hajee Shabuddin Scholarship	Tk. 35,000 a year
20 A.B.M. Ghulam Mohiuddin Scholarship	Tk. 35,000 a year
21 Abu Ahmed Abdul Hafiz Scholarship	Tk. 35,000 a year
22 Syeda Shaher Banu Chaudhurani Scholarship	Tk. 35,000 a year
23 Abdul Kaher Scholarship	Tk. 35,000 a year
24 Habiba Khatun Scholarship	Tk. 35,000 a year
25 Alhajj Abdur Rahman-Begum Walida Rahman Scholarship	Tk. 35,000 a year
26 Justice Nurul Huda-Begum Sufia Huda Scholarship	Tk. 35,000 a year
27 M.A. Haque Scholarship	Tk. 35,000 a year
28 Abdur Rahman Scholarship	Tk. 35,000 a year
29 Abdul Jabbar Scholarship	Tk. 35,000 a year
30 Abdus Samad Scholarship	Tk. 35,000 a year
31. Dutch Bangla Bank Scholarship	Tk.27,000 a year
32. Dutch Bangla Bank Scholarship	Tk.27,000 a year
33. Dutch Bangla Bank Scholarship	Tk.27,000 a year
34. Suraiya Farashuddin Scholarship	Tk.27,000 a year
35. Suraiya Farashuddin Scholarship	Tk.27,000 a year
36. Standard Chartered Bank Scholarship	Tk.27,000 a year
37. Standard Chartered Bank Scholarship	Tk.27,000 a year
38. Eakub H. Chowdhury Scholarship	Tk.27,000 a year
39. Eakub H. Chowdhury Scholarship	Tk.27,000 a year
40. Mercantile Bank Scholarship	Tk.27,000 a year
41. Mercantile Bank Scholarship	Tk.27,000 a year
42. East West University Scholarship	Tk.35,000 a year
43. East West University Scholarship	Tk.35,000 a year
44. East West University Scholarship	Tk.35,000 a year
45. East West University Scholarship	Tk.35,000 a year
46 East West University Scholarship	Tk.35,000 a year
47. East West University Scholarship	Tk.35,000 a year
48. East West University Scholarship	Tk.35,000 a year
49. East West University Scholarship	Tk.35,000 a year
50. East West University Scholarship	Tk.35,000 a year
51. East West University Scholarship	Tk.35,000 a year
52. Naushaba-Kalim Sharafi Scholarship	Tk.30,000 a year
53. Mutual Trust Bank Ltd. Scholarship	Tk.22,000 a year
54. Mutual Trust Bank Ltd. Scholarship	Tk.22,000 a year
55. Prime Bank Ltd. Scholarship	Tk.27,000 a year
56. Prime Bank Ltd. Scholarship	Tk.27,000 a year
57. Eastern Bank Ltd. Scholarship	Tk.27,000 a year
58. Eastern Bank Ltd. Scholarship	Tk.27,000 a year

The East West University Medha Lalon Fund is administered by the Financial Aid Committee of the university. To procure 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 university charges a minimum amount (less than one percent) as administration costs from the earnings of the East West University Medha Lalon Fund. It ensures maintenance of regular accounts of the Medha Lalon Fund and has the accounts audited externally every year.

The Financial Aid Committee keeps Medha Lalon Fund donors informed about the operation of the funds on a regular basis. The Committee arranges meetings with East West University Medha Lalon Fund 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 & financial aid programs.

The table below shows the number of recipients/beneficiaries of various scholarships and financial aid programs during the last six years:

Sl.	Name of Scholarship/ Financial Assistance	2002		2003		2004		2005		2006		2007	
		No. of Students	Amount Taka	No. of Students	Amount Taka	No. of Students	Amount Taka	No. of Students	Amount Taka	No. of Students	Amount Taka	No. of Students	Amount Taka
1	Menit Scholarship (Place Holders + Menit Scholarship Awardees)	50	2,660,650	82	4,439,500	104	6,056,400	153	8,413,900	192	10,607,285	133	98,91,600
2	Medha Lalon Fund	-	-	30	720,600	59	1,324,200	59	1,618,602	68	1,553,548	54	17,54,000
3	Financial Aid	70	1,673,800	127	2,033,900	343	6,604,826	517	9,538,360	681	12,982,400	523	1,39,30,000
4	Half-Tuition Family Assistance	60	1,543,800	90	2,282,975	133	3,425,475	153	4,042,200	190	5,031,905	321	45,34,320
5	Director's Quota	16	923,600	22	1,099,400	33	1,363050	52	1,995,525	59	1,802,905	63	18,78,637
6	Special Assistance	15	205,100	15	285,800	21	309,350	26	243,450	37	491,140	74	4,39,855
	Total	211	7,006,950	366	10,962,225	693	19,083,301	960	25,852,037	1,227	3,25,00,000	1168	3,24,28,412
	Percentage (%) of net Tuition Receipts	5.92%		6.75%		8.02%		8.94%		10.08%		10.40%	
	Percentage (%) of net Student Enrollment	11.25%		14.00%		18.03%		23.33%		26.29%		21.73%	

* Percentage has been calculated excluding Medha Lalon Fund

Convocation 2008: Presentation of Graduation Certificates

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 statemfents 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 emphasis 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 refund, penalty and appeal, income tax authority.
Credits: 3 Prerequisite: ACT 201

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 the students to 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 focused 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

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 the students to 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, stockholders' 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: ACT 411

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

ACT 430: Accounting Information System
This course has been presented 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

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

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

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 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 with the written 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 would provide students a competitive edge in this fast growing business world.
Credits: 3 Prerequisite: ENG 102

BUS 321: **Business for Engineering and Technology**
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 Prerequisite: ENG102

BUS 361: Legal Environment of Business:
This subject is designed and taught to give the students an appreciation of legal environment in relation to business activities. The students will undertake studies in some of the core law papers 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 agency, law of sale of goods, law of bailment, law of company and partnership etc. Then the course examines some legal regimes having application for international business transactions. In particular, laws concerning international sale of goods: CIF and FOB contracts, laws concerning international carriage of goods by sea and laws concerning financing of trade are reviewed under this course. In addition to 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 asked to solve some commercial disputes (specially designed to suit the course) and, secondly, students are introduced with the basic court structure of the country and the dispute settlement procedure.
Credits: 3 Prerequisite: None

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.
Credits: 3

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 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.

2. Chemistry: Chang.

3. 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.

CSE 101: Introduction to Computers I

Introduction to skills, concepts, and capabilities necessary to effectively use Information Technology. Skills include standard applications to email, word processing and Web search. Concepts include digital representation of information, computer basics and introductory programming. Capabilities include managing complexity, debugging, and dealing unexpected consequences.

The course includes lab works based on theory taught.

Credits: 3; Pre-requisite: None.

CSE 102: Introduction to Computers II

Fundamental of Information Systems, Operating Systems, Programming Languages, Database Systems, Computer Networks, Computer Graphics, HTML/DHTML, Web Design, E-Commerce, Multimedia and other recent development in computing fields.

The course includes lab works based on theory taught.

Credits: 3, Pre-requisite: CSE 101.

CSE 105: Structured Programming

Introduction to digital Computers. Programming algorithms and flowchart construction. Information representation in digital computers, binary number system, binary arithmetic, binary codes. Writing, debugging and running structured programs using C language: data types, variables, constants, operators and expressions, assignments and type conversion in assignments, control flow, functions and program structure, pointers and arrays, strings, advanced data

types, pointer to functions, user defined data types, advanced operators, records, input/output, dynamic variables and linked lists, recursion, and graphics programming. Introduction to C++.
The course includes lab works based on theory taught.
Credits: 3+1=4; Pre-requisite: None.

CSE 107: Object Oriented Programming
Introduction to Java and JVM, Java and Internet, Java foundation, Control flow, Interface and Polymorphism, Abstract classes and packages, Exception Handling, Applets, Multithreading, Network programming, Graphics, 2D and 3D API.
The course includes lab works based on theory taught.
Credits: 3+1=4; Pre-requisite: CSE 105.

CSE 109: Electrical Circuits
Fundamental electrical concepts and measuring units. D. C. voltage, current, resistance and power. Laws of electrical circuits and methods of network analysis. Principles of D. C, measuring apparatus. Laws of magnetic fields and methods of solving simple magnetic circuits. Alternating current - instantaneous and r.m.s current, voltage and power, average power for various combinations of R, L and C circuits, Phasor representation of sinusoidal quantities. Single-phase AC circuit analysis. Introduction to Polyphase circuit analysis.
The course includes lab works based on theory taught. Credits: 3+1=4; Pre-requisite: None.

CSE 205: Discrete Mathematics
Mathematical logic: propositional calculus, predicate calculus. Permutations, Combinations and Discrete Probability. Set theory: sets, relations, partial ordered sets, functions. Graph theory: graphs, paths, trees. Recurrence Relations and Recursive Algorithms. Algebraic structures: binary operations, semi groups, groups, permutation groups, rings and fields, lattices.
Credits: 3; Pre-requisite: MAT 101.

CSE 207: Data Structure
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, threaded trees, heaps, binary search tree, AVL tree, B+ tree, digital search tree, Tries. Searching, priority queues, hashing. Graphs, DFS and BFS, shortest path and minimum spanning tree. Garbage collection. Dynamic storage allocation. Internal and external sorting.
The course includes lab works based on theory taught. Credits: 3+1=4; Pre-requisite: CSE 107.

CSE 225: Numerical Methods
Solution techniques for linear, simultaneous algebraic equations: iterative methods of solution of nonlinear equations, interpolation of curve fitting, numeric integration by interpolative and quadrature methods, numerical solution of ordinary differential equations including initial value eigenvalue problem and boundary value problem, matrices.
The course includes lab works based on theory taught. Credits: 3+1=4; Pre-requisite: CSE 107.

CSE 245: Algorithms
Techniques for analysis of algorithms. Methods for design of efficient algorithms: divide and conquer greedy method, dynamic programming, backtracking, branch and bound. Searching and sorting algorithms. Graph algorithms. String manipulation algorithms. Arithmetic algorithms. Number theoretic algorithms. Lower bound theory, NP-hard and NP-complete problems.
The course includes lab works based on theory taught. Credits: 3+1=4; Pre-requisite: CSE 207.

CSE 251: Electronic Devices and Circuits
Semiconductors, Junction diode characteristics, Bipolar transistor characteristics, Small-signal low frequency h-parameter model, hybrid pie model. Amplifiers, Darlington pairs. Introduction to oscillators, differential amplifiers. Linear application of op-amp, gain, input and output impedance offset null adjustment, frequency response and noise. Introduction to JFET, MOSFET, NMOS, and CMOS - biasing and application in switching circuits. SCR, Triac, Diac, UJT: characteristics and applications. Introduction to rectifiers, active filters, regulated power supply, stabilizer and UPS. Basic ideas about IC fabrication technique. The course includes lab works based on theory taught. Credits: 3+1=4; Pre-requisite: CSE 109.

CSE 252: Basic Electronics
Introduction to DC and AC voltage, current and power, classifications of electrical components: resistors, capacitors and inductors. Ohm Law, Kirchhoffs Law: KCL, KVL, and their limitations. Basic circuit analysis methods: nodal, mesh and modified nodal analysis. Fundamentals of AC circuits, transformers, induction to 3-phase circuit. Semiconductor materials and PN junctions, semiconductor diodes: barrier formation in metal-semiconductor characteristics; small signal models of diodes; some applications of diodes; special diodes. Bipolar transistor: IV characteristics and small signal models; transistor biasing; small signal amplifiers.
The course includes lab works based on theory taught.
Credits: 3+1=4; Pre-requisite: None

CSE 255: Digital Logic Design
Review of Binary number system, Boolean algebra, Simplification of Boolean Functions, Logic gates, Combinational Logic, Arithmetic and Comparator Circuits, Encoders and Decoders, Multiplexers and

Demultiplexers, Flip-Flops, Sequential Logic, Registers, Counters, Programmable Logic devices.
The course includes lab works based on theory taught.
Credits: 3+1=4; Pre-requisite: None.

CSE 275: Operating Systems
Principles of operating systems; Process management, memory management, auxiliary storage management and resource allocation. Operating system design and construction techniques; Concurrent programming, operating system kernels, correctness, deadlock, protection, transaction processing, design methodologies, comparative structure of different kinds of operating systems and other topics.
Credits: 3; Pre-requisite: CSE 207.

CSE 301: Database Systems
Fundamental concepts; System organization and implementation of database systems; Relational, hierarchical and network data models; File organizations and data structures; Query languages, query optimization. Database design; Concurrency control; Security issues evolving distributed database systems.
The course includes lab works based on theory taught.
Credits: 3+1=4; Pre-requisite: CSE 107.

CSE 350: Data Communications
Principles involved in data communication. Modulation techniques, Pulse Modulation, Pulse amplitude modulation, pulse width modulation, pulse position modulation, pulse code modulation, pulse position modulation, quantization, Delta modulation, TDM, FDM, OOK, FSK, PSK, QPSK; Representation of noises, probability of error for pulse system, concept of channel coding and capacity, asynchronous and synchronous communications; Multiplexers, concentrators and buffers, communication medium, fiber optics.
Credits: 3; Pre-requisites: MAT 102, CSE 251.

CSE 352: Introduction to Wireless Systems
Fundamentals of modern wireless systems; Fundamentals of radio propagation and link performance; Cellular concept: interference, base stations and cell sites, handoffs, system capacity; Fading environments: multipath propagation, delay spread, Doppler Spread, statistically fading channel models; Multiple-access schemes: FDMA, TDMA, CDMA, SDMA. Emerging methodologies: phases/adaptive antenna array, multi-array (MIMO) communication systems.
Credits: 3; Pre-requisite: CSE 350.

CSE 360: Computer Architecture
Study of architectural concepts in computer systems. Computer arithmetic and arithmetic logic unit design; Memories, memory hierarchies and dynamic address translation. CPU characteristics, performance factors. Control unit design: hardware and micro-program, microprogramming; Interrupt mechanism; DMA. Pipelining.
The course includes lab works based on theory taught. Credits: 3+1= 4; Pre-requisite: CSE 255.

CSE 380: Digital Electronics
Diode logic gates, transistor switches, transistor gates, MOS gates, Logic Families: TTL, ECL, IIL and CMOS logic with operational details. Propagation delay, product and noise immunity. Open collector and High impedance gates. Electronic circuits for Flip-Flops, counters and register. Memory system, PLAs and PLDs. A/D and D/A converters with applications. S/H circuits, LED, LCD and optically coupled oscillators. Non-linear applications of OP-AMPs. Analog switches. Linear wave shaping: diode wave shaping techniques, clipping and clamping circuits. Comparator circuits. Pulse transformers, pulse transmission. Pulse generator- monostable, bistable and astable multivibrators. Schmitt trigger. Blocking oscillators and time-base circuits. Timing circuits. Simple voltage sweeps, linear current sweeps.
The course includes lab works based on theory taught.
Credits: 3+1= 4; Pre-requisites: CSE 251, CSE 255.

CSE 401: Information System Analysis and Design
Application Development Policy and Strategies: Planning of Information System, Policy in Information System Development, Strategies for achieving Information System goals. Application System Development Life Cycle: Phases in Application System Development, interrelationship among each phase; Feasibility assessment: problems and needs in Information System Development, preliminary application requirement determination, economic, technical operational and schedule feasibility. Information Requirements Determination: Strategies for obtaining information requirements, techniques for information requirements determination, methods for providing assurance that requirement are correct and complete. Structured System Analysis: Steps in Structured System Analysis, Activity Diagrams and related documentation, data dictionary, problem analysis, structured walk through. System Design Methodology: Checklist Methodology, Process-Oriented Methodology, Application Generator, Structured Design. Program Development and Testing: Structured Programming, Method for Testing.
Credits: 3; Pre-requisites: CSE 275, CSE 301.

CSE 405: Computer Networks
Computer network architectures, protocol layers. Transmission media, encoding systems, error detection, multiplexing, switching. Data link, multiple access channel protocols. Network security, privacy. Applications including network management, electronic mail, virtual terminals, URL, HTTP, Multimedia, distributed operating systems.
The course includes lab works based on theory taught.
Credits: 3+1=4; Pre-requisites: CSE 245, CSE 350.

CSE 409: Systems Programming
Differences and similarities in machine organization, central processors. Fundamentals of machine language and addressing. Assembly language programming. Assembler: general design procedure, table processing. Macro language and microprocessor. Loaders: design of absolute loader and direct link loader. Linkers. Translators.
Credits: 3; Pre-requisite: CSE 107.

CSE 410: Artificial Intelligence
Artificial intelligence techniques. Logic: propositional logic, first-order logic, resolution principle. Problem representation: state-space representation, problem-reduction representation. Production system: PS structure, recognition-action cycle, inference directions, blackboard systems, PS implementation. Frame representation: basic structure, inheritance of properties, slot extension, implementation. Relational data model: relational database model, entity and relationship, generalization and aggregation. Search: blind and non-blind searches, depth-first search, breadth-first search, heuristic search, best-first search, optimal search, A search. Implementation complexity. Programming Languages for AI Research: Features of AI programming languages. Major AI programming languages - LISP and PROLOG.
Credits: 3; Pre-requisite: CSE 207.

CSE 411: Software Engineering
Software: Its nature and qualities; Software Engineering Principles: Rigor and formality, separation of concerns, modularity, abstraction, Incrementally; The Software Process: Process models, planning, cost estimation and project control, software design. Modularization: structure, representation, interface and information hiding, design notations. Object-oriented Design: Object paradigm, introduction to a specific object-oriented design technique. Software Specification: Operational specification - semi-formal schemes, asynchronous systems - Petri nets, Descriptive specification - traditional scheme, ER model and logic, introduction to a formal scheme (Z). Software verification, software testing, Software tools and environments.
Credits: 3; Pre-requisite: CSE 245, CSE 301.

CSE 412: Programming with JAVA
Threads and Sockets, JDBC, Serialization and reflection, Client Server programming, RMI and distributed computing, CORBA, Beans, Enterprise Java beans, XML Programming with Java, Java Servlets.
The course includes lab works based on theory taught.
Credits: 3+1=4; Pre-requisite: CSE301

CSE 413: Automata Theory and Theory of Computations
Computational models including finite automata, regular expressions, context-free grammars, pushdown automata, Turing machines, and techniques for analyzing them. Languages described by these machines and their properties; Chomsky Hierarchy. Basic computability theory and Church-Turing Thesis. Undecidability, Post correspondence problem. Fundamentals of computational complexity theory; Intractable problem and NP-completeness. Some NP complete problems. Cook's theorem. Approximation algorithms.
Credits: 3; Pre-requisite: CSE 245.

CSE 415: Software Development Project
Students will develop large application/ database/ Internet software(s) with proper documentation as assigned by teacher.
Credits: 3; Pre-requisite: CSE 245, CSE 301.

CSE 420: Computer Graphics
Introduction to computer graphics. Graphics I/O devices and types. Graphic software design: Desired functions, Universal Graphic language, display files, Databases for pictorial applications. Graphics Techniques: Point-plotting techniques, Line drawing, Geometric transformations, Windowing and clipping, Raster graphics. Hardware for Computer Graphics: Typical small and large system graphic terminals, Plotters, Graphic Display Processors, Device Independent Graphics Systems. Graphics Software: Simple Graphics Package, Segmented Display Files, Geometric Models, Picture structure. Interactive Graphics: Input techniques, event handling, three-dimensional graphics, curves and surfaces, 3-D transformation. Hidden Surface Problem: Back Face Removal, Hidden-Line removal.
The course includes lab works based on theory taught.
Credits 3; Pre-requisite: CSE 245.

CSE 422: Simulation and Modeling
Simulation methods, model building, random

number generator, statistical analysis of results, validation and verification techniques. Digital simulation of continuous systems. Simulation and analytical methods for analysis of computer systems and practical problems in business and practice. Introduction to the development of simulation packages.
Credits 3; Pre-requisites: STA 102, CSE 107.

CSE 430: Compiler Design
Introduction to Compilers. Lexical analyzer, Regular expression, Non-deterministic finite automata and deterministic finite automata, Context free grammar, Ambiguous grammar, Parsing techniques, Syntax directed translation, type checking. Intermediate code, Symbol table, Data structure for symbol table, Run time storage administration, Error detection and recovery, code optimization, code generation. Use of tools - LEX and YACC. Design of a compiler for a subset of a programming language.
Credits: 3; Pre-requisite: CSE 245.

CSE 432: Digital Signal Processing
Discrete time description of signals and systems. Fourier transform of discrete time signals, Discrete Fourier transform. Z-transform. Digital filter structure, Infinite Impulse Response Filter design techniques, Finite Impulse Response Filter design techniques, Finite precision effects, Inverse filtering.
The course includes lab works based on theory taught.
Credits: 3+1=4; Pre-requisites: MAT 301, CSE 205, CSE 251.

CSE 433: Wireless Programming
Basic concept of telecomm network and wireless programming, The J2ME architecture, CDLC and KVM, The connected and limited devices configuration, Mobile information device profile, MIDP Programming, Low level user interface API, Event handling, Record management system, Network management, Using push registry in J2ME, SMS programming, .Net framework for wireless programming, Bluetooth and IrDA Communication, Programming PDA
Credits: 3; Pre-requisite: CSE 412.

CSE 434: Advanced Enterprise Application Design and Development
Overview of the different tiered application architectures (1, 2, 3, N tiers) and some sample designs. The foundation skills required for building medium to large scale web-based applications, with a B2B e-commerce focus is being introduced. J2EE and Microsoft .NET as two technology architectures for implementing enterprise applications. Java Servlets and Java Server Pages (JSP), Java application servers, integration of data from multiple data sources and distribution of business logic in component-based applications. Multiple application-end delivery formats are considered including web browsers and WAP phones.
Credits: 3; Pre-requisite: CSE 412.

CSE 435: Software Quality Assurance
The major areas related to software quality, including: Defining quality, Software quality assurance processes, Software quality standards, Software testing standards, CMMI, PSP, Extreme Programming.
Credits: 3; Pre-requisite: CSE 412.

CSE 436: Multimedia Design and Development
Analysis, design and implementation of multimedia software, primarily for e-learning courses or training. Projects emphasize user interface design, content design with storyboards or scripts, creation of graphics, animation, audio and video materials, and software development using high level authoring tools, such as Flash.
Credits: 3; Pre-requisites: CSE 411, CSE 412.

CSE 437: Advanced Computer Architecture
Pipelined processor design, Cache memory, Memory system design, Concurrent processors, Vector processors and multiprocessors, Array processors, Parallelism in multiprocessors and Multicomputers, Compute-intensive processors and Multicomputers, Automatic Vectorization, Hypercube systems and Key application, Data flow computation.
Credits: 3; Pre-requisites: CSE 275, CSE 360.

CSE 438: Digital Image Processing
Introduction to Digital Image Processing, Digital Image Fundamentals, Image Transform, Image Enhancement, Image Restoration, Image Compression, Image Segmentation, Representation and Description, Recognition and Interpretation.
Credits 3; Pre-requisites: MAT 301, CSE 420.

CSE 439: Digital Computer Design
Review of MSI logic design, Registers, Counters and Memory units. Register transfer logic, micro-operations, processor logic design, control logic design, micro-Programmed control, pipeline and vector processing, computer arithmetic, microcomputer system design: case study.
Credits: 3; Pre-requisite: CSE 360.

CSE 442: Microprocessors and Microcomputers
Introduction to different types of microprocessors, Architecture, Instruction Format, Instruction Sets, Opcode, Processor status and Flag registers, Addressing modes, Branching and Looping, Interrupt structures, I/O operation, I/O interfacing, DMA. Programming in Microcomputers. Hardware and Software interfacing in Microcomputer System Design, I/O design and total system design. Microprocessor based system design: Hardware design, building, debugging, testing and linking program modules. Programming EPROM. Multiprocessor configurations: coprocessor configurations, numeric data processor, I/O processors. Advanced Microprogramming: Bit-Slice Microprocessor, Parallelism in Microprocessor.
The course includes lab works based on theory thought.
Credits: 3+1=4; Pre-requisites: CSE 380.

CSE 444: Fault Tolerant Computing
Faults and their manifestation, issues, theory, and techniques of reliable systems design, testing, design for testability, self-checking and fail-safe circuits, coding techniques, system-level fault diagnosis, fault-tolerant communication, reliable software design, and evaluation criteria.
Credits 3; Pre-requisite: CSE 360.

CSE 450: Data Structure and Algorithm
Data Types and Data Structures. Analysis Of Algorithms. List, Its Sequential, Linked, Stack and Queue Implementations and Applications. Tree Representations And Traversals. Binary Search Tree, Heaps, AVL Tree and B+ Tree. Searching and Hashing. Methods for Design of Efficient Algorithms: Sequential Method, Divide and Conquer Method, Greedy Method and Dynamic Programming. Sorting Algorithms. Graph Representation, DFS and BFS. Graph Algorithms: Shortest Path Algorithms and Minimum Spanning Trees. String Manipulation Algorithms. Number Theoretic Algorithms.
The course includes lab works based on the concepts introduced.
Credits: 3+1= 4; Pre-requisite: CSE 105.

CSE 452: Distributed Systems and Algorithms
Formal approaches to distribute computing problems. Topics vary, but typically include models of distributed computing, agreement problems, impossibility results, mutual exclusion protocols, concurrent reading while writing protocols, knowledge analysis of protocols, and distributed algorithms.
Credits: 3; Pre-requisites: CSE 245, CSE 275.

CSE 460: Programming Language Principles
A study of non-imperative programming paradigms such as functional, object-oriented, logic, and constraint programming. Programming language semantics and type theory.
Credits: 3; Pre-requisite: CSE 301.

CSE 464: Advance Database System
Introduction to the principles of database management systems. Topics include database system architecture, data models, theory of database, query optimization, concurrency control, crash recovery, and storage strategies.
Credits: 3; Pre-requisite: CSE 301.

CSE 470: Expert Systems
Basic principles of Expert Systems. Natural Language Processing, Medical diagnostics, Financial design, and Manufacturing planning.
Credits: 3; Pre-requisite: CSE 410.

CSE 474: Pattern Recognition
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.
Credits: 3; Pre-requisite: CSE 410.

CSE 476: Neural Networks
Introduction to neural networks. Neuronal Dynamics: Activation and signals, activation models. Synaptic Dynamics: Unsupervised and supervised learning.

Neural network architectures and equlibria.
Credits: 3; Pre-requisite: CSE 410.

CSE 478: Stochastic Processes
Probability distribution and expectations, discontinuous probability distributions, continuous probability distributions. Stochastic process. Discrete time Markov chain and continuous time Markov chain. Birth-death process in queuing. Queuing Models.
Credits: 3; Pre-requisite: STA 102.

CSE 480: Web Database Programming
Designing an Internet utilizing a range of different technologies. Simplifying the creation and updating web content. Expanding Intranet services by adding client-slide and server-side processing. Interfacing Internet to a database. Querying a database using Cold Fusion.
Credits: 3; Pre-requisite: CSE 412.

CSE 482: Parallel Computation
Survey of parallel computing including the processing modes of pipelining, data parallelism, thread parallelism, and task parallelism; algorithmic implications of memory models; shared memory and message passing; hardware implementations; bandwidth and latency; synchronization, consistency, inter-processor communication; programming issues including implicit and explicit parallelism, locality, portability.
Credits: 3; Pre-requisite: CSE 245.

CSE 484: Computational Geometry
Problems in computational geometry, worst case complexity of geometric algorithms; expected complexity of geometric algorithms and geometric probability, geometric intersection problems, nearest neighbor searching, point inclusion problems, distance between sets, polygon decomposition, Voronoi diagram and other planner graph, updating and deleting from geometric structures.
Credits: 3; Pre-requisite: CSE 245.

CSE 490: VLSI Design
Introduction to microelectronics and MOS technology, Basic electrical properties and circuit design process of MOS and CMOS circuits, Scaling of MOS circuits, Subsystem design process and layout. Computational elements: Design of an ALU subsystem, Adder, Multipliers, Memory, Registers, and aspects of system timing. Practical aspects of design tools and testability, CMOS design: behavioral description, structural description, physical description and design verification, Introduction to GaAs technology: Ultra-fast VLSI circuits and systems.
Credits: 3; Pre-requisites: CSE 251, CSE 255, CSE 380.

CSE 492: Robotics
Robotic manipulation, direct kinematics: the arm equation, inverse kinematics: solving the area equation, workspace analysis and trajectory planning, differential motion and static manipulator dynamics, robot control, task planning.
Credits: 3; Pre-requisite: None.

CSE 498: Social and Professional Issues in Computing
History of Computing, Social context of computing, Methods and tools of analysis, Professional and ethical responsibilities, Risks and liabilities of computer-based systems, Intellectual property, Privacy and civil liberties, Computer crime, Economic issues in computing, Philosophical frameworks.
Credits: 3; Pre-requisite: None.

CSE 499: Project/Internship
Students will be placed for internship of one semester duration or they will be assigned a project under the supervision of a faculty member. Student must complete the internship/project within one consecutive semester.
Credits: 3; Pre-requisite: None.

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 markets. Factor market: introduction to the labor market, Rent theory.
Credits 3; Prerequisite: None

ECO 102: Introduction to Macroeconomics
Macroeconomic is the policy oriented part of economics. The course will deal with the concepts and measurement of national income, inflation, unemployment, with an attempt to reveal how macro- economic variables such as national income, unemployment, inflation can be manipulated by government policies. The course will also introduce the macro economic models using a graphical approach: consumption function, investment theory, equilibrium and disequilibrium models of macro economy - classical and Keynesian theory. The focus of the discussion in the course will be to acquaint students of the macroeconomic fundamentals of an economy.
Credits 3; Prerequisite: ECO 101

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

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. Current issues important to the environment are stressed 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

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 dealing with unemployment, inflation and interest rates. Analysis of monetary and fiscal policies and their impact on national income, output employment & growth.
Credits 3; Prerequisite: ECO 102

ECO 304: Economics of Health
Application of economic concepts and analytical tools to the health service system. Review of empirical studies of demand 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

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.
Credits 3; Prerequisite: ECO 302

ECO 312: Industrial Organization
Industrial Organization is the study of the structure of firms and markets and of their interaction. This course deals with how markets work (and why they sometimes sail 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 application deals with firms and product markets, the underline ideas are general and applicable to a wide variety of economic situation.
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, corrective policies to externalities. On the taxation side, topics include the question of tax incidence, efficiency effects of taxes and optimal taxation.
Credits 3; Prerequisite: ECO 101, ECO 102

ECO 315: Public Finance
Study of 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. Prerequisite: ECO 101, ECO 102, ECO 301.

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: ECO 101 and ECO 102

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: ECO 102

ECO 353: Economics of Development in South Asia
Background and analysis of plans and progress toward economic development in South Asia, their trends in development, economic characteristics of the area and their significance for economic development. Case studies are included on respective countries of South Asia to examine their economic trends & prospects.
Credits 3; Prerequisite: ECO 102

ECO 354: Environmental & Natural Resource Economics II
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. Theory of property rights regimes such as public, private and common property ownership into resource management. Market failure, externality and economics of pollution control. Economics of regional global pollution. Pollution control policies and their implications for efficiency, equity and growth. Credits: 3 Prerequisite: ECO101, ECO 260, MAT 211

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 301, ECO 302, MAT 110, MAT 211

ECO 360: Socio-Economic Profiles of Bangladesh

It surveys the socioeconomic features and studies of the macroeconomic performance of the economy of Bangladesh within the context of the sociopolitical reality; sectoral development and analysis of the sectors 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 102

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: ECO 260.

ECO 406: International Economic Theory

This course offers advanced treatment of trade models covered in ECO 328 as well as 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 on export promotion & import substitution policies of the developing economics.

Credits 3; Prerequisite: ECO 101, ECO 328

ECO 414: Trade Policy Analysis

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: ECO 328

ECO 433: Gender & Development

This course examines gender discrimination & gender equality as it relates to economic development. Topics include: success and failures of NCO activities that directly address women's participation in development, womanization of poverty in under developed countries.

Credits 3; Prerequisite: None

ECO 443: Social Mobilization, Rural Banking and Community Organization

This is aimed at analyzing the role of grass root organizations and NGO's in development. Their achievements in activities like microcredit, education and awareness building is discussed. Field trips are an integral part of this course.

Credits 3; Prerequisite: None

ECO 447: Applied Economics

This course analyses some selected issues in regulation and government intervention and their impacts. Advanced topics of macro & micro economics are included.

Credits 3; Prerequisite: ECO 301, ECO 302.

ECO 449: Economics of information

Moral hazard, adverse selection in game theoretic models; Individual and social choices under incomplete and imperfect information.

Credits: 3; Prerequisite: ECO 467

ECO 450: Labor Economics

This course surveys a number of topics in labor economics, including the facts underlying the rising labor participation of women, the effects of legislation such as minimum wages and overtime regulation on wages and employment, the factors that determine wage rates paid to different individuals, and in particular the degree to which observed patterns of wages conform to the predictions of the simple competitive model versus other models of wage determination; the economics of education, discrimination in the labor market, and other selected topics.

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, 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: ECO 467

ECO 460: Managerial Economics
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: ECO 301

ECO 465: Basic Econometrics
Main focus is on OLS estimate 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, STA 217

ECO 467: Intermediate Microeconomic Theory II
Advanced treatment of microeconomic concepts. Traditional concepts of theories about production and consumer choice will be discussed with mathematical rigor and special emphasis will be given to market structure, strategic behavior and game theory.
Credits: 3; Prerequisite: ECO 301 and MAT 211

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: MAT 211, and ECO 467

ECO 475: History of Economic Thought
Birth 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 economic discipline.
Credits 3; Prerequisite: ECO 101 or ECO 102

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: None

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. Example includes 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 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. 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 490: Research Methodology
Topics include purpose of scientific research; features and scopes and limitations of research; classification of scientific research; techniques of data collection and selection; various biases in data collection; preparation and presentation of independent seminar. Credits 3; Prerequisite: ECO ECO 465, STA 217

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, 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 495: Supervised Research Paper
In this course, each student will write a research monograph on a topic of his/her choice. S/He will be supervised by a faculty. It is expected that in this research s/he will be able to synthesize a research problem. Credits 3; Prerequisite: ECO 490

EEE 101: Electrical Circuits I
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: loop and node 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. Magnetic Circuits: Magnetic quantities and variables: Flux, permeability and reluctance, magnetic field strength, magnetic potential, flux density, magnetization curve. Laws of magnetic circuits: Ohm's law and Ampere's circuital law. Magnetic circuits: series, parallel and series-parallel circuits. Electrical safety.
The course includes lab work based on theory taught.
Credits: 3+1 = 4; Pre-requisite: None.

EEE 102: Electronic Circuits I
Ideal diode. p-n junction diode: operating principle, current-voltage characteristics, DC and AC models. Diode circuits: Half and full wave rectifiers, rectifier with capacitor filter, clipping and clamping circuits. Zener diode and zener shunt regulator. Bipolar junction transistor (BJT): structure and physical operation, BJT characteristics, BJT as an amplifier, biasing BJT amplifiers, small signal equivalent circuit models, BJT as a switch. Single-stage mid-band frequency BJT amplifiers with different configurations: voltage and current gain, input and output resistances. Metal-oxide-semiconductor field-effect-transistor (MOSFET): structure and physical operation of enhancement type MOSFETs, current-voltage characteristics, threshold voltage and body effect, biasing MOSFET amplifiers, small signal operation and models, single-stage mid-band frequency MOSFET amplifiers with different configurations.
The course includes lab work based on theory taught.
Credits: 3+1 = 4; Pre-requisite: EEE 101

EEE 200: Electrical Services Design
Electrical wiring system design, drafting and estimation. Design for illumination and lighting. Electrical installation system design: substation, air-conditioning, elevator etc. Design for intercom, public addressing system and telephone system. Design for security systems: CCTV, fire alarm, smoke detector, sprinkler system. Issues for designing multistoried buildings.
Credits: 0+1 = 1; Pre-requisite: EEE 201

EEE 201: Electrical Circuits II
Periodic functions: period and frequency. Sinusoidal functions: Instantaneous and effective (r.m.s.) values of current, voltage, power. Complex quantities, phasor representation of sinusoidal quantities. Impedance, real and reactive power, average power and power factor. Single phase ac circuit analysis: Series and parallel RL, RC and RLC circuits, nodal and mesh analysis, application of network theorems in ac circuits, circuits simultaneously excited by sinusoidal sources of several frequencies, transient response of RL and RC circuits with sinusoidal excitation. Resonance in ac circuits: Series and parallel resonance. Magnetically coupled circuits. Analysis of three phase circuits: Three phase supply, balanced and unbalanced circuits, power calculation.
The course includes lab work based on theory taught.
Credits: 3+1 = 4; Pre-requisite: EEE 101

EEE 202: Electronic Circuits II
Operational amplifiers (Op-Amp): properties of ideal Op-Amp, inverting, non-inverting and differential amplifiers, integrator and differentiator, weighted summer and other Op-Amp circuits, effects of finite open-loop gain and bandwidth, large signal operation, DC imperfections. Differential and multistage amplifiers: basic operation of differential amplifier, large signal analysis of BJT and MOS differential pairs, basic analysis of multistage amplifiers. Frequency response: amplifier transfer functions, diode and transistor high-frequency small signal models, techniques of determining 3 dB frequencies of amplifier circuits, frequency responses of single-stage, multistage and differential amplifiers. Negative feedback: properties, basic topologies, analysis of

feedback amplifiers with different topologies, stability.
The course includes lab works based on theory taught.
Credits: 3+1 = 4; Pre-requisite: EEE 102

EEE 203: Numerical Analysis for Electrical Engineering
Numerical solution of algebraic and transcendental equations. Matrices. Interpolation. Curve fitting by least squares. Numerical differentiation and integration. Finite differences. Numerical solution of differential equations.
The course includes lab works based on theory taught.
Credits: 3+1 = 4; Pre-requisites: EEE 101, CSE 105

EEE 204: Electrical Measurement and Instrumentation
Measurement of resistance, inductance and capacitance. Measurement of conductivity of bulk materials. Cable faults and localization of cable faults. Magnetic measurement, ballistic galvanometers, flux meters. Measurement and separation of iron losses. Illumination measurement. High voltage measurements. Instrumentation amplifiers. Transducers: measurement of strain, pressure, temperature and flow. Measuring instruments: classification. Ammeters, voltmeters and multimeters - extension of instrument ranges. Current and voltage transformers. Measurement of power and energy: wattmeters, watt-hour meters and maximum demand indicators. Measurement of speed, frequency and phase difference. Electronic measuring instruments: Oscilloscope, Digital meters - DMM, VTVM, Q meters. Statistical methods in measurements.
The course includes lab works based on theory taught.
Credits: 3+1 = 4; Pre-requisites: EEE 201, EEE 202, for CSE students EEE 251

EEE 301: Electrical Machines I
Basics of electromechanical energy conversion: Faraday's law of electromagnetic induction, Fleming's rule and Lenz's law. Elementary generator: electromagnetic force, left hand rule. Ideal transformer - transformation ratio, no-load and load vector diagrams; Actual transformer - construction, equivalent circuit, regulation, short circuit and open circuit tests, parallel operation; Auto transformer. Three phase induction motor: construction, rotating magnetic field, equivalent circuit, vector diagram, torque-speed characteristics, motor torque and developed rotor power, no-load test, blocked rotor test, starting and braking and speed control. Single phase induction motor: principle of operation, equivalent circuit and starting.
Credits: 3+0 = 3; Pre-requisite: EEE 201

EEE 302: Digital Logic Design
Review of binary number system and codes. 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. Programmable logic devices.
The course includes lab work based on theory taught.
Credits: 3+1 = 4; Pre-requisite: EEE 102

EEE 303: Signals and Systems
Continuous-time and discrete-time signals; commonly encountered signals; unit impulse and unit step functions; sampling and aliasing; continuous-time and discrete-time systems; basic properties. Linear Time-Invariant (LTI) Systems: The convolution sum; the convolution integral; properties; difference and differential equations. Fourier series representation of periodic signals: Continuous and discrete-time periodic signals; properties of continuous and discrete-time Fourier series; Fourier series and LTI systems.Continuous-Time Fourier Transform: Properties; convolution and multiplication properties. Discrete-Time Fourier Transform: Properties; convolution and multiplication properties. Laplace Transform: Region of convergence; inverse Laplace transform; properties; analysis of LTI systems using the Laplace transform. Z-Transform: Region of convergence; inverse z-transform; properties; analysis of LTI systems using the z-transform.
Credits: 3+0 = 3; Pre-requisites: EEE 201, MAT 301

EEE 304: Electrical Machines II

DC generator: Operating principle, construction, classification, no-load voltage characteristics, build-up of a self excited shunt generator, critical field resistance, load-voltage characteristic, effect of speed on no-load and load characteristics and voltage regulation. DC motor: Operating principle, classification, torque, back emf, speed, torque-speed characteristics, starting and speed regulation. Synchronous Generator: excitation systems, equivalent circuit, vector diagrams at different loads, factors affecting voltage regulation, synchronous impedance, synchronous impedance method of predicting voltage regulation and its limitations. Parallel operation: necessary conditions, synchronizing, circulating current and vector diagram. Synchronous motor: Operation, effect of loading under different excitation condition, effect of changing excitation, V-curves.

The course includes lab work based on theory taught.

Credits: 3+1 = 4; Pre-requisite: EEE 301

EEE 305: Electromagnetic Fields and Waves

Electrostatics: Review of 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, Curvilinear co-ordinates, rectangular, cylindrical and spherical co-ordinates, 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, concept 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. Relation between circuit theory and field theory: Circuit concepts and the derivation from the field equations. High frequency circuit concepts, circuit radiation resistance. Skin effect and circuit impedance. Concept of good and perfect conductors and dielectrics. Current distribution in various types of conductors, depth of penetration, internal impedance, power loss, calculation of inductance and capacitance. Propagation and reflection of electromagnetic waves in unbounded media: Plane wave propagation, polarization, power flow and Poyinting's theorem. Transmission line analogy, reflection from conducting and conducting dielectric boundary; Display lines ion in dielectrics, liquids and solids, plane wave propagation through the ionosphere. Introduction to radiation.

Credits: 3+0 = 3; Pre-requisites: MAT 102, PHY 102

EEE 306: Power System Engineering

Line representation: Equivalent circuit of short, medium and long transmission line. Network representation: Single line and reactance diagram of power system and per unit representation. Load flow: Gauss-Seidel method. Power flow control: Tap changing transformer, phase shifting, booster and regulating transformer and shunt capacitor. Fault analysis: Short circuit current and reactance of a synchronous machine. Symmetrical fault calculation methods: symmetrical components, sequence networks and unsymmetrical fault calculation. Power system stability: swing equation, equal area criterion, methods of improving transient stability. Protection: Introduction to relays, differential protection and distance protection. Circuit breakers. Load curves: Demand factor, diversity factor, load duration curves, energy load curve, load factor, capacity factor and plant factor.

Credits: 3+0 = 3; Pre-requisite: EEE 201

EEE 307: Telecommunication Engineering I

Elements of communication systems, necessity of modulation, system limitations, message source, bandwidth requirements, transmission media types, bandwidth and transmission capacity. Noise: Source, characteristics of various types of noise and signal to noise ratio. Amplitude Modulation and Demodulation: Double side band, single side band, vestigial side band. 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. Pulse modulation: Sampling - sampling theorem, Nyquist criterion. Pulse code modulation (PCM) - quantization principle, quantization noise, demodulation of PCM. Frequency and time division multiplexing and their applications. Radio Wave Propagation: Effects of ionosphere and earth's curvature. Introduction to Satellite and Optical Communication. Introduction to telephony: Different types of switching, SPC and digital switching systems, time and space switching.
The course includes lab work based on theory taught.
Credits: 3+1 = 4; Pre-requisite: EEE 303

EEE 308: Electronic Properties of Materials
Crystal Structures: Types of crystals, lattice and basis, Bravais lattice and Miller indices. Classical Theory of Electrical and Thermal Conduction: Scattering, mobility and resistivity, temperature dependence of metal resistivity, Mathiessen's rule, Hall effect and thermal conductivity. Introduction to Quantum Mechanics: Wave nature of electrons, Schrödinger's equation, one-dimensional quantum problems - infinite quantum well, potential step and potential barrier; Heisenberg's uncertainty principle and quantum box. Band Theory of Solids: qualitative description of 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 and average 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 orientational; 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.
Credits: 3+0 = 3; Pre-requisites: PHY 102, MAT 301

EEE 309: Digital Signal Processing
Introduction to Digital Signal Processing (DSP): 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 Transformations: 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. Digital Filters: 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.
The course includes lab works based on theory taught.
Credits: 3+1 = 4 Pre-requisite: EEE 303

EEE 310: Electronic Circuits III
Active filters: different types of filters and specifications, transfer functions, realization of first and second order low, high and band pass filters using Op-Amps. Signal generator: basic principle of sinusoidal oscillation, Op-Amp RC oscillator, LC and crystal oscillator. Power amplifier: classification of output stages, class A, B and AB output stages. MOSFET switch: circuit structure, static and dynamic operation of a CMOS inverter, basic CMOS logic-gate circuits, noise margin and propagation delay. Junction field effect transistor (JFET): structure and physical operation, characteristics. Logic operation and brief description of RTL, DTL, TTL and ECL logic families.
Credits: 3+0 = 3; Pre-requisite: EEE 202

EEE 401: Microprocessors and Interfacing

Different types of microprocessors (8 bits and 16 bits). Instruction sets. Hardware organization. Microprocessor interfacing. Intel 8086 microprocessor: Architecture, addressing modes, instruction sets, 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. Introduction to micro-controllers.

The course includes lab work based on theory taught.

Credits: 3+1 = 4; Pre-requisites: EEE 102, CSE 105

EEE 402: Control Systems

Linear System Models: Transfer function, block diagram and signal flow graph (SFG).

State Variables: SFG to state variables, transfer function to state variable and state variable to transfer function. Feedback Control System: Closed loop systems, parameter sensitivity, transient characteristics of control systems, effect of third pole and zero on the system response and system types and steady state error. Routh stability criterion. Root locus method and frequency response method. Design of Feedback Control System: Controllability and observability, root locus, frequency response and state variable methods. Digital Control Systems: Introduction, sampled data systems, stability analysis in Z-domain. Solving & analysis various problems by using Matlab.

The course includes lab work based on theory taught.

Credits: 3+1 = 4; Pre-requisite: EEE 303 or ICE 304

EEE 403: Semiconductor Devices

Brief review of charge carriers in semiconductors. Drift of carriers in electric fields, diffusion of carriers, diffusion process, built-in field, continuity equation and diffusion length. P-N junctions in Equilibrium: contact potential, Fermi level, space charge. Current flow in a P-N Junction: qualitative description, carrier injection, the diode equation, reverse- bias Breakdown, Zener Breakdown, avalanche Breakdown. AC condition of p-n junctions: stored charge, reverse recovery transient, diffusion capacitance and junction capacitance. Metal semiconductor junctions: Schottky barrier, rectifying and Ohmic contacts. Bipolar junction transistor: BJT fundamentals, Ebers-Moll equation, capacitance and charging times. Metal-insulator-semiconductor FET: basic operation, ideal MOS capacitor, flatband voltage, threshold voltage, MOS capacitance-voltage analysis. MOS field-effect transistor: I-V relationship, substrate bias effect, control of threshold voltage, short channel effects, frequency limitations.

Credits: 3+0 = 3; Pre-requisites: EEE 102, EEE 308

EEE 404: Engineering and Professional Ethics

Definition and scopes of ethics. Different branches of ethics. Social change and emergence of new technologies, History and development of engineering ethics. Study and application of ethics in engineering. Human qualities of an engineer. Obligation of an engineer to the clients and to the society. Interaction among engineers. Ethical expectations: employers and employees, inter-professional relationships, desired characteristics of a professional code, ethical standards, institutionalization of ethical conduct.

Credits: 3+0 = 3; Pre-requisite: None

EEE 411: Quantum Phenomena in Nanostructures

Fundamentals of Quantum Mechanics: Concept of effective mass; bra-ket notations of state vectors; Schrödinger's equation; matrix formulation of quantum mechanics. Scattering Theory: Born approximation and partial wave analysis. Approximation Methods: Different types of approximation methods including perturbation theory. Fundamentals of Non-Equilibrium Statistical Mechanics: Scattering and relaxation. Carrier transport: Density of states, tunneling and transmission probabilities; basic principles of tunnel diode, superlattice and quantum dot.

Credits: 3+0 = 3; Pre-requisite: EEE 308

EEE 412: Theory of Semiconductor Devices

Lattice Vibration: Simple harmonic model, dispersion relation, acoustic and optical phonons. Band Structure: Isotropic and anisotropic crystals, band diagrams and effective masses of different semiconductors and alloys. Scattering theory: Review of classical theory, Fermi-Golden rule, scattering rates of different processes, scattering mechanisms in different semiconductors, mobility. Different Carrier Transport Models: Drift-diffusion theory, ambipolar transport, hydrodynamic model, Boltzmann transport equations, quantum mechanical model, simple applications.

Credits: 3+0 = 3; Pre-requisite: EEE 308

EEE 413: Fundamentals of Nanotechnology

Introduction to nano-dimension and paradigm, definitions, background and current practice. Basic concepts: brief review of molecules and periodic table, introduction to organic molecules and polymers, electron spin. Carbon nanotubes: formation, bandstructure, structural and electronic properties. Nanofabrication: nanoscale lithography, molecular synthesis, self-assembly, nanocrystal growth. Nanoelectronics: Modification of bandstructure and density-of-states by quantization, ballistic transport, structure, operating principle and characteristics of carbon nanotube transistor, molecular transistor, spin polarized transistor. Nanophotonics: effect of carrier confinement on stimulated emission, light in nanoscale structures, photonic crystals. Quantum computing: basic physics, quantum computing devices, quantum computing algorithms. Other important applications: micro-electro-mechanical systems (MEMS), sensors, biostructures etc.

Credits: 3+0 = 3; Pre-requisite: EEE 308

EEE 414: Optoelectronics

Properties of light: Particle and wave nature of light, polarization, interference, diffraction and blackbody radiation. 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. 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. Photo-Detectors: Photoconductors, junction photo-detectors, PIN detectors, avalanche photodiodes and phototransistors. Solar Cells: Solar energy and spectrum, silicon and Schottky solar cells. Modulation of light: Phase and amplitude modulation, electro-optic effect, acousto-optic effect and magento-optic devices.

Credits: 3+0 = 3; Pre-requisite: EEE 403

EEE 415: Semiconductor Processing and Fabrication

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. Growth and deposition of dielectric layers: Thermal oxidation, CVD, plasma CVD, sputtering and silicon-nitride growth. Etching: Wet chemical etching, silicon and GaAs etching, anisotropic etching, selective etching, dry physical etching, ion beam etching, sputtering etching and reactive ion etching. Cleaning: Surface cleaning, organic cleaning and RCA cleaning. Lithography: Photo-reactive materials, pattern generation, pattern transfer and metallization. Discrete device fabrication: Diode, transistor, resistor and capacitor. Integrated circuit fabrication: Isolation - pn junction isolation, mesa isolation and oxide isolation. BJT based microcircuits, p-channel and n-channel MOSFETs, complimentary MOSFETs and silicon on insulator devices. Testing, bonding and packaging.

Credits: 3+0 = 3; Pre-requisite: EEE 403

EEE 416: VLSI Circuits and Systems

VLSI Technology: Top down design approach, technology trends and design styles.

Review of MOS Transistor Theory: Threshold voltage, body effect, I-V equations and characteristics, latch-up problems. NMOS and CMOS inverter, pass-transistor and transmission gates. CMOS Circuit Characteristics and Performance Estimation: Resistance, capacitance, rise and fall times, delay, gate transistor sizing and power consumption. CMOS Circuit and Logic Design: Layout design rules and physical design of simple logic gates. CMOS Building Blocks: adders, counters, multipliers, memory structure, arithmetic logic unit. Programmable logic arrays. I/O systems. VLSI Testing: objectives and strategies.

The course includes lab works based on the concepts introduced.

Credits: 3+1 = 4; Pre-requisite: EEE 310

EEE 418: Analog Integrated Circuits

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.

Credits: 3+0 = 3; Pre-requisite: EEE 310

EEE 419: Biomedical Electronics

The human body; an overview, forms of mammalian cells, bioelectricity; Electro conduction system of the heart; Bio-electric amplifiers; carrier amplifiers; 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.

Credits: 3+0 = 3; Pre-requisites: EEE 202, EEE 204

EEE 421: RF and Microwave Engineering

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.

Credits: 3+1 = 4; Pre-requisites: EEE 305, EEE 307

EEE 422: Digital Communications

Introduction to Communication channel - Communication channels, mathematical model and characteristics; Probability and stochastic processes. Source coding: Mathematical models of information, entropy Huffman code and linear predictive coding. Scrambling/descrambling; Multiplexing techniques; Additive white Gaussian noise (AWGN); Detection techniques for baseband digital signals corrupted by AWGN; Eye diagrams and intersymbol interference (ISI); Bit error performance of base band digital signals in presence of AWGN and ISI; Error control coding schemes; Description of M-array digital

modulation systems (PSK, MSK, QAM); Symbol error performances in the presence of AWGN and ISI and co-channel interference (CCI); Power spectral analyses; Bandwidth requirements and timing recovery circuits; Reliability objectives; System gain; Fade margin requirements for a specific system availability; Design guidelines; Transparent and regenerative transponders; Single channel per carrier (SCPC) systems; Frequency division multiple access (FDMA); Time division multiple access (TDMA) systems; Link budget.

The course includes lab works based on the concepts introduced.

Credits: 3+1 = 4; Pre-requisites: EEE 202, EEE 307

EEE 423: Wireless and Mobile Communications

Concept, evolution and fundamentals of wireless and mobile communications; analog and digital cellular systems. Cellular Radio System: Frequency reuse, co-channel interference, cell splitting and components. Mobile radio propagation: Propagation characteristics, models for radio propagation, antenna at cell site and mobile antenna. Frequency Management and Channel Assignment: Fundamentals, spectrum utilization, fundamentals of channel assignment, fixed channel assignment, non-fixed channel assignment, traffic and channel assignment. Handoffs and Dropped Calls: Reasons and types, forced handoffs, mobile assisted handoffs and dropped call rate. Diversity Techniques: Concept of diversity branch and signal paths, carrier to noise and carrier to interference ratio performance. Digital cellular systems: Global system for mobile, time division multiple access and code division multiple access; Mobile propagation; Channel modeling; Principles of cellular communications systems; Multiple access techniques; Pan-European digital cellular mobile system (GSM): radio aspects, network aspects; GPRS, HSCSD and EDGE; UMTS/IMT2000: radio aspects, network aspects.

The course includes lab works based on the concepts introduced.

Credits: 3+1 = 4; Pre-requisites: EEE 202, EEE 307

EEE 424: Fiber Optics

Theory of Light Propagation: Ray optics theory and mode theory. Optical Fiber: Types and characteristics, transmission characteristics, fiber joints and fiber couplers. Light Sources: Light emitting diodes and laser diodes. Detectors: PIN photo-detector and avalanche photo-detectors. Receiver Analysis: Direct detection and coherent detection, noise and limitations. Transmission Limitations: Chromatic dispersion, nonlinear refraction, four wave mixing and laser phase noises. Optical Amplifier: Laser and fiber amplifiers, applications and limitations. Multi-Channel Optical System: Frequency division multiplexing, wavelength division multiplexing and co-channel interference.

The course includes lab works based on the concepts introduced.

Credits: 3+1 = 4; Pre-requisites: EEE 202, EEE 307

EEE 425: Digital Image Processing

Digital image fundamentals: image digitization, sampling and quantization, image resolution, color perception and processing, image processing: pixel based information, geometric transformation, local processing (edge detection, subpixed location estimation) restoration (degradation, inverse fitting and weiner filtering), binary image processing: thesholding, runlength encoding, distance transforms, medical axis transforms, morphological operations, region segmentation and representation: split and mere algorithm, region growing, image filtering-histogram modification, linear and Gaussian filters, contours- digital curves, polyline splitting, Hop-along algorithm, Conic and Splines Hough transform, Fourier description, textures: statistical syntactic and model based methods, image transforms- Fourier, Hadamard, discrete cosine, wavelets and other orthogonal transforms, compression image (predictive compression methods, vector quantization, hierarchical and progressive methods, JPEG and MPEG), case studies.

The course includes lab works based on the concepts introduced.

Credits: 3+1 = 4; Pre-requisite: EEE 309

EEE 426: Telecommunication Engineering II

Introduction: principle, evolution, networks, exchange, standards. Switching systems: introduction to analog system, digital systems. Traffic analysis: traffic characterization, grades of service, network blocking probability, queuing. Modern telephony: internet telephony, integrated services digital network, asynchronous transfer and intelligent networks. Fundamentals of satellite communication: orbits and constellations, free-space loss, attenuation and polarization, link budget. Satellite communication systems: INTELSAT, GPS, GEO, MEO, LEO and VSAT. Earth-station technology.

Credits: 3+0 = 3; Pre-requisite: EEE 307

EEE 431: Advanced Logic Design

Graph-based representation of logic functions - binary and multiple-valued decision diagrams and their use in logic minimization. Logic functions with various properties and equivalence classes of logic functions. Optimization of sequential networks. Delay and asynchronous behavior. Multi-valued input and two-valued output functions. Heuristic optimization of two-level networks. Multi-level logic synthesis. Logic design using modules. Logic design using EXORs. Register transfer logic design. Hardware description language. Logic synthesis with FPGAs.

Credits: 3+0 = 3; Pre-requisite: EEE 302

EEE 432: Microprocessor Based System Design

Limitations of 16 bit processors. 32 bit microprocessors (Intel 80386/80486, Motorola 68000) internal architecture, addressing modes, instructions, memory and I/O interfaces, system design, programming, applications to industrial process control. Embedded processors architecture advanced port, programming, controller design for adjustable speed motor devices.

The course includes lab works based on the concepts introduced.

Credits: 3+1 = 4; Pre-requisite: EEE 401

EEE 433: Computer Networks

Introduction: What is the Internet, What is a 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: Mechanisms. What protocol mechanisms/techniques are commonly found in networks (particularly Internet) protocols and why are they used? Signaling, randomization, indirection, multiplexing, virtualization, scalability. Introduction to Queuing: M/M/1; closed loop system models; packet versus fluid models; bounding techniques (e.g., Chernoff bound); normal distributions (equivalent bandwidth), network calculus Measurement. Workload models; traffic and topology characterization, analysis (LRD, heavy tails). The course includes lab works based on the concepts introduced.

Credits: 3+1 = 4; Pre-requisite: CSE 105

EEE 434: Computer Architecture

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.
Credits: 3+1 = 4; Pre-requisite: EEE 302

EEE 441: Power Stations
Estimates of load, load curves, study and analysis of load curves, interpretation of load curves. Determination of actual demand and capacity of various components in a system, plotting the expected load curve of a system. Use of the load curve. Load growth and extrapolation of load curves. Selection of service requirements, its effect on plant design. Cost consideration. Equations of performance for plant equipment and electric service. Selection of units, standby units, large or small units. Number and sizes of units. Plant location. Considerations for site selection for different types of plants. Generation considerations for different types of power plants-big, medium and small, conventional and nuclear. Economic marginal transmission cost. Graphical solution for location of different types of distribution. Rectangular distribution of loads. Economic conductor section. General consideration. The ideal conductor. Effect of any deviation from the ideal cross section. Limits for size of underground cables. Selection of ideal supply voltage. Plant performance and operation characteristics. Performance characteristics. Efficiency. Heat rate. Incremental rate method. Station performance characteristic. Station incremental rate. Capacity scheduling. Base load and peak load. Load division between steam and hydro stations. Bus systems, Importance of power control. Current limiting reactors. Different types of bus system layout. Forces on buses in case of short circuits. Nuclear power stations. Comparison with conventional generation methods. Chain reactors. Moderators. Classification of reactors. Types of reactors. Special power reactors. Shielding.
Credits: 3+0 = 3; Pre-requisite: EEE 306

EEE 442: Switchgear and Protective Relays
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 arc 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 instrument transformer for relays. Problems of high speed relaying of transmission lines. Overcurrent 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.
Credits: 3+0 = 3; Pre-requisite: EEE 201

EEE 443: Special Machines
Generalized energy conversion processes, general principles of electromechanical energy conversion, energy storage. Interpretation of generalized machines from field concepts. Linear induction motor, stepper motor, universal motor, electrostatic motor, repulsion motor, permanent magnet motor, shaded pole motor, hysteresis motor, synchronous reluctance and switched reluctance motor, amplidynes and metadynes. Introduction to vector control of induction motors. Introduction to electric traction.
Credits: 3+0 = 3; Pre-requisite: EEE 304

EEE 444: High Voltage Engineering
High voltage dc: rectifier circuits, voltage multipliers, Van-de-Graff generators, electrostatic generators. High voltage ac: cascaded transformers and Tesla coil. Impulse voltage: shapes, mathematical analysis, single and multi stage impulse generators, tripping and control of impulse generators. Breakdown in gas, liquid and solid dielectrics. High voltage

measurements and testing. Over voltage phenomena and insulation co ordination: lightning and switching surges, basic insulation level, surge diverters, arresters, protector tubes and metal oxide varistors.
Credits: 3+0 = 3; Pre-requisite: EEE 306

EEE 445: Renewable Energy
Importance of renewable energy, sources; Statistics regarding solar radiation and wind speed; Insulation; geographical distribution, atmospheric factors, measurements; Solar cell; principle of operation, spectral response, factors affecting conversion efficiency, I_V characteristics, maximum power output; PV modules and arrays; stationary and tracking; PV systems; stand alone, battery storage, inverter interfaces with grid; Wind turbine generators; types; operational characteristics; cut-in and cut-out speed, control, grid interfacings, AC-DC -AC link.
Credits: 3+0 = 3; Pre-requisite: EEE 102

EEE 446: Power System Operation and Reliability
Introduction to unit commitment, contingency evaluation and security assessment; Automatic generation control; Reliability concepts; general reliability functions, exponential distribution, mean time to failure, series- parallel systems, Markov's process; Generation model; Load model; Reliability evaluation of a power system; LOLP, LOEP.
Credits: 3+0 = 3; Pre-requisites: MAT 102, EEE 306

EEE 447: Power Electronics
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.
The course includes lab works based on the concepts introduced.
Credits: 3+1 = 4; Pre-requisites: EEE 202, EEE 403

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 improve 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 generally 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.
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 characteristic 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 etc.
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, you will learn how to develop and deliver messages and how to use

supporting materials. You 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 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.

ENG 213: English Satire
Dryden: *McFlecknoe*
Swift: *Gulliver's Travels*
A Battle of the Books
Addison: *"Sir Roger at Church"*
"Sir Roger at the Assizes"
Pope: *"Epistle to Dr. Arbuthnot"*
Byron: *Don Juan, Book I*
Orwell: *Animal Farm*
Credits: 3, Prerequisite: ENG 191+ ENG 192

ENG 222: Introduction to Bangla Literature
বাংলা সাহিত্য
বাংলা ভাষা ও সাহিত্য সম্পর্কে শিথীদের কৌতূহল স্বজন 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 : শাস্তি, রবিবার ।
প্রভাতকুমার মুখোপাধ্যায় : বিবাহের বিজ্ঞাপন ।
প্রেমেন্দ্র মিত্র : বিকৃতুধার ফাঁদে ।
সুবোধ ঘোষ : জতুগৃহ ।
আখতারুজ্জামান ইলিয়াস : উৎসব ।
Credits: 3, Prerequisite: ENG 191+ 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, meetings 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 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 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
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. Texts include selections from Thomas Kyd, Christopher Marlowe, William Shakespeare, Ben Jonson, and William Congreve.
Credits: 3, Prerequisite: ENG 191 + 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 module 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

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 + at least 8 other courses

ENG 313: English for the Media
This paper seeks to train students in journalistic writings such as short news reports with catchy 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 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 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. This course 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 155 + ENG 309 + at least 5 literature courses

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 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+ENG192

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 145 + ENG 154

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 will try 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 the 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: Completion of at least 10 literature courses

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 207 + 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 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 303 + ENG 306 & ENG 335

ENG 415: Language Policy and Planning
The purpose of this course is to introduce students to some 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 208

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 Whitman.
Credits: 3, Prerequisite: ENG 191+ENG192 + at least 3 other literature courses

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 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: ENG 191 +ENG192+ 6 other literature courses

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-191 + ENG-192 + 4 other literature courses

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 420+ at least 8 other literature courses

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: Completion of at least 8 literature courses

ENG 435: Postcolonial Theory and Literature
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: Completion of at least 12 literature courses

ENG 436: ELT Project
The purpose of this course is to provide students 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: 10 courses in Linguistics and ELT/Applied Linguistics

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, and Arnold.
Credits: 3, Prerequisite: Completion of at least 12 literature courses

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 + 12 other literature courses

ENG 445: Modern Poetry
This course will study 20th century Modern English and American lyric poetry. While not striking a delicate balance between the English and American poets, the course will place the major thrust on the 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+ at least 7 other literature courses

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 its affinities 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 155+309

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. The following authors will be read: John Fowles, A.S. Byalt, Harold Pinter, Tom Stoppard, Philip Larkin, Ted Hughes, Sylvia Plath and J. G. Farell
Credits: 3, Prerequisite: 5 Literature courses

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: Completion of at least 6 literature courses

ENG 458: Feminist Readings of Literature.
This 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, Pre-requisite: 6 literature courses

ETE 101: Introduction to Telecommunication Engineering
Idea of signals and systems; Digital and Analog sources and systems; Block diagram of a basic communication system and functions of its different parts; Basics of the propagation of electromagnetic (EM) waves; Formal definition of information; Fourier series; Idea of spectra of signals; Information data rate and bandwidth of a signal; Channel capacity and ideal communication systems; Basic idea of coding; Concept of telephone switching systems; Basics of telecommunication networks; Idea of different types of telecommunication systems (Wireless, Optical Fiber and Satellite Communications).
Credits: 1; Prerequisite: None.
Recommended Textbook: This is a very basic course and there is no standard textbook for it. Course materials will be collected from various basic texts.
Reference Book: Signals & Systems, S. Haykin and B. Van Veen, Wiley & Sons.

ETE 105: Computer Fundamentals & Programming Language

Introduction to HTML: Mark up tags for basic document layout: paragraph tags, headings, ordered and unordered lists, definition lists, nested lists Tables: cell alignment Visual effects: logical and visual styles, special characters Hypertext links: directory paths, links to other documents, links inside documents Including multimedia objects: images, sound and video.

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 and unions, file management, graphics programming.

The course includes lab work based on theory taught.

Credits: 3 (Theory)+1(Lab)=4; Prerequisite: None.

Recommended Textbook: 1. HTML: The Complete Reference, Thomas A. Powell, Osborne /McGraw-Hill.

2. Programming in ANSI C, E. Balagurusamy, McGraw-Hill Education.

Reference Book: Schaum's Outlines Programming with C, Byron Gottfried, McGraw-Hill.

ETE 107: Electrical Circuits - I

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: loop and node 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.

Credits: 3 (Theory)+1(Lab)=4; Pre-requisite: None.

Recommended Textbook: 1. Introduction to Electric Circuits, RC. Dorf, John Wiley.

2. Introduction to Electrical Circuits, Nilsson, Addison-Wesley.

Reference Book: Engineering Circuit Analysis, Hayt & Kemmerly, McGraw Hill.

ETE 207: Electrical Circuits - II

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. Magnetically coupled circuits. Balanced and unbalanced three phase circuits, power calculation. Series and parallel resonance.

The course includes lab work based on theory taught.

Credits: 3 (Theory)+1(Lab)=4; Prerequisite: ETE 107.

Recommended Textbook: 1. Introduction to Electric Circuits, RC. Dorf, John Wiley.

2. Introduction to Electrical Circuits, Nilsson, Addison-Wesley.

Reference Book: Engineering Circuit Analysis, Hayt & Kemmerly, McGraw Hill.

ETE 212: Electronic Circuits - I

Diode: physical operation, terminal characteristics, circuit analysis, and applications - rectifier, clipper, clamper, Zener diode. MOSFET: physical operations, terminal characteristics, threshold voltage, body effect, early effect, biasing, amplifier configurations, small and large signal model, and frequency response. Op-Amp: ideal op-amp, inverter, non-inverter, difference amplifier, integrator, differentiator, and weighted summer. Open and closed loop gain, large signal operation, DC imperfection, and frequency response.

The course includes lab work based on theory taught.

Credits: 3 (Theory)+1(Lab)=4; Pre-requisite: ETE 207.

Recommended Textbook: 1. Microelectronic Circuits and Devices, M.N. Horenstein, Prentice Hall.

2. The Art of Electronics, P. Horowitz and W. Hill, Cambridge University Press.

Reference Book: Microelectronic Circuits, Sedra and Smith, Saunder's College Publishing.

ETE 214: Electronic Circuits - II

MOS differential amplifier: small signal equivalent circuit, high frequency response, active load, and CMRR. Introduction to multistage amplifiers. Feedback: concept, properties of negative feedback, shunt and series topologies, and stability. Filters: transmission function, Butterworth, Chebychev, 1st and 2nd order filter. Introduction to active filters. Signal Generators: sinusoidal oscillators, Wien bridge, and LC-crystal oscillator. BJT: physical operation, terminal characteristics, biasing, small and large signal model. Classification of power amplifiers: class A, AB, B, power conversion efficiency. Integrated circuits: current sources, current mirrors, small signal, and high frequency analysis. Introduction to cascade amplifiers and advanced mirror circuits.

The course includes lab work based on theory taught.

Credits: 3 (Theory)+1(Lab)=4; Prerequisite: ETE 212.

Recommended Textbook: 1. Microelectronic Circuits and Devices, M.N. Horenstein, Prentice Hall.

2. The Art of Electronics, P. Horowitz and W. Hill, Cambridge
University Press.

Reference Book: Microelectronic Circuits, Sedra and Smith, Saunder's College Publishing.

ETE 216: Signals & Systems

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.

Credits: 3; Prerequisite: MAT 205.

Recommended Textbook: Signals & Systems, S. Haykin and B. Van Veen, Wiley & Sons.

Reference Book: Signals & Systems, Alan V. Oppenheim, Prentice Hall.

ETE 219: Electronic Properties of Materials

Atomic structure of crystals; Classical waves; quantization; wave-particle duality; Elementary quantum mechanics of the electron; Chemical bonding and the periodic table; The free electron theory of metal; Band theory of solids; Semiconductors: Doping, holes, statistics, transport, and excess carriers; Introduction to semiconductor device concepts; Dielectric properties of materials; Magnetic properties of materials; Superconducting properties of materials.

Credits: 3; Pre-requisite: PHY 209.

Recommended Textbook: 1. Electronic Materials & Devices: D.K. Ferry and J.P. Bird,
Academic Press, 2001.

2. Solid State and Semiconductor Physics, J. McKelvey, 1982.

3. Electronic Properties of Materials: Rolf E. Hummel, Springer, 2001.

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.

ETE 261: Introduction to Bioengineering

Covers, at an introductory level, a variety of topics such as cellular and molecular therapies, novel medical devices to diagnose and treat disease, engineering and computational models of the body, genomics, biomechanics, cell signaling, and tissue engineering. Application of statics and dynamics to simple force analyses of the musculoskeletal system. Introduction to the fundamentals of strength of materials; Biomechanics of soft and hard tissues: microstructure and mechanical properties.

Credits: 3; Prerequisite: PHY 209

Recommended Textbook: 1. Introduction to Bioengineering: Edited by Y.C. Fung, World Scientific.

2. Introduction to Biomedical Engineering: Enderle, Blanchard, and
Bronzino, Academic Press, 2000.

Reference Book: Introduction to Bioengineering: Edited by S.A. Berger, E.W. Doldsmith and E.R. Lewis, Oxford University Press.

ETE 281: Introduction to Environmental Engineering

Introduction, Mass and Energy Fundamentals, Physical Chemistry and Principles, Organic Chemistry, Microbiology and Microbial Growth, Erosion Control and Storm-water Management, Water Quality, Water Treatment, Solid Waste, Hazardous Waste, Air Pollution, Global Events.

Credits: 3; Prerequisite: CHE 109, PHY 109
Recommended Textbook: 1. Introduction to Environmental Engineering: M.L. Davis and D.A. Cornwell, McGraw-Hill, 2006.
2. Introduction to Environmental Engineering and Science: G.M. Masters, Prentice-Hall, 1998.
Reference Book: Introduction to Environmental Engineering: P.A. Vesilind and S.M. Morgan, Brooks/Cole Pub. Co., 2003.

ETE 302: Computer Communications & Networks
Introduction to computer and telecommunication networks, types of switching- circuit message and packet, transmission media characteristics, data communication principles - asynchronous and synchronous, layered architecture for computer networks, 7 layer OSI network model, standards for different layers, RS-232 C, X. 21. HDLC, X. 25 TCP/IP etc. network topologies, WAN, MAN, Intranet and LAN technology, IEEE 802 standards, ISDN & B-ISDN, frame relay and ATM network, traffic theory and network performance.
The course includes lab work based on theory taught.
Credits: 3 (Theory)+1(Lab)=4; Prequisite: ETE 101, ETE 105.
Recommended Textbook: Computer Networks, Andrew S. Tanenbaum, Prentice Hall.
Reference Book: Data and Computer Communications, Stallings, MacMillan.

ETE 310: Electromagnetic Theory
Electromagnetism: Orthogonal Curvilinear co-ordinates (Rectangular, Cylindrical and Spherical); Laplace's and Poisson's equations, method of images, energy of an electrostatic system; Vector magnetic potential, energy of magnetostatic system, mechanical forces and torques in electric and magnetic fields, solutions to static field problems; solution to Laplace's equations.
Electrodynamics: Maxwell's equations, displacement current, equation of continuity, boundary condition; Propagation of uniform plane waves in perfect dielectric and in lossy medium, reflection, refraction, phase and group velocities, transmission line: evaluation of line parameters, design concepts, cutoff frequency, attenuation, dispersion, power handling capacity, traveling waves, standing waves, Smith chart and matching techniques, pulse propagation, radiation concept: elementary dipole, half-wave dipole, radiation patterns, gain, pattern multiplication, basic antennas.
Credits: 3; Prerequisite: MAT 205.
Recommended Textbook: Engineering Electromagnetics, W.H. Hyat, McGraw-Hill.
Reference Book: Field and Wave Electromagnetics, D.KK. Cheng, Addison Wesley.

ETE 311: Digital Electronics
Idea of Number systems; Binary Logic - Basic Boolean operators (AND, OR, NOT); Boolean algebra and logic circuits: De Morgan's Laws; Further Boolean operators (XOR, NAND, NOR); Switching algebra; Minimizing functions using maps and combinational circuit analysis. Different logic families, TTL, ECL, NMOS, CMOS, pass transistor logic, combinational logic circuits:- adders/subtractor, demultiplexers, encoders, decoders, ROMs, PLAs etc. sequential logic circuits:- flip flops and latches, shifters, counters, finite state machine - state transition diagrams and state transition tables, memory elements:- ROM, PROM, RAM-SRAM, DRAM. Introduction to VERILOG and FPGA.
The course includes lab work based on theory taught.
Credits: 3 (Theory)+1(Lab)=4; Prerequisite: ETE 214.
Recommended Textbook: Digital Design, M.M. Mano, Prentice Hall.
Reference Book: Digital Fundamentals, T.L. Floyd, Prentice Hall.

ETE 312 Communications Theory
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.
Signal Space Analysis: Geometric representation of signals; Conversion of the continuous AWGN channel into a vector channel; Likelihood functions; Coherent detection of signals in noise; Correlation receiver; Probability of error.
Credit: 3; Prerequisite: ETE 216.
Recommended Textbook: 1. Communications System, Simon Haykin, Wiley.
2. Modern Digital & Analog Communication Systems, Lathi.
Reference Book: Digital Communications, John J. Proakis, McGraw Hill.

ETE 314: Digital Communications
Baseband Signal Transmission: Power spectral density of different line codes; The matched filter, properties of the matched filter; Error rate due to noise; Intersymbol interference; Nyquist's criterion for distorsionless baseband binary transmission; Correlative level coding; Baseband M-ary PAM transmission; Digital subscriber lines; Optimum linear receiver; Adaptive equalization.
Passband Signal Transmission: Passband transmission model; Hierarchy of digital modulation techniques; Coherent binary amplitude-shift keying (ASK); Coherent binary phase-shift keying (PSK); Coherent binary frequency-shift keying (FSK); Coherent quadriphase-shift keying (QPSK); Coherent minimum phase-shift keying (MSK); Noncoherent orthogonal modulation; Noncoherent binary FSK; Differential PSK (DPSK); M-ary PSK; M-ary quadrature amplitude modulation (QAM); Carrierless amplitude/phase (CAP) modulation; M-ary FSK; Power spectra; Bandwidth efficiency; Synchronization; Multichannel modulation and the idea of OFDM.
Multiple Access Techniques: FDMA, TDMA, Concept of Spread-Spectrum & CDMA.
The Course includes lab work based on theory taught.
Credits: 3 (Theory)+1(Lab)=4; Prerequisite: ETE 312.
Recommended Textbook:
1. Communication Systems, Simon Haykin, Wiley.
2. Modern Digital & Analog Communication Systems, Lathi.
Reference Book: Digital Communications, John J. Proakis, McGraw Hill.

ETE 316: Microprocessors & Interfacing
Microprocessor and its Architecture: Internal microprocessor architecture, real mode memory addressing, protected mode memory addressing, memory paging. Addressing Modes: Data addressing modes, program memory addressing modes, stack memory-addressing modes. Data Movement Instructions: MOV, PUSH/POP, load effective addresses, string data transfer, miscellaneous data transfer instructions, segment override prefix, assembler. Arithmetic, Logic and Program Control Instructions: Arithmetic operations, BCD and ASCII arithmetic, basic logic instructions, shift and rotate, string comparisons, the jump group, controlling the flow of assembly language program, procedures, interrupts, machine control instructions. Programming in Microprocessor: Modular programming, using keyboard and video display, data conversions, disk files. 8086/8088 Hardware Specifications: Pin outs and pin functions, clock generators, bus buffering and latching, bus timing, ready and the wait state, minimum mode and maximum mode. Peripheral Interfacing: Parallel versus serial transmission, synchronous and asynchronous serial data transmission, interfacing of hexadecimal keyboard and display unit, CRT terminal interfacing, printer interface, floppy disk interface, DMA controllers. 80186, 80286, 80386, 80486, Pentium and Pentium Pro Microprocessors: Introduction, memory management, special features.
The course includes lab work based on theory taught.
Credits: 3 (Theory)+1(Lab)=4; Prequisite: ETE 311.
Recommended Textbook: System Design with MC68020, MC69040. 32-bit Microprocessors, A. Noor, Van Nostrand Reinhold.
Reference Book: The Inter Microprocessors 8088/8088, 80186, 80286, 80386 and 80486: Architecture, Programming and Interfacing Techniques, MacMillan.

ETE 322: Digital Signal Processing
The z-Transform; Properties of the Region of Convergence; Properties of the z-Transform; Inversion of the z-Transform; Transform Analysis of LTI Systems; Signal representation using unitary transforms, DFT, DCT, Haar and Walsh Hadamard transform, properties of DFT, circular convolution, linear convolution using DFT, overlap add and save methods, FFT, filter structures for IIR and FIR filters, direct form I and II, parallel and cascade forms, frequency sampling structure for FIR filters, linear

phase FIR filters, digital filter design techniques, IIR filter design by impulse invariance and bilinear transformation, transformation of digital filters, FIR filter design using windows, MATLAB based examples, introduction to multirate DSP, decimation and interpolation, polyphase decomposition, uniform DFT filter banks, quadrature mirror filters and perfect reconstruction, introduction to finite register length effects on digital filter performance, spectral estimation.

The course includes lab work based on theory taught.

Credit: 3 (Theory)+1(Lab)=4; Prerequisite: ETE 216.

Recommended Textbook: Digital Signal Processing, John G. Proakis, Prentice Hall.

Reference Book: Signals and Systems, Ziemer, Tranter and Fanin, Prentice Hall/MacMillan.

ETE 350: Information Theory & Coding

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; Idea of cryptography.

Credits: 3; Prequisite: ETE 314.

Recommended Textbook:

1. Communication Systems, Simon Haykins, Wiley.
2. Modern Digital & Analog Communication Systems, Lathi.

Reference Book: Digital Communications, John J. Proakis, McGraw-Hill.

ETE 399: Design & Simulation

Introduction - Modeling of energy-based systems. Modeling the structure of design problems - Influence diagrams, Modeling Design Objectives, What is modeling and Simulation? Modeling of energy-based systems - The Modelica Language, Evaluation and comparison of continuous-time M&S software, Solving differential (algebraic) equations, Debugging Modelica Models. Modeling uncertainty - Sources and types of uncertainty, Representation of uncertainty, Computing with uncertainty information, Sensitivity Analysis, The Method of Morris.

Modeling preferences - Value functions and trade-offs under certainty, Utility theory, Multi-attribute utility theory, The role of optimization in design, Information Economics -- trade-offs between (design) process and system objectives

Selected Topics - Information Modeling for Systems Engineering - SysML.

Credits: 0 (Theory)+1(Lab)=1; Prerequisite: Up to all ETE 300 level courses, ETE 350.

Recommended Textbook: 1. Introduction to Systems Engineering, A.P. Sage, J.E. Armstrong Jr.
Wiley & Sons, 2000. (ISBN: 0471027669).

2. Continuous System Simulation, F.E. Cellier and E. Kofman, Springer,
2006. (ISBN: 0387261028).

3. Simulation with Arena, 3rd edition, W. Kelton, R. Sadowski, D. Sturrock,
McGraw-Hill, 2003. (ISBN: 0072919817).

Reference Book: Principles of Object-Oriented Modeling and Simulation with Modelica 2.1,
Peter Fritzson, Wiley-IEEE Computer Society Press, 2003. (ISBN:
047147163).

ETE 400: Semiconductor Devices

Introduction to Energy Bands, Metals, Semiconductors, and Insulators; Electrons and Holes, Effective Mass; Intrinsic Material, Extrinsic Material; Distribution functions, Fermi-Dirac Statistics, Maxwell-Boltzmann statistics, and Carrier Concentrations - The Fermi level, Electron and Hole Concentrations at Equilibrium; Temperature Dependence of Carrier Concentrations Compensation and Space Charge Neutrality;

Conductivity and Mobility, Drift and Resistance; Diffusion Processes, Diffusion and Drift of Carriers, Built-in Fields, Diffusion and Recombination, Steady State Carrier Injection; Diffusion Length. p-n Junctions: Equilibrium Condition, The Contact Potential, Equilibrium Fermi Levels, Space Charge at a Junction; Forward- and Reverse-Biased Junctions; Steady State Conditions Qualitative Description of Current Flow at a Junction; Carrier Injection; Reverse Bias, Reverse-Bias Breakdown, Zener Breakdown, Avalanche Breakdown; Capacitance of p-n Junctions; Schottky Barrier Rectifying Contacts, Ohmic Contacts, Typical Schottky Barriers, narrow-base diode; The Ideal MOS Capacitor, Effects of Real Surfaces (Flatband voltage), Threshold Voltage, MOS Capacitance-Voltage Analysis; Output Characteristics, Transfer Characteristics; Control of Threshold Voltage; BJT Fundamentals, common-emitter amplifier and small-signal circuit, Ebers Moll equation; Basic Operation.

Credits: 3; Pre-requisite: ETE 219.

Recommended Textbook: Solid State Electronic Devices, B.G. Streetman, Prentice Hall.

Reference Book: Semiconductor Devices, M.J. Cooke, Prentice Hall.

ETE 401: VLSI Circuit Design

Introduction to the VLSI design flow, unit processes in VLSI (oxidation, diffusion, lithography, ion implantation, metallization, etc,), isolation schemes, bipolar and CMOS processing, analog ICs CMOS OPAMP static and dynamic CMOS/BICMOS and logic PLA circuits, SRAM, DRAM, introduction to mixed signal ICs, basic design methodologies: full custom and semi-custom design, ASIC field programmable devices, optimization at various levels, (algorithmic architecture, logic, circuit, device), simulation and testing, design rules, floor planning, placement, routing and layout, mask making procedure, parasities and other non-idealities, timing issues, clock skew etc, importance of device modeling.

The course includes lab work based on theory taught.

Credits: 3 (Theory)+1(Lab)=4; Prerequisite: ETE 219.

Recommended Textbook: Basic VLSI Design, Pucknell Eshraghian, Prentice Hall.

Reference Book: Design of VLSI Systems-A Practical Introduction, Linda E.M. Brackenbury, Scholium International, Inc.

ETE 403: Optoelectronics

Properties of Light: Particle and wave nature of light; polarization, interference, diffraction and blackbody radiation.

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.

Light Emitting Diode (LED): Principles; materials for visible and infrared LED; internal and external efficiency; loss mechanism; structure and coupling of optical fibers.

Stimulated Emission & Light Amplification: Spontaneous and stimulated emission; Einstein's 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.

Photo-Detectors: Photoconductors; junction photo-detectors; PIN detectors; avalanche photodiodes and phototransistors.

Solar Cells: Solar energy and spectrum; silicon and schottky solar cells.

Modulation of Light: Phase and amplitude modulation; electro-optic effect; acousto-optic effect and magneto-optic devices.

The course includes lab work based on theory taught.

Credits: 3 (Theory)+1(Lab)=4; Prerequisite: ETE 219.

Recommended Textbook: Optoelectronics: An Introduction, Vinod K. Sharma, P.C. Mathur, K.N. Tripathi, Avinash Kapoor, BS Publications.

Reference Book: Optoelectronics for Data Communication Description: San Diego, Academic Press.

ETE 405: Advanced Digital Logic Design

Introduction. Combinational circuit design with programmable logic devices, implementation of high speed multipliers. Design of modular sequential logic circuits, implementation of digital fractional rate multipliers. State machine design, Mealy and Moore machines. Asynchronous circuit design. Design, modeling and verification of complex digital systems. Modern design methodologies for logic design: Data path and control design, algorithmic state machines integration of data and control. Logic circuit testing and testable design. Modern tools for the design and testing of digital systems. Digital design case studies.

The course includes lab works based on the concepts introduced.

Credits: 3 (Theory)+1(Lab)=4; Pre-requisites: ETE 311.

Recommended Textbook: Digital Design, M.M. Mano, Prentice Hall.

Reference Book: Integrated Circuits in Digital Electronics, Barna, John Wiley.

ETE 407: Quantum Theory for Semiconductor Devices

Lattice Vibration: Simple harmonic model; dispersion relation; acoustic and optical phonons.

Band Structure of Solids: Isotropic and anisotropic crystals; free electron theory of metals; density of states; band diagram and effective masses of different semiconductors and alloys.

Scattering Theory: Review of classical theory; Born approximation and partial wave analysis; Scattering and relaxation. Approximation Methods: Different types of approximation methods including perturbation theory. Fermi-Golden rule; scattering rates of different processes; scattering mechanisms in different semiconductors; mobility.

Different Carrier Transport Models: Drift-diffusion theory; ambipolar transport; hydrodynamic model; Boltzmann-transport equation; quantum mechanical models.

Low-Dimensional Systems: Fundamentals of two, one and zero dimensional semiconductor nanostructures; Density of states for different dimensions; Tunneling and transmission probabilities; Quantum well, super-lattice, quantum wire, quantum dot; Ballistic transport; Quantum Hall effect.

Credits: 3; Prerequisite: ETE 219.

Recommended Textbook: Quantum Phenomena in Clusters and Nanostructures, Shiv N. Khanna, Albert W. Castleman, Springer.

Reference Book: Physics of Semiconductor Devices, S.M. SZE, John Wiley and Sons.

ETE 409: Semiconductor Processing and Fabrication

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. Growth and deposition of dielectric layers: Thermal oxidation, CVD, plasma CVD, sputtering and silicon-nitride growth. Etching: Wet chemical etching, silicon and GaAs etching, anisotropic etching, selective etching, dry physical etching, ion beam etching, sputtering etching and reactive ion etching. Cleaning: Surface cleaning, organic cleaning and RCA cleaning. Lithography: Photo-reactive materials, pattern generation, pattern transfer and metallization. Discrete device fabrication: Diode, transistor, resistor and capacitor. Integrated circuit fabrication: Isolation - pn junction isolation, mesa isolation and oxide isolation; p-channel and n-channel MOSFETs, complimentary MOSFETs and silicon on insulator devices. Testing, bonding and packaging.

Credits: 3; Pre-requisites: ETE 219.

Recommended Textbook: Fundamentals of Solid State Electronics, C.T. Sah, World Scientific.

Reference Book: Semiconductor Devices, M.J. Cooke, Prentice Hall.

ETE 411: Analog Integrated Circuits

Review of FET 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.

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.

The course includes lab works based on the concepts introduced.

Credits: 3 (Theory)+1(Lab)=4; Pre-requisites: ETE 214.

Recommended Textbook: Microelectronic Circuits and Devices, M.N. Horenstein, Prentice Hall.

Reference Book: Integrated Circuits, K.R. Botkar, Khanna Publishers.

EEE 413: Introduction to Nanotechnology

Key nanofabrication techniques, including scanned probe techniques such as scanning tunneling microscopy (STM) and atomic force microscopy (AFM), molecular self-assembly, nanoimprint and soft lithography, DNA-based assembly, and MEMS-based multi-probe systems. This will be followed by coverage of the basic building blocks for nanotechnology, including molecules, carbon nanotubes, semiconducting nanowires and quantum dots. The last part of the course will cover the nanotechnology applications that are currently being realized or are being actively pursued. These applications are in the areas of materials, devices for electronic, chemical and biological sensing applications and systems such as future electronic integrated circuits that couple new nanotechnologies with silicon technology.

Credits: 3; Prerequisite: ETE 219.

Recommended Textbook: Fundamentals of Solid State Electronics, C.T. Sah, World Scientific

Reference Book: Semiconductor Devices, M.J. Cooke, Prentice Hall.

ETE 415: Power Electronics

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.

The course includes lab works based on the concepts introduced.

Credits: 3 (Theory)+1(Lab)=4; Pre-requisites: ETE 311.

Recommended Textbook: Power Electronics: Circuits, Devices and Applications, H. Rashid,
Prentice Hall.

Reference Book: Power Electronics: Principles and Applications, Vithayathil, McGraw Hill.

ETE 418: Introduction to Embedded Systems

Introduction to Embedded Systems; Specification and Modeling of Embedded Systems; Components of Embedded Systems; Time in Embedded Systems; Hardware-Software Partitioning; Control Systems; Validation of Programmable Embedded Systems; Early Estimation Techniques; Compilation for Embedded Systems; Reconfigurable Computing in

Embedded Systems.
The course includes lab work based on theory taught.
Credits: 3 (Theory)+1(Lab)=4; Prerequisite: ETE 311.
Recommended Textbook: Embedded Systems Architecture: A Comprehensive Guide for Engineers and Programmers, Tammy Noergaard, Newnes.
Reference Book: Embedded Systems: From Hardware to Applications, P. Raghavan, Auerbach.

ETE 419: Biomedical Electronics

The human body; an overview, forms of mammalian cells, bioelectricity; Electro conduction system of the heart; Bio-electric amplifiers; carrier amplifiers; 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.
The course includes lab works based on the concepts introduced.
Credits: 3 (Theory)+1(Lab)=4; Prerequisites: ETE 311.
Recommended Textbook: Introduction to Biomedical Engineering, John D. Enderle, Susan M. Blanchad, Academic Press.
Reference Book: Introduction to Biomedical Engineering , Michael M. Domach, Prentice Hall.

ETE 420: Introduction to Control Systems

Linear System Models: Transfer function; block diagram and signal flow graph (SFG).
State Variables: SFG to state variables; transfer function to state variable and state variable to transfer function.
Feedback Control System: Closed loop systems; parameter sensitivity; transient characteristics of control systems; effect of third pole and zero on the system response and system types and steady state error; Routh stability criterion; root locus method and frequency response method.
Design of Feedback Control System: Controllability and observability; root locus; frequency response and state variable methods.
Digital Control Systems: Introduction; sampled data systems; stability analysis in Z-domain; solving and analyzing various problems by using MATLAB software.
The course includes lab work based on theory taught.
Credit: 3 (Theory)+1(Lab)=4; Prerequisite: ETE 322.
Recommended Textbook: Modern Control Systems, Dorf & Bishop, Prentice Hall.
Reference Book: Schaum's Outline of Feedback and Control Systems, Allen J. Stubberud, Ivan J. Williams, Joseph J. DiStefano, McGraw Hill.

ETE 430: RF & Microwave Engineering

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 - loop and helical antennas, folded dipole and Yagi-uda array: Babinet s principle: slot, horn and complimentary antennas, radiation

from apertures, ridge and corrugated horns, GTD, reflector antennas, baluns, antenna for mobile communication, antenna measurements. Propagation and microwave filter synthesis.

This course includes lab work based on theory taught.

Credits: 3 (Theory)+1(Lab)=4; Prerequisite: ETE 310.

Recommended Textbook: Foundations for Microwave Engineering, R..E. Collin. McGraw Hill.

Antenna Theory, Constantine A. Balanis, Wiley, John & Sons. Reference Book: Fields and Waves in Communication Electronics, S. Ramo, J.R. Whinnery, Wiley.

Antennas, John D. Kraus, Ronald J. Marhefka, Ronald J. Marhefka, Ronald J. Marhefka, McGraw-Hill.

ETE 441: Wireless & Mobile Communications

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 comparision 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.

Credits: 3; Prerequisite: ETE 314.

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: Wireless Communications: Principles and Practice, Theodore S. Rappaport, Prentice Hall.

ETE 442: Optical Fiber Communications

Characteristics of optical transmission media, optical fibers - propagation and transmission characteristics , loss and dispersion mechanisms, optical sources - principles of operation, modulation characteristics and driver circuits, photo detectors - principles of operation, circuits and performance, post detection amplifiers, fiber optic communication systems and link budget using direct detection, fiber optic connectors, couplers, multiplexers and splices, wavelength converters, routers, optical amplifiers, coherent and WDM systems.

This course includes lab works based on theory taught.

Credits: 3 (Theory)+1(Lab)=4; Prerequisite: ETE 314.

Recommended Textbook: Optical Fiber Communications: Principle and Practice, John M. Senior, Prentice Hall.

Reference Book: Understanding Optical Fiber Communications, A.J. Rogers, Artech House Publishers.

ETE 444: Telecommunication Networks & Switching

Telephone Switching: Simple telephone connection, introduction to switching and signaling systems, single and multi- stage space switching analysis and design. Time/Digital switching systems, TS, ST, STS, TST systems, concept of packet switching and ATM, practical systems, circuit switching hierarchy and routing, signaling systems - SS7., telephone instruments, pulse and tone dialing, BORSCHT functions, modems, digital subscribers loops, telephone traffic theory. Telephone Networks: Motivation for ISDN, New services, network and protocol architecture, transmission channels, user-network interfaces, service characterization, internetworking, ISDN standards, expert systems in ISDN, B-ISDN, voice data integration.

Credits: 3; Prerequisite: ETE 314.

Recommended Textbook: Telecommunication Switching Systems and Networks, Thiagaranjan

Viswanathan, Prentice-Hall of India.
Reference Book: Signaling in Telecommunication Networks, John G. van Bosse, John G. Bosse, Bosse Van Bosse, John Wiley & Sons.

ETE 450: Communications and Network Security
Basic concepts of cryptography, mathematical overview of number theory, complexity and information theory, simple crypto systems - transpositions, substitution ciphers, homophonic ciphers, polyalphabetic ciphers, rotor machines, crypto analysis principles, private key systems, public key systems, signature systems, hash functions, cryptographic techniques, key sharing mechanisms, access control security policy, systems like Kerberos, fire walls.
The course includes lab works based on theory taught.
Credits: 3 (Theory)+1(Lab)=4; Prerequisite: ETE 350.
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: Cryptography and Network Security, William Stallings, Prentice Hall.

ETE 452: Multimedia Communications
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, MPEG, and JPEG. 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.
Credits: 3; Prerequisite: ETE 322.
Recommended Textbook: Multimedia Communication Systems: Techniques, Standards, and Networks,Rao, Bojkovic & Milovanovic, Prentice Hall.
Reference Book: Multimedia Communications: Protocols and Applications, Kuo, Garcia Luna-Aceves & Effelsberg, Prentice Hall.

ETE 456: Wireless Networks
Course overview and history, radio access, modulation, physical layer rudiments, error control, multiple access, TDMA, CDMA. Network layer, protocols, switching, signaling, mobility management, traffic engineering and management. First generation cellular, AMPS, signaling, digital AMPS, network design. Second generation voice systems, speech coding, TDMA/IS-136, CDMA/IS-95, GSM. Mobile data systems, GPRS and EDGE, mobile IP, wireless LANs, CSMA/CD, IEEE 802.11, wireless residential networks, satellite telephony. Cellular Digital Packet Data (CDPD), architecture, MAC protocol, wireless ATM. The 3G and 4G mobiles, UMTS services, architecture and infrastructure. Network operations and traffic control. Security, cryptography, authentication, key management.
The course includes lab works based on theory taught.
Credits: 3 (Theory)+1(Lab)=4; Prerequisite: ETE 441.
Recommended Textbook: Wireless Communications: Principles and Practice, T. S. Rappaport, Pearson Education.
Satellite Communications, D. Roddy, McGraw-Hill Professional.
Reference Book: 3G Wireless Networks, Clint Smith, McGraw-Hill Osborne.
Satellite Communication System, M. Richharia, McGraw-Hill.

ETE 457: Telecommunication Network Planning & Optimization
Introduction: Objectives of network planning, procedure of network planning, site survey, site selection.
Propagation Analysis and Coverage Planning: Propagation modeling, multi-path propagation - path loss, path loss corrections, slow and fast fading; connection between coverage and quality of service,

link budget; antenna feeder loss, antenna gain, application example.

Capacity Planning: Procedure of capacity planning, frequency reuse, prediction of offered traffic, example of capacity planning.

Radio-Frequency Planning: RF planning for different modulation techniques (GSM and CDMA), cell planning, frequency hopping, coverage interference prediction, frequency planning, interference levels, adjacent channel interference and avoidance, minimum reuse distance, allocation of frequencies, application example.

Advanced Network Planning: Future planning (phase wise), indoor coverage, tunnel coverage.

Radio Network Optimization: Cause and effect of optimization, procedure of optimization, drives tests.

Telecommunication Network Planning Tools: Digital MAP info, path loss, propagation analysis and coverage planning; Hata model and Walfish-Ikegami model, antenna height and topography corrections; frequency allocation, route calculations - comparison of predicted and measured data, simulation of calls along routes.

Credits: 3; Prerequisite: ETE 441.

Recommended Textbook: Advanced Cellular Network Planning and Optimisation: 2G/2.5G/3G Evolution to 4G, Ajay R. Mishra, John Wiley and Sons.

Reference Book: Radio Network Planning and Optimisation for UMTS, Jaana Laiho, Achim Wacker, Tomas Novosad, John Wiley and Sons.

ETE 458: Intelligent Networks

Introduction. Motivation for IN. Evolution of telecommunication services. Examples of typical IN services. Basics of IN architecture. Detailed survey of IN services and service features. Typical applications of IN services. Standardization of IN - from CS1 to CS4. IN CS1 conceptual model. Service Plane. Global Functional Plane. Distributed Functional Plane. Physical Plane. Basic Call Process. POIs, PORs and SIBs. Basic Call State Model (BCSM). Detection points (DPs) and their arming and disarming. IN service creation. Concept of SCE. Service management. IN signaling. INAP, TCAP and SCCP. Survey of ETSI CS1/2 INAP operations. Relationship to the IN CM model. Charging mechanisms and scenarios. Application of IN model to development of GSM services - idea of CAMEL architecture. IN based mobile services and service features. CAP protocol. Evolution of CAMEL. IN CS3 standard. Parlay/OSA API - opening IN infrastructure for third party service providers. IN and IP/Internet - hybrid services. PINT and SPIRITS architecture and reference services. Examples of services - Internet call waiting, click-to-call, click-to-hear content. Interworking of IN architecture with SIP/H.323 environment. IN CS4. Evolution of IN and recapitulation.

Credits: 3; Pre-requisites: ETE 441.

Recommended Textbook: The Intelligent Network Standards: Their Application to Services, Igor Faynberg, Lawrence R. Gabuzda, Marc P. Kaplan, Nittin J. Shah, McGraw-Hill Professional.

Reference Book: CAMEL: Intelligent Networks for the GSM, GPRS and UMTS Network, Rogier Noldus, Wiley, John & Sons.

ETE 460: Foundations of TCP/IP

Review of Network Technologies: Wide Area and Local Area Networks, Ethernet, FDDI, ATM, APPANET. Interworking Concept: Application-Level Interconnection, Network-Level Interconnection, Internet Architecture, and Interconnection through IP routers. Internet Addressing: Universal Identifier Classified addressing scheme, Network Connections, Network and directed broadcast addresses. Address Resolution Protocol: Address Resolution Problem, Types of Physical addresses, Direct Mapping, Dynamic Binding, ARP cache. Reverse Address Resolution Protocol: RARP, Timing RARP Transactions. IP-Connectionless Datagram Deliver: Virtual Network, Internet Architecture, Connectionless delivery system, Purpose of Internet Protocol. IP-Routing IP Datagrams: Routing in the Internet, Direct and Indirect Delivery, Table Driven IP routing, Next hop routing. User Datagram Protocol: UDP, Format of UDP messages, Layering, Pseudo header. Transmission Control Protocol: Reliable Service, Sliding Window, TCP Segment Format, TCP Checksum, Acknowledgements and Re-transmissions, Response to Congestion. Routing in

Autonomous System: Static vs. Dynamic interior routes, Routing Information Protocol (RIP), The Hello Protocol, The Open Shortest Path First protocol (OSPF). The Domain Name System: Flat namespace, Hierarchical Names, Domain Name Resolution. Real-Time IP Protocols: Audio and Video transmission and Reproduction, Filter and playback delay, Real-Time Transport Protocol (RTP), Streams, mixing and multicasting.
The course includes lab work based on theory taught.
Credits: 3 (Theory)+1(Lab)=4; Prerequisite: ETE 302.
Recommended Textbook: Computer Networks, Andrew S. Tanebaum, Pearson Education.
Reference Book: Inside TCP/IP, Karanjit S. Siyan, Techmedia.

ETE 461: Object Oriented Programming
Object Oriented Concepts: Classes, objects, methods, inheritance, and class methods.
OO Design Techniques: Booch class diagrams, object interaction diagrams, event-based software.
OO Programming in C++: Classes and objects, dynamic storage, input/output classed, operator overloading, inheritance, class and member functions and data, scope rules for members.
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.
Credits: 3 (Theory)+1(Lab)=4; Prerequisite: ETE 105.
Recommended Textbook: 1. Teach Yourself C++, Herbert Schildt, McGraw-Hill Companies.
2. The Complete Reference Java 2, Herbert Schildt, McGraw-Hill
Osborne Media.
Reference Book: The complete Reference C++, Herbert Schildt, McGraw-Hill Companies.

ETE 463: Data Structures & Algorithms
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.
Credits: 3; Prerequisite: ETE 105.
Recommended Textbook: Data Structures and Program Design in C, Kruse, Leung and Tondo, Prentice Hall
Reference Book: Data Structure and Algorithms in Java, Robert Lafore, Sams.

ETE 465: Database Systems, Software Analysis & Design
Database System Architecture: Three levels of architecture; External level; Conceptual Level; Internal Level; Database Management Systems Introduction to Relational Databases: Relational Model Overview; Optimization, Relations; Views; Domains; Relations. Specification and Description Language (SDL): Formal descriptive techniques; system specifications, types and instances; state machines; blocks, channels and processes; Backus-Naur Form (BNF) and modified BNF; declarations and block interactions; process creation and termination specification; process and communication addressing; timers; procedures, shorthands; drawing & lexical rules of SDL; supported by a number of simple application examples. Relational Algebra; Syntax; Semantics; Operators; Grouping and ungrouping; Functional Dependencies: Basic definitions; Trivial and new trivial dependencies; Closure of a set of dependencies; Closure of a set of attributes. Normal Forms:- INF, 2NF, 3NF, BCNF Nonlossless decomposition and functional dependencies; First Second and Third Normal Form; Dependency preservation; Boyce code Normal Form. Semantic Modeling: E/R Model; E/R Diagrams; Database design with the E/R model. Object Databases: Objects, classes, methods and messages; Inheritance specialization and generalization; Conceptual Object modeling.
The course includes lab work based on theory taught.
Credits: 3 (Theory)+1(Lab)=4; Prerequisite: ETE 105.
Recommended Textbook: Fundamentals of Database Systems, Elmasri and Navathe, Addison Wesley.

Reference Book: Database System Concepts, Abraham Silberschatz, Henry Korth and S. Sudarshan, McGraw-Hill.

ETE 467: Computer Organization and Operating Systems

Computer Organization: Computer arithmetic, point representations, introduction to CISC processor architecture, instruction set and addressing modes, hardware design principles polling of processors, memory types & interfacing & timing I/O handling, interrupts & DMA & device interfaces - CRT, floppy disk, HDD, optical disk, serial interfaces & data acquisition, software interrupts, memory hierarchy and virtual memory, multiprocessors concept, cache memory, pipelining and introduction to RISC processors, super scalar processors.

Operating Systems: Operating system concepts & architectural support - privileged mode; operating system design and construction techniques; WINDOWS operating system, concepts of LINUX/UNIX operating systems; kernels; NOS.

Credits: 3; Prerequisite: ETE 316.

Recommended Textbook: 1. Computer Organization & Design, David A. Patterson and John L.

Hennessy, Morgan Kaufmann.

2. Operating Systems: Design and Implementation, Andrew Tanenbaum and Albert S. Woodhull, Prentice Hall..

Reference Book: 1. Structured Computer Organization, Andrew Tanenbaum, Prentice Hall.

2. Operating System Concepts, Silberschatz, Galvin and Gagne, Wiley.

ETE 470: Applied Numerical Methods

Overview of engineering computation algorithms and methods; Issues in engineering computation; Solution to sets of linear equations; Solution of over-determined equations; Polynomial curve fitting; Iterative techniques and applications; Finite difference techniques and applications; Numerical integration; Solution of ordinary differential equations; Solution of partial differential equations; Random number generation. Different applications of numerical methods.

The course includes lab work based on theory taught.

Credits: 3 (Theory)+1(Lab)=4; Prerequisite: MAT 205.

Recommended Textbook: Advanced Engineering Mathematics, E. Kreyszig, John Wiley.

Reference Book: Engineering Mathematics, Neil, Thomson Learning.

ETE 472: Speech & Image Processing

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.

Credits: 3 (Theory)+1(Lab)=4; Prerequisite: ETE 322.

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: Digital Image Processing Algorithms and Applications , Ioannis Pitas, Wiley-Interscience .

ETE475: Artificial Intelligence & Expert Systems

Artificial Intelligence: Artificial Intelligence Techniques: Logic: propositional logic, first order logic, resolution principle. Problem Representation: state-space representation, problem reduction representation. Production System: PS structure, recognition-action cycle, inference directions, blackboard systems, PS implementation. Frame Representation: basic structure, inheritance of properties, slot extension, implementation. Relational Data Model: relational database model, entity and relationship, generalization and aggregation. Search: blind and non-blind searches, depth-first search,

breadth-first search, heuristic search, best-first search, optimal search, A search. Implementation Complexity. Major AI programming Languages: LISP and PROLOG. Expert Systems: Basic Principles of Expert Systems. Natural Language Processing, Medical diagnostics, Financial design, and manufacturing planning.
Credits: 3; Prerequisite: ETE 322.
Recommended Textbook: Computational Intelligence: An Introduction, Andries P. Engelbrecht, John Wiley.
Reference Book: Fuzzy Expert Systems and Fuzzy Reasoning, William Siler, James J. Buckley, John Wiley.

ETE477: Neural Networks and Applications
Neurons and neural networks, basic models of artificial neural networks: simple layer perception, feed forward multilayer perceptron, Hopfield networks, competitive learning networks, applications of neural networks for matrix algebra problems, adaptive filtering and adaptive pattern recognition, dynamic system identification, dynamic system modeling using recurrent neural networks, approximation/optimization problems, VLSI implementation of neural networks.
Credits: 3; Prerequisite: ETE 322.
Recommended Textbook: Understanding Neural Networks and Fuzzy Logic: Basic Concepts and Applications, Stamatios V. Kartalopoulos, John Wiley.
Reference Book: Principal Component Neural Networks: Theory and Applications, K. I. Diamantaras, S. Y. Kung, John Wiley.

ETE479: Robotic Engineering
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.
Credits: 3 (Theory)+1(Lab)=4; Prerequisite: MAT 104.
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 498: Research Project/Industrial Training
Each student will be assigned a project under the supervision of a faculty member. The student must complete the project within two consecutive semesters. Alternatively the student may be placed for industrial training/internship for two semesters in an organization of related industry instead of doing Research Project.
Credits: 4; Prequisite: All Required Courses.

FIN 101: Principles of Finance
This course is designed to give the basic concepts, principles, analytical methods and tools that are used in basic financial management. The course includes the following topics like, 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, STA 101, ECO 101.

FIN 201: Business Finance
This course has been designed to develop understanding of both theoretical and practical utilities 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, financing short-term operation from cost effective sources (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 etc.
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 and capital markets, and financial instruments traded in these markets, determination of interest rate, mutual funds operations, pension funds operations, discussions of major financial institutions and the understanding about the Bangladesh Financial Markets are the major focus of the course.
Credits: 3 Prerequisite: ECO 102, FIN 201

FIN 350: Real Estate Finance
This course is designed to discuss about the fundamental concepts, principles, analytical methods and tools that are used for making investment and financing decisions regarding commercial real estate assets. The course discusses the following topics, the operation of mortgage and structured finance markets, the characteristics that make real property different, including cash flow uncertainties, debt sources and tax features, available strategies and structures of real estate finance, including capital structure choices for construction and permanent financing, applications of basic tools of finance to evaluate the mortgage, lease, and asset-backed contracts, the pricing of these contracts, and strategies to securitize both debt and real estate equity.
Credit: 3 Prerequisite: FIN 201

FIN 380: Management of Commercial Banks
This course is designed to acquaint the students with the basic ideas, practice and principles of banking in Bangladesh. The topics include deposit collection, banking environment, interest rate, credit management, capital and risk management, banking regulations, banking technology and marketing, monetary policy and banking etc.
Credits: 3 Prerequisites: FIN 201

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 Prerequisite: ACT 201, FIN 201

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

FIN 425: Investment Analysis and Management
This course undertakes a rigorous study of concepts and evidence relevant to investment management. Topics include asset allocation, diversification, factor models, long and horizon investing, portfolio optimization, hedge funds, mutual funds, behavioral finance, performance evaluation, secondary trading.
Credits: 3 Prerequisites: FIN 201, MAT 211, STA 217

FIN 435: Managerial Finance
This course is designed to orient students with tools and techniques that managers use for efficient running of the finance department of a corporation. After completing the course, the students are expected to learn about an overview of managerial finance, capital budgeting decision, risk and refinements in capital budgeting, leverage and capital structure theories, dividend policy decision, leasing, common stock and investment banking process, and mergers.
Credits: 3 Prerequisite: FIN 201

FIN 450: Cases in Financial Management
This course provides the opportunity to learn the real tool through analyzing the real cases in the real world set up. Case studies will be utilized to develop insight and provide experience in the application of financial theory and practice to such decision-making areas as working capital management, capital budgeting, capital structure determination and dividend policy. The course also helps to interpret the financial health of a company based on the performance of its cash flow components and financial ratios, to create financial forecasts and learn to interpret the insights that appear in different scenarios, to justify with confidence the acceptance or rejection of a loan and how to assign covenants and work to establish the necessary collateral, to estimate the value of capital investment projects and articulate the positive and negative issues associated with a project, to discover the implications of synergy and its measurement, to explain how management establishes a firm's target capital structure, to discover the substantive issues that cause changes in a firm's target capital structure and the issues associated with debt, equity and hybrid sources of funds and to estimate the intrinsic value of a stock and a firm and explain the strengths and shortcomings of analysis.
Credit: 3 Prerequisite: FIN 201

FIN/ITB 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: FIN 201

FIN 475: Option and Future
This course provides a thorough introduction to the valuation and use of financial derivatives. Topics include the forward and futures markets, forward and futures prices, hedging strategies using futures, interest rate futures, swaps, the options markets, properties of stock options, trading strategies involving options, the binominal option pricing model, the Black and Scholes options pricing model, options on stock indices, currencies, and futures, credit derivatives, interest derivatives, and real options.
Credits: 3 Prerequisite: FIN 425

GEN 201: Bangladesh Studies
The objective of the course is to get the students acquainted with major thematic areas of national importance in Bangladesh. Taught from an interdisciplinary perspective, this course covers the following topics: origin and historical development of the nation; geographic features, natural resources and environmental issues; major issues relating to

culture and society including cultural change, social inequality and urbanization; important themes relating to the functioning of the state include judicial, administrative and legislative systems, public administration and governance; featured issues of economic and social development comprising several topics such as economic trends and planning, poverty eradication, role of NGOs, donors and the civil society.
Credits: 3; Prerequisite: ENG 102

GEN 202: 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

GEN 203: Ecological System & 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, economic globalisation of agriculture 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 Maupassant, 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 students with a conceptual overview of understanding human behavior and mental processes, but also a pathway to self-understanding, offering the potentials of a future career, and will give them an opportunity for intellectual discovery.
Credits: 3; Prerequisite: ENG102

GEN 206: Introduction to Sociology
The objective of the course is to introduce the students to key sociological concepts, primary social institutions, social structure and stratification, groups, religion and social problems with special reference to Bangladesh. Students will also be familiar with the different methods and techniques of social research. Major topics include: the sociological perspective; culture; socialization; social Institutions; social stratification and social mobility; deviance and social control; sociology of development; research methodology and major social problems of Bangladesh.
Credits: 3; Prerequisite: None

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: ENG102

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 would 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; Environmental Philosophy, Business Philosophy, Philosophy of Globalization Existentialism, Pragmatism and Logical Positivism as philosophical trends.
Credits: 3; Prerequisite: None

GEN 209: 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 familiar with and understanding of 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 systematic way. The basic objective of this course is to understand the world that is changing fast. Towards this end, this course intends to equip 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 in one hand and media studies on the other. Journalism: The specific objective of the course in Journalism is to how 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: students will be introduced to the various forms of media including print, 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

GEN 212: 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 Bangladeshi contexts. It also attempts to help students to contribute to the

efforts to eliminate all forms of gender discrimination in Bangladesh society. The course examines 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, women development policy and programme in Bangladesh. Topics include: sex and gender, 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 would provide an opportunity of gaining elementary competence in German language. It would enable the course participants to verbally act and react in simple everyday life situation.
Credits 3; Prerequisite: None

GEN 214: Development Studies
The course provides an introductory look at the theories and concepts, which form the foundation of development. 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 other 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 students.
Credits 3; Prerequisite: None

GEN 217: Introduction to Chinese Language
The objective of the course is to familiarize students with the basics of the 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 and the 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

GEN 219: Introduction to Social Anthropology and Ethnology
Social Anthropology is concerned with the description and analysis of people's lives and traditions. Ethnology is the study that deals with the adequate interpretations of such descriptions. This course explores some introductory and basic elements of social anthropology and ethnology, the use of anthropological knowledge, skills, and methodologies to understand several social phenomena and problems, and to develop solutions to those problems.
Credits 3; Prerequisite: None

GEN 220: 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

GEN 221: Globalization and Social Identity
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 nations 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

GEN 222: 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.
Credit: 3; Prerequisite: ENG102, GEN206

GEN 223: 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

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 factors in organizational performances, motivation and performance, HR planning; job design and staffing development and appraisal, compensation and reward, employee projection and representation and the future of HRM.
Credits: 3 Prerequisite: MGT101

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's 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, career development issues and role of succession planning in human resource planning.
Credits: 3 Prerequisite: MGT 251, HRM 301

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: 03 Prerequisites: MGT 251, HRM 301

HRM 414: Industrial Relations
This course has been offered as a major course in the area of Human Resource Management to give a knowledge-base regarding the different aspects of industrial relations so that the students can play a vital role in maintaining sound industrial relations in their respective organizations. Major topics covered are: industrial revolution and nature of industrial relations, theories of industrial relations, trade unions and collective bargaining, employee grievances and dispute settlement machinery, disciplinary action, quality of work life and worker's participation in management, labor law in Bangladesh and international dimensions of industrial relations. Special emphasis has been given on the industrial relations in Bangladesh.
Credits: 03 Prerequisites: MGT 251, HRM 301

HRM 415: Training and Development
This course focuses on developing employee knowledge, skills and attitude, developing competencies for improving productivity and achieving organizational goals. The topics include Human learning and behavior; Training and development function; Training need assessment; Various training methods and strategy for employee development; Designing and implementing training programs; Organization of the training department function; Evaluation of training programs and follow-up; Technical training; Employee development programs; Training and development of employees in long-term perspective.
Credit: 3 Prerequisite: MGT 251, HRM301

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 expectations.
Credit: 3 Prerequisite: MGT 251, HRM301

HRM 417: Human Resource Information System (HRIS)
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: 03 Prerequisites: MGT 251, MIS 305, HRM 301

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 Prerequisite: MGT 251, HRM301

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.

Credits: 03 Prerequisites: MGT 251, HRM 301

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.

Credits: 03 Prerequisites: MGT 251, MIS 305, HRM 301

ICE 101: Introduction to Telecommunication Engineering

Idea of different Number systems; Binary Logic - Basic Boolean operators (AND, OR, NOT); Boolean algebra and logic circuits: De Morgan's Laws; Karnaugh Maps; Further Boolean operators (XOR, NAND, NOR). Idea of signals and systems; Digital and Analog sources and systems; Block diagram of a basic communication system and functions of its different parts; Basics of the propagation of electromagnetic (EM) waves; Necessity of modulation, system limitations, message source, transmission media types; Formal definition of information; Fourier series; Idea of spectra of signals; Information data rate and bandwidth of a signal; Channel capacity and ideal communication systems; Basic idea of coding; Concept of telephone switching systems; Basics of telecommunication networks; Idea of different types of telecommunication systems.

Credits: 3; Prerequisite: None.

Recommended Textbook: This is a very basic course and there is no standard textbook for it. Course materials will be collected from various basic texts.

Reference Book: Signals & Systems, S. Haykin and B. Van Veen, Wiley & Sons,

ICE 105: Computer Fundamentals & Programming Language

Introduction to HTML: Mark up tags for basic document layout: paragraph tags, headings, ordered and unordered lists, definition lists, nested lists Tables: cell alignment Visual effects: logical and visual styles, special characters Hypertext links: directory paths, links to other documents, links inside documents Including multimedia objects: images, sound and video.

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 and unions, file management, graphics programming. Programming with C++.

The course includes lab work based on theory taught.

Credits: 3(Theory)+1(Lab)=4; Prerequisite: ICE 101.

Recommended Textbook: 1. HTML: The Complete Reference, Thomas A. Powell, Osborne /McGraw- Hill.

2. Programming in ANSI C, E. Balagurusamy, McGraw-Hill Education.

3. Teach Yourself C++, Herbert Schildt, McGraw-Hill Companies.

Reference Book: Schaum's Outlines Programming with C, Byron Gottfried, McGraw-Hill.

ICE 107: Object Oriented Programming

Introduction to Java and JVM, Java and Internet, Java foundation, Control flow, Interface and Polymorphism, Abstract classes and packages, Exception Handling, Applets, Multithreading, Network Programming; Graphics, 2D and 3D API.

Credits: 3(Theory)+1(Lab)=4; Prerequisite: ICE 105.

Recommended Textbook: 1. Teach Yourself C++, Herbert Schildt, McGraw-Hill Companies.

2. The Complete Reference Java 2, Herbert Schildt, McGraw-Hill Osborne Media.

Reference Book: The complete Reference C++, Herbert Schildt, McGraw-Hill Companies.

ICE 109: Electrical Circuits & Networks

Circuit Concepts: Active Circuit Elements: Voltage Sources, Current Sources; Passive Circuit Elements: Resistors, Inductors, and Capacitors with their properties; Sign Conventions; Ohm s Law. Network Theorems and Circuit Analysis: Introduction; Kirchhoff's laws: Kirchhoff's Voltage Law (KVL), Kirchhoff's Current Law (KCL); Determination of Sign; Analysis Methods: Branch Current Method, Mesh Current Method; Delta-Star and Star-Delta Transformation; Maxwell s Loop Current Method; Superposition Theorem; Thevenin's Theorem; Norton s Theorem; Maximum Power Transfer Theorem. A.C. Fundamentals: Equations of Alternating Voltages and Currents; Cycle, Time Period, Frequency and Amplitude of a Wave; Phase Difference; RMS and Average Values; A.C. through Resistance only; A.C. through Inductance only; A.C. through Capacitance only. Series and Parallel A.C. Circuits: A.C. through Resistance and Inductance; A.C. through Resistance and Capacitance; Series R-L-C Circuit; Resonance in R-L-C Circuits; Bandwidth of Resonance Circuit; Parallel A.C. Circuits; Simplification of Parallel R-L-C Circuits. Poly Phase Circuits: Two-Phase system; Three-Phase System; Star Connection System; Delta Connection System; Balanced Star-Delta and Delta-Star Conversations. Transients: Types of Transients; Transients in R-L Circuits (D.C and A.C); Transients in R-C Series Circuits (D.C. and A.C).

The course includes lab work based on theory taught.

Credits: 3(Theory)+1(Lab)=4; Pre-requisite: None.

Recommended Textbook: 1. Introduction to Electric Circuits, RC. Dorf, John Wiley.

2. Introduction to Electrical Circuits, Nilsson, Addison-Wesley.

Reference Book: Engineering Circuit Analysis, Hayt & Kemmerly, McGraw Hill.

ICE 207: Data Structures

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, threaded trees, heaps, binary search tree, AVL tree, B+ tree, digital search tree, Tries; Searching, priorities queues, hashing; Graphs, DFS and BFS, shortest path and minimum spanning tree; Garbage collection; Dynamic storage allocation; Internal and external sorting.

The course includes lab work based on theory taught.

Credits: 3(Theory)+1(Lab)=4; Prerequisite: ICE 107.

Recommended Textbook: Data Structures and Program Design in C, Kruse, Leung and Tondo, Prentice Hall.

Reference Book: Data Structure and Algorithms in Java, Robert Lafore, Sams.

ICE 209: Signals & Systems

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.

Credits: 3; Prerequisite: MAT 205.

Recommended Textbook: Signals & Systems, S. Haykin and B. Van Veen, Wiley & Sons.

Reference Book: Signals & Systems, Alan V. Oppenheim, Prentice Hall.

ICE 245: Algorithms

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.
Credits: 3(Theory)+1(Lab)=4; Prerequisite: ICE 207.
Recommended Textbook: Data Structures and Program Design in C, Kruse, Leung and Tondo, PrentECE Hall
Reference Book: Data Structure and Algorithms in Java, Robert Lafore, Sams.

ICE 251: Electronic Circuits
P-N Junction Diode: Terminal characteristics and equivalent circuit, application in rectification.
MOSFET: Physical operation, terminal characteristics, operating modes, amplification - biasing, small signal model, gain and MOSFET switch.
BJT: Physical operation, terminal characteristics, operating modes.
Op-Amp: Ideal op-amp, inverting and non-inverting amplifiers, difference amplifier, integrator and differentiator, non-ideal characteristics.
The course includes lab work based on theory taught.
Credits: 3(Theory)+1(Lab)=4; Prerequisite: ICE 109.
Recommended Textbook: 1. Microelectronic Circuits and Devices, M.N. Horenstein, Prentice Hall. 2. The Art of Electronics, P. Horowitz and W. Hill, Cambridge University Press.
Reference Book: Microelectronic Circuits, Sedra and Smith, Saunder's College Publishing.

ICE 275: Operating Systems
Principles of operating systems; Process management, memory management, auxiliary storage management and resource allocation. Operating system design and construction techniques; Concurrent programming, operating system kernels, correctness, deadlock, protection, transaction processing, design methodologies, comparative structure of different kinds of operating systems and other topics.
Credits: 3; Prerequisite: ICE 245.
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.

ICE 301: Database Systems, Software Analysis & Design
Database System Architecture: Three levels of architecture; External level; Conceptual Level; Internal Level; Database Management Systems. Introduction to Relational Databases: Relational Model Overview; Optimization, Relations; Views; Domains; Relations. Specification and Description Language (SDL): Formal descriptive techniques; system specifications, types and instances; state machines; blocks, channels and processes; Backus-Naur Form (BNF) and modified BNF; declarations and block interactions; process creation and termination specification; process and communication addressing; timers; procedures, shorthands; drawing & lexical rules of SDL; supported by a number of simple application examples. Relational Algebra; Syntax; Semantics; Operators; Grouping and ungrouping; Functional Dependencies: Basic definitions; Trivial and new trivial dependencies; Closure of a set of dependencies; Closure of a set of attributes. Normal Forms:- INF, 2NF, 3NF, BCNF Nonlossless decomposition and functional dependencies; First Second and Third Normal Form; Dependency preservation; Boyce code Normal Form. Semantic Modeling: E/R Model; E/R Diagrams; Database design with the E/R model. Object Databases: Objects, classes, methods and messages; Inheritance specialization and generalization; Conceptual Object modeling.
The course includes lab work based on theory taught.
Credits: 3(Theory)+1(Lab)=4; Prerequisite: ICE 275.

Recommended Textbook: Fundamentals of Database Systems, Elmasri and Navathe, Addison Wesley.

Reference Book: Database System Concepts, Abraham Silberschatz, Henry Korth and S. Sudarshan, McGraw-Hill.

ICE 302: Computer Communications & Networks
Introduction to computer and telecommunication networks; types of switching- circuit message and

packet, transmission media characteristics, data communication principles - asynchronous and synchronous, layered architecture for computer networks, 7 layer OSI network model, standards for different layers, RS-232 C, X.21. HDLC, X.25 TCP/IP etc. network topologies, WAN, MAN, Intranet and LAN technology, IEEE 802 standards, ISDN & B-ISDN, frame relay and ATM network, traffic theory and network performance.
The course includes lab work based on theory taught. Credits: 3(Theory)+1(Lab)=4; Prequisite: ICE 209.

Recommended Textbook: Computer Networks, Andrew S. Tanenbaum, Prentice Hall.

Reference Book: Data and Computer Communications, Stallings, MacMillan.

ICE 310: Electromagnetic Theory
Electromagnetism: Orthogonal Curvilinear co-ordinates (Rectangular, Cylindrical and Spherical); Gauss's theorem, electrostatic potential, Laplace's and Poisson's equations, method of images, energy of an electrostatic system; 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; solution to Laplace's equations.

Electrodynamics: Maxwell's equations, displacement current, equation of continuity, boundary condition; Propagation of uniform plane waves in perfect dielectric and in lossy medium, reflection, refraction, phase and group velocities, transmission line: evaluation of line parameters, design concepts, cutoff frequency, attenuation, dispersion, power handling capacity, traveling waves, standing waves, Smith chart and matching techniques, pulse propagation, radiation concept: elementary dipole, half-wave dipole, radiation patterns, gain, pattern multiplication, basic antennas.
Credits: 3; Prerequisite: MAT 205.

Recommended Textbook: Engineering Electromagnetics, W.H. Hyat, McGraw-Hill.

Reference Book: Field and Wave Electromagnetics, D.KK. Cheng, Addison Wesley.

ICE 311: Digital Electronics
Review work on basic digital gates; switching algebra; minimizing functions using maps and combinational circuit analysis. Different logic families, TTL, ECL, NMOS, CMOS, pass transistor logic, combinational logic circuits:- adders/subtractor, demultiplexers, encoders, decoders, ROMs, PLAs etc. sequential logic circuits:- flip flops and latches, shifters, counters, finite state machine - state transition diagrams and state transition tables, memory elements:- ROM, PROM, RAM-SRAM, DRAM. Introduction to VERILOG and FPGA.
The course includes lab work based on theory taught. Credits: 3(Theory)+1(Lab)=4; Prerequisite: ICE 251.

Recommended Textbook: Digital Design, M.M. Mano, Prentice Hall.

Reference Book: Digital Fundamentals, T.L. Floyd, Prentice Hall.

ICE 312 Communications Theory
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.
Signal Space Analysis: Geometric representation of signals; Conversion of the continuous AWGN channel into a vector channel; Likelihood functions; Coherent detection of signals in noise; Correlation receiver; Probability of error.
Credit: 3; Prerequisite: ICE 209.
Recommended Textbook: Communications System, Simon Haykin, Wiley.
Reference Book: Digital Communications, John J. Proakis, McGraw Hill.

ICE 314: Digital Communications
Baseband Signal Transmission: Power spectral density of different line codes; The matched filter, properties of the matched filter; Error rate due to noise; Intersymbol interference; Nyquist's criterion for distorsionless baseband binary transmission; Correlative level coding; Baseband M-ary PAM transmission; Digital subscriber lines; Optimum linear receiver; Adaptive equalization.
Passband Signal Transmission: Passband transmission model; Hierarchy of digital modulation techniques; Coherent binary amplitude-shift keying (ASK); Coherent binary phase-shift keying (PSK); Coherent binary frequency-shift keying (FSK); Coherent quadriphase-shift keying (QPSK); Coherent minimum phase-shift keying (MSK); Noncoherent orthogonal modulation; Noncoherent binary FSK; Differential PSK (DPSK); M-ary PSK; M-ary quadrature amplitude modulation (QAM); Carrierless amplitude/phase (CAP) modulation; M-ary FSK; Power spectra; Bandwidth efficiency; Synchronization; Multichannel modulation and the idea of OFDM.
Multiple Access Techniques: FDMA, TDMA, Concept of Spread-Spectrum & CDMA.
The Course includes lab work based on theory taught
Credits: 3 (Theory)+1(Lab)=4; Prerequisite: ICE 312.

Recommended Textbook: Communication Systems, Simon Haykin, Wiley.

Reference Book: Digital Communications, John J. Proakis, McGraw Hill.

ICE 316: Microprocessors & Interfacing
Microprocessor and its Architecture: Internal microprocessor architecture, real mode memory addressing, protected mode memory addressing, memory paging. Addressing Modes: Data addressing modes, program memory addressing modes, stack memory-addressing modes. Data Movement Instructions: MOV, PUSH/POP, load effective addresses, string data transfer, miscellaneous data transfer instructions, segment override prefix, assembler. Arithmetic, Logic and Program Control Instructions: Arithmetic operations, BCD and ASCII arithmetic, basic logic instructions, shift and rotate, string comparisons, the jump group, controlling the flow of assembly language program, procedures, interrupts, machine control instructions. Programming in Microprocessor: Modular programming, using keyboard and video display, data conversions, disk files. 8086/8088 Hardware Specifications: Pin outs and pin functions, clock generators, bus buffering and latching, bus timing, ready and the wait state, minimum mode and maximum mode. Peripheral Interfacing: Parallel versus serial transmission, synchronous and asynchronous serial data transmission, interfacing of hexadecimal keyboard and display unit, CRT terminal interfacing, printer interface, floppy disk interface, DMA controllers. 80186, 80286, 80386, 80486, Pentium and Pentium Pro Microprocessors: Introduction, memory management, special features.
The course includes lab work based on theory taught.
Credits: 3(Theory)+1(Lab)=4; Prequisite: ICE 311.

Recommended Textbook: System Design with MC68020, MC69040. 32-bit Microprocessors, A. Noor, Van Nostrand Reinhold.

Reference Book: The Inter Microprocessors 8088/8088, 80186, 80286, 80386 and 80486: Architecture, Programming and Interfacing Techniques, MacMillan.

ICE 322: Digital Signal Processing

The z-Transform; Properties of the Region of Convergence; Properties of the z-Transform; Inversion of the z-Transform; Transform Analysis of LTI Systems; Signal representation using unitary transforms, DFT, DCT, Haar and Walsh Hadamard transform, properties of DFT, circular convolution, linear convolution using DFT, overlap add and save methods, FFT, filter structures for IIR and FIR filters, direct form I and II, parallel and cascade forms, frequency sampling structure for FIR filters, linear phase FIR filters, digital filter design techniques, IIR filter design by impulse invariance and bilinear transformation, transformation of digital filters, FIR filter design using windows, MATLAB based examples, introduction to multirate DSP, decimation and interpolation, polyphase decomposition, uniform DFT filter banks, quadrature mirror filters and perfect reconstruction, introduction to finite register length effects on digital filter performance, spectral estimation.

The course includes lab work based on theory taught.

Credit: 3(Theory)+1(Lab)=4; Prerequisite: ICE 312.

Recommended Textbook: Digital Signal Processing, John G. Proakis, Prentice Hall.

Reference Book: Signals and Systems, Ziemer, Tranter and Fanin, Prentice Hall/MacMillan.

ICE 350: Information Theory & Coding

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; Idea of cryptography.

Credits: 3; Prequisite: ICE 312.

Recommended Textbook: Communication Systems, Simon Haykins, Wiley.

Reference Book: Digital Communications, John J. Proakis, McGraw-Hill.

ICE 401: VLSI Circuit Design

Introduction to the VLSI design flow, unit processes in VLSI (oxidation, diffusion, lithography, ion implantation, metallization, etc,), isolation schemes, bipolar and CMOS processing, analog ICs CMOS OPAMP static and dynamic CMOS/BICMOS and logic PLA circuits, SRAM, DRAM, introduction to mixed signal ICs, basic design methodologies: full custom and semi-custom design, ASIC field programmable devices, optimization at various levels, (algorithmic architecture, logic, circuit, device), simulation and testing, design rules, floor planning, placement, routing and layout, mask making procedure, parasities and other non-idealities, timing issues, clock skew etc, importance of device modeling.

The course includes lab work based on theory taught.

Credits: 3(Theory)+1(Lab)=4; Prerequisite: ICE 311.

Recommended Textbook: Basic VLSI Design, Pucknell Eshraghian, Prentice Hall.

Reference Book: Design of VLSI Systems-A Practical Introduction, Linda E.M. Brackenbury, Scholium International, Inc.

ICE 431: RF & Microwave Engineering

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.

This course includes lab work based on theory taught.

Credits: 3(Theory)+1(Lab)=4; Prerequisite: ICE 310.

Recommended Textbook: Foundations for Microwave Engineering, R..E. Collin. McGraw Hill.

Reference Book: Fields and Waves in Communication Electronics, S. Ramo, J.R. Whinnery, Wiley.

ICE 441: Wireless & Mobile Communications

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 comparision 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.

The course includes lab work based on theory taught.

Credits: 3(Theory)+1(Lab)=4; Prerequisite: ICE 314.

Recommended Textbook: 1. Modern Wireless Communications, Simon Haykin and Michael Moher, Pearson Education.

2. Wireless Communications: Principles and Practice, Theodore S. Rappaport, Prentice Hall.

Reference Book: Mobile Communications Engineering, W. C. Lee, McGraw-Hill.

ICE 442: Optical Fiber Communications

Characteristics of optical transmission media, optical fibers - propagation and transmission characteristics, loss and dispersion mechanisms, optical sources - principles of operation, modulation characteristics and driver circuits, photo detectors - principles of operation, circuits and performance, post detection amplifiers, fiber optic communication systems and link budget using direct detection, fiber optic connectors, couplers, multiplexers and splices, wavelength converters, routers, optical amplifiers, cohe ent and WDM systems.

This course includes lab works based on theory taught.

Credits: 3(Theory)+1(Lab)=4; Prerequisite: ICE 314.

Recommended Textbook: Optical Fiber Communications: Principle and Practice, John M. Senior, Prentice Hall.

Reference Book: Understanding Optical Fiber Communications, A.J. Rogers, Artech House Publishers.

ICE 444: Telecommunication Networks & Switching

Telephone Switching: Simple telephone connection, introduction to switching and signaling systems, single and multi- stage space switching analysis and design. Time/Digital switching systems, TS, ST, STS, TST systems, concept of packet switching and ATM,

practical systems, circuit switching hierarchy and routing, signaling systems - SS7., telephone instruments, pulse and tone dialing, BORSCHT functions, modems, digital subscribers loops, telephone traffic theory. Telephone Networks: Motivation for ISDN, New services, network and protocol architecture, transmission channels, user-network interfaces, service characterization, internetworking, ISDN standards, expert systems in ISDN, B-ISDN, voice data integration.
Credits: 3; Prerequisite: ICE 314.

Recommended Textbook: Telecommunication Switching Systems and Networks, Thiagaranjan Viswanathan, Prentice-Hall of India.

Reference Book: Signaling in Telecommunication Networks, John G. van Bosse, John G. Bosse, Bosse Van Bosse, John Wiley & Sons.

ICE446: Satellite Communications

Orbits: Kepler's Laws, Newton's Law, Orbital ParamECErs, Inclined Orbits, Geostationary Orbit. Space Environment: Mechanical Effects, Atmospheric Effects (Radiation, Ionospheric Effects, Rain Attenuation), Polarisation, 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 ServECEs: Broadcasting Satellite ServECEs (DBS, DVB-S), Integrated ServECEs Digital Broadcasting - Satellite, Fixed Satellite ServECEs (INTELSAT, VSAT), Navigational Satellite ServECEs (NAVSTAR GPS), Earth Resource Satellite ServECEs (Radarsat, NOAA), Mobile Satellite ServECEs, 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.
Credits: 3; Prerequisite: ICE 441.

Recommended Textbook: Satellite Communications, D. Roddy, McGraw-Hill Professional.

Reference Book: Satellite Communication System, M. Richharia, McGraw-Hill.

ICE 450: Communications and Network Security

Basic concepts of cryptography, mathematical overview of number theory, complexity and information theory, simple crypto systems - transpositions, substitution ciphers, homophonic ciphers, polyalphabetic ciphers, rotor machines, crypto analysis principles, private key systems, public key systems, signature systems, hash functions, cryptographic techniques, key sharing mechanisms, access control security policy, systems like Kerberos, fire walls.
The course includes lab works based on theory taught.
Credits: 3(Theory)+1(Lab)=4; Prerequisite: ICE 350.

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: Cryptography and Network Security, William Stallings, Prentice Hall.

ICE 452: Multimedia Communications

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, MPEG, and JPEG. In the networking aspect, special considerations for sending multimedia over ATM, wireless, and IP networks, such as error resilience and quality of servECE, 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 course includes lab works based on theory taught.

Credits: 3(Theory)+1(Lab)=4; Prerequisite: ICE 322.

Recommended Textbook: Multimedia Communication Systems: Techniques, Standards, and Networks,Rao, Bojkovic & Milovanovic, Prentice Hall.

Reference Book: Multimedia Communications: Protocols and Applications, Kuo, Garcia Luna-Aceves & Effelsberg, Prentice Hall.

ICE 454: Antenna Engineering

Concepts of lines of force, closed electric and magnetic lines, review on Maxwell s equations, transmission lines, short antennas and radiations, examples of short antennas, basic antenna parameters, point sources and array of point sources, self and mutual impedances, reciprocity theorem, loop and helical antennas, folded dipole and Yagi-uda array: Babinet s principle: slot, horn and complimentary antennas, radiation from apertures, ridge and corrugated horns, GTD, reflector antennas, baluns, antenna for mobile communication, antenna measurements.

The course includes lab works based on theory taught.

Credits: 3(Theory)+1(Lab)=4; Prerequisite: ICE 310.

Recommended Textbook: Antenna Theory, Constantine A. Balanis, Wiley, John & Sons.

Reference Book: Antennas, John D. Kraus, Ronald J. Marhefka, Ronald J. Marhefka, Ronald J. Marhefka, McGraw-Hill.

ICE 456: Wireless Networks

Course overview and history, radio access, modulation, physical layer rudiments, error control, multiple access, TDMA, CDMA. Network layer, protocols, switching, signaling, mobility management, traffic engineering and management. First generation cellular, AMPS, signaling, digital AMPS, network design. Second generation voice systems, speech coding, TDMA/IS-136, CDMA/IS-95, GSM. Mobile data systems, GPRS and EDGE, mobile IP, wireless LANs, CSMA/CD, IEEE 802.11, wireless residential networks, satellite telephony. Cellular Digital Packet Data (CDPD), architecture, MAC protocol, wireless ATM. The 3G and 4G mobiles, UMTS services, architecture and infrastructure. Network operations and traffic control. Security, cryptography, authentication, key management.

The course includes lab works based on theory taught.

Credits: 3(Theory)+1(Lab)=4; Prerequisite: ICE 441.

Recommended Textbook: Wireless Communications: Principles and Practice, T. S. Rappaport, Pearson Education.

Reference Book: 3G Wireless Networks, Clint Smith, McGraw-Hill Osborne.

ICE 457: Telecommunication Network Planning & Optimization

Introduction: Objectives of network planning, procedure of network planning, site survey, site selection.

Propagation Analysis and Coverage Planning: Propagation modeling, multi-path propagation - path loss, path loss corrections, slow and fast fading; connection between coverage and quality of service, link budget; antenna feeder loss, antenna gain, application example.

Capacity Planning: Procedure of capacity planning, frequency reuse, prediction of offered traffic, example of capacity planning.

Radio-Frequency Planning: RF planning for different modulation techniques (GSM and CDMA), cell planning, frequency hopping, coverage interference prediction, frequency planning, interference levels, adjacent channel interference and avoidance, minimum reuse distance, allocation of frequencies, application example.
Advanced Network Planning: Future planning (phase wise), indoor coverage, tunnel coverage.
Radio Network Optimization: Cause and effect of optimization, procedure of optimization, drives tests.
Telecommunication Network Planning Tools: Digital MAP info, path loss, propagation analysis and coverage planning; Hata model and Walfish-Ikegami model, antenna height and topography corrections; frequency allocation, route calculations - comparison of predicted and measured data, simulation of calls along routes.
Credits: 3; Prerequisite: ICE 441.

Recommended Textbook: Advanced Cellular Network Planning and Optimisation: 2G/2.5G/3G Evolution to 4G, Ajay R. Mishra, John Wiley and Sons.

Reference Book: Radio Network Planning and Optimisation for UMTS, Jaana Laiho, Achim Wacker, Tomas Novosad, John Wiley and Sons.

ICE 458: Intelligent Networks
Introduction. Motivation for IN. Evolution of telecommunication services. Examples of typical IN services. Basics of IN architecture. Detailed survey of IN services and service features. Typical applications of IN services. Standardization of IN - from CS1 to CS4. IN CS1 conceptual model. Service Plane. Global Functional Plane. Distributed Functional Plane. Physical Plane. Basic Call Process. POIs, PORs and SIBs. Basic Call State Model (BCSM). Detection points (DPs) and their arming and disarming. IN service creation. Concept of SCE. Service management. IN signaling. INAP, TCAP and SCCP. Survey of ETSI CS1/2 INAP operations. Relationship to the IN CM model. Charging mechanisms and scenarios. Application of IN model to development of GSM services - idea of CAMEL architecture. IN based mobile services and service features. CAP protocol. Evolution of CAMEL. IN CS3 standard. Parlay/OSA API - opening IN infrastructure for third party service providers. IN and IP/Internet - hybrid services. PINT and SPIRITS architecture and reference services. Examples of services - Internet call waiting, click-to-call, click-to-hear content. Interworking of IN architecture with SIP/H.323 environment. IN CS4. Evolution of IN and recapitulation.
The course includes lab work based on theory taught.
Credits: 3(Theory)+1(Lab)=4; Pre-requisites: ICE 441.

Recommended Textbook: The Intelligent Network Standards: Their Application to Services, Igor Faynberg, Lawrence R. Gabuzda, Marc P. Kaplan, Nittin J. Shah, McGraw-Hill Professional.

Reference Book: CAMEL: Intelligent Networks for the GSM, GPRS and UMTS Network, Rogier Noldus, Wiley, John & Sons.

ICE 459: Teletraffic Theory
Traffic Concepts: Erlang, busy hour, traffic variations, blocking concept. Traffic Classification. Probability concepts, arrival processes. Stochastic processes: Markov Chains, Introduction to queueing. Loss system. M/M/1 queue, Erlang B and C formulas. Sharing systems. Network Models: routers switches. Heavy Traffic Approximations, Fluid Models. Traffic Engineering: Packet Speech Models, Packet Video Models. QoS: IntServ, DiffServ, ATM Traffic Control. Packet Scheduling, Priorities.
Credits: 3; Prerequisite: ICE 302.

Textbook: 1. Lecture Notes; will be collected from different texts.

Reference Book: 1. J.H. Hui: Switching and Traffic Theory for Integrated Broadband Networks, Kluwer Academic Publishers, 1990.
2. Saito: Teletraffic Technologies in ATM Networks, ArtechHouse, Boston-London, 1994.

ICE 460: Foundations of TCP/IP

Review of Network Technologies: Wide Area and Local Area Networks, Ethernet, FDDI, ATM, APPANET. Interworking Concept: Application-Level Interconnection, Network-Level Interconnection, Internet Architecture, and Interconnection through IP routers. Internet Addressing: Universal Identifier Classified addressing scheme, Network Connections, Network and directed broadcast addresses. Address Resolution Protocol: Address Resolution Problem, Types of Physical addresses, Direct Mapping, Dynamic Binding, ARP cache. Reverse Address Resolution Protocol: RARP, Timing RARP Transactions. IP-Connectionless Datagram Deliver: Virtual Network, Internet Architecture, Connectionless delivery system, Purpose of Internet Protocol. IP-Routing IP Datagrams: Routing in the Internet, Direct and Indirect Delivery, Table Driven IP routing, Next hop routing. User Datagram Protocol: UDP, Format of UDP messages, Layering, Pseudo header. Transmission Control Protocol: Reliable Service, Sliding Window, TCP Segment Format, TCP Checksum, Acknowledgements and Re-transmissions, Response to Congestion. Routing in Autonomous System: Static vs. Dynamic interior routes, Routing Information Protocol (RIP), The Hello Protocol, The Open Shortest Path First protocol (OSPF). The Domain Name System: Flat namespace, Hierarchical Names, Domain Name Resolution. Real-Time IP Protocols: Audio and Video transmission and Reproduction, Filter and playback delay, Real-Time Transport Protocol (RTP), Streams, mixing and multicasting.

The course includes lab work based on theory taught.

Credits: 3(Theory)+1(Lab)=4; Prerequisite: ICE 302.

Recommended Textbook: Computer Networks, Andrew S. Tanebaum, Pearson Education.

Reference Book: Inside TCP/IP, Karanjit S. Siyan, Techmedia.

ICE 469: Computer Architecture

Computer arithmetic, point representations, introduction to CISC processor architecture, instruction set and addressing modes, hardware design principles polling of processors, memory types & interfacing & timing I/O handling, interrupts & DMA & device interfaces - CRT, floppy disk, HDD, optical disk, serial interfaces & data acquisition, software interrupts, memory hierarchy and virtual memory, multiprocessors concept, cache memory, pipelining and introduction to RISC processors, super scalar processors.

Credits: 3(Theory)+1(Lab)=4; Prerequisite: ICE 316.

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.

ICE 470: Applied Numerical Methods

Overview of engineering computation algorithms and methods; Issues in engineering computation; Solution to sets of linear equations; Solution of over-determined equations; Polynomial curve fitting; Iterative techniques and applications; Finite difference techniques and applications; Numerical integration; Solution of ordinary differential equations; Solution of partial differential equations; Random number generation. Different applications of numerical methods.

The course includes lab work based on theory taught.

Credits: 3(Theory)+1(Lab)=4; Prerequisite: MAT 205.

Recommended Textbook: Advanced Engineering Mathematics, E. Kreyszig, John Wiley.

Reference Book: Engineering Mathematics, Neil, Thomson Learning.

ICE 471: Network Programming

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.
Credits: 3(Theory)+1(Lab)=4; Prerequisite: ICE 302.

ICE 472: Speech & Image Processing
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.
Credits: 3(Theory)+1(Lab)=4; Prerequisite: ICE 322.

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: Digital Image Processing Algorithms and Applications , Ioannis Pitas, Wiley-Interscience .

ICE 474: Computer Graphics & Visualizations
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 Behaviour 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.
The course includes lab work based on theory taught.
Credits: 3(Theory)+1(Lab)=4; Prerequisite: ICE 275.

ICE 475: Artificial Intelligence & Expert Systems
Artificial Intelligence: Artificial Intelligence Techniques: Logic: propositional logic, first order logic, resolution principle. Problem Representation: state-space representation, problem reduction representation. Production System: PS structure, recognition-action cycle, inference directions, blackboard systems, PS implementation. Frame Representation: basic structure, inheritance of properties, slot extension, implementation. Relational Data Model: relational database model, entity and relationship, generalization and aggregation. Search: blind and non-blind searches, depth-first search, breadth-first search, heuristic search, best-first search, optimal search, A search. Implementation Complexity: Major AI programming Languages: LISP and PROLOG. Expert Systems: Basic Principles of Expert Systems, Natural Language Processing,
Medical diagnostics, Financial design, and manufacturing planning.
Credits: 3; Prerequisite: ICE 322.

Recommended Textbook: Computational Intelligence: An Introduction, Andries P. Engelbrecht, John Wiley.

Reference Book: Fuzzy Expert Systems and Fuzzy Reasoning, William Siler, James J. Buckley, John Wiley.

ICE 477: Neural Networks and Applications
Neurons and neural networks, basic models of artificial neural networks: simple layer perceptron, feed forward multilayer perceptron, Hopfield networks, competitive learning networks, applications of neural networks for matrix algebra problems, adaptive filtering and adaptive pattern recognition, dynamic system identification, dynamic system modeling using recurrent neural networks.

approximation/optimization problems, VLSI implementation of neural networks.
Credits: 3; Prerequisite: ICE 322.

Recommended Textbook: Understanding Neural Networks and Fuzzy Logic: Basic Concepts and Applications, Stamatios V. Kartalopoulos, John Wiley.

Reference Book: Principal Component Neural Networks: Theory and Applications, K. I. Diamantaras, S. Y. Kung, John Wiley.

ICE 479: Robotic Engineering

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.
Credits: 3; Prerequisite: MAT 104.
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.

ICE 481: Telecommunications System Design

Telecommunications Switching Systems Fundamentals: Description of services using information flows and SDL diagrams. System Operation: Description of system components; description of system interface; description of use of SDT CASE tool. Organizational Approach: Group organization and tasks; group interaction mechanisms; Gantt chart and deliverables; review; gates; report formats.
The course includes lab works based on theory taught.
Credits: 3(Theory)+1(Lab)=4; Prerequisite: ICE 314.

ICE 482: Design of Real Time Systems

Introduction: Nature of RT systems, RT operating systems, RT programming languages.
C language constructs: Data structures and linked lists. Relation to task management.
RT Objects: Tasks, event flags, shared memory, semaphores, messages, and signals.
Tasks: Co-ordination using event flags; local, public and private event flags; waiting on event flags; event flag management.
Message Buffers and Mailboxes: Reasons to use message buffers; mailbox commands; use of mailboxes.
Semaphores and Controlled Shared Variables: Reasons for using semaphores, semaphore use, control of shared variables.
Task Co-Ordination and Signals: Signaling procedures; task-to-task communications; single sided and double sided co-ordination; other co-ordination methods.
Real-time kernel example: mC/OS kernel is examined in detail to show how real-time kernel services are implemented.
Debugging Real-time Systems: Debugger task; monitor task; fault codes and exception handling.
Analysis of real-time systems: Reliability models discussed. Basic queuing theory.
Design of Real-time systems: software design models. System specification standards.
The course includes lab works based on theory taught.
Credits: 3(Theory)+1(Lab)=4; Prerequisite: ICE 275.

ICE 497: Engineering Ethics

Definition and scopes of ethics. Different branches of ethics. Social change and emergence of new technologies, History and development of engineering ethics. Study and application of ethics in engineering. Human qualities of an engineer. Obligation of an engineer to the clients and to the society. Interaction among engineers. Ethical expectations: employers and employees, inter-professional relationships, desired characteristics of a professional code, ethical standards, institutionalization of ethical conduct.
Credits: 3; Pre-requisite: None.

Recommended Textbook: Engineering Ethics, Fleddermann, Prentice Hall.

Reference Book: Engineering Ethics: Concepts and Cases, Jr., Charles E. Harris, Michael S. Pritchard, Michael J. Rabins, Wadsworth Publishing.

ICE 498: Research Project/Industrial Training

Each student will be assigned a project under the supervision of a faculty member. The student must complete the project within two consecutive semesters. Alternatively the student may be placed for industrial training/internship for two semesters in an organization of related industry instead of doing Research Project.

Credits: 6; Prequisite: All Required Courses.

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

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

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

ITB 445: International Financial Institution

The course attempts to provide greater understanding of foreign exchange market and its intricacies with 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

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

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

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 to- day'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

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

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, Binomial Theorem.
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 Pfahler Eisenhart, 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 Spiegel Schaum'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 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 a 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,

and installation, traceability, project planning and management.
Credits: 3 Prerequisite: MIS305

MIS 403: Object Oriented Programming
The Objective of this course is to introduce the concept of object oriented programming to MIS students. 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. It will cover the essentials of the C++/Java class library and introduce event driven Graphical User Interface (GUI) programming. This course includes extensive lab work.
Credits: 3 Prerequisite:MIS305,MIS401

MIS 404: Networking and Operating System
A collection of interconnected autonomous computers is called computer network. The objective of this course is to understand the computer network and different network operating systems. In addition to the theoretical perspective this course will also help the students to build and manage a full-fledged network in a business organization. Topics included are: the logical and physical design and implementation of computer network, reference models, different protocols, different media of communication, network naming and security and contemporary network operating systems.
Credits: 3 Prerequisite: MIS 305

MIS 406: Relational Database Management Systems
This course focuses on logical and physical design of database using computerized tools. Topics include - query optimization, DDL, DML, DCL, keys, joins, triggers, standard SQL functions e.g. count, sum, order and group by, snap shots, clusters, table space, etc. Other topics include database system architecture, data models, theory of database, query optimization, concurrency control, crash recovery and storage strategies. A great deal of emphasis will be given to query writing using the PL/SQL, forms and report will be created by using different front end tools. Software used in RDBMS course: MS Access, Microsoft SQL Server / Oracle. The course includes project work on different learning topics and there is lab work based on theory taught.
Credits: 3 Prerequisite: MIS 305

MIS 407: System Integration & Security and Internet
Business and system specification, existing hardware and software platform, file system of different operating systems, integration features of different 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 promotion, internet software development and security.
Credits: 3 Prerequisite: MIS305

MIS 408: Internetworking with TCP/IP and Implementing Exchange Server
Introduction to TCP/IP, identifying machine with IP routing, IP address resolution, host name resolution, Net BIOS name resolution, DHCP, WING, internet working, browsing, connectivity in heterogeneous environments, SNMP services, fine tuning and optimization, trouble shooting, and administration of exchange server.
Credits: 3 Prerequisite: MIS404

MIS 409: Client/Server Administration
Domain model in the enterprise, server managing, uses (local and global) management, resource management, server and client, internet services, internet work routing, system performance, network monitoring, and server and client trouble shooting.
Credits: 3 Prerequisite: MIS408

MIS 410: Database Systems
Fundamental concepts. System organization and implementation of database systems. Relational, hierarchical and network data models. File organizations and data structures. Query languages, query optimization. Database design. Concurrency control. Security issues in evolving distributed database systems. The course includes lab works based on theory taught.
Credits: 3, Perquisite: MIS305

MIS 415: Decision Support Systems
This is a specialized course in information systems and information technology (IS/IT) for undergraduate MIS majors. This course will examine the design, development and implementation of information technology based systems that support managerial and professional work, including Communications-Driven and Group Decision Support Systems (GDSS), Data-Driven DSS, Model-Driven DSS, Document-Driven DSS, and Knowledge-Driven DSS. The course will also explore the role of DSS in supporting organization goals and the impact of information systems on organizations. Topics include: Decision Support Systems and Business Intelligence, Computerized Decision Support, Decision Support Systems Concepts, Methodologies, and Technologies, Modeling and Analysis, Data Warehousing, Knowledge Management, Implementing Decision Support Systems.
Credits: 3 Prerequisite: MIS 305

MIS 419: E-Commerce and Web Programming
This course focuses on recognizing and explaining electronic business process and identifying and recommending Internet and E-Commerce. Topics include implementation of and conducting E-Business and managing web: the global and local market, business to business, web application, corporate web server management, legal considerations, Electronic Payment Systems (EPS), role of the bank in E-Commerce, business model for E-Commerce. It covers web technology comprehensively. A great deal of emphasis will be also given to static and dynamic web development techniques using HTML, DHTML, JavaScript, PHP and other web development tools. Other topics include Search Engine Optimization (SEO), online shopping cart / checkout development, web marketing of different forms, domain registration and hosting issues, E-Commerce website development for Bangladeshi users, etc.
Credits: 3 Prerequisite: MIS 305

MKT 101: Principles of Marketing
Principle of marketing course is designed to give students an interesting and decision oriented approach to the study of basic marketing concepts and practice. This course provides an integration of marketing activities of the firm into a system, which includes basically product, price, promotion and place.
Credits: 3 Prerequisite: BUS101

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
This course starts and continues for a while concentrating on the personal selling activities of the organization, salesmanship, different traits, caliber, skill and working methodology of a salesperson. The topics that they are supposed to study include sales management and the business enterprise, setting personal-selling objectives, development of relationship strategy, relations maintained by sales department, the sales organization, the sales budget, sales territories, quota, designing and managing the sales force. 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

MKT 402: Integrated Marketing Communication
This course involves coordinating the various promotional elements and other marketing activities that communicate with a firm's customers. This course basically recognizes the added value of a comprehensive promotion plan that evaluates the strategic roles of a variety of communication disciplines and combines those disciplines to achieve synergistic results, develops a total marketing communications strategy that recognizes how all of a firm's marketing activities, not just promotion, communicate with its customers and also turns

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MKT 402: Integrated Marketing Communication
This course involves coordinating the various promotional elements and other marketing activities that communicate with a firm's customers. This course basically recognizes the added value of a comprehensive promotion plan that evaluates the strategic roles of a variety of communication disciplines and combines those disciplines to achieve synergistic results, develops a total marketing communications strategy that recognizes how all of a firm's marketing activities, not just promotion, communicate with its customers and also turns

business students into promotion experts with a delicate knowledge on overall marketing process, consumer behavior and communications theory.
Credits: 3 Prerequisite: MKT 201

MKT /ITB 408: International Marketing
Analysis of international operations. Emphasis on the factors influencing marketing to and within foreign countries and the alternative methods of operations open to international firms.
Credits: 3 Prerequisite: ITB301 MKT201

MKT 410: Consumer Behavior
Examines underlying psychological, sociological, and economic factors, which influence consumer behavior. Studies and impact of marketing activities on society, consumerism, and legislation affecting the market place.
Credits: 3 Prerequisite: MKT201

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.
Credits 3 Prerequisite: MKT201

MKT 412: Service Marketing
This course is designed to recognize the differences between specific categories of services 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

MKT 414: Marketing Research
This course is designed to help those who plan to commission and use marketing research for making strategic or tactical decisions concerning products, brands, customers, stakeholders, and markets. The course focuses on finding, attracting, and maintaining customers profitably, predictably, and consistently requires solid theoretical understanding and extensive practical experience in the design, implementation, and analysis of marketing intelligence. The course also imparts the end-to-end sense and logic of the marketing research process through hands-on assignments and projects, juxtaposes the features, requirements, and limitations of various alternatives for designing the optimal marketing research project, and provides an accessible introduction to analytical methods for making sense of data collected through marketing research.
Credits: 3 Prerequisite: STA 327, MKT 201

MKT 416: Brand Management
The focus of this course is on formulating and implementing complete marketing programs for successful brand management. The main objective is to provide an in-depth understanding of the role of brands in marketing consumer and industrial goods/services. The course also deals with the key responsibilities of a brand manager and provides students also with some of the quantitative tools that are helpful to brand managers in analyzing customers and competitors and guiding them in their strategic and tactical decisions. Definition of brand, the nature and evolution of branding, brand image, positioning and repositioning brands, building and measuring brand equity, pricing and promoting brands, brand strategy and brand plans, global branding, protecting the brand.
Credits: 3 Prerequisite: MKT201

MKT 418: Supply Chain Management
This course aims to discuss about the inbound and outbound logistics activities commonly known as material management and physical distribution respectively. The course gives emphasis on qualitative and quantitative approaches to create long term relationship within the chain between suppliers to the end users to make product and services available at different stages also suggests strategies to gain competitive advantage through the CRM and effective trade-off to ensure maximum utilization of the resources within the system. The course includes the following topics, transportation, inventory, warehousing, location analysis, distribution channels and customer service as elements of the system.
Credits: 3 Prerequisite: MKT 201

MKT 430: Strategic Marketing
The course discusses marketing strategy, defining and analyzing markets, marketing segmentation, analyzing competition, market targeting and positioning strategies, product portfolio strategy, implementation, and other relevant topics.
Credits: 3 Prerequisite: STA101, MKT201

MKT/ITB 408: International Marketing
Analysis of international operations. Emphasis on the factors influencing marketing to and within foreign countries and the alternative methods of operations open to international firms.
Credits: 3 Prerequisite: ITB 301, MKT 201

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 being. 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 with 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 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 101

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 on 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: PHRM 103

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 to the students. 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 & use the concepts of statistics as a decision-making & 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 of 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: None

PHRM 211: Organic Pharmacy II
The course is designed to provide advanced knowledge on organic chemistry to the students of Pharmacy. The course includes studies on

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 about 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 on 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 206

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 how do the chemical natures of small molecules influence or exhibit biological activities and how the structural modification influences potential activity. It also emphasizes on the influences of the structures on the mechanism of actions of the chemical compounds. Along with these, this course also gives 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 on the actions of some compounds commonly used as medical practices. This provides the basic idea on research about the activities of the unknown compounds.
Credits: 4, Prerequisite: PHRM 301

PHRM 307: Pharmaceutical Technology I
This course intends to introduce the students with three major aspects of industrial manufacturing of drugs into 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 on 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 310

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 203

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 307

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 helping students in practicing the various research patterns to help them pursue 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 & 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 406: Biopharmaceutics & Pharmacokinetics

This course explores how the fate of drugs in the body is influenced by physiological and biochemical processes. It will give an overview on 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 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 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 b discussed in details.

Credits: 4, Prerequisite: PHRM 309

PHRM 410: Pharmacy Law and Ethics

This course provides an insight on 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 deal with in this course.

Credits: 3, Prerequisite: PHRM 301

PHRM 411: Cosmetology
This course provides an in-depth understanding about 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 412: Medicinal Chemistry III
The objectives of this course are to orient 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 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 name 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 on the actions of some compounds commonly used as medical practices related to the theory topics. This will provide some basic idea on research about the activities of the unknown compounds.
Credits: 4; Prerequisites: PHRM 306

PHRM 414: Pharmaceutical Engineering
This course provides an insight on 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 pharmacist 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

PHY 100: Introductory Physics
Vectors: Concepts of vectors and scalars; algebra of vectors, differentiation and integration of vectors, gradient, divergence, and curl.
Force and Motion: Newton's laws of motion; frictional force, motion in more than one-dimensions; uniform circular motion; work, energy and power, linear momentum, angular monentum and torque, Newton's law of gravitation, Kepler's laws.
Waves and Oscillatins: Simple harmonic motion; damaped harmonic motion; forced oscillation and resonance; different types of waves; interference of waves; standing waves and resonance; Doppler Effect.
Electricity: Electric charge and Coulomb's law; electric field and electric potential; electric dipole, electric current and Ohm's law.
Magnetism: Biot-Savart Law, Ampere's law; solenoid and toroid; Faraday's law of electromagnetic induction.
Optics: Light as electromagnetic wave; reflection and refraction of light; total internal reflection; interference of light; Michelson interferometer, diffraction of light; polarization of light. Credits: 3; Pre-requisites: MAT 101.

PHY 101: Physics I (Mechanics, Waves & Thermodynamics)
Vectors: Algebra of vectors; calculus of vectors; gradient, divergence and curl.
Mechanics: Force and momentum, Newton's laws, work and energy, conservation of momentum involving friction, simple rotational systems; elasticity and its different modulii.
Introduction to Fluid Mechanics: Basic principle of hydrostatics and streamline fluid flow relating to buoyancy, forces in hydraulic systems, Bernoulli's principle; surface tension and viscosity.
Waves: Different types of waves; harmonic motion in simple vibrating systems damped and forced

oscillations, wave propagation and transmission of vibrations and sound, Doppler effect.

Thermodynamics: Concept of temperature and zeroth law of thermodynamics; first law of thermodynamics and its application; isothermal and adiabatic relations; work done by a gas; kinetic theory of gases; Vander Waals equation of state; second law of thermodynamics - reversible and irreversible processes; Carnot cycle; Carnot's theorem; concept of entropy.

The course includes lab work based on theory taught.

Credits: 3(Theory)+1(Lab)=4; Pre-requisites: MAT 101.

Recommended Textbook: Fundamentals of Physics, Halliday, Resnick & Walker, Wiley.

Reference Book: University Physics, Sears, Zamansky and Young, Addison Wesley Publishing Company.

PHY 102: Physics II (Electricity, Magnetism & Physical Optics)

Electricity: Concept of electric charge, conductors and insulators, permittivity of a medium, Coulomb's law, the electric field, lines of force, dipole in an electric field, electric flux, Gauss' law, electric potential, relation between electric potential and electric field, capacitance, calculation of capacitance, different types of capacitors, capacitors with dielectric, energy storage in an electric field, charging and discharging of a capacitor, time constant.

Magnetism: Permeability of a medium, the magnetic field, Biot-Savart law, Ampere's law, magnetic force on a current, magnetic lines of induction, force between two parallel current carrying conductors, Electromagnetic Induction: Faraday's law, Lenz's law, self and mutual induction, and transient response in LR circuit.

Physical Optics: Light as electromagnetic wave; reflection and refraction of light; total internal reflection; interference of light, interference fringes, Michelson interferometer, Newton's ring; Fresnel and Fraunhofer diffractins, diffraction by single slit, diffraction by double slits, diffraction gratings and its resolving power; polarization of light, different types of polarization, Nicol's prism, and optically active materials.

The course includes lab work based on theory taught.

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 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; Equilibrium of Rigid Bodies.

Fluid Mechanics: 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 in Elastic Media: Different types of 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.

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, Nicol's prism, and optically active materials.

Crystal Structures: Types of crystals, lattice and basis, Bravais lattice and Miller indices.

The course includes lab work based on theory taught.

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 209: Engineering Physics II (Introductory Quantum Physics)

Modern Physics: Photoelectric effect, quantum theory of light, X-rays and X-ray diffraction, Compton effect; de Broglie waves, phase velocity and group velocity, particle diffraction; Concept of operators, Schrödinger equation, Harmonic oscillator, and other one-dimensional systems - infinite quantum well, potential step and potential barrier; quantum box.

Formal Theory of Quantum Mechanics: Kets, Bras, and Operators; Matrix Formulation; Hilbert Space; Measurements, Observables, and the Uncertainty Relations; Position, Momentum, and Translation; Wave Functions in Position and Momentum Space; Time Evolution and the Schrödinger Equation; The Schrödinger Picture, Heisenberg Picture and Interaction Picture; Operator theory of Simple Harmonic Oscillator.

The course includes lab work based on theory taught.

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.

STA 101: Introduction to Statistics

Definition and Scope of Statistics, Variables, Levels of Measurements, Qualitative and Quantitative Data, Population and Sample, Construction of Table, Frequency Distribution, Graphical Presentation of Data: Bar Diagram, Pie Diagram, Line Diagram, Frequency polygon, Histogram, Cumulative Frequency Polygon, Scatter Diagrams, Measures of Central Tendency: Arithmetic Mean, Median, Mode, Geometric Mean, Related Positional Measures: Quartile, Percentile and Decile, Measures of Dispersion: Range, Mean Deviation, Variance, Standard Deviation, Skewness and Kurtosis, Basic Concepts of Probability, Probability Laws, Independence, Conditional Probability and Mathematical Expectations, Bayes Theorem, Basic Concepts of Discrete and Continuous Probability Distributions: Binomial, Hypergeometric, Poisson and Normal Distributions, Simple Correlation and Regression.

Credits 3; Prerequisite: MAT 100

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 217: Statistics For Business and Economics

Introduction to modern theory and methodology of statistics in areas of economics and business. Topics include: sampling theory and methodology of sampling distributions and hypothesis testing, contingency tables, multiple regression, analysis of variance, decision theory, index number and time series analysis.

Credits: 3; Prerequisite: STA 101

EWU Faculty Members

Faculty members are chosen through a rigorous selection process. Applications are first scrutinized at the department level, and then processed through an Appointment Committee of the university. Acting on the recommendations of the Appointment Committee, the Board finally appoints Faculty members.

At the moment about 80% of the Faculty members of East West University work full-time. A list of faculty members is provided below:

Professor

Md. Mozammel Huq Azad Khan
Ph.D. in Computer Science & Engineering
(Bangladesh University of Engineering & Technology)
M.Sc. Engg. in Computer Engineering
(Bangladesh University of Engineering & Technology)

Md. Abdul Hye
Ph.D. in Accounting
(University of Dhaka)
M.Com. in Accounting
(University of Dhaka)
B.Com (Hons),
(University of Dhaka)

Mohamed Ruhul Amin
Ph.D., University of St Andrews, U.K., 1990, Theoretical Plasma Physics
Research Areas: Plasma Physics, Communications Engineering;
M.Sc., (Jahangirnagar University), 1986, Physics

Abu Saleh Abdun Noor
Ph.D., Flinders University of S. A., Australia, 1980, Pure Mathematics
Research Area: Lattice Theory
M.Sc., (University of Rajshahi), 1970, Mathematics

Syed Akhter Hossain
Ph.D. in Applied Bio-Chemistry, Food and Nutrition
Department of Food Science (School of Agriculture
Sutton Bonington
(University of Nottingham, UK)
M.Sc. in Bio-Chemistry
(University of Dhaka)

Anisul Haque
Ph.D. in Electrical & Computer Engineering
(Clarkson University, NY,USA)
MS in Electrical Engineering
(Texas A & M University, USA)
M.Sc.(Engg) in EEE (BUET, Dhaka)
B.Sc.(Engg) in EEE (BUET, Dhaka)

Tanbir Ahmed Chowdhury
Ph.D. in Financial Management & Quantitative Techniques, (University of Pune, India)
M.Com in Finance and Banking
(University of Dhaka)
B.Com (Hons) Finance and Banking
(University of Dhaka)
Trained in Higher Education
Leadership Professional
Development Program
(The Pennsylvania State University,USA)

Nazrul Islam
Ph.D. in International Business
(Asian Institute of Technology, Thailand)
MBA in School of Management
(Asian Institute of Technology, Thailand)
M. Com. in Management
(University of Dhaka)
B.Com (Hons)
(University of Dhaka)
LL.B (University of Dhaka)

Muhammad Sirajul Haque
Ph.D. in Economics (Growth Theory)
(Simon Fraser University, Burnaby, BC, Canada)
M.S. in Economics (Investment Model)
(University of Waterloo, Waterloo, Ontario, Canada)
M.A. in Economics
(University of Chittagong, Chittagong)

Muniruddin Ahmed
Ph.D. in Pharmacy
(Free University, Germany)

Md. Humayun Kabir Chowdhury
Post Doc. Japan Society for the Promotion of Sciences(JSPS)
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