



Undergraduate Bulletin

EAST WEST UNIVERSITY

A large, stylized graphic of a tree or plant is located in the bottom right corner of the cover. It is rendered in a lighter shade of blue than the background, featuring thick, dark blue outlines for the branches and leaves.

UNDERGRADUATE BULLETIN

(A Compilation of Information on EWU)



EAST WEST UNIVERSITY



UNDERGRADUATE BULLETIN

(12th Edition)

Publication Committee :

| | |
|--|----------|
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University Profile

Mission Statement

In keeping with its name, East West University, 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 and one of the top private university of Bangladesh, 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 attempting to render 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, nonpolitical, charitable organization called Progoti Foundation for Education and Development (PFED). East West University is its first major project. Members of the Board of Directors (Present name Board of Trustees) of the University are: Mr. Jalaluddin Ahmed, Mr. S.M. Nousher Ali, Mr. Farooque B. Chaudhury, Dr. Rafiqul Huda Chaudhury, Syed Manzur Elahi, Dr. Mohammed Farashuddin, Mr. Mohammed Zahidul Haque, R.Ph., Dr. Saidur Rahman Lasker, Dr. Muhammad A. Mannan, Professor Dr. 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 at 43, Mohakhali Commercial Area, Dhaka. At present, there are over 340 faculty members and approximately 9,000 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 permanent campus of East West University is located in Aftabnagar, Rampura on the Progoti Sarani close to BTV Bhaban on 7.4 bighas of land. Total floor area of the 9 storied university complex is 4,58,957.04 sft. with modern facilities.

East West University has also bought 594.75 decimals (5.95 acres) of land at Mouja Vadham, P.S. Tongi, District Gazipur. In addition, it has received an allotment of one bigha of land at Uttara from Rajuk.

Faculties

There are currently three academic faculties :

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



There are 10 (ten) 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.S.S. in Sociology
- B.A. in English
- B.S. in Applied Statistics
- 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)
- B.Sc. in Genetic Engineering & Biotechnology

EWU plans to offer L.L.B. in Nursing in the near future.

EWU also offers the following Masters Degrees:

- MBA Regular and Executive
- Master of Arts in English (MA in English)
- Master of Arts in English Language Teaching (MA in ELT)
- Master of Bank Management (MBM)
- Master in Development Studies (MDS)
- M.S.S. in Economics
- MS in Applied Statistics
- Master of Science in Computer Science and Engineering (MS in CSE)
- Master of Science in Telecommunications Engineering (MS in TE)
- Master of Science in Applied Physics and Electronics (MS in APE)
- Master of Population, Reproductive Health, Gender and Development (MPRHGD)
- M. Pharm in Clinical Pharmacy and Molecular Pharmacology

Semesters

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

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

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

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

The B.Pharm Program is divided into two semester:

Spring Semester (January-June)

Fall Semester (July-December).

Classes

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

Slot Day

ST Sunday & Tuesday

SR Sunday & Thursday

TR Tuesday & Thursday

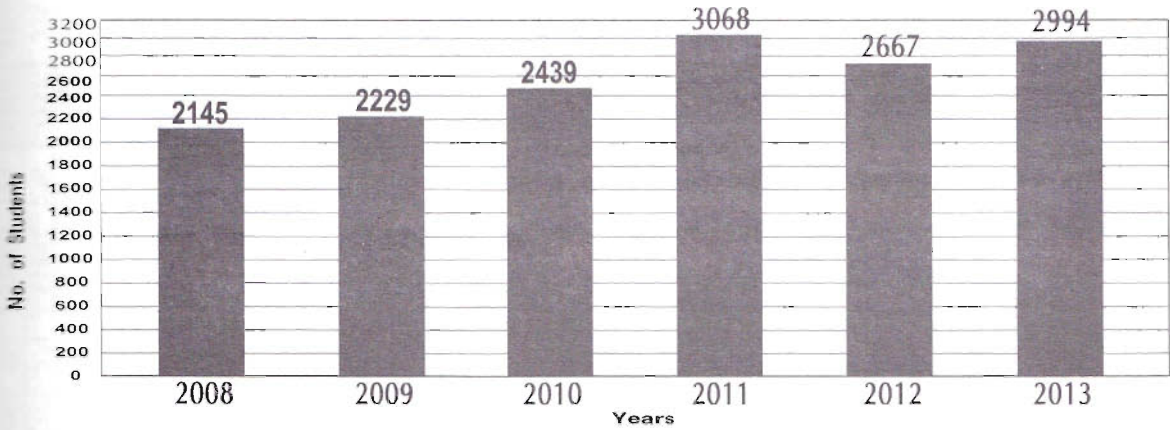
MW Monday & Wednesday

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

East West University (EWU) has achieved remarkable success within a short period of time. In the most recent 'Webometrics' survey reports in 2013, East West University was ranked the number one private University of Bangladesh. In July 2007 and July 2008, East West University was ranked the number one private University of Bangladesh. 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, now has approximately 9,000 students and 340 faculty members. Its growth testifies to its steady and significant progress towards promoting quality university education. It has already produced 8,200 graduates from its Undergraduate and Graduate programs. The dynamic growth of EWU can be seen in the figure provided below:

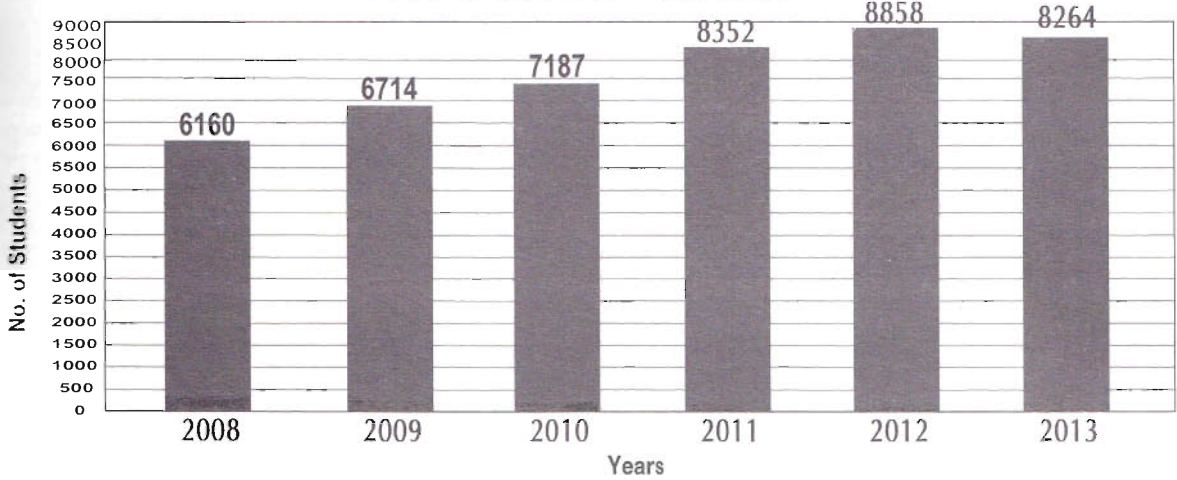
Newly Admitted Students: Year-wise

Newly Admitted Students: Year-wise

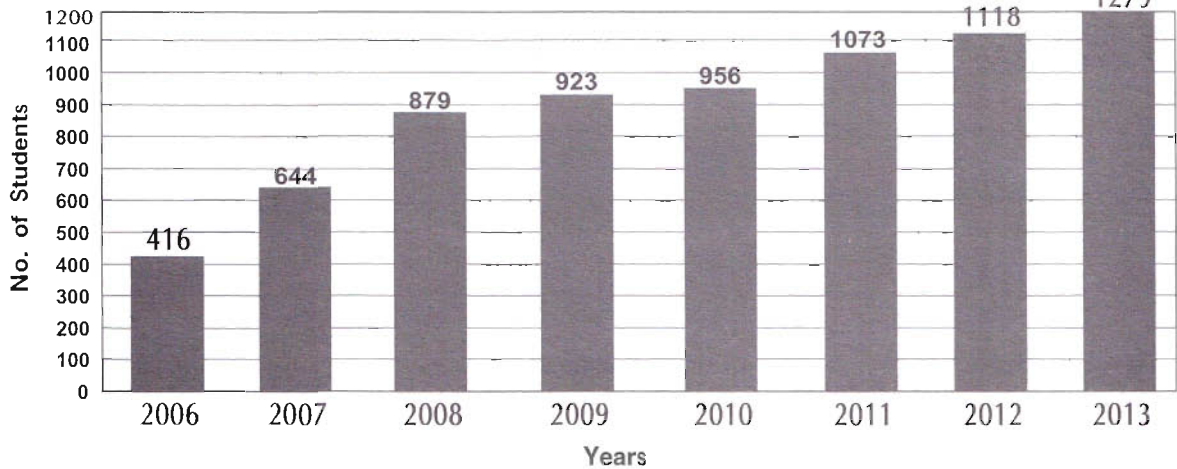


Enrolled Students: Year-wise

Enrolled Students: Year-wise



Graduating Students: Year-wise



**Semester-wise statistics of Admission and Enrollment of students
(From Summer 2008-Spring 2011)**

| Programs | Summer 2008 | | Fall 2008 | | Spring 2009 | | Summer 2009 | | Fall 2009 | | Spring 2010 | | Summer 2010 | | Fall 2010 | | Spring 2011 | |
|----------------------|-------------|----------|-----------|----------|-------------|----------|-------------|----------|-----------|----------|-------------|----------|-------------|----------|-----------|----------|-------------|----------|
| | Admitted | Enrolled | Admitted | Enrolled | Admitted | Enrolled | Admitted | Enrolled | Admitted | Enrolled | Admitted | Enrolled | Admitted | Enrolled | Admitted | Enrolled | Admitted | Enrolled |
| Undergraduate | | | | | | | | | | | | | | | | | | |
| BBA | 291 | 2201 | 212 | 2180 | 313 | 2290 | 353 | 2447 | 95 | 2277 | 285 | 2374 | 398 | 2581 | 273 | 2684 | 449 | 2967 |
| ECO | 51 | 157 | 64 | 190 | 51 | 211 | 82 | 256 | 53 | 262 | 65 | 267 | 91 | 316 | 61 | 321 | 85 | 332 |
| ENG | 62 | 267 | 39 | 267 | 62 | 287 | 38 | 289 | 24 | 277 | 55 | 308 | 56 | 337 | 48 | 346 | 88 | 399 |
| CSC | | 4 | | 5 | | 4 | | 3 | | 2 | | 1 | | 1 | | 1 | | |
| CSE | 40 | 161 | 4 | 145 | 31 | 139 | 41 | 159 | 15 | 145 | 23 | 148 | 29 | 166 | 23 | 177 | 39 | 199 |
| ICE | | | 3 | 175 | | 157 | | 133 | | 118 | | 101 | | 88 | 5 | 74 | 5 | 50 |
| ETE | 34 | 56 | 16 | 80 | 25 | 95 | 37 | 130 | 17 | 135 | 28 | 155 | 13 | 164 | 31 | 183 | 38 | 206 |
| EEE | 74 | 337 | 20 | 332 | 55 | 372 | 74 | 416 | 23 | 399 | 44 | 424 | 40 | 537 | 38 | 436 | 80 | 482 |
| B. PHRM | | 175 | 121 | 646 | 50 | 642 | 50 | 642 | | 600 | 51 | 557 | 54 | 557 | | 546 | 77 | 539 |
| GEB | | | | | | | | | | | | | | | | | | |
| APPL.STA. | | | | | | | | | | | | | | | | | | |
| Sociology | | | | | | | | | | | | | | | | | | |
| Total | 552 | 3551 | 479 | 4020 | 587 | 4197 | 675 | 4475 | 227 | 4215 | 551 | 4335 | 681 | 4647 | 479 | 4768 | 861 | 5174 |
| Graduate | | | | | | | | | | | | | | | | | | |
| MBA | 121 | 485 | 85 | 493 | 133 | 548 | 111 | 579 | 95 | 553 | 116 | 574 | 159 | 613 | 121 | 630 | 165 | 668 |
| EMBA | 58 | 241 | 34 | 243 | 36 | 240 | 47 | 224 | 31 | 206 | 24 | 184 | 38 | 167 | 35 | 166 | 54 | 190 |
| MBM | 14 | 42 | 9 | 37 | 11 | 46 | 25 | 60 | 14 | 66 | 15 | 66 | 12 | 70 | 10 | 67 | 12 | 63 |
| MDS | | | | | 13 | 70 | 16 | 58 | 20 | 60 | 24 | 72 | 15 | 66 | 14 | 57 | 9 | 61 |
| MA in ENG | 16 | 54 | 23 | 64 | 23 | 76 | 18 | 82 | 22 | 80 | 10 | 74 | 15 | 69 | 12 | 65 | 10 | 58 |
| MA-ELT | 25 | 65 | 25 | 69 | | | 16 | 17 | 8 | 23 | 4 | 27 | 12 | 39 | 4 | 39 | 11 | 38 |
| MS in TEL | 24 | 90 | 4 | 24 | 11 | 60 | 18 | 48 | 13 | 50 | 12 | 50 | 6 | 38 | 4 | 29 | 10 | 26 |
| MS CSE | 24 | 90 | 15 | 83 | 13 | 30 | 24 | 49 | 17 | 50 | 15 | 56 | 11 | 80 | 4 | 58 | 24 | 66 |
| MPRHGD | | | | | | | 0 | 0 | 5 | 5 | 1 | 6 | 3 | 7 | 2 | 13 | 2 | 14 |
| M.PHARM | | | | | | | | | | | | | | | 30 | 27 | 35 | 56 |
| APPL.PHY. | | | | | | | | | | | | | | | | | 7 | 7 |
| MSS-ECO | | | | | | | | | | | | | | | | | | |
| MS-APPL.STA. | | | | | | | | | | | | | | | | | | |
| Total | 266 | 1008 | 195 | 1013 | 240 | 1070 | 275 | 1117 | 225 | 1093 | 221 | 1190 | 271 | 1149 | 236 | 1151 | 339 | 1247 |
| Grand Total | 818 | 4559 | 674 | 5033 | 827 | 5267 | 950 | 5592 | 452 | 5308 | 772 | 5444 | 952 | 5796 | 715 | 5919 | 1200 | 6421 |

**Semester-wise statistics of Admission and Enrollment of students
(From Summer 2011-Fall Semster 2013)**

| Programs | Summer 2011 | | Fall 2011 | | Spring 2012 | | Summer 2012 | | Fall 2012 | | Spring 2013 | | Summer 2013 | | Fall 2013 | |
|----------------------|-------------|----------|-----------|----------|-------------|----------|-------------|----------|-----------|----------|-------------|----------|-------------|----------|-----------|----------|
| | Admitted | Enrolled | Admitted | Enrolled | Admitted | Enrolled | Admitted | Enrolled | Admitted | Enrolled | Admitted | Enrolled | Admitted | Enrolled | Admitted | Enrolled |
| Undergraduate | | | | | | | | | | | | | | | | |
| BBA | 401 | 3136 | 162 | 3206 | 331 | 3370 | 255 | 3434 | 205 | 3380 | 375 | 3505 | 196 | 3485 | 230 | 3493 |
| ECO | 183 | 453 | 34 | 387 | 53 | 395 | 72 | 414 | 132 | 504 | 122 | 555 | 50 | 546 | 54 | 530 |
| ENG | 247 | 609 | 37 | 535 | 71 | 541 | 76 | 541 | 49 | 525 | 69 | 540 | 43 | 553 | 50 | 564 |
| CSC | | 1 | | | | | | | | | | | | | | |
| CSE | 46 | 244 | 30 | 248 | 43 | 277 | 58 | 319 | 38 | 323 | 67 | 360 | 66 | 394 | 55 | 419 |
| ICE | | 29 | | 18 | | 9 | | 7 | | 2 | | 3 | 17 | 32 | 35 | 62 |
| ETE | 47 | 252 | 30 | 261 | 68 | 303 | 70 | 341 | 40 | 352 | 35 | 360 | 32 | 343 | 33 | 361 |
| EEE | 44 | 486 | 33 | 470 | 48 | 457 | 51 | 455 | 47 | 463 | 55 | 469 | 111 | 535 | 48 | 533 |
| B. PHRM | 53 | 539 | | 494 | 56 | 491 | 51 | 491 | | 464 | 82 | 465 | 78 | 465 | | 452 |
| GEB | | | | | | | | | 16 | 16 | 26 | 40 | 16 | 54 | 21 | 71 |
| APPL.STA. | | | | | | | 1 | 1 | 2 | 2 | 27 | 28 | 39 | 55 | 8 | 41 |
| Sociology | | | | | | | | | | | 37 | 34 | 26 | 54 | 9 | 49 |
| Total | 1021 | 5749 | 326 | 5619 | 670 | 5843 | 634 | 6003 | 529 | 6031 | 895 | 6359 | 674 | 6516 | 543 | 6575 |
| Graduate | | | | | | | | | | | | | | | | |
| MBA | 142 | 665 | 113 | 625 | 129 | 634 | 149 | 617 | 144 | 649 | 114 | 637 | 108 | 634 | 113 | 647 |
| EMBA | 45 | 197 | 35 | 195 | 35 | 199 | 39 | 200 | 34 | 199 | 41 | 184 | 43 | 207 | 46 | 213 |
| MBM | 19 | 70 | 15 | 70 | 17 | 74 | 16 | 67 | 15 | 73 | 20 | 81 | 28 | 88 | 14 | 90 |
| MDS | 16 | 49 | 7 | 48 | 16 | 51 | 13 | 52 | 11 | 48 | 14 | 45 | 17 | 56 | 26 | 67 |
| MA in ENG | 12 | 57 | 7 | 58 | 7 | 51 | 2 | 36 | 8 | 38 | 19 | 29 | 7 | 26 | 12 | 35 |
| MA-ELT | 7 | 39 | 12 | 48 | 10 | 48 | 8 | 48 | 16 | 56 | 14 | 62 | 18 | 68 | 22 | 80 |
| MS in TEL | 11 | 27 | 2 | 24 | 8 | 22 | 9 | 29 | 7 | 27 | 16 | 34 | 10 | 37 | 5 | 32 |
| MS CSE | 18 | 75 | 9 | 56 | 21 | 52 | 15 | 58 | 15 | 60 | 17 | 67 | 15 | 73 | 16 | 51 |
| MPRHGD | 3 | 15 | 4 | 18 | | 8 | 2 | 13 | 2 | 11 | 3 | 13 | 3 | 18 | 5 | 15 |
| M.PHARM | 30 | 56 | | 80 | 19 | 79 | | 79 | 31 | 85 | 31 | 87 | | 87 | 40 | 99 |
| APPL.PHY. | | 6 | 3 | 4 | 2 | 6 | 3 | 7 | 1 | 6 | 3 | 6 | 2 | 4 | 1 | 5 |
| MSS-ECO | | | 11 | 11 | 8 | 17 | 7 | 20 | 14 | 29 | 13 | 32 | 15 | 40 | 10 | 45 |
| MS-APPL.STA. | | | | | | | 1 | 1 | | | 3 | | 6 | 5 | 2 | 9 |
| Total | 303 | 1256 | 218 | 1237 | 272 | 1241 | 264 | 1227 | 298 | 1281 | 298 | 1277 | 272 | 1343 | 312 | 1388 |
| Grand Total | 1324 | 7005 | 544 | 6856 | 942 | 7084 | 898 | 7230 | 827 | 7312 | 1193 | 7636 | 946 | 7859 | 855 | 7963 |

Non-Discrimination

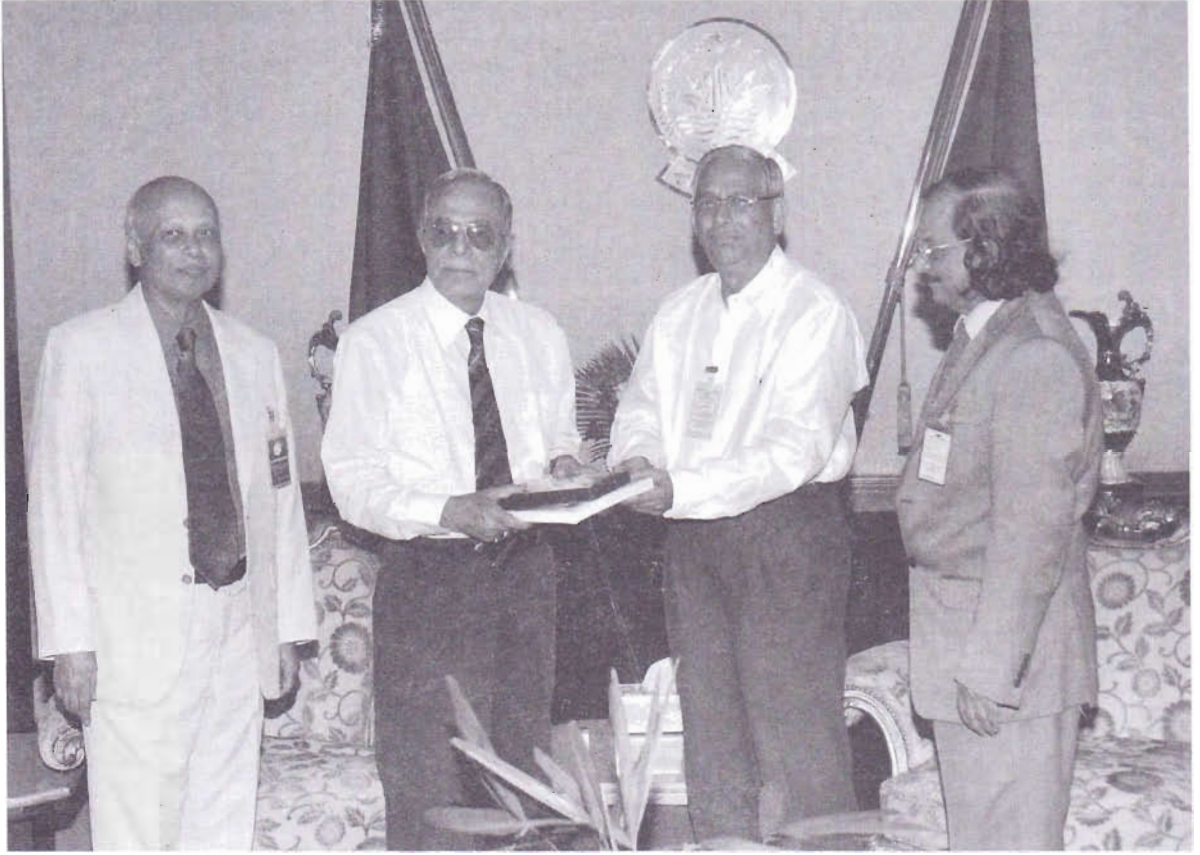
East West University believes that every type of discrimination, whether social or cultural, whether based on race, gender, color, social condition, language or religion, is to be overcome and eradicated.

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.



রাষ্ট্রপতি মোঃ আবদুল হামিদ এর সাথে ২৪ জুন সোমবার বঙ্গভবনে ইস্ট ওয়েস্ট ইউনিভার্সিটির সভাপতি ড. মোহাম্মদ ফরাসউদ্দিন এর নেতৃত্বে প্রতিনিধিদল সাক্ষাৎ করেন। -পিআইডি

University Administration

President, Board of Trustees, EWU
Vice Chancellor
Pro-Vice Chancellor
Treasurer (Acting)

Advisor
Dean of the Faculty of Business and Economics
Dean of the Faculty of Sciences and Engineering
Dean of the Faculty of Liberal Arts
& Social Sciences

Chairpersons

Department of Business Administration
Department of Economics
Department of English
Department of Social Relations
Department of Applied Statistics
Department of Electronics &
Communications Engineering
Department of Computer Science & Engineering
Department of Electrical & Electronic Engineering
Department of Pharmacy
Department of Genetic Engineering
and Biotechnology

Coordinators & Advisors

Honorary Coordinator & Advisor,
Department of Economics
Honorary Coordinator & Advisor, MPRHGD
Honorary Coordinator & Advisor, Applied Statistics

Registrar
Additional Registrar
Deputy Registrar
Assistant Registrar (Jr.) (Admission Office)

Proctor
Adviser, Students' Welfare
Librarian
University Engineer

Chief, HR & Logistics
Deputy Registrar
Deputy Chief, HR, Admin & Logistics

Deputy Controller of Examinations
Controller of Finance & Accounts
Chief, Internal Audit Unit
Senior Medical Officer
Medical Officer

Dr. Mohammed Farashuddin (Ph.D in Economics)
Professor Ahmed Shafee
Professor Dr. M. Sekander Hayat Khan
Professor Dr. Tanbir Ahmed Chowdhury

Professor Nurul Islam
Professor Dr. Tanbir Ahmed Chowdhury
Professor Dr. M. Mofazzal Hossain
Professor Dr. Muhammed Shahriar Haque

Professor Dr. Tanbir Ahmed Chowdhury
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Professor Dr. M. Ataharul Islam
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Dr. Halima Begum
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Ms. Farida Yasmin, MA, M.Phil
Mr. Mohammad Eklas Uddin, M.Com
Mr. Pyari Mohan Mondal, B.Sc
Dr. Arshad Hossain, MBBS
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 in Economics - 123 Credits
 - b. **Graduate Programs**
Master of Bank Management - 60 credits
Master of Development Studies - 39 credits
Master of Social Science in Economics - 36 credits

Faculty of Liberal Arts and Social Sciences

1. **Department of English**
 - a. **Undergraduate Program**
BA in English - 123 credits
 - b. **Graduate Programs**
Master of Arts in English (MA in English) - 36 credits/ 45 credits
Master of Arts in English Language Teaching (MA in ELT) - 42 credits/48 credits/66 credits
2. **Department of Social Relations**
 - a. **Undergraduate Program**
Bachelor of Social Science in Sociology - 123 credits
 - b. **Graduate Program**
Master of Population, Reproductive Health, Gender and Development (MPRHGD) - 48 credits

Faculty of Science and Engineering

1. **Department of Applied Statistics**
 - a. **Undergraduate Program**
Bachelor of Science (BS) in Applied Statistics - 127 credits
 - b. **Graduate Program**
MS in Applied Statistics - 35 credits
2. **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 Programs**
Master of Science in Telecommunications Engineering (MS in TE) - 35 credits
Master of Science in Applied Physics and Electronics (MS in APE) -35 credits
3. **Department of Computer Science & Engineering**
 - a. **Undergraduate Program**
B.Sc. in Computer Science & Engineering (CSE) - 140 credits
 - b. **Graduate Program**
Master of Science in Computer Science and Engineering (MS in CSE) - 33 credits
4. **Department of Electrical and Electronic Engineering**
 - Undergraduate Program**
B.Sc. in Electrical and Electronic Engineering (EEE) - 140 credits
5. **Department of Pharmacy**
 - a. **Undergraduate Program**
Bachelor of Pharmacy (B. Pharm) - 158 credits
 - b. **Graduate Program**
M. Pharm in Clinical Pharmacy and Molecular Pharmacology - 30 credits
6. **Department of Genetic Engineering and Biotechnology**
 - a. **Undergraduate Program**
Bachelor of Science in Genetic Engineering and Biotechnology- 134 credits

Graduation Requirements

Graduation Requirements for Undergraduate Programs

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

1. Credit completion requirement for:
 - a. BBA - a minimum of 123 credits
 - b. BSS in Economics - a minimum of 123 credits
 - c. BA in English - a minimum of 123 credits
 - d. BSS in Sociology - 123 credits
 - e. BS in APS - 127 credits
 - f. B.Sc. in CSE - 140 credits
 - g. B.Sc. in ETE- 140 credits
 - h. B.Sc. in ICE - 140 credits
 - i. B.Sc in EEE - 140 credits
 - j. B. Pharm - 158 credits
 - k. B.Sc. in GEB - 134 credits

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

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

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

4. Payment of all university dues.

5. All university properties must have been returned.

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

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

Minor

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

Requirements

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

Business Administration

Compulsory Courses: ACT 101, FIN 101, MGT 101 & MKT 101

Optional Courses: (Any Three)

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

Economics

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

English

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

Information and Communication Engineering

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

ICE 314 ICE 320, ICE 412 Group B: Any two from the following courses:

ICE 414, ICE 415, ICE 423, ICE 435

Electronic and Telecommunication Engineering

Group A: Any five from the following courses

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

Group B: Any two from the following courses

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

Computer Science and Engineering

Group A: Any five from the following courses:

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

Group B: Any two from the following courses:

CSE 411, CSE 348, CSE 442, CSE 480

Electrical and Electronic Engineering

Group A: Any five from the following courses:

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

Group B: Any two from the following courses:

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

Double Major

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

Academic Awards

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

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

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

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

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

Department of Business Administration

The Department of Business Administration at East West University started its operation in September 1996. Since its inception, it has been offering undergraduate program in Business Administration. Graduate Program offers M.B.A., EM.B.A. & MBM Programs. The contemporary and innovative curriculum of B.B.A. degree is based upon a compelling philosophy of teaching that allows students to cope with the radical transformation that business activities have been undergoing in the wake of globalization. It covers 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 B.B.A. 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 B.B.A. 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, finance, accounting, HRM, MIS and operation 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 B.B.A. program at EWU offers concentration in seven areas: Accounting, Finance Marketing, Human Resources Management,

Management Information System, Management, and International Business. To qualify for the B.B.A. degree at EWU one has to complete a minimum of 41 courses (123 credits) that normally takes four years. Students may complete the degree earlier by enrolling in more than three courses each semester.

Of the 41 courses that a student must complete for the degree, 11 are General Education Courses, 20 are Core Courses, 3 are Open Elective Courses, 6 are 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.

Total number of students currently enrolled in the B.B.A. program is about 3500. The number of applicants seeking admission into the B.B.A. program of EWU has been increasing at a very high rate. The acceptance rate in the last two semesters was about 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 3172 students graduated from this department. A sizeable number of them are now working with reputation in very prestigious National and Multinational organizations like, Unilever (Bd.) Ltd., Grameen Phone Ltd. Banglalink Robi, ADCOM, ASIATIC, Nestle, Local Commercial and Multinational Banks, Insurance companies, Square Group, Beximco group, Rahim Afroz, IDLC Finance limited, credit agencies in Bangladesh, AC Nelson, British American Tobacco Co Ltd and other.

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

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

Bachelor of Business Administration (BBA)

Minimum Requirement 123 Credits

| Course | Title | Credit |
|----------------|---------------------|-----------|
| General | Requirements | 33 |

Compulsory General Education Courses **24**

| | | |
|---------|--|---|
| BUS 101 | Introduction to Business | 3 |
| CSE 101 | Introduction to Computers I | 3 |
| 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

| | | |
|---------|---|---|
| MGT 321 | Industrial Management | 3 |
| CSE 102 | Introduction to Computers II | 3 |
| GEN 204 | Western Thought | 3 |
| GEN 205 | Introduction to Psychology | 3 |
| GEN 207 | Industrial Psychology | 3 |
| GEN 208 | Introduction to Philosophy | 3 |
| GEN 210 | International Relation | 3 |
| GEN 211 | Concepts of Journalism & Media Studies | 3 |
| GEN 213 | Introduction to German Language | 3 |
| MAT 100 | College Mathematics (Compulsory for those students who have no Mathematics in HSC or equivalent level) | 3 |
| POP 201 | Health Challenges of Adolescents and Youth | 3 |
| POP 202 | Introduction to Public Health | 3 |
| SOC 101 | Introduction to Sociology | 3 |
| SOC 202 | Social Psychology | 3 |
| SOC 211 | Eastern Culture and Heritage | 3 |
| SOC 212 | Social Ecology, Environment and Society | 3 |
| SOC 213 | Women in Development | 3 |
| SOC 214 | Introduction to Development Studies | 3 |
| SOC 215 | Principles of Social & Public Relations | 3 |
| SOC 216 | Globalization and Social Identity | 3 |

Core Requirements **60**

| | | |
|---------|-----------------------|---|
| ACT 101 | Financial Accounting | 3 |
| ACT 201 | Management Accounting | 3 |

| Course | Title | Credit |
|--------|-------|--------|
|--------|-------|--------|

| | | |
|---------|---|---|
| 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

| | | |
|---------|------------------------------------|---|
| MKT 311 | Taxation | 3 |
| FIN 325 | 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/FIN 465 | International Finance Management | 3 |

Choose any three courses from the following

| | | |
|-------------|---------------------------------------|---|
| ITB 445 | International Financial Institution | 3 |
| ITB 450 | International Businesses Negotiations | 3 |
| ITB 455 | Country Risk Analysis | 3 |
| ITB 460 | International Competitiveness | 3 |
| ITB/MKT 408 | International Marketing | 3 |

d) Concentration in Management

| | | |
|---------|------------------------------|---|
| MGT 402 | Management Science | 3 |
| MGT 421 | Entrepreneurship Development | 3 |
| MGT 465 | Leadership Management | 3 |

Choose any three courses from the following

| | | |
|---------|---------------------------------------|---|
| MGT 405 | Organizational Development and Change | 3 |
| MGT 410 | International Labor Management | 3 |
| MGT 425 | Total Quality Management | 3 |
| MGT 437 | Small Business Management | 3 |
| MGT 448 | Managing Globalization | 3 |

e) Concentration in Management Information System

| | | |
|---------|--|---|
| MIS 401 | Structured Programming | 3 |
| MIS 402 | System Analysis and Design | 3 |
| MIS 404 | Networking and Operating System | 3 |
| MIS 406 | Relational Database Management Systems | 3 |

Choose any two courses from the following

| | | |
|---------|--|---|
| MIS 403 | Object Oriented Programming | 3 |
| MIS 407 | System Integration & Security and Internet | 3 |
| MIS 408 | Internetworking with TCP/IP and Implementing Exchange Server | 3 |
| MIS 409 | Client/Server Administration | 3 |
| MIS 410 | Database Systems | 3 |

| | | |
|---------|--------------------------------|---|
| MIS 415 | Decision Support Systems | 3 |
| MIS 419 | E-Commerce and Web Programming | 3 |

f) Concentration in Marketing

| | | |
|---------|--------------------|---|
| MKT 410 | Consumer Behavior | 3 |
| MKT 414 | Marketing Research | 3 |

Choose any four courses from the following

| | | |
|-------------|------------------------------------|---|
| MKT 401 | Sales Management | 3 |
| MKT 402 | Integrated Marketing Communication | 3 |
| MKT/ITB 408 | International Marketing | 3 |
| MKT 412 | Service Marketing | 3 |
| MKT 411 | Export-Import Management | 3 |
| MKT 416 | Brand Management | 3 |
| MKT 418 | Supply Chain Management | 3 |
| MKT 430 | Strategic Marketing | 3 |

g) Concentration in Human Resource Management

| | | |
|--------|-------------------------|---|
| HRM411 | Human Resource Planning | 3 |
| HRM412 | Compensation Management | 3 |
| 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 B.B.A. 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 prereq usite courses to qualify for enrollment into these open elective courses. Students willing to enroll into open elective courses of other departments must consult with the chairpersons and course instructors concerned.

Internship/Project Work 3

| | | |
|---|--------------|---|
| Choose one course from the following | | |
| BUS 498 | Project Work | 3 |
| BUS 499 | Internship | 3 |

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

| | | |
|------------------------------|---|-----------|
| Required core courses | | 33 |
| MAT 110 | Mathematics for Business and Economics I | 3 |
| 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**



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M.B.A in MIS (University of Dhaka)
B.B.A. in Management (University of
Dhaka)

Md. Nazmul Hossain

M.B.A. in Marketing
(University of Dhaka)
B.B.A. in Marketing
(University of Dhaka)

Md. Kazi Raihan Uddin

M.B.A in HRM (University of Dhaka)
B.B.A. in Management
(University of Dhaka)

Khairul Alam

M.B.A in Finance
(East West University, Dhaka)
B.B.A. in Finance
(East West University, Dhaka)

Mohammad Shohidul Islam Khan

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(University of Dhaka)
B.B.A. in Marketing
(University of Dhaka)

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M.A in Marketing Management
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School, London)
B.B.A. in Marketing
(North South University)

Israt Jarin

M.B.A in Finance (University of Dhaka)
B.B.A in Finance (University of Dhaka)

Md. Ariful Islam

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B.B.A. in MIS (University of Dhaka)

Nurun Nahar Tasneem

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B.B.A. in Finance and Marketing
(East West University, Dhaka)

Afreen Chowdhury

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(University of Dhaka)
B.B.A. in Marketing
(University of Dhaka)

Nymatul Jannat Nipa

M.B.A in MIS (University of Dhaka)
B.B.A. in MIS (University of Dhaka)

Safayet Rahman

M.B.A in ITB (University of Dhaka)
B.B.A. in Management
(University of Dhaka)

Amirus Salat

M.B.A in AIS (University of Dhaka)
B.B.A. in AIS (University of Dhaka)

Mohammad Rakib Uddin Bhuiyan

M.Sc (University of Birmingham)
M.B.A in ITB (University of Dhaka)
B.B.A. in Accounting
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M.A in Marketing (Middlesex
University, London, England)
B.B.A. in Marketing (IBA, University of
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Rushdy Mohammad Bakth

M.Sc. in Finance (Macquarie
University, Australia)
B.B.A. in Finance & Accounting
(North South University)

Manirujjaman

Ph.D. Candidate,
(Deakin University, Australia)
M.Com (University of Central
Queensland, Australia)
M.Com in Marketing
(University of Dhaka)
B.Com (Hons.) in Marketing
(University of Dhaka)

Department of Economics

The Department of Economics at East West University has a cherished goal of becoming a very strong and resourceful Economics department in Bangladesh. The teaching faculty comprises highly qualified and experienced professors as well as bright young economists. Research is of high priority in the department.

Economics is the most vibrant subject among all social science subjects 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 of Social Science in Economics.

Visiting Faculty

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

Academic Programs Undergraduate Studies

Bachelor in Social Science (Economics) - 123 Credits

Graduate Studies

Master of Bank Management - 60 credits

Master of Development Studies - 39 credits

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

Master of Public Policy - 30 credits (under
preparation)

Master of Social Science in Economics - 36 credits

Research

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

Bachelor of Social Science (BSS) in Economics

Minimum Requirement 123 Credits

| Course ID | Course Title | Credit |
|--|---|-----------|
| Compulsory General Education Courses | | 24 |
| BUS 101 | Introduction to Business | 3 |
| CSE 101 | Introduction to Computers I | 3 |
| ENG 100 | Spoken English/ Improving Oral Communication Skills | 3 |
| ENG 101 | Basic English | 3 |
| ENG 102 | Composition and communication skills | 3 |
| GEN 201 | Bangladesh Studies | 3 |
| MAT 110 | Mathematics For Business and Economics I | 3 |
| STA 101 | Introduction to Statistics | 3 |
| **MAT 100 for those who have no Mathematics in HSC Level | | |

| Course ID | Course Title | Credit |
|---|---|----------|
| Optional General Education Courses | | 9 |
| CSE 102 | Introduction to Computers II | 3 |
| GEN 204 | Western thought | 3 |
| GEN 205 | Introduction to Psychology | 3 |
| GEN 207 | Industrial Psychology | 3 |
| GEN 210 | International Relation | 3 |
| GEN 211 | Concepts of Journalism & Media Studies | 3 |
| GEN 213 | Introduction to German Language | 3 |
| ACT 101 | Financial Accounting | 3 |
| ENG 145 | Introduction to Linguistic | 3 |
| ETE 101 | Introduction to Telecommunication Engineering | 3 |
| FIN 101 | Principles of Finance | 3 |
| MAT 101 | Differential and Integral Calculus | 3 |
| MAT 102 | Differential Equation and Special Function | 3 |
| MGT 101 | Principles of Management | 3 |
| MIS 101 | Introduction to Management Information System | 3 |
| MKT 101 | Principles of Marketing | 3 |
| MAT100 | College Mathematics(* MAT 100 for those who have no Mathematics in HSC or equivalent Level) | 3 |
| SOC 101 | Introduction to Sociology | 3 |
| SOC 102 | Introduction to Anthropology | 3 |
| SOC 211 | Eastern Culture and Heritage | 3 |
| SOC 212 | Social Ecology, Environment & Society | 3 |
| SOC 215 | Principles of Social & Public Relations | 3 |

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

**Other than the courses listed any 1xx level, 3-credit course

from any discipline with no prerequisite other than which are CGE courses (Compulsory General Education Courses) can be taken as Optional General Education Course.

** Few 1xx level courses may have some prerequisites (which prerequisites are also listed in the group). In those cases all the courses are required. (Example: FIN 101 is prerequisites of FIN 201).

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

| Course ID | Course Title | Credit |
|---------------------------------|--|-----------|
| Core Requirements Course | | 54 |
| ECO 101 | Principles of Microeconomics | 3 |
| ECO 102 | Introduction to Macroeconomics | 3 |
| ECO 260 | Environmental & Natural Resource Economics | 3 |
| ECO 301 | Intermediate Microeconomic Theory I | 3 |
| ECO 302 | Intermediate Macroeconomic Theory I | 3 |
| ECO 310 | Money and Banking | 3 |
| ECO 315 | Public Finance | 3 |
| ECO 328 | International Trade and Finance | 3 |
| ECO 349 | Economics of Development | 3 |
| ECO 360 | Socio-Economic Profiles of Bangladesh | 3 |
| ECO 465 | Basic Econometrics | 3 |
| ECO 467 | Intermediate Microeconomic Theory II | 3 |
| ECO 475 | History of Economic Thought | 3 |
| ECO 477 | Intermediate Macroeconomic Theory II | 3 |
| ECO 490 | Research Methodology | 3 |
| ECO 495 | Supervised Research Paper | 3 |
| MAT 211 | Mathematics for Business and Economics II | 3 |
| STA 217 | Statistics For Business And Economics | 3 |

Proposed Open Elective Courses:

Students must complete 36 credits from the pool of Open Elective Courses. Out of these 36 credits At least 15 credits must be from Economics Courses. Other 18 credits can be from any other disciplines.

At least 06 credits must be from 2xx level
 At least 12 credits must be from 3xx level
 At least 18 credits must be from 4xx level

| Course ID | Course Title | Credit |
|---|--------------------------------------|-----------|
| Open Elective Courses (2xx pool) | | 06 |
| ACT 201 | Management Accounting | 3 |
| BUS 231 | Business Communication | 3 |
| CSE 205 | Discrete Mathematics | 3 |
| ECO 200 | Agricultural Economics | 3 |
| ENG 200 | Advanced Verbal Communication Skills | 3 |
| FIN 201 | Business Finance | 3 |
| MAT 201 | Linear Algebra | 3 |
| MGT 251 | Organizational Behavior | 3 |
| MKT 201 | Marketing Management | 3 |

**BUS 231 must be completed.

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

| Course ID | Course Title | Credit |
|---|--|-----------|
| Open Elective Courses (3xx pool) | | 12 |
| 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 |
| BUS 361 | Legal Environment of Business | 3 |
| ENG 313 | English for the Media | 3 |
| FIN 335 | Financial Institution and Market | 3 |
| FIN 350 | Real State Finance | 3 |
| FIN 380 | Management of Commercial Bank | 3 |
| HRM 301 | Human Resource Management | 3 |
| MGT 337 | Production Operation Management | 3 |

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

| Course ID | Course Title | Credit |
|---|-------------------------------|-----------|
| Open Elective Courses (4xx pool) | | 18 |
| 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 |
| STA 427 | Mathematical Statistics | 3 |
| FIN 408 | Financial Analysis and Control | 3 |
| FIN 410 | Risk Management and Insurance | 3 |
| FIN 425 | Investment Analysis and Management | 3 |
| FIN 435 | Managerial Finance | 3 |
| FIN 450 | Cases in Financial Management | 3 |
| FIN 475 | Option and Future | 3 |
| HRM 411 | Human Resource Planning | 3 |
| HRM 414 | Industrial Relations | 3 |
| HRM 419 | Leadership Power and Influence | 3 |
| HRM 420 | Organization Development | 3 |
| MGT 402 | Management Science | 3 |
| MGT 405 | Organizational Development and Change | 3 |
| MGT 410 | International Labor Market | 3 |
| MKT 410 | Consumer Behavior | 3 |
| MKT 411 | Export Import Management | 3 |
| MKT 412 | Service Marketing | 3 |
| MKT 414 | Marketing Research | 3 |
| MKT 406 | Brand Management | 3 |

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

Second Major in Economics

A second major in Economics is open to all undergraduate students at EWU who are enrolled in BBS in Economics students. Once a student earns a second major his/her degree will have a suffix Economics, like BBA (Marketing and Economics), etc. The following curriculum for completing a second major for non-Economics undergraduate student at EWU.

| | |
|----------------------------------|-----------|
| 4) Compulsory Credits | 39 |
| 5) ECO 3XX/ECO 4XX Level credits | 06 |
| Total Credit Requirement | 45 |

Economics Courses

| | |
|--|-----------|
| Required compulsory courses | 39 |
| ECO 101 Principles of Microeconomics | 3 |
| ECO 102 Principles of Macroeconomics | 3 |
| ECO 260 Environmental & Natural Resource Economics | 3 |
| ECO 305 Public Finance | 3 |
| MAT 110 Mathematics for Business & Economics I | 3 |
| STAT 101 Introduction to Statistics | 3 |
| ECO 301 Intermediate Microeconomic Theory I | 3 |
| ECO 302 Intermediate Macroeconomic Theory I | 3 |
| ECO 301 Intermediate Macroeconomic Theory II | 3 |
| ECO 465 Basic Econometric | 3 |
| ECO 477 Intermediate Macroeconomic Theory II | 3 |
| ECO 301 Mathematics for Business Economics II | 3 |
| STAT 217 Statistics for Business & Economics | 3 |

Elective Courses: Any two from ECO three or four hundred level courses: 6 Credits (ECO 3XX OR ECO 4 XX) 06

Faculty Members of the Department of Economics

Professor

Muhammad Sirajul Haque

Ph.D. in Economics (Growth Theory)
(Simon Fraser University, Canada)
MS in Economics (Investment Model)
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MA in Economics (University of Chittagong)
BA (Hons.) in Economics (University of Chittagong)

Mudabber Ahmed

Ph.D. in Economics
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(Dalhousie University, Canada)
MSS in Economics
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BSS (Hons.) in Economics
(University of Chittagong)

Associate Professor

Basanta Kumar Barmon

Post doc in Development Economics
(Japan Society for the Promotion and Science-JSPS)
Ph.D. in Economics
(Hokkaido University, Japan)
MS in Economics
(Hokkaido University, Japan)
MS in Statistics
(Bangladesh Agricultural University, Mymensingh)
B.Sc. in Agricultural Economics
(Bangladesh Agricultural University, Mymensingh)

Assistant Professor

Ahmed Taneem Muzaffar

M.Sc. in Financial and Business Economics
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BS in Economics (North South University)
(On Leave)

Iftekharul Huq

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B.Sc. in Economics
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(On Leave)

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Lecturer

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BSS (Hons.) in Economics
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BSS (Hons.) in Economics
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Asica Siddica

MA in Economics
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MSS in Economics
(University of Dhaka)
BSS in Economics
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Visiting Professor

Honorary Coordinator & Advisor

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MA in Economics
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MA in Economics
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MSc in Agricultural Economics
(University of Guelph, Ontario, Canada)
MSS in Economics
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BSS Honours in Economics
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M A Hakim

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BA (Hons.) in Economics
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Priya Brata Paul

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 (PLPFU), (Moscow)
 MSc in Economics
 (Patrice Lumumba Peoples Friendship University
 (PLPFU), (Moscow)
 BSc in Economics
 (Patrice Lumumba Peoples Friendship University
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Md. Nisar Ahmed Shams

M.Sc in Development of Resource Economics
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 (Jahangirnagar University)

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 (Jahangirnagar University)
 B.Sc. in Economics
 (Jahangirnagar University)

Mostafa Azad Kamal

MA in International and Development Economics
 (University of Namur, Belgium)
 MSS in Social Science

(University of Chittagong)
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 (University of Chittagong)

Hossain Ishrath Adib

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 MSS in Economics
 (University of Chittagong)
 BSS in Economics
 (University of Chittagong)

Nusrat Islam

MA in Economics
 (University of Manitoba, Canada)
 BSS in Economics
 (East West University)



Gold Medalist and Valedictorian receiving gold medal from Honorable Education Minister Mr. Nurul Islam Nahid, MP

Department of English

The 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. This department is among the oldest departments of East West University. It started in August 1996, and now has 36 full-time and 4 part-time faculty members. The Department currently offers a wide variety of undergraduate and graduate courses in the English language, linguistics and literature to about 500 students. Furthermore, it offers a number of compulsory 'service' courses to all students of East West University.

The Department of English offers both undergraduate and graduate programs. At the undergraduate level, the department offers a 4-year BA program in English. The undergraduate program includes two major areas: English literature or language, that is, English language teaching (ELT). At the graduate level too, students may go for an MA in English with a concentration in either Literature or Linguistics and ELT or they can opt for a separate MA in English Language Teaching (ELT) programme. MA in ELT is a practical course aimed at making students more aware of contemporary issues and techniques in ELT and designed for those who are interested in a career in Teaching of English as a Foreign Language (TEFL). It provides an in-depth discussion to a wide range of aspects of the structure of contemporary English, and an understanding of the way in which language learning takes place in classrooms, as well as evaluating current materials and methods used in TEFL. At this point, 337 students have received the BA degrees; 190 students have graduated with an MA in English degree and 35 with MA in ELT (English Language Teaching) from this 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 America, Canada, Britain, Australia, Japan, Thailand, New Zealand, Malaysia or India, and are at the forefront of some of the best research work at home, certainly speaks volumes for 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. The department organizes international conferences seminar, which provide the faculty and students a supportive forum for research and to exchange and develop ideas. The English Department has been organizing seminars and discussion programmes since 2004. During these sessions, faculty members, and speakers from home and abroad, present their papers and engage in meaningful academic discussions in the presence of colleagues, guests, and students. Furthermore, the department has organized three international conferences: Passages: English Studies in the Region in April 2006; Democracy, the "New World Order" and English Studies in December 2008; Empire and English Studies: Pedagogy and Activism Now in

December 2009. The English Department of East West University is committed to provide state-of-the-art teaching and learning facilities. The department has a multimedia language lab, very modern self-access centre, 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 English Conversation Club, which organizes a full-range of co-academic and social events throughout the year.

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 are:

- 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 23 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 on the following page.



Students in a class with Prof. Dr. Muhammed Shahriar Haque, Dean, Faculty of Liberal Arts & Social Sciences

Bachelor of Arts (BA) in English: Courses

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 205: | Introduction to Psychology (Compulsory for English Dept. Students) | 3 |
| GEN 207: | Industrial Psychology | 3 |
| GEN 208: | Introduction to Philosophy (Compulsory for English Dept. Students) | 3 |
| GEN 210: | International Relations | 3 |
| GEN 211: | Concept of Journalism and Media (Compulsory for English Dept. Students) | 3 |
| SOC 101: | Introduction to Sociology (Compulsory for English Dept. Students) | 3 |
| SOC 202: | Social Psychology | 3 |
| SOC 211: | Eastern Culture & Heritage | 3 |
| SOC 212: | Social Ecology, Environment & Society | 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 This course is the prerequisite for all literature courses. | 3 |
| 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 |

| Course | Title | Credit |
|--|---|-----------|
| 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 |

| Course | Title | Credit |
|---|--|--------|
| ENG 320 | Victorian Prose and Poetry Prerequisite: ENG 191 + ENG 192 + ENG 245 | 3 |
| 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 |
| ENG 440 | Literary Theory Prerequisite: ENG 438 | 3 |
| ENG 445 | Modern Poetry Prerequisite: ENG 320 | 3 |
| ENG 450 | Modern Drama Prerequisite: ENG 301 + ENG 310 | 3 |
| ENG 452 | Contemporary Literature in English Prerequisite: 5 Literature courses | 3 |
| ENG 455 | Comparative Literature Prerequisite: Completion of at least 12 literature courses | 3 |
| ENG 458 | 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 |

| Course | Title | Credit |
|---------|---|--------|
| ENG 235 | Teaching Language through Literature Prerequisite: ENG 145 and ENG 306 | 3 |
| ENG 255 | Second Language Acquisition (SLA) Prerequisite: ENG 145+ENG 207 | 3 |
| ENG 303 | Syllabus and Material Design Prerequisite: ENG 145 + ENG 306 | 3 |
| ENG 305 | Linguistic Theories Prerequisite: ENG 145 + ENG 154 | 3 |
| ENG 307 | Academic Writing Prerequisite: ENG 155 | 3 |
| ENG 313 | English for the Media (Open elective) Prerequisite: ENG 102 | 3 |
| ENG 316 | English for Specific Purposes Prerequisite: ENG 303 + ENG 306 | 3 |
| ENG 319 | Translation Studies (Open elective) Prerequisite: ENG 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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Department of Social Relations

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

More importantly, DSR offers MA in Population, Reproductive Health, Gender and Development (MPRHGD), Bachelor of Social Science (BSS) in Sociology and courses on General Education. The programs of the department are run by highly qualified faculty members who are internationally acclaimed in diversified disciplines such as sociology, population science, political science, public administration, development studies, environmental studies, international relations, psychology, gender

studies, and communication. As we practice reflective learning approach, our faculty members are very friendly and cooperative in order to nurture vibrant intellectual environment for the learners. Most notably, the department is committed to educating a new generation of learners in the region who will help ensure the development of Bangladesh and beyond in the 21st century.

Programs Offered

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

General Education:

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

The department offers courses in the following academic areas:

| Course | Title | Pre Requisite | Credits |
|-------------------|--|----------------|---------|
| Compulsory | General Education Courses | - | - |
| GEN 201 | Bangladesh Studies | ENG102 | 3 |
| Optional | General Education Courses | - | - |
| GEN 204 | Western Thought | None | 3 |
| GEN 205 | Introduction to Psychology | ENG102 | 3 |
| GEN 207 | Industrial Psychology | ENG102 | 3 |
| GEN 208 | Introduction to Philosophy | None | 3 |
| GEN 210 | International Relations | ENG102 | 3 |
| GEN 211 | Concepts of Journalism & Media Studies | ENG102 | 3 |
| GEN 213 | Introduction to German Language | None | 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 223 | Contemporary Security Studies in Asia-Pacific | ENG102, GEN210 | 3 |
| GEN 224 | Bangla Language | None | 3 |
| GEN 229 | Professional Ethics | ENG102 | 3 |
| POP 201 | Health Challenges of Adolescents and Youths | None | 3 |
| POP 202 | Introduction to Public Health | None | 3 |
| SOC 101 | Introduction to Sociology | None | 3 |
| SOC 102 | Introduction to Anthropology | None | 3 |
| SOC 102 | Social Psychology | ENG102 | 3 |
| SOC 201 | Eastern Culture and Heritage | None | 3 |
| SOC 202 | Social Ecology, Environment and Society | None | 3 |
| SOC 203 | Women in Development | ENG101 | 3 |
| SOC 204 | Introduction to Development Studies | ENG102 | 3 |
| SOC 205 | Principles of Social and Public Relations | ENG102 | 3 |
| SOC 206 | Globalization and Social Identity | ENG102 | 3 |
| SOC 217 | Religion, Ethnicity, Culture and Development in South Asia | ENG102, SOC101 | 3 |

Bachelor of Social Science (BSS) in Sociology

Program Philosophy and Pedagogy

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

Program Mission and Objectives

The key mission and purpose of the BSS in Sociology program of the University is to develop analytical skills and intellectual aptitudes of the learners preparing them as resourceful and competent professionals. The program intends to provide students with transformative skill and creative learning mind for a deeper understanding of social,

cultural, political, and economic issues in order to extend well-organized services to the community at a time of social crisis, ethical degradation, and environmental disorder. The program is planned and designed to facilitate students' attaining an extensive sociological and applied social background through academic exercise that will equip them well for professional careers in the fields of social/rural development, social research, socio-economic planning, community health, community service, mass communication, social change, rural development, community counseling, education, disaster, environment and social ecology, and also for advanced studies at graduate school.

Career Prospects

The graduates would be able to successfully and consistently compete for careers in the challenging arena of global social transformation and development. In the present era, trained professionals are on high demand by various international organizations, private-social agencies, rehabilitation centers, government agencies, and non-governmental organizations both at the national and international levels.

Collaboration and Partnership

Partnership and cooperation would be established with North American Universities and international and national organizations in the country to ensure academic excellence and distinction in the field.

Bachelor of Social Science in Sociology

Requirement: 123 Credits Hours

Compulsory General Courses

| Course Code | Course Title | Credit (Total) |
|-------------|--------------------------------------|----------------|
| ENGL 100 | Spoken English | 3 Credits |
| ENGL 101 | Basic English | 3 Credits |
| ENGL 102 | Composition and Communication Skills | 3 Credits |
| CSSE 101 | Introduction to Computer | 3 Credits |
| GEN 201 | Bangladesh Studies | 3 Credits |
| GEN 240 | Bangla Language | 3 Credits |

Credit (Total)
18

Compulsory Foundation Courses

| Course Code | Course Title | Credit (Total) |
|-------------|------------------------------|----------------|
| SOC 101 | Introduction to Sociology | 3 Credits |
| SOC 102 | Introduction to Anthropology | 3 Credits |
| SOC 103 | Liberation War of Bangladesh | 3 Credits |

Credit (Total)
9

Required Core Courses (19 Courses)

| Course Code | Course Title | Credit (Total) |
|-------------|---------------------------------------|----------------|
| SOC 104 | Social Problems | 3 Credits |
| SOC 201 | Sociology of Family and Marriage | 3 Credits |
| SOC 202 | Social Psychology | 3 Credits |
| SOC 204 | Research Methodology | 3 Credits |
| SOC 205 | Rural Sociology | 3 Credits |
| SOC 206 | Statistics for Sociology | 3 Credits |
| SOC 207 | Early Social Thought | 3 Credits |
| SOC 210 | Community, Communication, and Culture | 3 Credits |
| SOC 301 | Qualitative Research Methodology | 3 Credits |
| SOC 302 | Social Structure of Bangladesh | 3 Credits |
| SOC 303 | Urban Sociology | 3 Credits |
| SOC 304 | Sociology of Environment | 3 Credits |
| SOC 305 | Medical Sociology | 3 Credits |
| SOC 306 | Social Problem Analysis | 3 Credits |
| SOC 309 | Sociology of Education | 3 Credits |
| SOC 312 | Social Demography | 3 Credits |
| SOC 401 | Classical Sociological Theories | 3 Credits |
| SOC 406 | Sociology of Development | 3 Credits |
| SOC 407 | Contemporary Sociological Theories | 3 Credits |

Credit (Total)
57

Elective Courses (Choose any 11 courses)

| Course Code | Course Title | Credit (Total) |
|-------------|--|----------------|
| SOC 105 | Peasant Societies | 3 Credits |
| SOC 208 | Social (Stratification and) Inequality | 3 Credits |
| SOC 209 | Industrial Sociology | 3 Credits |
| SOC 211 | Eastern Culture and Heritage | 3 Credits |
| SOC 212 | Social Ecology, Environment and Society | 3 Credits |
| SOC 213 | Women in Development | 3 Credits |
| SOC 214 | Introduction to Development Studies | 3 Credits |
| SOC 215 | Principles of Social and Public Relations | 3 Credits |
| SOC 216 | Globalization and Social Identity | 3 Credits |
| SOC 217 | Religion, Ethnicity, Culture and Development in South Asia | 3 Credits |
| SOC 310 | Sociology of Organization | 3 Credits |
| SOC 307 | Bangladesh Society and Culture | 3 Credits |
| SOC 308 | Social Services in Bangladesh | 3 Credits |
| SOC 311 | Feminist Thought | 3 Credits |
| SOC 313 | Criminology | 3 Credits |
| SOC 314 | Sociology of Aging | 3 Credits |
| SOC 315 | Principles of Economic Sociology | 3 Credits |
| SOC 316 | Globalization, Migration, Development and Refugee Issues | 3 Credits |
| SOC 317 | Sociology of Science and Technology | 3 Credits |
| SOC 402 | Sociology of Poverty | 3 Credits |
| SOC 403 | Political Sociology | 3 Credits |
| SOC 404 | Marxist Sociology | 3 Credits |
| SOC 405 | Social Forestry | 3 Credits |
| SOC 408 | Sociology of Gender Planning and Development | 3 Credits |
| SOC 409 | Sociology of Mass Communication | 3 Credits |
| SOC 410 | Community Development Organizations and Social Change | 3 Credits |
| SOC 411 | Human Rights and Social Justice | 3 Credits |
| SOC 412 | Social Interventions and Practice | 3 Credits |

Credit (Total)
33

Individual Research/ Practicum/Internship (Required: Choose either one)

| | | |
|---------|----------------------------|-----------|
| SOC 413 | Research Project/Monograph | 6 Credits |
| SOC 414 | Practicum and Internship | 6 Credits |

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(From left) Convocation Speaker Mrs. Selina Hossain, President, Board of Trustees Dr. Mohammed Farashuddin, Honorable Education Minister Mr. Nurul Islam Nahid, MP and Vice Chancellor Professor Ahmed Shafee at 13th Convocation of EWU

Department of Applied Statistics

A. Introduction

Demand for professionals with strong quantitative analytical skills is not new, but recent changes in the economy and the growing reliance of our businesses and governments on data have created an even greater need for workers who can manage data, produce informative visualizations of data, and are guided by fundamental statistical principles. B.S. Program in Applied Statistics (AST) will help meet this need by providing working professionals the means to obtain graduate-level education in applied statistics and quantitative analytics.

B.S. Program in Applied Statistics is designed to provide working professionals with the necessary theoretical foundations of modern statistical practice to prepare students for careers in quantitative analysis, data management and data analysis, and statistics. Students will take courses in theory, statistical models, data management, and data visualization. The program will help meet current and projected demand for professionals with analytical skills. More importantly, the format and delivery of B.S. Honors Program in Applied Statistics has been designed to allow currently working scientific, technical and quantitative professionals to complete the degree while continuing their fulltime employment.

B.S. Program in AST is designed for people who like to work in different industries and business firms, industrial planning and development, and to pursue research for creative work and teaching. From the point of feasibility of the proposed program, we expect to attract some experts from outside, besides the existing relevant teaching staffs of our University. Other than the existing lab facilities at our university, we can make use of the facilities existing in different educational institutions and research establishments in the country.

The B.S. course in Applied Statistics is an integrated four-year program. The program includes courses of both theoretical and applied nature, but more emphasis is given on the applications of the statistical techniques to real life situations. The course is so designed that after successful completion, the graduates are equipped to work efficiently and completely in government and non-government organizations, research organizations, service departments and other related fields. Each student has to complete a total of 127 credits over four

academic years to earn the degree of B. S. in Applied Statistics.

B. Admission Requirements

In order to be considered for admission, each applicant for admission must fulfill the admission requirements as laid down by EWU. An applicant must have earned a higher secondary certificate (HSC) or its equivalent in any group having mathematics and required general education subjects. Applicants must take an admission test. Admission tests are given before the beginning of each of the three semesters of the EWU academic year.

C. Admission Test

The Admission Test will judge applicants' knowledge, skill, abilities and aptitude for the program. The test is administered by EWU. The admission test has a written and an oral component. To qualify in a written test, an applicant is required to obtain a minimum quality points (marks) as set by EWU, in English Language and Communication, and intermediate level Mathematics. Applicants qualified in the written test may be asked to take a viva voce. Students obtaining acceptable level of cumulative quality points will be invited to get admitted in the program.

D. Degree Requirements

The degree requirements for a Bachelor of Science (BS) in Applied Statistics will be as follows:

- (i) Completion of minimum 127 credit hours.
- (ii) Maintaining a minimum cumulative grade point average (CGPA) of 2.0.

Student performance will be assessed semester basis and any student with a CGPA of <2.0 will be placed in academic probation. The student will be notified to meet an academic advisor. The academic advisor will make a list of remedial courses the student must take in order to improve his/her CGPA to 2.0 or above. If the student fails to improve his/her CGPA to 2.0 or better in the next two semesters, the student will be dismissed from the program.

E. Length of the Program

B.S. Program in Applied Statistics is usually a twelve-semester program. It is to be mentioned here that at East West University there are three semesters in a year. Students may be allowed to spend maximum six more semesters.

B. Credit Load

Usually the minimum and maximum credit load per semester is three courses (9 credits) and four courses (12 credits) respectively.

C. Academic Schedule

Classes will be conducted in the morning slots. The academic year is divided into three semesters described below:

| | |
|----------|-----------------------|
| Spring - | January to April |
| Summer - | May to August |
| Fall - | September to December |

D. The BS in Applied Statistics Program Minimum Requirement for the degree of BS in Applied Statistics 127 credits

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

| Section | Description | Credit Hours |
|--------------|---|--------------|
| I | Language and General Education Requirements | 21 |
| II | Mathematics, Economics & Computer Science | 16 |
| III | Applied Statistics Core Courses | 78 |
| IV | Applied Statistics Elective Courses | 12 |
| Total | | 127 |

Section I: General Education Requirements (21 Credit Hours)

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

| Course Number/Course title | Credit Hours |
|---|--------------|
| ENG 101: Basic English | 3 |
| ENG 102: Composition & Communication Skills | 3 |
| GEN 101: Bangladesh Studies | 3 |
| Total | 9 |

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

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

| Course Number/Course title | Credit Hours |
|---|--------------|
| GEN 204: Western Thought | 3 |
| GEN 205: Introduction to Psychology | 3 |
| GEN 207: Industrial Psychology | 3 |
| GEN 208: Introduction to Philosophy | 3 |
| GEN 210: International Relations | 3 |
| GEN 211: Concepts of Journalism & Media Studies | 3 |
| GEN 219: Professional Ethics | 3 |
| GEN 225: Demography and Economic Statistics | 3 |

| | |
|--|---|
| SOC 101: Introduction to Sociology | 3 |
| SOC 202: Social Psychology | 3 |
| SOC 211: Eastern Culture & Heritage | 3 |
| SOC 212: Social Ecology, Environment & Society | 3 |
| GEN 2XX: Any other GEN course approved by the University | 3 |

Requisite Total 6

Section I C: Optional Courses from Business & Relevant Subject (2 courses, OPT003 and OPT004). Applied Statistics students may choose any two courses: 3+3=6 credit hours).

| Course Number/Course title | Credit Hours |
|--|--------------|
| ACT 101: Financial Accounting | 3 |
| BUS 101: Introduction to Business | 3 |
| BUS 321: Business for Engineering & Technology | 3 |
| FIN 101 : Principles of Finance | 3 |
| MGT 101: Principles of Management | 3 |
| MKT 101: Principles of Marketing | 3 |
| Requisite Total | 6 |

Section II: Mathematics, Economics and Computer Science (16 Credit Hours)

These courses stress the fundamental principles upon which the applied statistics subject is based. Applied Statistics students must take a total of 16 credit hours).

| Course Number/Course title | Credit Hours |
|---|--------------|
| MAT 101: Differential & Integral Calculus | 3 |
| MAT 102: Differential Equations & Special Functions | 3 |
| MAT 206: Basic Algebra and Linear Algebra | 3 |
| AST 106: Principles of Economics | 3 |
| CSE 111: Programming with Fortran and C | 4 |
| Requisite Total | 16 |

Section III. Applied Statistics Core Courses (78 Credit Hours)

The following courses stress fundamental Applied Statistics concepts.

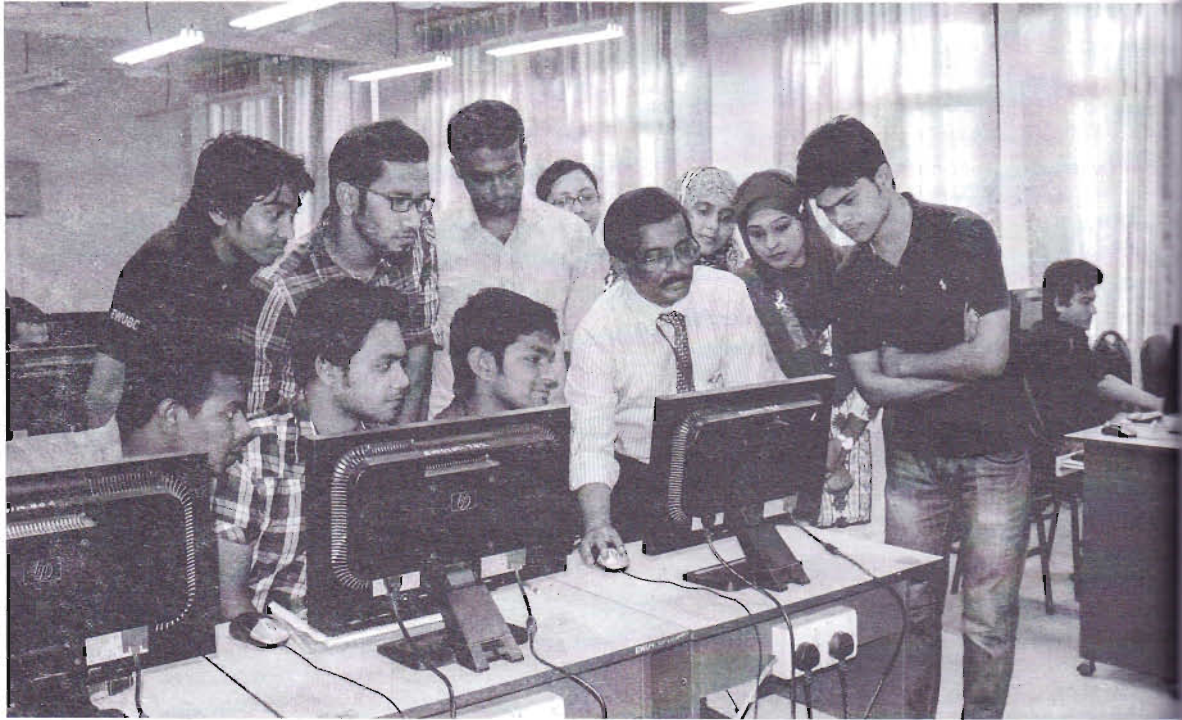
| Course Number/Course title | Credit Hours |
|---|--------------|
| AST 101 Elements of Applied Statistics | 3 |
| AST 102 Elements of Probability | 3 |
| AST 130 Statistical Computing I | 3 |
| AST 131 Statistical Computing II | 3 |
| AST 201 Probability Distributions and Simulation | 3 |
| AST 202 Sampling Distributions and Order Statistics | 3 |
| AST 203 Statistical Inference I | 3 |
| AST 204 Agricultural Statistics and Design of Experiments | 3 |
| AST 205 Introduction to Demography | 3 |
| AST 206 Introductory Sampling Methods | 3 |
| AST 207 Data Analysis using S Language and MATLAB | 3 |
| AST 230 Statistical Computing III | 3 |
| AST 231 Statistical Computing IV | 3 |
| AST 232 Statistical Computing V | 3 |
| AST 301 Design and Analysis of Factorial Experiments | 3 |
| AST 302 Advanced Sampling Techniques | 3 |
| AST 303 Applied Regression Analysis | 3 |

| | |
|---|-----------|
| AST 304 Epidemiology | 3 |
| AST 305 Population Studies | 3 |
| AST 306 Social Statistics and Social Development | 3 |
| AST 307 Research Planning, Monitoring and Evaluation | 3 |
| AST 308 Data Analysis using SPSS and SAS | 3 |
| AST 402 Statistical Inference II | 3 |
| AST 406 Industrial Statistics and Operations Research | 3 |
| AST 489 Internship | 3 |
| AST 499 Project Report and Seminar | 3 |
| Requisite Total | 78 |

Section IV: Applied Statistics Elective Courses (ELV001-ELV004). (12 Credit Hours)

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

| Course Number/Course title | Credit Hours |
|---|---------------------|
| AST 401 Advanced Probability and Stochastic Process | 3 |
| AST 403 Applied Multivariate Data Analysis | 3 |
| AST 404 Econometric Methods | 3 |
| AST 405 Lifetime Data Analysis | 3 |
| AST 407 Actuarial Statistics | 3 |
| AST 408 Modeling Time Series Data | 3 |
| AST 409 Generalized Linear Models | 3 |
| AST 432 Statistical Computing XI | 3 |
| Requisite Total | 12 |



Students in Lab class with Prof. Dr. Abdus Sattar

Faculty Members of the Department of Applied Statistics

Honorary Advisor and Coordinator

Professor Dr. M. Mosleh-Uddin

Honorary Coordinator and Advisor
Department of Applied Statistics

Professor

Mehus Sattar

Professor and Chairperson
Department of Applied Statistics, EWU
Ph.D. in Statistics
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M.Sc. in Economics
(Dessa Institute of National Economy, Odessa,
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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. The ECE Department offers two undergraduate programs: B.Sc in ETE (Electronic and Communication Engineering), B.Sc in ICE (Information and Communications Engineering), and two graduate programs: MS in TE (Masters in Telecommunications Engineering) and MS in Applied Physics and Electronics. Besides those ECE department offers basic mathematics and science courses (Physics, Chemistry) 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. Nowadays, modern civilizations absolutely governed by telecommunication engineering. The fixed and cellular telephony, satellite communication, IP telephony, Internet and World Wide Web and digital high definition television are perhaps the most visible applications of telecommunications engineering.

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

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

Academic Programs

At present, the department offers the following programs:

B.Sc in Electronic & Telecommunication Engineering (ETE)

B.Sc in Information & Communications Engineering (ICE)

MS in Telecommunication Engineering (MTE)

MS in Applied Physics & Electronics

Mission of undergraduate Programs

B.Sc in Electronic and Telecommunication Engineering (ETE)

B.Sc in Electronic & Telecommunication Engineering (ETE) is a four year B.Sc engineering program. The purpose of this program is to produce competent engineers who are highly trained in both electronics and telecommunications engineering to meet the needs of our expanding telecom industry. 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 and 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 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.

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 instill 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 ETE and B.Sc. in ICE Graduates

Engineers graduated in ICE and ETE 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 in Bangladesh

- Mobile operators: BanglaLink, GrameenPhone, Robi, City Cell, TeleTalk, Warid, etc. and other relevant multinational companies
- BTTB; the graduates can complete BCS examination for relevant government jobs 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 in electronic, computer science and telecommunications engineering.

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 near future.

Research Activities under ECE Department

The present research activities of the Department include research work in the fields of Wireless & Mobile Communication, RF and Antenna Engineering, Communication Networks, Optical Communication, Teletraffic Engineering, Digital Signal Processing, Telemedicine, Signal, Image & Multimedia Processing, Materials Science, Plasma Technology, 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/Seminars 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. In Summer 2009 semester student of ECE department visited the Fiber Optic Landing Station at Cox's Bazar.

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

Minimum Requirement 140 Credits

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

| | |
|--|-------------|
| I Language & General Education Requirements | 21C |
| II Mathematics & Basic Sciences | 26C |
| III ETE Core (including Optional Core) | 68C |
| IV ETE Technical Electives (Depth as well as Breadth) | 18C |
| V 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 204 - Western Thought | 3 |
| GEN 205 - Introduction to Psychology | 3 |
| GEN 207 - Industrial Psychology | 3 |
| GEN 208 - Introduction to Philosophy | 3 |
| GEN 210 - International Relations | 3 |
| GEN 211 - Concepts of Journalism & Media Studies | 3 |
| GEN 239 - Professional Ethics | 3 |
| SOC 101 - Introduction to Sociology | 3 |
| SOC 202 - Social Psychology | 3 |
| SOC 211 - Eastern Culture & Heritage | 3 |
| SOC 232 - Social Ecology, Environment & Society | 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 432 - Antenna 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 451 - IP Telephony | 3 |
| 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

The 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. The courses, 3+4=7 Credit hours.

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

| Course Number & Name | Credit Hours |
|---|--------------|
| ETE 262 - Introduction to Bioengineering | 3 |
| ETE 282 - Introduction to Environmental Engineering | 3 |
| ETE 282 - Renewable Energy Technology | 3 |
| ETE 282 - Mechatronics | 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 | 1 st Year | | 2 nd Year | | 3 rd year | | 4 th Year | |
|--------------------------|----------------------|---------------|----------------------|------------------|----------------------|---------------|----------------------|-----------------------|
| Course | Course No (Credit) | Pre-requisite | Course No (Credit) | Pre-requisite | Course No (Credit) | Pre-requisite | Course No (Credit) | Pre-requisite |
| 1 st Semester | ENG101(3) | None | ETE207(4) | ETE107 | ETE219(3) | PHY209 | ETE399(1) | All 300 Level courses |
| | ETE101(1) | None | MAT205(3) | MAT102 MAT104 | ETE302(4) | ETE105 | IDE002(4) | None |
| | MAT101(3) | None | OPT001(3) | ENG102 | ETE311(4) | ETE212 | ETE420(4) | ETE216 |
| | PHY109(4) | None | STA102(3) | MAT102 | | | ETE441(3) | ETE314 |
| 2 nd Semester | ENG102(3) | ENG101 | ETE212(4) | ETE207 | OPT004(3) | ENG102 | TEE002(3/4) | |
| | ETE105(4) | None | GEN239(3) | ENG102 | ETE310(3) | PHY209 | TEE003(3/4) | |
| | MAT102(3) | MAT101 | PHY209(3) | PHY109 | ETE312(3) | ETE216 | TEE004(3/4) | |
| | | | | MAT205 | ETE316(4) | ETE311 | ETE498(1) | |
| 3 rd Semester | CHE109(4) | None | ETE214(4) | ETE212 | ETE314(4) | ETE312 | TEE005(3/4) | |
| | ETE107(4) | None | ETE216(3) | MAT205 | ETE322(4) | ETE216 | TEE006(3/4) | |
| | GEN201(3) | None | IDE001(3) | None | ETE350(3) | ETE312 | ETE498(3) | |
| | MAT104(3) | MAT101 | OPT003(3) | ENG102 | TEE001(3/4) | | | |
| Total Credit | 35C | | 36C | | 38-39C | | 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: Courses

Minimum Requirement 140 Credits

Credit Requirements for the degree of B.Sc. in ICE

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

| | |
|----------------------------------|--------------|
| A General Education Requirements | 21C |
| B Mathematics & Basic Sciences | 26C |
| C ICE Core | 79C |
| D Technical Electives | 14C |
| Total | 140 C |

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 |
| GEN 239 - (Professional Ethics) | 3 |
| Total | 9 |

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

| Course Number & Name | Credit Hours |
|--|--------------|
| GEN 204 - Western Thought | 3 |
| GEN 205 - Introduction to Psychology | 3 |
| GEN 207 - Industrial Psychology | 3 |
| GEN 208 - Introduction to Philosophy | 3 |
| GEN 210 - International Relations | 3 |
| GEN 211 - Concepts of Journalism & Media Studies | 3 |
| SOC 101 - Introduction to Sociology | 3 |
| SOC 202 - Social Psychology | 3 |
| SOC 211 - Eastern Culture & Heritage | 3 |
| SOC 212 - Social Ecology, Environment & Society | 3 |
| Total | 6 |

(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 109 (Engineering Physics -I) | 4 |
| PHY 209 (Engineering Physics -II) | 3 |
| CHE 109 (Engineering Chemistry -I) | 4 |
| STA 102 - Probability and Statistics | 3 |
| Total | 26 |

C. Information & Communication Engineering Core

These courses stress fundamental Information & Communication Engineering concepts (a total of 79 credit hours).

| Course Number and Name | Credit Hours |
|---|--------------|
| ICE 101 - Introduction to Telecommunication Engineering | 1 |
| 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 | 1 |
| 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 399 (Design and Simulation) | 1 |
| ICE 441 - Wireless & Mobile Communications | 3 |
| ICE 444 - Telecommunication Networks & Switching | 3 |

| | |
|--|-----------|
| ICE-437 - Applied Numerical Methods | 4 |
| ICE-498 - Research Project / Industrial Training | 4 |
| Total | 79 |

3. 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 maximum of 14 credit hours from these Elective Modules.

| Course Number & Name | Credit Hours |
|---|--------------|
| ICE-401 - VLSI Circuit Design | 4 |
| ICE-403 - 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 Engineering | 3 |

| | |
|--|-----------|
| ICE 460 - Foundations of TCP/IP | 4 |
| ICE 469 - Computer Architecture | 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 (1) MAT 101(3) PHY 109 (4) | 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 PHY 209 ICE 251 ENG 102 | ICE 322 (4) ICE 441 (3) ICE 470 (4) ECT 001 (3/4) | ICE 312 ICE 314 None |
| SEM-2 | ENG 102 (3) ICE 105 (4) MAT 102 (3) | ENG 101 ICE 101 MAT 101 MAT 101 | ICE 207 (4) OPT 002 (3) PHY 209 (3) | ICE 107 ENG 102 PHY 109(4) | ICE 301 (4) ICE 302 (4) ICE 312 (3) | ICE 275 ICE 209 ICE 209 | ICE 444 (3) ECT 002 (3/4) ICE 498 (1) ICE 399 (1) | ICE 314 |
| SEM-3 | GEN 201(3) ICE 109 (4) MAT104 (3) CHE 109 (4) | ENG102 MAT102 MAT101 | ICE 245 (4) ICE 251 (4) OPT 003 (3) GEN 239 (3) | ICE 207 ICE 109 ENG 102 None | ICE 314 (4) ICE 316 (4) ICE 350 (3) | ICE 312 ICE 311 ICE 312 | ECT 003 (3/4) ECT 002 (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.

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Telecommunications Engineering
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S. M. Mahmudul Hasan

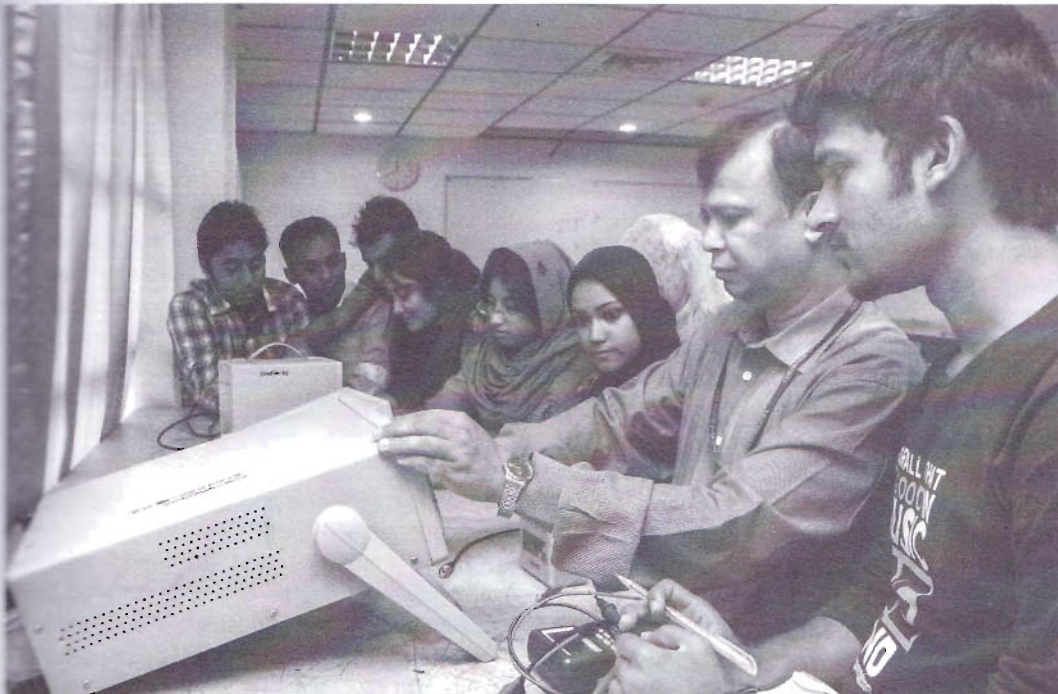
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M.Sc (Jahangirnagar University, Dhaka) 2010,

Mathematics



Lab Class with Dr. Gurudas Mandal, Chairperson of ECE

Department of Computer Science and Engineering

The present civilization cannot be thought without the use of Information and Communication Technology (ICT). The use of ICT has deeply rooted itself into every sphere of modern life such as education, research, commerce, business, entertainment, communication, household affairs, and in many more areas, which indeed improved the quality of life. The ICT is mainly based on two technologies - (i) use of computers together with its associated technologies for solving problems and for processing as well as storing information, and (ii) communication of information over long distances using telecommunication backbones and the Internet. ICT is basically merging of many technologies, where Computer Science and Engineering (CSE) plays the most vital role. Therefore, in the current scenario of higher education, CSE has become one of the most important areas of science and engineering education.

The Department of Computer Science and Engineering (CSE) at East West University offers four-year Bachelor of Science (B. Sc.) degree program in Computer Science and Engineering (CSE) with an ambition of developing competent work force for the emerging ICT world. The curriculum of the degree is prepared with the intension to groom up the students to effectively contribute in all aspects of ICT. Therefore, the curriculum of the B. Sc. in CSE program focuses on (i) Theoretical Computer Science, which builds the theoretical and mathematical foundation of solving problems using computers, (ii) Software Engineering and Information Systems Design, which enables developing software for solving various problems and creating information systems for the corporate and public sectors, (iii) Computer Communication and Networking, which develops capability of creating computer networks and using telecommunication infrastructures and the Internet for effective communication of information, (iv) Computer Hardware Systems, which prepares for designing, installing, and maintaining computer hardware systems, (v) Intelligent Systems, which provides opportunity for developing smart and intelligent software systems for solving very complex and complicated problems, and (vi) Signal and Information Processing, which develops competency in effective processing, storage, and communication of various audio, video, graphics, and text information. The above competencies require a solid

foundation of basic sciences such as mathematics, statistics, physics, and chemistry. Therefore, the curriculum contains sufficient courses on these areas.

Today's ICT personnel must be aware of society, economics, business, law and ethical issues, and must have good communication skills to effectively use ICT for betterment of the humankind. Keeping this thought in consideration, a number of courses in English, Business, Economics, and other Social Sciences and Humanities have been incorporated in the curriculum. The curriculum also makes provision for gathering hands on experience in research and development through final year Thesis/Project course or getting exposure to the real life ICT industry through Internship course. Moreover, the curriculum has the provision for a student to develop focused expertise in his/her field of interest by choosing optional courses.

The CSE Department has a strong inclination towards research and development. Faculty members of the department are undertaking research projects and publishing research papers in high quality international journals and conferences. In these research endeavors, students are also participating under capable guidance of the faculty members and publishing good quality research papers.

The CSE Department is equipped with state-of-the-art laboratories to give practical training on the subjects taught. The department is currently using Electrical Circuit and Machine Laboratory, Electronics Laboratory, VLSI Laboratory, Computer Networking Laboratory, Digital Systems Laboratory, and several Computer Laboratories. Recently, the department has established a dedicated Software Engineering Laboratory for the students of CSE program comprising of latest models of computers and software facilities.

The department is trying to bridge the gap between the academia and the ICT industry by sending interns to these industries and arranging seminars and workshops conducted by the experts from both academia and the industry. These seminars and workshops are also providing opportunities for continuing educations for both faculty members and students.

Curriculum of Bachelor of Science (B. Sc.) in Computer Science and Engineering (CSE) Program: Courses

Minimum Requirement 140 Credits

| Course Category | Credits |
|---|----------------|
| Compulsory General Education Courses | 9 |
| Optional General Education Courses | 6 |
| Optional Business and Economics Courses | 6 |
| Basic Science Courses | 11 |
| Mathematics and Statistics Courses | 15 |
| Compulsory Computer Science and Engineering Courses | 74 |
| Thesis/Project/Internship | 4 |
| Optional Computer Science and Engineering Courses | 15-20 |
| Total | 140-145 |

List of Courses

| Course Title | Credits | Prerequisite |
|--|----------|------------------|
| Compulsory General Education Courses | 9 | |
| ENG001 Basic English | 3 | ENG099 if needed |
| ENG002 Composition and Communication Skills | 3 | ENG101 |
| GEN001 Bangladesh Studies | 3 | ENG102 |
| Optional General Education Courses (Two courses) | 6 | |
| GEN 204 Western Thought | 3 | |
| GEN 205 Introduction to Psychology | 3 | ENG102 |
| GEN 207 Industrial Psychology | 3 | ENG102 |
| GEN008 Introduction to Philosophy | 3 | |
| GEN210 International Relation | 3 | ENG102 |
| GEN211 Concepts of Journalism and Media Studies | 3 | ENG102 |
| GEN213 Introduction to German Language | 3 | |
| GEN215 Introduction to French Language | 3 | |
| GEN216 Introduction to Spanish Language | 3 | |
| GEN217 Introduction to Chinese Language | 3 | |
| GEN218 Introduction to Arabic Language | 3 | |
| GEN223 Contemporary Security Studies in Asia Pacific | 3 | ENG102, GEN210 |
| GEN239 Professional Ethics | 3 | ENG102 |
| SOC 101 Introduction to Sociology | 3 | |
| SOC 102 Introduction to Anthropology | 3 | |
| SOC 202 Social Psychology | 3 | ENG102 |
| SOC 211 Eastern Culture and Heritage | 3 | |
| SOC 212 Social Ecology Environment & Society | 3 | |
| SOC 213 Women in Development | 3 | ENG101 |
| SOC 214 Introduction to Development Studies | 3 | ENG102 |
| SOC 215 Principle of Social & Public Relations | 3 | ENG102, SOC 101 |
| SOC 216 Globalization and Social Identity | 3 | ENG102, GEN210 |
| SOC 217 Religion, Ethnicity, Culture and Development in South Asia | 3 | ENG102 |
| Any other courses added to this list | | |

| Optional Business and Economics Courses [Two courses] | 6 | |
|---|----------|----------------|
| ACT101 Financial Accounting | 3 | |
| BUS321 Business for Engineering and Technology | 3 | ENG102 |
| ECO101 Principle of Microeconomics | 3 | |
| ECO102 Introduction to Macroeconomics | 3 | ECO101 |
| FIN101 Principle of Finance | 3 | STA102 |
| MGT101 Principle of Management | 3 | ENG101 |
| MGT337 Production Operations Management | 3 | MGT101, STA102 |
| MKT101 Principle of Marketing | 3 | |
| MKT201 Marketing Management | 3 | MKT101 |

| Basic Science Courses | 11 | |
|---|-----------|--------|
| PHY109 Engineering Physics-I (Introductory Classical Physics) | 3+1=4 | MAT102 |
| PHY209 Engineering Physics-II (Introductory Quantum Physics) | 3+0=3 | MAT205 |
| CHE109 Engineering Chemistry | 3+1=4 | |

| Mathematics and Statistics Course | 15 | |
|---|-----------|--------|
| MAT101 Differential and Integral Calculus | 3 | |
| MAT102 Differential Equations and Special Functions | 3 | MAT101 |
| MAT104 Coordinate Geometry and Vector Analysis | 3 | MAT101 |
| MAT205 Linear Algebra and Complex Variable | 3 | MAT102 |
| STA102 Statistics and Probability | 3 | |

| Compulsory Computer Science and Engineering Courses | 74 | |
|--|-----------|----------------|
| CSE105 Structured Programming | 3+1=4 | |
| CSE107 Object Oriented Programming | 3+1=4 | CSE105 |
| CSE109 Electrical Circuits | 3+1=4 | |
| CSE205 Discrete Mathematics | 3+0=3 | CSE107 |
| CSE207 Data Structures | 3+1=4 | CSE205 |
| CSE225 Numerical Methods | 3+1=4 | CSE105, MAT102 |
| CSE245 Algorithms | 3+1=4 | CSE207 |
| CSE248 Signals and Systems | 3+0=4 | CSE209, MAT205 |
| CSE251 Electronic Circuits | 3+1=4 | CSE209 |
| CSE301 Database Systems | 3+1=4 | CSE205 |
| CSE325 Operating Systems | 3+1=4 | |
| CSE345 Digital Logic Design | 3+1=3 | CSE205, CSE251 |
| CSE350 Data Communications | 3+0=3 | CSE251, CSE348 |
| CSE360 Computer Architecture | 3+0=3 | CSE325, CSE345 |
| CSE365 Artificial Intelligence | 3+1=4 | CSE245 |
| CSE375 Compiler Design | 3+0=3 | CSE245 |
| CSE405 Computer Networks | 3+1=4 | CSE245, CSE350 |
| CSE411 Software Engineering and Information System Design | 3+1=4 | CSE301 |
| CSE442 Microprocessors and Microcontrollers | 3+1=4 | CSE360 |
| CSE498 Social and Professional Issues in Computing | 3+0=3 | |

| Thesis/Project/Internship [Students must take either CSE497 or CSE499] | 4 | |
|---|----------|--|
| CSE497 Thesis/Project | 0+4=4 | Completed at least 110 credits |
| CSE499 Internship | 0+4=4 | Completed all courses except CSE498/CSE499 |

| | | |
|--|-----------|----------------|
| Optional Computer Science and Engineering Courses [Five courses: Three courses from one group and two courses from one or two groups other than the group selected for three courses] | 15 | |
| Computer Science Group | | |
| CSE413 Automata Theory and Theory of Computations | 3+0=3 | CSE245 |
| CSE460 Programming Language principles | 3+0=3 | CSE107 |
| CSE478 Stochastic Processes | 3+0=3 | STA102, CSE245 |
| CSE482 Parallel Computation | 3+0=3 | CSE245 |
| CSE483 Graph Theory | 3+0=3 | CSE245 |
| CSE484 Computational Geometry | 3+0=3 | MAT104, CSE245 |
| CSE485 Advanced Algorithm | 3+0=3 | CSE245 |
| CSE486 Bioinformatics Algorithms | 3+0=3 | CHE109, CSE245 |

| | | |
|--|-------|----------------|
| Software and Information Systems Group | | |
| CSE409 Systems Programming | 3+1=4 | CSE325 |
| CSE420 Computer Graphics | 3+0=3 | MAT104, CSE245 |
| CSE422 Simulation and Modeling | 3+0=3 | STA102, CSE245 |
| CSE433 Wireless Programming | 3+1=4 | CSE107 |
| CSE434 Enterprise Application Design and Development | 3+0=3 | CSE411 |
| CSE435 Software Quality Assurance | 3+0=3 | CSE411 |
| CSE 441 Component Based Design and Development | 3+0=3 | CSE301 |
| CSE452 Distributed Systems and Algorithms | 3+0=3 | CSE245, CSE325 |
| CSE464 Advanced Database System | 3+0=3 | CSE301 |
| CSE480 Web Database Programming | 3+1=4 | CSE301 |

| | | |
|---|-------|--------|
| Computer Communications and Networks Group | | |
| CSE451 Advanced Data Communication | 3+0=3 | CSE350 |
| CSE453 Wireless Networks | 3+0=3 | CSE405 |
| CSE454 Multimedia Communications | 3+0=3 | CSE405 |
| CSE455 Optical Networks | 3+0=3 | CSE405 |
| CSE456 Wide Area Networks | 3+0=3 | CSE405 |
| CSE457 Cellular Networks | 3+0=3 | CSE405 |

| | | |
|---------------------------------------|-------|----------------|
| Hardware Systems Group | | |
| CSE437 Advanced Computer Architecture | 3+0=3 | CSE360 |
| CSE439 Advanced Digital Logic Design | 3+0=3 | CSE345 |
| CSE444 Fault Tolerant System | 3+0=3 | CSE345 |
| CSE490 VLSI Design | 3+1=4 | CSE345 |
| CSE492 Robotics | 3+0=3 | MAT104, CSE365 |
| CSE493 Embedded Systems | 3+1=4 | CSE442 |

| | | |
|----------------------------------|-------|--------|
| Intelligent Systems Group | | |
| CSE470 Expert System | 3+0=3 | CSE365 |
| CSE474 Pattern Recognition | 3+0=3 | CSE365 |
| CSE475 Machine Learning | 3+0=3 | CSE365 |
| CSE476 Soft Computing | 3+1=4 | CSE365 |
| CSE477 Data Mining | 3+0=3 | CSE365 |

| | | |
|--|-------|--------|
| Signal and Information Processing Group | | |
| CSE432 Digital Signal Processing | 3+1=4 | CSE248 |
| CSE436 Multimedia Design and Development | 3+0=3 | CSE411 |
| CSE438 Digital Image Processing | 3+0=3 | CSE248 |
| CSE440 Data Compression | 3+0=3 | CSE245 |

Course Flow Chart

| Year | 1 st Year | | 2 nd Year | | 3 rd Year | | 4 th Year | |
|--------------------------|----------------------|-----------------|----------------------|-----------------|----------------------|-----------------|----------------------|-----------------|
| Course | Course No (Credit) | Pre - requisite | Course No (Credit) | Pre - requisite | Course No (Credit) | Pre - requisite | Course No (Credit) | Pre - requisite |
| 1 st Semester | ENG101(3) | | GEN201(3) | | OBE -I(3) | | CSE405(3+1) | CSE245, CSE350 |
| | MAT101(3) | | STA102(3) | | CSE251(3+1) | CSE109 | CSE498(3+0) | |
| | CSE105(3+1) | | CSE205(3) | CSE107 | CSE301(3+1) | CSE205 | OCSE -I | |
| | | | | | | | OCSE -II | |
| 2 nd Semester | ENG102(3) | ENG101 | OGEN -I(3) | | OBE -II(3) | | CSE497(4) | |
| | MAT102(3) | MAT101 | MAT205(3) | MAT102 | CSE325(3+1) | | CSE411(3+1) | CSE301 |
| | CSE107(3+1) | CSE105 | CSE207(3+1) | CSE205 | CSE345(3+1) | CSE205, CSE251 | OCSE -III | |
| | | | CSE225(3+1) | CSE105, MAT102 | | | OCSE -IV | |
| 3 rd Semester | PHY109(3+1) | MAT102 | OGEN -II(3) | | CSE350(3 +0) | CSE251, CSE248 | CSE442(3+1) | CSE360 |
| | MAT104(3) | MAT101 | PHY209(3) | MAT205 | CSE360(3) | CSE325, CSE345 | OCSE -V | |
| | CHE109(3+1) | | CSE245(3+1) | CSE207 | CSE365(3+1) | CSE245 | CSE499(4) | |
| | CSE109(3+1) | | CSE248(3) | CSE109, MAT205 | CSE375(3+0) | CSE245 | | |
| Total Credit | 35 | | 36 | | 35 | | 34 | |

Legends:

OGEN = Optional General Education Course [GEN202 to GEN239]

OBE = Optional Business and Economics Course [ACT101, BUS321, ECO101, ECO102, FIN101, MGT101, MGT337, MKT101, MKT102]

OCSE = Optional CSE Course [Three courses from one group and two courses from one or two groups other than the group selected for three courses]



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(University of Lancaster, UK)

Mohammad Samiullah

Lecturer
Dept. of Computer Science and Engineering,
University of Dhaka
M.S. in Computer Science & Engineering
(University of Dhaka)
B. Sc. (Hons) in Computer Science & Engineering
(University of Dhaka)

A.S.M. Mahmudul Hasan

Lecturer
Dept. of Computer Science and Engineering,
Hamdard University Bangladesh
M. Sc in Computer Science and Engineering
(Jahangirnagar University)
B. Sc in Computer Science and Engineering
(Jahangirnagar University)

Department of Electrical and Electronic Engineering (EEE)

The involvement of electrical and electronic technologies in modern civilization is inextricable. All aspects of this engineering branch play vital roles in improving the quality of living. 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 physical sciences. 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 program 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 the study of a number of core courses of electrical and electronic engineering, along with some advanced elective 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, Humanities and Ethics courses.

Program Objectives/Highlights of the Program

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

- To provide the students with solid foundation of mathematics and physics
- To provide understanding of electrical and electronic circuits and systems.
- 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: Courses Minimum Requirement 140 Credits

The credit distribution is given below:

| | |
|----------------------------------|---------------|
| A. General Education Requirement | 21 credits |
| B. Core Requirement | 95 credits |
| C. Elective Requirement | 20-24 credits |
| D. Project/Industrial Training | 4 credits |

Total 140-144 credits

A. General Education Requirement 21 credits

(i) Compulsory General Education Courses 12 credits

| | |
|--|---|
| ENG 101 Basic English | 3 |
| ENG 102 Composition and Communication Skills | 3 |
| GEN 201 Bangladesh Studies | 3 |
| MGT 321 Industrial Management | 3 |

(ii) Optional General Education Courses 6 credits

Choose any two General courses from 200 level

(iii) Optional Course from non Engineering Subjects 3 credits

Choose one course

B. Core Courses 95 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 Techniques in Engineering | 3+1=4 |
| EEE 205 Digital Logic Design | 3+1=4 |
| EEE 301 Electrical Machines Fundamentals | 3+1=4 |
| EEE 303 Signals and Linear Systems | 3+0=3 |
| EEE 304 Synchronous Machines and Power System Fundamentals | 3+1=4 |
| EEE 305 Electromagnetic Fields and Waves | 3+0=3 |
| EEE 307 Telecommunication Engineering | 3+1=4 |
| EEE 308 Electronic Properties of Materials | 3+0=3 |
| EEE 309 Digital Signal Processing | 3+1=4 |
| EEE 311 Electrical Measurement and Instrumentation | 3+1=4 |
| 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 205 Linear Algebra and Complex Variables | 3+0=3 |
|--|-------|

| | |
|---|-------|
| PHY 109 Engineering Physics - I (Introductory Classical Physics) | 3+1=4 |
|---|-------|

| | |
|--|-------|
| PHY 209 Engineering Physics - II (Introductory Quantum Physics) | 3+0=3 |
|--|-------|

| | |
|------------------------------------|-------|
| STA 102 Statistics and Probability | 3+0=3 |
|------------------------------------|-------|

C. Elective Courses 20-24 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. Out of six elective courses, at least two of these have to be 4 credits course, of which one from major and one from other groups.

GROUP A (Electronics)

| | |
|--|-------|
| EEE 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 417 Semiconductor Devices | 3+0=3 |
| 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 Advanced Telecommunication Engineering | 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 436 Multimedia Design and Development | 3+0=3 |
| CSE 450 Data Structure and Algorithm | 3+1=4 |

GROUP D (Power Engineering)

| | |
|--|-------|
| EEE 441 Power Stations | 3+0=3 |
| EEE 442 Switchgear and Protective Relays | 3+0=3 |
| EEE 443 Special Machines | 3+0=3 |

| | | |
|--------|--|-------|
| EEE-44 | High Voltage Engineering | 3+0=3 |
| EEE-45 | Renewable Energy | 3+0=3 |
| EEE-46 | Power System Operation and Reliability | 3+0=3 |
| EEE-47 | Power Electronics | 3+1=4 |

GROUP E. Project Work/Industrial Training 4 credits

Choose any ONE course from

| | | |
|---------|---------------------|-------|
| EEE 498 | Project Work | 4+0=4 |
| EEE 499 | Industrial Training | 4+0=4 |

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

| Semester | Year I | | Year II | | Year III | | Year IV | |
|----------|---------|-------------|-------------|-------------|-------------|-------------|----------------------------------|----------------|
| I | PHY 109 | (4) | STA 102 | (3) | EEE 301 | (4) | MGT 321 | (3) |
| | MAT 101 | (3) | EEE 102 | (4) | EEE 303 | (3) | EEE 402 | (4) |
| | EEE 101 | (4) | OGEC -I | (3) | EEE 311 | (4) | EEE 404 | (3) |
| | | | GEN 201 | (3) | | | ELTV -I | (3/4) |
| | | (11) | | (13) | | (11) | | (13/14) |
| II | ENG 101 | (3) | OGEC -II | (3) | ONEC -I | (3) | ELTV -II | (3/4) |
| | MAT 104 | (3) | MAT 205 | (3) | EEE 304 | (4) | ELTV -III | (3/4) |
| | EEE 201 | (4) | EEE 200 | (1) | EEE 305 | (3) | ELTV -IV | (3/4) |
| | | | EEE 202 | (4) | EEE 307 | (4) | EEE 498 [†] | (1) |
| | | (10) | | (11) | | (14) | | (11/13) |
| III | ENG 102 | (3) | PHY 209 | (3) | EEE 308 | (3) | ELTV -V | (3/4) |
| | MAT 102 | (3) | EEE 203 | (4) | EEE 309 | (4) | ELTV -VI | (3/4) |
| | CSE 105 | (4) | EEE 205 | (4) | EEE 401 | (4) | EEE 498 [†] /EEE 499 | (3/4) |
| | CHE 101 | (4) | | | | | | |
| | | | (14) | | (11) | | (11) | |

Legends

OGEC : Optional General Education Courses

(any two from GEN 200 Level Courses)

ONEC : Optional Courses from non-Engineering courses.

ELTV : Elective Courses.

EEE 498 (Project Work) must be spread over two semesters. Although the registration for EEE 498 will be done in SEM II and SEM III, the grades for this course will be assigned at the end of SEM III. However, EEE 499 (Industrial Training) should be taken in one semester.

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

Professor

Anisul Haque

Ph.D in Electrical & Computer Engineering
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Ph.D in Electrical Engineering
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(BUET, Dhaka)
B.Sc.(Engg) in EEE (BUET, Dhaka)
(On Leave)

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Ph.D in Electronic Engineering
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D. Engg. in Computer Science and Design Engineering
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M. Engg. in Electrical and Electronic Engineering
(Yamaguchi University, Japan)
B.Sc.(Engg) in EEE (BUET, Dhaka)

Halima Begum

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(Yamaguchi University, Japan)
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B.Sc.(Engg) in EEE (BUET, Dhaka)

Fakir MASHUQUE ALAMGIR

M.Sc.(Engg) in Wireless Communication & System
Engineering
(University of Greenwich, UK)
B.Sc.(Engg) in Computer Science & Communication
Engineering
(University of Greenwich, UK)

Rony Kumer Saha

M. Engg. in Information & Communications Technologies
(Asian Institute of Technology, Thailand)
B.Sc.(Engg) in EEE (KUET, Khulna)

Lecturer

Sohana Tanzeem

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B.Sc.(Engg) in EEE (BUET, Dhaka)

Mariam B. Salim

M.Sc.(Engg) in Global Information and Telecommunication
Studies
(Waseda University, Japan)
B.Sc.(Engg) in EE
(Prairie View A&M University, Texas, USA)

Anwarul Azim

M.Sc.(Engg) in Electrical Engineering
(Colorado State University, Colorado, USA)
B.Sc.(Engg) in EEE (IUT, Gazipur, Dhaka)

Md. Niazul Islam Khan

M.Sc.(Engg) in Communications Technology-Major
Microelectronics
(University of Ulm, Germany)
B.Sc.(Engg) in EEE (BUET, Dhaka)

Mohammad Rezaul Islam

MS in Electrical Engineering
(Michigan Technological University, USA)
BS in EEE (IUT)

Visiting Faculty:

Kazi Mujibur Rahman

Professor
Ph.D. in Electrical and Electronic Engineering
(BUET, Dhaka)
M. Tech. in Industrial Electronics
(Mysore University)
B.Sc.(Engg) in EEE (BUET, 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.

Program

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

graduate course, M.Pharm in Clinical Pharmacy and Molecular Pharmacology.

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

Mission and Future Prospect

The rapid expansion of Pharmaceutical Industry and advances in the health sector have created a lot of opportunities for pharmacists to be involved in the process of drug design, dosage form design, drug formulation, production & distribution, clinical pharmacy services, clinical research and biotechnological advancements. Here the pharmacist must keep abreast of innovation 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.
- Department of Pharmacy, Jahangirnagar University, Savar, Dhaka.
- School of Pharmacy, The University of Mississippi, USA.

- Department of Molecular & Cellular Biology, Harvard University, USA.
- WHO & TWAS laboratories, International Center for Chemical & Biological Sciences, Karachi, Pakistan.
- BIRDEM, Dhaka.
- ICDDR,B, Dhaka.
- National Institute of Cardiovascular Diseases, Dhaka.
- Institute of Child Health, Dhaka.
- Institute of Public Health, Dhaka.

Laboratory

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

- High Performance Liquid Chromatography (HPLC) with auto-injector, dual detectors (Refractive Index and Photodiode Array detectors) and high pressure gradient pump control by PC.
- Fourier Transform Infrared Spectrophotometer (FT-IR) with Temperature Controlled High-Sensitivity

DLATGS Detector and advanced Dynamic Alignment System

- Capillary Gas Chromatography (GC) with Flame Ionization, Flame Thermionic, Electron Captured Detectors and Multi-Capillary Advanced Columns
- PC controlled UV-visible spectrophotometer

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

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 B. Pharm degree are listed on the next page.



Pharmacy Lab class with Prof. Dr. Chowdhury Faiz Hossain, Chairperson of Pharmacy

Bachelor of Pharmacy: Courses

Minimum Requirement 158 Credits

Credit distribution is given below:

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

Total 158 Credits

A. Compulsory General Education Requirement 18

| Course | Title | Credits |
|---------|--------------------------------------|---------|
| PHY 100 | Introductory Physics | 3 |
| MAT 100 | Mathematics | 3 |
| ENG 101 | Basic English | 3 |
| ENG 102 | Composition and Communication Skills | 3 |
| BSA 101 | Bangladesh Studies | 3 |
| BSA 107 | 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 104 | Human Physiology I | 4 |
| PHRM 105 | Basic Microbiology | 4 |
| PHRM 106 | Pharmaceutical Analysis I | 4 |
| PHRM 107 | Physical Pharmacy II | 4 |
| PHRM 108 | Inorganic Pharmacy | 4 |
| PHRM 109 | Biochemistry | 4 |
| PHRM 110 | Pharmacognosy I | 4 |
| PHRM 111 | 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 |

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

| Semester | Year I | | Year II | | Year III | | Year IV | |
|----------|---------------|----|----------|----|----------|----|----------|----|
| 1st | ENG 101 | 3 | GEN 201 | 3 | PHRM 304 | 4 | PHRM 404 | 5 |
| | Math 100 | 3 | PHRM 205 | 4 | PHRM 305 | 4 | PHRM 405 | 3 |
| | PHRM 101 | 4 | PHRM 207 | 4 | PHRM 306 | 4 | PHRM 406 | 4 |
| | PHRM 102 | 3 | PHRM 208 | 4 | PHRM 307 | 3 | PHRM 407 | 3 |
| | PHRM 103 | 4 | PHRM210 | 4 | PHRM 308 | 4 | PHRM 412 | 3 |
| | PHRM202 | 4 | | | | | PHRM 413 | 4 |
| | Total credits | 21 | | 19 | | 19 | | 22 |
| 2nd | ENG 102 | 3 | GEN 207 | 3 | PHRM 309 | 4 | PHRM 401 | 3 |
| | Physics 100 | 3 | PHRM 203 | 4 | PHRM 310 | 3 | PHRM 410 | 3 |
| | PHRM 201 | 4 | PHRM 206 | 4 | PHRM 311 | 3 | PHRM 411 | 4 |
| | PHRM 209 | 3 | PHRM 301 | 3 | PHRM 312 | 3 | PHRM 409 | 4 |
| | PHRM 204 | 4 | PHRM 302 | 3 | PHRM 402 | 4 | PHRM 414 | 3 |
| | PHRM211 | 3 | PHRM 303 | 3 | PHRM 403 | 3 | | |
| | Total credits | 20 | | 20 | | 20 | | 17 |

Faculty Members of the Department of Pharmacy

Professor and Chairperson

Chowdhury Faiz Hossain

Postdoctoral Fellow in Drug Discovery
(University of Mississippi, USA)
Ph.D in Pharmaceutical Sciences
(Chiba University, Japan)
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Nishat Nasrin

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U.K. Shams-ud-Doha

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Arandom Pal

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Barah Shahjin

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Dewan Taslima Akhter

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Abdullah-Al-Faysal

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Meena Afroze Shanta

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Advisor

Muniruddin Ahmed

Professor of Clinical Pharmacy and Pharmacology of the University of Dhaka
Ph.D in Pharmacy (Free University, Berlin, Germany)
Master of Pharmacy (University of Dhaka)
Bachelor of Pharmacy (Honors) (University of Dhaka)



Pharmacy Lab class with Dr. Shamsun Nahar Khan

Department of Genetic Engineering and Biotechnology

Introduction:

Genetics Engineering and Biotechnology are rapidly progressing and growing fields with widespread applications in many areas of science, history, agriculture, medicine, forensics and a growing number of industries. The demand for graduates with a familiarity in these fields is expected to grow worldwide. East West University has begun a new department both to directly address the growing need for people skilled in these fields and to provide the basics necessary for the dedicated students to be well prepared for graduate education at the top level institutions in the West.

Direction

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

Current laboratory facilities shared with the Pharmacy Department

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 highly advanced and sophisticated state-of-the-art Instruments like Shimadzu PC based Automated Binary Gradient High Performance Liquid Chromatography (HPLC) Prominence System with Refractive Index (RI) detector and Photodiode Array (PDA) detector, Shimadzu PC Based Fourier Transform Infrared Spectrophotometer (Prestige-21) with RI solution software including Temperature Controlled High-Sensitivity DLATGS Detector and advanced Dynamic Alignment System, Shimadzu Gas Chromatography system with Flame Ionization Detector, Flame Thermionic Detector, Electron Captured Detector and Multi-Capillary Advanced Columns, UV-visible spectrophotometer, thermocycler for PCR, ELISA, high resolution microscope, fundamental chromatographic instrument.

Admission Requirements

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

Bachelor of Genetic Engineering and Biotechnology Minimum Requirement 134 Credits

The Bachelor of Genetic Engineering and Biotechnology at East West University is a four year program divided into 12 semesters (3 semesters per year) requiring completion of 134 credits.

| Section | Description | Credit Hours |
|--------------|--------------------------------|--------------|
| I | General Education Requirements | 21 |
| II | Mathematics and Basic Sciences | 32 |
| III | GEB Core Curriculum | 69 |
| IV | Elective GEB Courses | 12 |
| Total | | 134 |

Section I. General Education Requirements (21 Credit Hours)

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

| Course Number/Course title | Credit Hours |
|---|--------------|
| ENG 101: Basic English | 3 |
| ENG 102: Composition & Communication Skills | 3 |
| GEN 201: Bangladesh Studies | 3 |
| Total | 9 |

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

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

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

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

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

| | |
|--|----------|
| GEN 200: Any other GEN course approved by the University | 3 |
| ACT 101: Financial Accounting | 3 |
| BSB 101: Introduction to Business | 3 |
| ECO 101: Principles of Microeconomics | 3 |
| ECO 102: Introduction to Macroeconomics | 3 |
| FIN 101: Principles of Finance | 3 |
| MGT 101: Principles of Management | 3 |
| MKT 101: Principles of Marketing | 3 |
| MGT 251: Organizational Behavior | 3 |
| Total | 6 |

Section II: Mathematics and Basic Sciences (12 Credit Hours)

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

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

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

Section III. Genetic Engineering and Biotechnology Core Courses (69 Credit Hours)

The following courses stress fundamental Genetic Engineering & Biotechnology concepts.

| Course Number/Course title | Credit Hours |
|-----------------------------|--------------|
| GEB 101: Basic Biology | 3 |
| GEB 103: Cell Biology-I | 3 |
| GEB 104: Basic Microbiology | 4 |

| | |
|--|-----------|
| GEB 105: Cell Biology-II | 3 |
| GEB 201: Basic Biochemistry | 4 |
| GEB 202: Molecular Biology | 4 |
| GEB 203: Animal Physiology | 3 |
| GEB 204: General Genetics and Genetic Analysis | 4 |
| GEB 301: Plant Physiology | 3 |
| GEB 302: Fundamentals of Genetic Engineering & Biotechnology | 4 |
| GEB 304: Immunology | 4 |
| GEB 305: General Virology | 3 |
| GEB 308: Separation Technologies and Analytical Methods | 4 |
| GEB 410: Current topics in Genetic Engineering and Biotechnology | 3 |
| GEB 402: Advances in Recombinant Gene Technology | 4 |
| GEB 403: Animal and Plant Tissue Culture | 4 |
| GEB 406: Genomics, Proteomics and Bioinformatics | 3 |
| GEB 407: Industrial Biotechnology of Microbial Systems | 3 |
| GEB 420: Biochemistry & Molecular Biology of Diseases | 3 |
| GEB 490 Research Proposal | 3 |
| Total | 69 |

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

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

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

Flow Chart for Courses to be followed during the FOUR YEARS of the Undergraduate Program of Genetic Engineering & Biotechnology (Numbers in parentheses indicate Credits)

| Semester | Year I | | Year II | | Year III | | Year IV | |
|------------|----------------|-------------|---------|-------------|----------|-------------|---------|-------------|
| I | ENG 101/099 | (3) | GEB 203 | (3) | GEB 204 | (4) | GEB 308 | (4) |
| | MAT 101 | (3) | GEB 305 | (3) | GEB 406 | (3) | GEB 402 | (4) |
| | GEB 101 | (3) | PHY 108 | (4) | STA 208 | (3) | EGb II | (3) |
| | CSE 108 | (4) | | | | | | |
| | | (13) | | (10) | | (10) | | (11) |
| II | ENG 102/101 | (3) | GEB 201 | (4) | GEB 302 | (4) | GEB 403 | (4) |
| | GEB 103 | (3) | GEB 301 | (3) | GEB 407 | (3) | EGb III | (3) |
| | GEB 104 | (4) | PHY 208 | (4) | GEB 239 | (3) | EGn I | (3) |
| | CHE 108 | (4) | | | EBEc I | (3) | | |
| | | (14) | | (11) | | (13) | | (10) |
| III | GEB 105 | (3) | GEB 202 | (4) | GEB 304 | (4) | GEB 490 | (3) |
| | MAT 102 | (3) | GEB 410 | (3) | GEB 420 | (3) | EGb IV | (3) |
| | CHE 208 | (4) | MAT 205 | (3) | EBEc II | (3) | | |
| | GEN 201/ENG102 | (3) | | | EGb I | (3) | | |
| | | (13) | | (10) | | (13) | | (6) |

Legends

- EBEc : Elective for Business & Economics
- EGb : Elective for GEB
- EGn : Elective of GEN
- GEB 490 (Research Proposal) : For registration of GEB409, All required courses numbered 100-300

Faculty Members of the Department of Genetic Engineering & Biotechnology

Associate Professor

Edward Lee Organ

Ph.D. in Molecular Biology

(Vanderbilt University, Nashville Tennessee, USA)

Bachelor of Science

(Vanderbilt University, Nashville Tennessee, USA)

Lecturer

Ms. Tasnim Ahmed

M.S. in Genetic Engineering & Biotechnology
(University of Dhaka)

B.Sc in Genetic Engineering & Biotechnology
(University of Dhaka)

Senior Lecturer

Muhammad Manzur Sharif Sayeem

M.Sc. in Pharmacogenetics and Stratified Medicine

(University College London, Commonwealth Scholar -UK)

B.Sc. in Genetic Engineering & Biotechnology

(University of Dhaka)



Honorable Education Minister Mr. Nurul Islam Nahid, MP at 13th Convocation of EWU

Undergraduate Studies

Admission

Prospective students should obtain an EWU Admission Forms by paying in cash or by sending a bank draft of Taka 800 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 2.50 in both SSC and HSC Examinations. Or, At least one first division either in SSC or in HSC. (No third division is allowed) or total GPA of 5.00 in both SSC and HSC Examinations for the Freedom Fighter's children.
2. University of London & Cambridge GCE "O" Level in five subjects and "A" Level in two subjects. Out of these seven subjects at least 4B's or GPA of 4.00 and 3 C's or GPA of 3.5 (in the scale of A=5, B=4, C=3, D=2 and E=1) is required or
3. American High School Diploma; and
4. Acceptable EWU Admission Test Score (75%

weightage would be counted on the marks obtained in the written test of Undergraduate Programs and 25% weightage will be counted on the results obtained in SSC and HSC (10% for SSC and 15% for HSC) Examinations.

Admission Test Waiver

The candidates securing a minimum total score of 1500 in SAT (considering Critical Reading, Math and Writing). The candidates seeking admission in the Faculty of Sciences and Engineering must have minimum GPA 3.5 in Math and Physics separately in HSC/A level examinations in addition to above mentioned SAT scorer to get waiver from the Admission Test.

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

Pass with at least upper 50% marks/grade of their own education system.

Foreign students fulfilling the admission eligibility need not appear at the Admission Test.

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.

Merit Scholarships/Financial Aid

EWU has generous merit scholarships/financial aid programs. Top scorers in the undergraduate admission test with a minimum score of 75% marks will get full tuition free Merit Scholarship in the first year for a maximum of one-fourth of the total credit requirement of the program for undergraduate

Students subject to maintenance of minimum CGPA 3.50 in each semester as a regular student. Five students from the Faculty of Business and Economics two students from the Faculty of Sciences & Engineering and one student from the Faculty of Visual Arts and Social Sciences will get the following:

Candidates scoring GPA 5.00 (excluding 4th subject) in both SSC & HSC (in the most recent relevant examination year) or 7 A's in 'O' Level (at one sitting) and 3 A's in 'A' Level (in one year) will be awarded 100% merit scholarship at entry level in Undergraduate Programs for 4 years subject to qualifying in the admission test and maintenance of GPA 3.50 in each semester as a regular student.

Candidates scoring GPA 5.00 (including 4th subject) in the immediate past SSC & HSC examinations will be awarded 50% waiver of Tuition Fee as Merit Scholarship at entry level in Undergraduate Programs for first 1 (one) year, subject qualifying in the admission test, maintenance of GPA 3.50 in each semester as a regular student and fulfillment of other Merit Scholarship requirements.

Application forms are available in the website, as well as at EWU Admissions Office for Tk 800. 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 800 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 these requirements.

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

Attendance Requirement

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

Non-Degree Students

Applicants who are currently enrolled in an undergraduate program in a recognized university may apply for admission at EWU as non-degree students. Non-degree students may obtain transcripts reflecting credits and grades for the course(s)

attended. An admission fee of Tk. 5,000 is applicable for Non-Degree students.

Change of Degree Programs

A student who wishes to change his/her major discipline of study must appear in the Admission Test and qualify for the department to which s/he wants to study. For appearing in the subsequent admission test, the applicant must inform the Registrar. Re-admission Fee of TK. 11,000 is applicable in such cases.

The current fee structure is as follows:

1. Admission Fee: (one-time & non refundable) Tk. 11,000.
2. Course Fee: Tk. 3,100 per credit hour for English & Economics, Sociology, Applied Statistics courses and Tk. 4,200 for all other courses.
3. Laboratory Fee: Tk. 2,500 per semester for students of Science Faculties. For the students of B. Pharm. Program 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. 510 per semester for all Undergraduate Students. For the students of B. Pharm. Program this fee is Tk. 765 (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:

| Program | BBA-123 | CSE-140 | CSE-145 | ICE-140 | EEE-140 | ETE-140 | B.Pharm-158 | Economics-123 | English-123 | GEB-134 | Sociology-123 | APS-127 |
|--|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| Charges for General Education Courses | 1,28,700.00 | 81,600.00 | 81,600.00 | 81,600.00 | 81,600.00 | 81,600.00 | 69,000.00 | 1,28,700.00 | 1,28,700.00 | 81,600.00 | 93,600.00 | 81,600.00 |
| Charges for Core, Concentration, Elective, Foundation etc. Courses | 3,71,400.00 | 499,800.00 | 520,800.00 | 499,800.00 | 499,800.00 | 499,800.00 | 588,000.00 | 2,85,600.00 | 279,000.00 | 474,600.00 | 297,600.00 | 342,900.00 |
| 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 | 11,000.00 | 11,000.00 | 11,000.00 |
| Lab & Activities Fee | 18,120.00 | 36,120.00 | 36,120.00 | 36,120.00 | 36,120.00 | 36,120.00 | 36,120.00 | 18,120.00 | 18,120.00 | 36,120.00 | 18,120.00 | 18,120.00 |
| Total | 5,29,220.00 | 6,28,520.00 | 6,49,520.00 | 6,28,520.00 | 6,28,520.00 | 6,28,520.00 | 7,04,120.00 | 4,43,420.00 | 4,36,820.00 | 6,03,320.00 | 4,20,320.00 | 4,51,200.00 |

The university also offers remedial (non-credit) courses in English, for which a fee of Tk 3,163 for each is charged for one semester only. Remedial courses may be required for students on the basis of their score in the English part of the Admission Test. Passing these remedial courses is a prerequisite for continuing as a student. Remedial Biology is offered in Pharmacy Department with the same fee structure. If a student fails in the Remedial English course in the first attempt, he/she will have to pay regular course fees of Tk.9,300 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.

Other Charges:

1. Provisional Certificate Fee: Tk. 500.00
2. Official Transcript Fee: Tk. 500.00 (For urgent: Tk. 700.00)
3. Migration Certificate Fee: Tk. 200.00
4. Studentship Certificate Fee: Tk. 200.00
5. Certificate on Medium of Instruction Fee: Tk. 200.00
6. Duplicate Copy of Degree Certificate Fee: Tk. 1,000.00 (In case of Loss/Damage)
7. Change of Name Fee: Tk. 300.00
8. Credit Transfer/waiver fees : Tk. 500.00 per credit



Gold Medalist receiving gold medal from Honorable Education Minister Mr. Nurul Islam Nahid, MP at 13th Convocation of EWU

STATUTE

THE EAST WEST UNIVERSITY DISCIPLINARY CODE FOR STUDENTS, 2011

STATUTE

THE EAST WEST UNIVERSITY DISCIPLINARY
CODE FOR STUDENTS, 2011

PREAMBLE

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

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

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

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

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

1. TITLE

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

2. DEFINITIONS

- 2.1 **'University'** means East West University.
- 2.2 **'Code'** means the East West University Disciplinary Code for Students, 2010.
- 2.3 **'Vice Chancellor'** means the Vice chancellor of East West University including Acting Vice Chancellor.
- 2.4 **'Registrar'** means the Registrar of East West University.
- 2.5 **'Proctor'** means the Proctor of East West University.
- 2.6 **'Prosecutor'** means an employee of the University appointed by the Proctor to conduct the case for and present the evidence on behalf of the University at the Student Disciplinary Committee.
- 2.7 **'Board of Trustees'** means the Board of Trustees of East West University.
- 2.8 **'Syndicate'** means the Syndicate of East West University.
- 2.9 **'Teacher'** includes any person of any grade or status providing teaching or is employed to teach by the university or under the authority of the university whether remunerated or not, and/or any other person who is recognised as teacher by the university.
- 2.10 **'Officer'** means any officer of the university.
- 2.11 **'Employee'** means a permanent or temporary employee of the University.
- 2.12 **'Student'** means any person, who at the time of the alleged misconduct is or was.
 - (i) registered for a qualification listed in the University's calendars, or
 - (ii) taught or evaluated on any University premises by an employee or someone contracted by the University for that purpose, or,
 - (iii) any other person who is deemed to be student of the University for the purpose of this Code as per notification of the University.

- 2.13 **'Disciplinary Committee (DC)'** means a committee of East West University constituted under Section-28 of the Private University Act, 2010, to adjudicate charges of misconduct relating to students.
- 2.14 **'Disciplinary Appellate Authority'** means the Syndicate to consider appeals from decisions of the Disciplinary Committee.
- 2.15 **'University premises'** includes any premises or building which is the property of the University or is controlled and/or occupied on rented basis or otherwise for hour(s) or day(s) by the University for University activities including regional offices, centers and examination venues.
- 2.16 **'Unfair or Illegal means'** includes
- i) Communicating or attempting to communicate verbally or otherwise any information relating to an examination by a student with any other examinee or examinees in the examination hall.
 - ii) Possession of any written unauthorized chit/paper/ book(s)/materials/means and/or any unauthorised aid(s) related to the subject of examination, at anytime during the examination.
 - iii) Copying or attempt to copy from other examinee(s) or resorting to any other unfair means.
 - iv) Arrogant behaviour or use of insolent or indecent language to any person in the exam hall.
 - v) Unauthorized possession of or attempt to possess examination script or question(s) anytime before the specified time of a particular examination.
 - vi) Influencing or attempting to influence any person(s) involved with the examination to allow/give undue advantages or benefits to self or any other person(s).
 - vii) Appearing in the examination through a proxy or becoming a proxy for any examinee
 - viii) Collecting or attempting to collect from outside, any exam related materials.
 - ix) Any use of cell-phone or any other unauthorized electronic device(s) or Code/sign/symbol etc. related to the examination, anytime during the examination.
 - x) Intentionally or negligently assisting another student during the examination.
 - xi) The removal or attempted removal from an examination room of any examination book or writing paper supplied by the University for the purposes of answering an examination.
 - xii) The use of a false name, identity number or student number in an examination.
 - xiii) The commission of any other fraudulent or dishonest practice whereby a student, whilst being examined by the University, seeks to mislead or deceive the examiner or the examination officer.
 - xiv) submission for examination as own work any matter that has been copied, reproduced or exacted in whole or in part from the work of another student or any other person, or which is substantially the same in whole or in part as the work of another student or any other person, or otherwise committing an act of plagiarism.
 - xv) Aiding, abetting or assisting any other student in 'adopting unfair means' in any examination.
- 2.17 **'Examination'** includes all assessments, whether written, oral or practical, unseen or assignment or research based, of a student's performance organized and/or conducted in the name of the University.
- 2.18 **'Duration of Examination'** means the time when the answer book or the question paper or the assignment whichever is earlier has been made available to the student till it is declared the end.
- 2.19 **'Sexual Harassment'** means sexual harassment as defined in para-4 of the High Court's Directives given against Writ Petition No.5916 of 2008 (Please see Annexure-A for the said Directives). These Directives, hereinafter, will be referred to as the High Court's Directives.

3 GENERAL PRINCIPLES AND RULES

- 3.1 The Student Disciplinary Code is aimed at

- 3.1.1 upholding the name and reputation of the University
- 3.1.2 maintaining order, discipline, safety and security at the University
- 3.1.3 ensuring the integrity of the academic processes of the University
- 3.1.4 assuring the quality of the assessment processes at the University
- 3.2 The general supervision and control of students' discipline at the University vests with the Proctor and are administered in terms of this Disciplinary Code of the University.

3.3 **Applicability**

This Code will be applicable to conducts and discipline of the students of East West University provided that if a student is accused of 'sexual harassment', without prejudice to amenability of the said student to the High Court's Directive/enactment the said student shall, for the purpose of inflicting punishment under this Code, be deemed to be guilty of misconduct under this Code or being determined to have committed

'sexual harassment' under the High Court's Directives or any policy/guidelines/order for the time being in force or any law in this regard that may be in place.

4. **MISCONDUCT**

- 4.1 Misconduct: Any conduct of a student that contravenes the Disciplinary Code and/or negatively impacts on the goals of the Code may be regarded as misconduct and subject to disciplinary measures.
- 4.2 A student is guilty of misconduct if she/he:
 - 4.2.1 With specific regard to assessments, takes recourse to adopting illegal means as defined in para 2.16.
 - 4.2.2 intentionally or negligently contravenes or subverts, or attempts to contravene or subvert, or assists, encourages or persuades any other person to contravene or subvert this Code, any regulation or rule or instruction of the University;
 - 4.2.3 refuses or fails to comply with a lawful instruction or request of an employee of the University authorized to give such instruction or make such request, or acts contrary to such instruction or request;
 - 4.2.4 conducts in a manner that intentionally and substantially obstructs or disrupts teaching or freedom of movement or other lawful activities on university premises or in connection with any university- sponsored event or activity and is not constitutionally and/or legally protected;
 - 4.2.5 commits any crime whilst on University premises (for the purpose of this clause no adjudication order of the court of law in respect of the alleged crime in question is required);
 - 4.2.6 intentionally or negligently misuses, damages, defaces, destroys or alienates, or without authorization uses any space, building, furniture or equipment, computer, vehicle, notes, documents or any other thing owned or controlled by the University or by any employee of the University, or by any registered student of the University;
 - 4.2.7 intentionally or negligently mismanages and/or misappropriates University funds;
 - 4.2.8 brings intoxicating liquor or substance into the premises of the University and/or consumes or abuses intoxicating liquor or substance and/or is under the influence of such liquor while on University premises;
 - 4.2.9 brings an illegal dependence-producing drug and/or controlled substances under the Narcotics Control Act, 1990 (Act No. XX of 1990) onto the premises of the University, or is found to be in exclusive possession of such illegal substance or is under the influence of such substance whilst on the premises of the University;
 - 4.2.10 smokes anywhere within the university premises.
 - 4.2.11 brings into or stores on university premises a firearm, other dangerous weapon of any kind, and/or any kind of harmful chemicals and/or explosives.
 - 4.2.12 brings onto or stores on University premises any kind of fuel that cannot reasonably be shown to be required for the operation of a motor vehicle or any device allowed to bring by the University.

- 4.2.13 sexually (as defined in para-4 of the High Court's Directives shown in Annexure -A to this code) or otherwise harasses any person whilst on University premises.
- 4.2.14 commits any sexual and/or indecent activities, whether voluntarily or involuntarily, or whether forcible or nonforcible, or whether with consent or without consent of the counterpart, within the university premises.
- 4.2.15 commits any other act on University premises, which is indecent and/or racist and/or endangers or is likely to endanger health, welfare or safety of other person and/or prejudices or is likely to prejudice honour, dignity, rights, privileges or property of other members of the academic community, staff/employee of the university and visitors to the campus.
- 4.2.16 initiates or associates or assembles or engages in any student organization or living group, or any pastime or amusement engaged in with respect to an organization or living group, that causes or is likely to cause bodily danger or physical harm, or serious mental or emotional harm, or humiliation by ritual act, or sleep deprivation, or forcible participation in any philosophical or religious or cultural or political activities, to any student or any other person attending the university, and/or that causes or is likely to cause voluntary participation in any political activities resulting in division in the unity, amity or tranquility of the academic community.
- 4.2.17 unlawfully expresses, publishes or disseminates in speech, writing, print or other medium on University premises any views, beliefs or ideology that would infringe upon the dignity or other human rights of any student or groups of students, or any employee of the University, or person invited by the University as a guest of the University.
- 4.2.18 commits any act(s) bullying other student(s).
- 4.2.19 without the written permission of the Vice Chancellor uses the name of the University, or uses or displays the logo of the University
- 4.2.20 convenes an assembly on University premises without obtaining the prior consent of the Vice Chancellor (or the person duly authorized by her/him) or the management of the regional center, or attends a gathering prohibited by the Principal and Vice Chancellor or the management of the regional center
- 4.2.21 knowingly makes a false statement about the University in any media or anywhere or otherwise intentionally provides materially false information to anyone in or outside the University about the University or any matter thereof
- 4.2.22 intentionally or negligently tenders or presents to any teacher/employee of the University any document, record or evidence which she/he knows or ought reasonably to know to be false or forged and which causes or has the potential to cause prejudice to the administrative, financial or academic interests of the University
- 4.2.23 accepts or offers a bribe from/to students, employees or any other official of the University
- 4.2.24 reproduces or transmits in any form or manner, whether electronically or mechanically (including photocopying and faxing), any study guide, book, thesis, dissertation, article, examination paper, lecture, printed tutorial matter or any other study aids in respect of which copyright exists, unless the copyright owner's permission for the reproduction or transmission is obtained
- 4.2.25 contravenes the provisions of the Copyright Infringement and Plagiarism Policy of the University
- 4.2.26 neglects or refuses to return library material borrowed from the University library
- 4.2.27 behaves in any way that leads or may lead to the consequences, which were or should reasonably have been foreseen at the time when such behavior occurred, impairing and/or prejudicing and/or impeding the good name and reputation of the University or the maintenance of order, discipline and security at the University or the process of tuition, research and administration and general University activities.
- 4.2.28 creates or causes to create any forged/false certificate or any other forged/false documents/papers and or possesses, use, deals with or submit the same with the university or resorts to any fraudulent means.

- 4.2.29 is convicted by any competent court of law for committing any criminal offence off-campus against the law of the People's Republic of Bangladesh, which in judgment of the university significantly affects the interest of the university.
- 4.2.30 commits or causes to commit physical or sexual harm/abuse or harassment or sexual/indecent assault to any student, staff or employee of the university outside university premises.
- 4.2.31 commits or causes to commit physical or sexual harm/abuse or harassment or sexual/indecent assault to any 3rd party while the said student is on tour or act as a representative of the university, whether in abroad or inside the country.
- 4.2.32 violates any instructions of any teacher, officer or employee under whose command the said student is sent on duty, assignment or tour for academic purpose or otherwise, in abroad or inside the country.
- 4.2.33 commits or causes to commit any private or public nuisance, disturbance or sound pollution, or raving, or raging within university premises including hostel(s) of the university.

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

- 5.1 **Composition:** As per section 28(1) of the Private University Act, 2010 there shall be a Disciplinary Committee comprising as follows:
 - a. **Chairperson :** One member of the Board of Trustees nominated by the Board
 - b. **Members :**
 1. Vice Chancellor
 2. All Deans
 3. One Chairperson nominated by the Syndicate
 4. Registrar
 5. Proctor - Member - Secretary
- 5.2 **Terms of Reference:**
 - 5.2.1 **Jurisdiction:** The Disciplinary Committee is authorized to deal with and adjudicate any offence(s) of misconduct under this code; but implementation of its disposal/recommendation is subject to the approval of the Syndicate.
 - 5.2.2 **Assembly:** The Disciplinary Committee may assemble any time as and when required and be convened under para-9, but in exceptional circumstances to be recorded in writing, the Vice Chancellor may convene its meeting by a 6 hours notice.
 - 5.2.3 **Quorum:** Presence of 5 (five) members of the Disciplinary Committee shall constitute the Quorum of a meeting of the Disciplinary Committee.
 - 5.2.4 **Hearing:** The Disciplinary Committee will hear the case as per the General Procedure laid down in para- 12 of this code.
 - 5.2.5 **Arriving at Decision/Disposal:** The Disciplinary Committee shall follow the steps laid down in para-11.5 of this code.
 - 5.2.6 **Award of Punishment:** Where applicable the Disciplinary Committee is authorized to award any or combination of the Punishments within the Scale of Punishments mentioned in para-13 of this code.
- 5.3 **Absence of Disciplinary Committee Members**
 - 5.3.1 If at any stage during the sitting of the Disciplinary Committee a member of the Committee is no longer able to participate in the proceedings or is absent for any reason, the hearing will continue, provided that the Committee has the quorum.
 - 5.3.2 In all other cases, the hearing should be terminated and will commence de novo.
- 5.4 **Chairperson to Determine Procedures**
Subject to the provisions of this Code, the procedure adopted at the Disciplinary Committee is determined by the Chairman of the Disciplinary Committee.

6. LODGING COMPLAINT

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

- 7.1.2 In proper cases, the registrar may direct his subordinate to lodge a complaint with the Registrar in respect of a misconduct as to which the Registrar has information and in such case the Registrar may send the complaint to the Proctor for investigation and report.
- 7.1.3 The said person lodging complaint must state the facts as to misconduct(s) of the accused student with clarity enclosing therewith all documents available at the relevant time. Any document reasonably available at the relevant time shall not be accepted in the proceeding subsequent to lodging the said complaint.
- 7.1.4 After receiving a complaint the Proctor shall forthwith verbally report the matter to the Vice Chancellor and shall conduct an immediate investigation of the complaint except the offence(s) of sexual harassment, in the manner specified in para 7.1 and 7.2.
- 7.1.5 In case of Sexual Harassment the Proctor shall refer the complaint without investigation, to the Complaint Committee on Sexual Harassment for action under para-8 and 10 of the High Court's Directives (Copy enclosed as Annexure-A).
- 7.1.6 The Prosecutor
The Registrar in consultation with the Vice Chancellor shall appoint any assistant proctor or an officer as a prosecutor to present the case for the University before Disciplinary Committee.

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

- 7.2 Notification of the Complaint
- 7.2.1 In case of any offence(s) other than that of sexual harassment the Proctor shall, by registered post, formally serve a written notice containing an accusation/complaint or allegation in the form of charge(s), to the accused student or a person authorized by her/him to receive such complaint asking for a written reply of the accused student within 10 days of the issue of the notice.
- 7.2 Investigation
- 7.2.1 The Proctor thereafter, shall conduct an investigation into the accusation, complaint or allegation.
- 7.2.2 For investigation purpose the Proctor will take the written evidence of all probable eye witnesses, take into consideration the documentary and circumstantial evidence as and when applicable and may also examine the witness(s) or relevant person(s) to elicit the truth.
- 7.2.3 After completion of the investigation the proctor must submit the investigation report to the Vice Chancellor within 21 days of the receipt of the complaint by the Proctor.
- 7.2.4 The report must contain the written statements of all the witnesses duly signed by each, the documentary and circumstantial evidence/proof followed by '**Findings**' and '**Recommendations**' based thereon.
- 7.2.5 If the report finds anybody guilty the Proctor must submit with the report, a '**Charge Sheet**' against him/them briefly giving the particulars of offence(s) or act(s) of misconduct committed (alongwith the place, date and time of commission).

PROCEDURE IN CASE OF COMPLAINT RELATED WITH SEXUAL HARASSMENT

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

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

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

10. CONVENING OF THE MEETING OF THE DISCIPLINARY COMMITTEE

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

11. NOTICE TO THE ACCUSED STUDENT(S)

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

11.2 The Notice under this rule will inform the student:

- 11.2.1 that proceedings under the Disciplinary Code are to be instituted against her/him and that a copy of the Code is available for inspection in the Office of the Registrar,
- 11.2.2 of the Rule that the student is alleged to have breached and/or the act(s) of misconduct that the student is alleged to have committed. The Notice must set out the charge with sufficient particularity to enable the student to prepare for her/his defense,
- 11.2.3 of her/his right to answer the charge in writing before the hearing,
- 11.2.4 of her/his right to attend the hearing to present her/his case, or to be represented at the hearing by another student member or an employee of the University, and
- 11.2.5 of her/his right if she/he is a minor or insane, to be assisted by her/his parent or guardian or, at the discretion of the Disciplinary Committee, to be assisted by any other person appointed by such parent or guardian, provided that nothing contained in this Rule renders the conduct of the Disciplinary Committee void if the student is not so assisted on the date set for the hearing.

11.3 Service of Notice

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

11.4 Suspension

11.4.1 Generally, no student will be suspended from the University before a hearing is held. However, in appropriate cases, the Registrar in consultation with the Vice Chancellor, may, by service of Notice to the student(s), prohibit such student from:
 (i) entering into the premises of the University, or any part thereof, and/or
 (ii) exercising a right or privilege resulting from her/his enrolment as a student.

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

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

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

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

11.5 Decisions of the Disciplinary Committee

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

- 11.5.2 A finding of guilty will only be returned if:
- 11.5.2.1 The misconduct charged has, in the opinion of the Committee, been proved on a balance of probabilities; or
- 11.5.2.2 the student has freely and voluntarily admitted guilt and the Committee is satisfied that there is evidence from the accused or from another source to substantiate the admission. Should the Committee not be satisfied with the evidence presented, it may of its own accord call for further evidence to be led in respect of the charge.
- 11.5.3 If the Committee does not find the student guilty as provided for under para-11.5.1, the student is acquitted of the charge.
- 11.5.4 The decision of the Disciplinary Committee is determined by a majority vote of the members present.
- 11.5.5 In the event of an equality of votes, the Chairman of the Disciplinary Committee has a casting vote in addition to her/his ordinary vote.

11.6 Student's Absence from Hearing before the Disciplinary Committee

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

11.7 Obstruction of Proceedings

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

11.8 Record of Proceedings

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

11.9 Safekeeping of the Record of Proceedings

- 11.9.1 All documents and tape recordings, pertaining to a disciplinary matter, will be kept in safe custody by the Registrar. A student is, however, entitled to receive copies of such documents and tape recordings at her/his own expense.
- 11.9.2 Such documents and tape recordings will be held by the University for a period of three years after a matter has been finalized.

12 GENERAL PROCEDURES AT THE HEARING OF A CHARGE OF MISCONDUCT

- 12.1 In the interest of transparency, all hearings are open meetings unless the Chairperson of the Disciplinary Committee is persuaded by the circumstances of the case to direct that the hearing be closed to the University community/public.
- 12.2 The prosecutor leads evidence against the accused student and generally conducts the case for the University.
- 12.3 The Disciplinary Committee allows the student(s) or such person representing the student(s) a reasonable opportunity to present a defence and to answer the charges.
- 12.4 Both the prosecutor and the accused student(s) are allowed to adduce all relevant evidence and call witnesses and to examine and cross-examine witnesses, as appropriate.
- 12.5 The Disciplinary Committee may also ask the witnesses questions for clarity or eliciting the truth.

- 12.6 The Disciplinary Committee may further, of its own accord, call for evidence that it may deem relevant to a determination of the issue(s) before it.
- 12.7 The hearing of the Disciplinary Committee is conducted in an informal manner, according to the principles of natural justice and with due regard for the rights of the accused student. No accused student will be prejudiced by reason of a failure to comply with the rules of procedure or rules of evidence as applied in the ordinary courts.
- 12.8 If the student is a minor or insane, no disciplinary action(s) will be taken against that student before her/his parent or guardian has also been informed in writing of her/his alleged misconduct and has been given a proper opportunity to make a written statement and, if she/he so wishes, to appear before the Disciplinary Committee in person.

13. PUNISHMENT

- 13.1 If a student is found to be guilty of misconduct/misconducts, the Disciplinary Committee may, given consideration to the gravity of the misconduct/misconducts, award any or combination of punishments set out below:
 - (i) A written reprimand and/or warning;
 - (ii) Expulsion from the examination hall;
 - (iii) Expulsion from the examination of that course/paper/ subject concerned;
 - (iv) Expulsion from the examination hall and debarring from sitting in the examinations of the remaining papers/ courses/subjects;
 - (v) Cancellation of the examination of that paper/course/ subject;
 - (vi) Cancellation of examination(s) of all papers/courses/ subjects;
 - (vii) Expulsion from the university for a term from one semester to forever depending on the gravity of the offence committed;
 - (viii) Seizure of cell-phone or electronic devices concerned or unauthorized material;
 - (ix) Revocation of a degree, diploma or other qualification of a student(s) obtained from the University in an improper manner;
 - (x) Cancellation of admission or denial of a right or privilege resulting from enrolment as a student at the University;
 - (xi) A fine to the extent twice the tuition fee for three semesters of study of the qualification for which the student is registered;
 - (xii) Payment of compensation or requiring the accused student to repair the damage caused by her/his misconduct;
 - (xiii) Denial of the right or privilege to register for a particular study module or course or program offered by the University.

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

14.1 If the Disciplinary Committee finds an accused student:

- 14.1.1 guilty, the student is notified by the Registrar in writing of the finding and the punishment(s) imposed by the Disciplinary Committee. In the Notice, the student is further informed of her/his right to appeal against the finding(s) and/or the punishment(s) imposed;
- 14.1.2 not guilty, the student is notified in writing of the finding of the Disciplinary Committee.
- 14.1.3 if the student is a minor or insane, no disciplinary measure(s) will be taken against that student before her/his parent or guardian has also been informed in writing of her/his alleged misconduct and has been given a proper opportunity to make a written statement and, if she/he so wishes, to appear before the Disciplinary Committee in person.

15. DISCIPLINARY APPEAL

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

16. POWERS OF THE DISCIPLINARY APPELLATE AUTHORITY (SYNDICATE)

- 16.1 The Syndicate is responsible for the hearing of appeals in respect of the decisions of the Disciplinary Committee whether based on factual findings, matters relating to procedure and/or the sanctions imposed.
- 16.2 The Syndicate has the powers to approve, review, reverse, nullify or replace decisions of the Disciplinary Committee in all respects, and can also order that hearings be held de novo except expulsion of a student forever and reversing the order of acquittal.
- 16.3 Presence of 7 members of the Syndicate will form the Quorum of the Appellate authority.

17. RESTRICTIONS ON APPELLATE AUTHORITY

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

18. PROCEDURE OF APPEAL

18.1 Initiation of Appeal

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

18.2 Functioning

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

18.3 General Procedures

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

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

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

20. EDUCATING THE STUDENTS ON THIS CODE

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

21. REPEAL AND SAVINGS

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

22. COMMENCEMENT OF THIS CODE

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



Students studying at EWU Library

ANNEXURE - A

In the Supreme Court of Bangladesh

High Court Division

(Special Original Jurisdiction)

Writ Petition No. 5916 of 2008.

In the matter of

An application under Article 102(2) (a) (ii) of the Constitution of the People's Republic of Bangladesh.

And

In the matter of

Bangladesh National Women Lawyers

Association (BNWLA)

..... the petitioner

Versus

Government of Bangladesh and Others.

..... the respondents

Mrs. Fawzia Karim Firoze with Mrs. Seema Zahur, Ms. Rebeka Sultana and Ms. Sathi Shahjahan

..... for the petitioner.

Mr. Razik Al-Jail, DAG

.....for respondent No. 3.

Dr. Rafiqur Rahman

..... for respondent No. 7.

Mr. Mahmudul Islam

..... Amicus Curiae

Ms. Sara Hossain and Mr. Probir Neogi.

..... Intervenors

Present:

By Justice Syed Mahmud Hossain

And

By Justice Quamrul Islam Siddiqui

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

Directives in the form of Guidelines:

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

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

2. Aims and objectives.

The aims and objectives of these guidelines include-

- (a) to create awareness about sexual harassments;
- (b) to create awareness about the consequences of sexual offences;
- (c) to create awareness that sexual harassment is punishable offence.

3. Duties of employers and authorities.

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

4. Definition.

i) Sexual Harassment includes-

- a. Unwelcome sexually determined behaviour (whether directly or by implication) as physical contact and advances;
- b. Attempts or efforts to establish physical relation having sexual implication by abuse of administrative, authoritative or professional powers;
- c. Sexually coloured verbal representation;
- d. Demand or request for sexual favours;
- e. Showing pornography;
- f. Sexually coloured remark or gesture;
- g. Indecent gesture, teasing through abusive language, stalking, joking having sexual implication.
- h. Insult through letters, telephone calls, cell phone calls, SMS, pottering, notice, cartoon, writing on bench, chair, table, notice boards, walls of office, factory, classroom, washroom having sexual implication.
- i. Taking still or video photographs for the purpose of blackmailing and character assassination.
- j. Preventing participation in sports, cultural, organizational and academic activities on the ground of sex and/or for the purpose of sexual harassment;
- k. Making love proposal and exerting pressure or posing threats in case of refusal to love proposal;
- l. Attempt to establish sexual relation by intimidation, deception or false assurance.
- m. Stalking as defined below (Added vide High Court's Directive Number-2 given in the Writ Petition Case No.8769 of 2010).

Definition of Stalking:

A male individual stalks a female if the male engages in a course of conduct:

- (a) with the intention of causing sexual harassment or of arousing apprehension of sexual harassment in the female and
- (b) that includes any of the following:
 - (i) following the females;

- (ii) contacting the female by post, telephone, fax, text message (SMS/ MMS/bloggging/twitting), email or other electronic communication or by any other means whatsoever;
- (iii) causing an unauthorized computer function in a computer owned or used by the female or her family members;
- (iv) entering or loitering outside or near the female's place of residence or place of business or work or any other place frequented by the female;
- (v) keeping the female under surveillance;
- (vi) acting in any other way that could reasonably be expected to arouse apprehension or fear in the female for her own safety or the safety of her family members.

Exceptions:

The following lawful acts are excluded from the above definition of stalking:

- (a) the enforcement of the criminal law;
- (b) the administration of any Act of Parliament;
- (c) the enforcement of a law imposing a pecuniary penalty;
- (d) the execution of warrant;
- (e) the protection of the public revenue.

Such conduct mentioned in clauses (a) to (m) can be humiliating and may constitute a health and safety problem at workplaces or educational institutions; it is discriminatory when the woman has reasonable grounds to believe that her objection would disadvantage her in connection with her education or employment in various ways or when it creates a hostile environment at workplaces or educational institutions.

- ii) **Concerned Authority** means an authority of any educational institution or work place in both public and private sectors, which is authorised under the relevant disciplinary rules to take action in case of misconduct.
- iii) **Disciplinary Rules** mean rules prescribed by any Act or Ordinance or any other subordinate legislations and include any rules framed for maintenance of discipline in any public or private institutions, organisations and work places.

5. Creating awareness and public opinion.

- a. In order to deter and eliminate sexual harassment and torture, and to create a safe environment for work and education, the employers/ management of all workplaces and authorities of all educational institutions will attach prime importance to the publicity and publication against sexual harassment and gender discrimination. There must be sufficient orientation before the formal classes start for a new session in educational institutions, and monthly, half yearly orientation in all workplaces and institutions;
- b. There must be arrangement for proper counselling for the concerned persons, if necessary;
- c. Awareness of the rights of female students and employees guaranteed and conferred by the Constitution and the statutes should be created by notifying in simple words the relevant provisions of the Constitution and the statutes;
- d. The educational institutions and the employers will maintain regular communication and effective consultation with the administrative authorities to create awareness among the personnel in law enforcing agencies in this regard;
- e. To prepare and publish booklets containing these guidelines and provisions of the Constitution and statutes regarding gender equality and sexual offences;
- f. To create awareness regarding fundamental rights guaranteed in the Constitution;

6. Preventive steps.

All employers and persons in charge of work places and authorities of all educational institutions shall take effective measures for prevention of sexual harassment. To discharge these obligations they shall take, amongst others, the following steps:

- a. Prohibition of sexual harassment and sexual torture as defined in clause 4 above should be notified, published and circulated widely and in an effective manner,
- b. Constitutional and statutory provisions against gender discriminations and sexual harassment and punishment for the offences of sexual harassment and torture should be widely circulated;
- c. To ensure that there is no hostile environment towards women at workplaces and educational institutions, and to engender confidence and trust in women workers and students that they are not placed in a disadvantaged position in comparison to their male colleagues and fellow students.

7. Disciplinary Action:

Appropriate disciplinary action must be initiated in case of any falling within the definition of sexual harassment and torture in clause 4 of these guidelines.

8. Complaints:

Where such acts do not constitute misconduct under the disciplinary rules, an appropriate and effective mechanism must be evolved at the workplaces, and educational institutions, in both public and private sectors for record and redress of the complaint made by the victim. The following measures must be included in the complaint mechanism.

- (a) It must be ensured that the identity of the complainant and also that of the accused will not be disclosed until the allegation is proved;
- (b) Security of complainant will be ensured by the Concerned Authority;
- (c) Complaint can be lodged by the victim or through her relatives, friends or lawyers, and it can be sent by mail also;
- (d) A complainant can file the complaint with a female member of the Complaint Committee separately;
- (e) The complaint will be lodged with the Complaint Committee to be constituted as provided in clause 9 below.

9. Complaint Committee.

- (a) In all work places and educational institutions in both public and private sectors, the Concerned Authority will constitute a Complaint Committee in order to receive complaints, and to conduct investigation and make recommendations.
- (b) The Complaint Committee will have minimum five members and majority of the members will be women. The head of the Complaint Committee should be a woman, if available.
- (c) The Complaint Committee should have at least two members from outside the organization concerned, preferably from organizations working on gender issues and sexual abuse.
- (d) The Complaint Committees will submit annual reports to the Government on the compliance of these guidelines.

10. **Procedure of the Complaint Committee. Normally the complaint has to be lodged with the Complaint Committee within 30 working days of the occurrence. To verify the complaint the Complaint Committee will:**

- i) In case of minor harassment, if it is possible, the Complaint Committee shall dispose of the complaint with the consent of the parties involved and shall report to the Concerned Authority of the educational institution or work place in public or private sector, as the case may be.
- ii) In all other cases the Complaint Committee shall investigate the matter.

- 10) The Complaint Committee will have the power to send registered notice by mail to the parties and the witnesses, conduct hearing, gather evidence, and examine all relevant papers. In this type of complaint, apart from oral evidence emphasis should be placed on circumstantial evidence. To conduct the work of the Complaint Committee effectively the related office of the educational institutions and workplaces in both public and private sectors will be bound to extend any cooperation which is requested from them. The Complaint Committee will keep the identities of the complainant/s confidential. While recording the testimony of the complainant/s any question or behaviour which is intentionally base, insulting or harassing should be avoided. The testimony must be recorded in camera. If the complainant wants to withdraw the complaint or stop the investigation then the reason behind this has to be investigated and mentioned in the report.

The Complaint Committee shall submit the investigation report with recommendation within 30 working days to the Concerned Authority of the educational institution or work place, as the case may be. The period of 30 days may be extended up to 60 days where it is found necessary.

If it is proved that a false complaint has been filed intentionally then a report will be submitted to the Concerned Authority recommending appropriate action for the complainant/s. The Complaint Committee will take decisions on the basis of the view expressed by the majority of its members.

11 **Punishment:**

The Concerned Authority may suspend temporarily the accused person (other than students) and in case of students, may prevent them from attending their classes on the receipt of the recommendation of the Complaint Committee. If the accused is found guilty of sexual harassment, the Concerned Authority shall treat it as misconduct and take proper action according to the disciplinary rules of all work places and the educational institutions in both public and private sectors within 30 (thirty) days and/or shall refer the matter to the appropriate Court or tribunal if the act complained of constitutes an offence under any penal law.

We direct that the above guidelines will be strictly followed and observed in all educational institutions and work places in both public and private sectors until adequate and appropriate legislation is made in this field.

In this judgment the expression, "woman" has been used to include a female of any age as defined in the Nari-O-Shisu Nirjaton Daman Ain, 2000.

In the result, the Rule and the supplementary Rule are made absolute with the directives in the form of guidelines described hereinbefore.

We would like to record our note of appreciation to Mr. Mahmudul Islam who assisted the Court as amicus curiae by rendering valuable assistance in the performance of the difficult task in public interest.

There is no order as to costs.

Quamrul Islam Siddiqui, J

I agree.

Facilities & Amenities

Computing and Lab Facilities at East West University

a) Internet and Computing Facilities

Information and Communications Services (ICS) is to look after the total technological infrastructure of EWU. ICS provides intensive technical support to all the active computers around 750 PCs and printers (around 70 HP LaserJet and network printer) assigned to faculty, officers and others which are located in different places around the whole University Campus. ICS also conducts a highly elegant E-mail service system, which is provided to a very big number of members in EWU family. Mention may also be made of the fact that all these computers used in different places are provided with efficient Internet system.

East West University has internet facility of 50 Mbps bandwidth which cover both the LAN and WiFi facilities of the university. East West University has developed its WiFi zone within the campus. More than 54 Wi-Fi access points have been installed over the campus to support teachers, officials and students in cafeteria, indoor and outdoor common areas to establish a secure wireless network requiring access and password authentication. ICS maintains the service for smooth continuation of internal and external connectivity.

b) Lab Facilities

Computer Lab: EWU has established 5(five) general computer labs equipped with more than 260 computers and network printers of various ranges. Among the labs 4(four) labs are dedicated for the classes of the different departments and 1(one) lab fully dedicated for student practice. The operating support systems are Windows, Linux etc. The programming languages and package support include C/C++, Java, Fortran, Oracle, MatLab, Visul BASIC, SPSS, Ms-SQL Server, MySQL, PHP, .NET etc through Information and Communications Services (ICS) section. ICS works directly under the office of the Vice-Chancellor to facilitate computer lab facilities to students and to maintain computer hardware, software, multi-media, network systems and email service of the university.

High Voltage/Machine Lab: This lab has state-of-the-art 'Lab-volt' electro-mechanical training systems that can be used to carry out experiments on DC machines, transformers, induction motors and synchronous machines. The laboratory also has

inductor, capacitor and resistor banks, single and three phase variable AC power supplies and various types of measuring instruments to conduct experiments.

Electrical Circuit Lab: This laboratory has advanced facilities for investigating behavior of AC & DC circuits which comprises inductor, capacitor and resistor banks, DC power supplies, digital storage oscilloscopes, trainer boards for circuit layout design, high frequency signal generators. The lab is also equipped with various types of measuring instruments and variacs to conduct experiments of electrical circuits. In addition, the lab is also equipped with true RMS (AC+DC) volt and current meters and a LCR meter with computer interface to facilitate research.

Electronics Lab: Works related to electronics & power electronics courses are performed in this lab. It is equipped with modern digital storage oscilloscopes, analog and digital trainer boards, signal generators, DC power supplies, measuring instruments like ammeter, voltmeter, digital multimeter, wattmeters and various types of IC chips, small-signal MOSFETs, BJTs and other semiconductor devices.

Switchgear and Control Systems Lab: Experiments and project works on switchgear controls and data acquisition are done in this lab. The lab has five sets of ADVANTECH data acquisition cards run by dual-core computers to detect various types of electrical faults and subsequent operation of relays on custom-made fault simulation boards. The lab also houses five sets of Siemens PLC (S7-1200) with necessary input/output modules and proprietary computer interface software tools. PLC sets are used to train students in modern industrial control systems.

VLSI Lab: Design and simulation type lab work is performed in the VLSI lab. It 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 ADS, MAGIC, HSPICE, ANSOFT, MATLAB, PSPICE, etc are available in this lab. ADS, MAGIC and HSPICE are advanced industry standard EDA tools used worldwide in design and research. We have also purchased SILVACO TCAD tools. This is proprietary

software developed for simulation of electronic & photonic devices, fabrication processes through a clean room facility and for investigating the behavior of any electronic circuits composed of any arbitrary designed devices. This is also the standard software used throughout the design and analysis of electronic & photonic devices. Major electronic companies, such as, Intel, IBM, NEC, Samsung, TSMC, all use this software. Many universities in USA and Europe, including IITs in India (for example, IITs), also use this software to train their students in this field.

Software Engineering Lab: The Software Engineering Lab is equipped with a HP Server, 35 desktop computers, and a multimedia projector. All the computers of the lab are networked through JUNIPER switch. The lab provides a range of software to support lab classes and research works in the broad field of Software Systems including programming, database systems, information system development, software engineering, network security and performance simulation and modeling.

Digital Systems & Microprocessors Lab: The Digital Systems and Microprocessors Lab is equipped with instruments that range from Oscilloscopes, Logic Trainer Boards, Analog Trainer Board, Microcontroller Writer, Microprocessor Trainer Boards, Interface Adapters, Signal/function Generators, Multi-level DC Power Sources, Electronic Motherboard Drilling Systems and other supporting peripherals. It also provides hardware devices FPGA design, Project related to digital logic design, Digital Systems Lab, 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 them scope for practical demonstrations and enabling exercises for courses in communications. The TIMS equipment set constitutes an important part of this lab. This set consists of TIMS-301 basic system, PC based virtual instruments, TIMS-Interactives for simulation, and Emona TIMS advanced modules. The lab also contains microwave trainers, DSP trainers, cellular mobile trainers, analog communication trainers, digital communication trainers and optical fiber communication trainers. The university is in the process of procuring professional software, HFSS for design and performance analysis of microwave devices and antennas. In the Telecommunication Lab, we have also highly sophisticated Signal Generator (100 KHz-3 GHz),

Digital Oscilloscope, and Spectrum Analyzer (9 KHz-26.5 GHz).

Computer Communications and Networking

Lab : This lab has been established recently. It 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 carrying out everyday physics experiments. The dark room facility helps students in carrying out optical experiments.

Laboratory Facilities in the Department of Pharmacy

The Department of Pharmacy of East West University has seven laboratories including an advanced research laboratory. The laboratories are well equipped with modern and world-class equipments for individual practical courses. These laboratories also provides necessary infrastructure for research for B.Pharm. and M.Pharm. programs.

The Advanced Research Laboratory of the Department of Pharmacy is equipped with advanced research instruments to carry out analytical experiments as well as experiments in the molecular level. For analytical research, the laboratory has High Performance Liquid Chromatography (HPLC), Fourier Transform Infrared (FTIR) Spectroscopy and Gas Chromatography. The laboratory has a collection of thermocycler for the amplification of genes, an instrument for gel electrophoresis and Sodium dodecyl sulphate poly acrylamide gel electrophoresis (SDS PAGE) for protein analysis.

In addition of these sophisticated instruments, there are some other major instruments listed below: Microplate photometer/ ELISA reader, Freeze Dryer, Incubator/CO₂ Incubator for cell culture, Laminar air flow cabinet for microbiological assay, High speed centrifuge machine, UV-VIS spectrophotometer, Polarimeter, Refractometer

Karl Fischer Titrator, Rotary evaporator, Single punch tablet compression machine, Capsule filling machine, Distillation apparatus, Dissolution tester, Disintegrator, Sonicator, High resolution microscopes, Autoclaves and Fundamental chromatographic instruments as well as other supporting equipments

To evaluate the pharmacological activities of different samples in animal model, Department of Pharmacy is currently developing an animal house where experiments on animal model as well as breeding of different species will be done.

The East West University Center for Research and Training (EWUCRT)

The East West University Center for Research and Training (EWUCRT) promotes academic and applied research for creation and dissemination of new knowledge. Though it is a research organization in character, it executes multifarious activities to achieve its objectives. The EWUCRT is dedicated to develop the research potentialities of faculty members of EWU by continually motivating them to undertake research studies and publish scholarly papers. It provides financial support to the faculty members in conducting research studies. The Center organizes and sponsors seminars, symposiums and workshops to facilitate dissemination and cross fertilization of knowledge. For the purpose of sharing research results with academia, researchers and policy makers, EWUCRT publishes two academic journals in the fields of humanities and social sciences, business and economics. The Center also designs and organizes short term training programs on research methodology to enhance the research capabilities of young professionals working in universities, academic institutions, government, and non-government organizations. During the last six years (2007- June 2012), EWUCRT has allocated approximately Taka 4.5 millions to support faculty research and training, publications of research reports, journal and sponsoring of seminars and workshops.

The EWUCRT operates through a Research Committee, comprising representatives from the Board of Trustees, Deans and Chairpersons of the academic departments. The Center is currently chaired by Dr. Rafiqul Huda Chaudhury, Member, Board of Trustees of the University. At present, Dr. Muhammad Sirajul Haque, Professor, Department of Economics, East West University holds the position of the Executive Director. One research officer and one secretary assist the Chairperson and the directors in carrying out the activities of the Center. A brief description of the activities, particularly those carried out in 2013, of the Center follows next.

Research Publications

Monograph

Dr. Rafiqul Huda Chaudhury, Chairperson, East West University Center for Research and Training, co-authored a monograph on, Genderizing the Census: Strategic approaches to capturing gender realities of a population, with Dr. Meena Acharya. The monograph was published by United Nations Population Fund in July 2013.

Research Reports

The Center publishes working papers, occasional papers and annual research abstracts of faculty members of the university in order to disseminate and share knowledge for the purpose of creating a strong intellectual bond and network among the faculty members of the University and the outside academic world.

In the year of 2013, EWUCRT has brought out two research reports. These are:

- An investigation into viewers' Evaluation of Advertisements, by Mr. S.S.M Sadrul Huda, Department of Business Administration, EWU
- Practices of TQM in the Garment Sector of Bangladesh- An Empirical Investigation" by Ms. Farhana Ferdousi, Assistant Professor and Ms. Saadia Shabnam, Senior Lecturer, Department of Business Administration, EWU

Academic Publications:

Journals

Having recognized the growing importance and demand of quality research and scholarly publications of faculty members in the areas of humanities and culture, global business, marketing and sustainable development, EWUCRT publishes annually two academic journals- **East West Journal of Business and Social Studies** and **East West Journal of Humanities**. The Center has published **East West Journal of Business and Social Studies**, Volume 2, March 2013 and **East West Journal of Humanities** Vol. 3, April 2013.

Abstracts of Published Papers

The Center for Research and Training (CRT) is going to publish the 7th volume of Abstract of Published Papers 2012 by the faculty members of the university. This volume contains abstracts of 44 research articles, of which 39 were published in international journals, one co-edited book and two book chapters, both of which were published abroad and 4 international conference papers.

Academic Research Grants

In response to the call for research proposal round 7, two proposals have been received from the faculty members of the University. The proposals are at different stages of review by the referees and review by authors. Those are:

1. "Susceptible Factors of Type-2: Diabetes in a Population of Bangladesh" by Afsana-Al-Sharmin and Dr. M. Mostafizuddin Ahmed, Department of Applied Sciences, EWU; Helal Uddin Ahmed and Ms. Munima Akter, Southeast University and Parvin Akter Hossain, Department of Epidemiology & Biostatistics, IGCER

2. "Plagiarism Policies in Bangladeshi Universities: A Critical Perspective" by Dr. Muhammed Shahriar Hossain, Department of English, EWU

3. "Higher Dependency on Domestic Borrowings: Key Challenges for the Target Economic Growth and Debt Management in Bangladesh" by Saiyeeda Saniya Hossain, Biplob Kumar Nandi and Gazi Quamrul Hasan, Department of Economics, EWU

4. "Does Fiscal Policy and Composition of Expenditure Matter for Economic Growth? A Panel Analysis for South-East Asian countries" by Biplob Kumar Nandi, Quamrul Hasan, and Mir Tanzem Nur Angkur, Department of Economics, EWU

Seminars, Symposiums and Public Lectures:

EWUCRT plays a leading role in organizing seminars, symposiums and public lectures on contemporary issues such as population and environmental concerns, good governance, globalization, social conflicts, social movements, marketing, media and sustainable development.

In order to disseminate knowledge among the academia, the EWUCRT organized two research seminars in this year:

• Presence of Pathogenic Organisms in Food Samples Collected from Fixed and Mobile Food Vendors around the Old & New Campus of East West University by Sufia Islam, Farhana Rizwan, Nishat Nazim, and Muniruddin Ahmed, Dept. of Pharmacy, EWU

and Lutfun Nahar, Department of Social Relations, EWU.

• A Time Series Approaches to Tax Revenue Forecasting: A Case Study of Tax System in Bangladesh by Biplob Kumar Nandi, Muntasir Choudhury, and Gazi Quamrul Hasan, Department of Economics, EWU

Training Programme:

East West University Center for Research and Training (EWUCRT) is organizing a seven-week training workshop on research methods from August 22, 2013 to October 05, 2013 in order to develop research capacity and skills of faculty members. The program has been designed to develop research skills in terms of identifying a researchable problem, literature review, research ethics, theoretical framework, data collection and analysis.

The Center also organized the Orientation Program for new faculty members of East West University. The objective of the orientation ceremony was to acquaint the new faculty members with academic goals, achievements and practices of the university and to provide them with tips for most productive and pragmatic methods of teaching.

The inauguration ceremony of the Training Workshop and the Orientation Program for New Faculty Members of East West University was held on Thursday, 22 August 2013 at 5 pm in the Faculty Lounge of EWU with Dr. Rafiqul Huda Chaudhury, Member, Board of Trustees and Chairperson, Center for Research and Training, East West University, in the chair. Dr. Mohammed Farashuddin, President, Board of Trustees and Founder Vice Chancellor, East West University addressed the new faculty as the chief guest, while Dr. Shelly A. Mubdi, Member, Board of Trustees, East West University and Professor Ahmed Shafee, Vice Chancellor, East West University were present as special guests. Mr. Harunur Rashid Khan, Assistant Professor, Department of English, East West University spoke on the topic 'Excellence in Education and Available Teaching and Research Facilities at EWU'. Participants in the training workshop program, faculty members, officers and staffs of EWU attended the program.

Consulting and Policy Research:

The Center is open to the idea of carrying out applied and policy research in the areas of finance, corporate business, management, population and health, environment and ecology, and sustainable development in order to address the needs of multilateral, bilateral, and national organizations.

Software Development Center (SDC)

The mission of the Software Development Center (SDC) is to provide EWU students with real-world experience in designing and developing quality software for offices, banks, institutions and industries. The Software Development Center at EWU is a member of BASIS (Bangladesh Association for Software and Information Services) and incorporates

industry expertise for true software innovation. It has the potential to use the resources of the World Wide Web. SDC believes in simplicity and efficiency. It intends to integrate object-oriented programming (OOP) concepts with the World Wide Web by providing unique software development services along with training and mentoring programs of global IT standard.

Career Counseling Center (CCC)

The Career Counseling Center provides appropriate guidance to students about their career plans. The center liaises with prospective employers and arranges internships and jobs for students and graduates. CCC works to place students with leading business organizations of the country who can expand their activities by utilizing fresh mind imbued with modern skills and expertise. As a forerunner among private universities in Bangladesh, the Center endeavors not only to ensure excellence in education but also to help students find suitable careers.

CCC is a guide and mentor for students in helping them to develop their aims and building their confidence by arranging and organizing different on-campus job fairs, workshops, seminars, corporate presentations and symposia on a regular basis where students get to learn about formal writing, etiquette and grooming, successful interview techniques, corporate networking and how to succeed in the work place.

CCC is the meeting point for both career-seeking individuals and leading employers of the country and thus keeps the spirit of East West University high.

East West University Library

The East West University Library is an invaluable resource for students, researchers and for faculties of the university. It has been designed to meet the information, research, and curriculum needs of students, faculties, and staff members for research and development activities. The library has over the years built a robust collection of books, bound volumes, journals and news papers, and many other resources like theses, student's project reports, CDs and videos.

The EWU library, located on its own premises, (Block-B : 6th floor) spread over 10,500 sq. ft., also provides access to the best of digital resources through its subscription to various databases consisting of scholarly and science, business, management relevant content. The library has network to provide business, environment, agricultural and economic, and academic information to the users.

Service offered by EWU Library:

- Circulation Services
- Current Awareness Services (CAS)
- Selective Dissemination of Information Services (SDI)
- Reference Services
- Virtual Reference Services
- Referral Services
- Online Journal & E-books services
- Internet Service / Library Wi Fi Zone
- News clippings Service
- Photocopy Service

Library Automation:

East West University Library is using widely used Integrated Library Management Software (ILMS) koha for its automation which is open source, free and developed in New Zealand. This software comprises several modules like OPAC module, cataloguing, acquisition, serial control, patron management etc. This software can share its data with other library software using Z39.50 and MARC21 standards. EWU library Vufind search tools for books, online journals and digital library resources from one focal point.

Web address OPAC : <http://opac.ewubd.edu>

To integrate all these tools and services EWU library redesigned its website using Drupal, a popular content management system. Users also get virtual reference service which is based on ZOH, free instant messaging tools from library website.

Web address : <http://lib.ewubd.edu/>

Digital Library:

EWU Library is the first university library in Bangladesh that uses Greenstone Digital Library Software for building a digital library with a contribution to implement Bengali version of the software. To maintain a world class standard, East West University Library has chosen this software to build a digital library for this university. Primarily EWU Digital Library consists of News clippings, Theses, EWU publications, Images etc and some other sample collections. There are more than 1000 documents in this digital library. To get access to digital library, visit: <http://lib.ewubd.edu> and the Digital Library or <http://gsdl.ewubd.edu/>

Collections:

The general collection consists of approximately 15000 volumes, primarily scholarly books, related reference books, textbooks, pure reference materials, journals, magazines, and statistical publications, as well as current newspapers and periodicals. The collection of EWU Library is comprised of books and periodicals related to the field of Business Studies, Economics, Liberal Arts, Social Sciences, Electrical and Electronic Engineering, Physics, Pharmacy, Computer Science, Mathematics, English Language Literature, and Bangladesh Studies.

Books are placed in open stacks for the convenience of student consultation. EWU Library maintains open access shelves to give enough choices to users so that they can select desired library materials. Users can go directly to stacks and look for their required materials. Library personnel are ready to assist in locating information, answer on-the-spot queries, and provide instruction in the use of the catalogue, databases, resources, indexes, and contacts whenever needed. Users can read books, journals, periodicals, newsletters, newspapers, etc. inside the library and are allowed to pull books from shelves for reading and taking them to the Circulation desk, so that they can issue them.

Library Resources

| Type | Quantity (As on September 30, 2013) | |
|--------------------------------|--|--------|
| Books | : 25487 | copies |
| Journal/Periodicals/ Magazines | : 132 | titles |
| Foreign Journals | : 11 | titles |
| Thesis | : 734 | titles |
| CDROMs | : 1450 | copies |
| Audio Cassettes | : 137 | copies |
| Online journals databases | : 42 | titles |
| National Newspapers | : 18 | titles |
| Maps (Large size) | : 06 | copies |
| E-Books | : 3000+ | titles |

Online Journals:

Online journals are now timely demanded resource to any research and academic institution. All online journals are not free of cost. So EWU library subscribes world renowned online journals some of them directly from publisher and some of them through consortia for flexible and economic benefits and registered some selected free online journals.

UGC Digital Library Consortium:

East West University Library is a member of UGC Digital Library Consortium, EWU community can easily access a lot of online journals databases including emerald (<http://www.emeraldinsight.com/>) EM120 (detail title list can be found here http://www.emeraldinsight.com/products/management_ejournals/listings.htm#120) and emerald engineering (detail title list can be found here <http://www.emeraldinsight.com/products/eng/databases.htm>), ACM Digital Library (<http://dl.acm.org/>) and JSTOR (<http://www.jstor.org/>) through our university library website in the university premise.

Bangladesh INASP-PERI Consortium (BIPC):

The EWU Library is a member of Bangladesh INASP-PERI Consortium (BIPC) and is equipped to access fully online. To access online journals, visit: <http://lib.ewubd.edu/onlinejournals>. This consortium has access to 38 online journal databases.

E-Books:

The EWU Library provides e-Books services to its users through online services. You can access more than 3000 e-books through online subscription. They can easily access to this services through online by the following links:

www.tandfebook.com/search/advance

Corporate Membership:

EWU Library has corporate membership with British Council, Archer K. Blood American Center Library and International Federation of Library Associations and Institutions (IFLA). With these membership EWU library users may avail borrowing facilities, search online public access catalog and online journal of those institutions. Beside this EWU library has MOU with ICDDR Library for resources sharing.

Workshop/Training:

EWU Library organized workshops and training on contemporary issues and subjects related to library and information services i.e. electronic resources management, digital library, library automation, information literacy, etc. for the library professionals, health professionals and IT professionals to cope with modern technology and resources in library. Recently EWU Library organized a workshop on Free and Open Source Software (FOSS) for Building Digital Libraries: Greenstone Digital Library Software and Dspace for library professionals of Bangladesh.

Information Literacy program:

EWU Library organizes information literacy programs on regular basis for their patrons to make them empowered to use the library resources and services. The objectives of these programs are to increase interests and awareness among the library users about the library services. Thus, maximum utilization of resources is ensured.

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.

Students' Welfare Department

Students' Welfare Department is a rendezvous spot for students of East West University so that they can participate in various aspects of academic life. The primary objective of the Students' Welfare Department is to emphasize the wholeness of the university experience through synchronized development of body, mind and spirit. It emphasizes enhancing student experience through 'out of classroom learning' and through extra-curricular programs. Under this organization we have 18 clubs which are supervised by moderators who themselves are faculty members of East West University. The clubs give opportunities to students to discover their hidden potential. Here students are able to develop their interpersonal skills by working in groups; they are also able to develop their organizational and leadership skills. Through our clubs we are fulfilling our responsibilities and thereby enhancing the image of the university.

The names of the 18 (Eighteen) clubs are:

1. EWU Agro-Industrialization Club
2. EWU Business Club
3. EWU Computer Programming Club
4. EWU Creative Marketing Club
5. EWU Club for Performing Arts
6. EWU Debating Club
7. EWU Electronics Club

8. EWU English Conversation Club
9. EWU Environmental & Social Club
10. IEEE Student Branch, EWU
11. EWU MBA Club
12. EWU Pharmacy Club
13. EWU Photography Club
14. EWU Rotaract Club
15. EWU Science Club
16. EWU Sports Club
17. EWU Telecommunication Club
18. EWU Alfa- Beta Statistics Club

Major activities of these clubs include:

Seminar and workshops

Study Tours

Community Volunteer Work

Club Fairs

Cricket, Football and Indoor Games Tournaments

Celebration of national and international events such as Pohela Boishakh, International Mother Language Day, Independence Day, Victory Day

Drama

Cultural Programs

Voluntary Blood Donation Campaigns

Art, Photography and Hobby Exhibitions

Competition in Art, Debate, Music, Photography, Computer Programming, Business Plan

Research

Help groups/ Help sessions

The Student Welfare Office emphasizes the wholeness of university experience through synchronized development of body, mind and spirit.

Credit Transfer Policies

Credit Transfer Requirements

Students who intend to be admitted into EWU with credit transfer are considered for admission based on the result of the admission test and courses completed at public universities of Bangladesh, and other reputed private universities of Bangladesh. Credit is generally transferable, provided that course work has been successfully completed and is equivalent to that offered at East West University.

Faculty members evaluate courses already completed according to an established procedure. Courses taken at other university/institutions may satisfy the core curriculum requirements only if the courses are equivalent to EWU courses approved for the core curriculum and if a minimum (B-) grade was earned. Course equivalencies are determined on the basis of contents, prerequisites, writing requirements, and level. Some transfer students may be required to sit for placement examinations to determine eligibility for credit transfer.

Residency Requirements

Maximum of twenty five percent (25%) of credit

hours for the intended undergraduate program may be accepted through credit transfer into EWU's academic program.

Important Guidelines

1. The award of credit transfer will be administered on a case-to-case basis.
2. Applicant must ensure that the following documents are submitted to apply for the credit transfer at the stipulated deadline:
 - i. An Official Transcript (in sealed envelope) of the university/institution record to date.
 - ii. Complete syllabus and Course Outline (duly attested) of the subjects that are applied to be credited.
 - iii. An application for credit transfer.
3. A charge of Tk. 500/- (Five hundred) per credit for transfer/waiver would have to be paid by the concerned student.



Our proud graduates

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. An undergraduate student (except Pharmacy) must register for minimum 3 (three) courses (9 credits) every semester. Students of the B.Pharm. program must take 4 (four) courses (12 credits) every semester. Out of these three or four courses, as the case may be, a student may be allowed to withdraw one course with a 'W' grade assigned.
6. The maximum number of courses a student can take in a semester is 5 (five). 6 (Six) courses for the students of B.Pharm in bi-semester system.
7. 20% penalty will not be applicable to those students (Undergraduate or Graduate Programs) who remain absent without advising and also take leave of absence within Last Date of Adding Courses/Last Day of Dropping Course(s) with 100% Refund.
8. A student (Undergraduate or Graduate Programs) who was advised for courses in a semester but remained absent without authorization and without paying dues within Last Date of Adding Courses/Last Day of Dropping Course(s) with 100% Refund, will be required to pay semester tuition and fees as per normal rules of Academic Calendar together with Tk.1,000/- additional fee.

10. Student (Undergraduate or Graduate Programs) who was advised for courses in a semester and have paid his dues, will be refunded as per the rules of Academic Calendar when dropping/withdrawing a semester.

11. The students (Undergraduate or Graduate Programs) who are on probation and remained absent without permission may in some special cases be allowed leave by the Vice Chancellor for a maximum of one semester with 20% penalty of 9 credits tuition fees.

Late Registration

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.



Vice-Chancellor Prof. Ahmed Shafee presenting a crest to the Honorable Education Minister Mr. Nurul Islam Nahid, MP at 13th Convocation of EWU

Grades, Rules and Regulations

Grading System

A student may earn five letter grades on the basis of his/her performance in a course. The letter grades A, B, C, and D are considered passing grades. The grade F is the failing grade. The numerical equivalents of the grades are as follows:

| Numerical Scores | Letter Grade | Grade Point |
|------------------|-------------------|-------------|
| 97-100 | A+ | 4.00 |
| 90 - below 97 | A | 4.00 |
| 87 - below 90 | A- | 3.70 |
| 83 - below 87 | B+ | 3.30 |
| 80 - below 83 | B | 3.00 |
| 77 - below 80 | B- | 2.70 |
| 73 - below 77 | C+ | 2.30 |
| 70 - below 73 | C | 2.00 |
| 67 - below 70 | C- | 1.70 |
| 63 - below 67 | D+ | 1.30 |
| 60 - below 63 | D | 1.00 |
| below 60 | F | 0.00 |
| | F* Failure | 0.0 |
| | I** Incomplete | 0.0 |
| | P*** Pass | 0.0 |
| | R** Repeat/Retake | 0.0 |
| | S*** Satisfactory | 0.0 |
| | W** Withdrawal | 0.0 |

* A 0 grade point in F Letter Grade is applied only for the calculation of the grade point average.

** Credits for courses with these grades do not apply towards graduation and are not used for the calculation of the grade point average.

*** Credits for courses with these grades are required for graduation but are not used for the calculation of the grade point average.

Re-Scrutiny of Scripts of Final Examinations

1. Re-evaluation of Scripts of Final Examinations is not allowed.
2. Re-Scrutiny (i.e. any possible error/omission in marking or counting) of Scripts of Final Examinations is only allowed.
3. If any change of grade is required that must be done by the faculty concerned within 7 (seven) days of the next semester through Department Chairperson and the Dean, to the Controller of Examinations.
4. If any faculty member is not available, Departmental Academic Committee will authorize one faculty member for re-scrutiny of Scripts and Change of Grades (if applicable).
5. Delayed Grade submission will require the Vice Chancellor's approval before it is entered into records.
6. A security deposit of Tk.200 will be charged on the students as Re-Scrutiny Fee for re-scrutiny of each Script of Final Examinations. If it is found that the error/omission was done by the faculty member concerned, the amount will be refunded to the concerned student.

Grade Report

Grade Reports are recorded and prepared by the 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

...by dividing the total grade points earned in ... by the credits attempted for the semester. ... courses graded A+, A, A-, B+, B, B-, C+, C, C-, ... and F are used to determine credits ...

...students repeat courses, GPA and CGPA will be ... on the basis of the grades obtained in the ... of the course(s) only. Grades obtained in ... will be shown in the grade report.

...students who complete courses in addition ... normal credit requirements for graduation will ... the Registrar in writing about the courses, ... intends not to declare for consideration ... the requirements for the degree.

...courses are not counted in GPA and CGPA ...

Probation and Dismissal

...whose CGPA will be between 1 and 2 after ... two or any subsequent semesters, will be ... on probation for the next two semesters. ... to raise their CGPA to at least 2 after the ... period (irrespective of whether s/he is a ... student or remains absent without ...) will lead to dismissal from the If a student's CGPA falls below 2 ... , he/she will again be placed on Student who are on probation or subject ... are not allowed to drop a semester or to ... of absence.

Academic Dismissal

...whose CGPA falls below 1.0 after the first ... or any subsequent semesters, will be ... dismissed from the university. Students ... fail to raise CGPA to satisfactory levels during ... will face dismissal from the

...Remedial Course may be required for students on the ... of their score in the English part of the ... test. Students who fail to pass in remedial ... in two attempts will be placed on probation.

...student dismissed on academic ground (s) may be ... to be admitted in another program of this ... on qualifying the Admission Test for that

Incomplete (I) Grade

The "Incomplete" (I) grade may be used in special The "Incomplete" may be given only at ... of a semester to a student who has completed

all other requirements except appearing in the final ... without further class attendance. The ... must file with the Office of the Controller of ... an Incomplete Grade Form describing the ... to be completed.

The student has the sole responsibility to take the ... in making up the requirements for the ... grade as specified by the instructor. If ... is not taken within one week of the ... of the next semester, the "I" grade ... automatically be converted to "F", otherwise the ... grade will revert to the tentative final grade (the ... grade becomes an "F" if no tentative grade was ...). In the event where the instructor from ... whom a student received an incomplete grade is not ... available, the disposition of the case involving an ... grade resides with the respective Dean of

The concerned Instructor must submit the ... (I) Grade within one week of the next ... through Department Chairperson and the ... , to the Office of the Controller of Examinations. ... submission will require Vice ... 's approval before it is entered into

Usual submission of Grades by an Instructor shall be ... as per Academic Calendar through proper

Withdrawal (W) Grade

The grade "Withdrawal" (W) is assigned when a ... officially drops a course within the date ... in the Academic Calendar for the

Retake Policy

a. A student will be allowed to retake as many ... as he/she wants, but students will be allowed ... a particular course only once with any ... he/she earned previously.

b. A student with 'F' Grade(s) in a course(s) may ... the same any number of times to pass within ... allowed for Graduation. In case of ... a course due to 'F' grade, the 'F' grade of ... attempt(s) will be converted to 'R' grade and ... of last attempt will be counted in CGPA.

c. A student availing of the advantage of Retake ... Policy, shall not be eligible for getting Gold ... /Award/ Distinction.

Students who wish to retake a course must obtain

previous written permission of the Chairperson of the Department concerned. They will have to register for the course again and will be required to pay the usual tuition charges including lab (if applicable) and other fees.

Academic Honesty

There is a policy of zero tolerance on cheating. Any form of cheating such as copying any document or another person's work, seeking or providing help to other students during tests, or adopting any other form of unfair means during exams, will constitute grounds for disciplinary action. Instructors are expected to use reasonably practical means of preventing and detecting cheating. Any student found to be cheating will be reported to the Dean of concerned faculty by the relevant faculty member for disciplinary action.

Leave of Absence

Leave of absence or dropping a semester may be granted for up to three 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.

However, if a student after completing the first semester of probation (1 out of 2 semesters), asks for leave/drop, on extreme compassionate ground he/she may be granted leave/drop for the 2nd semester of probation considering his/her improved result achieved in the first semester of probation. Attending and completing the first semester of probation is mandatory for any student whatever may be the case.

A student who does not return for re-registration at the specified semester will be classified as "Officially Withdrawn" and must apply for re-admission to the Registrar.

Students who are on probation and remain absent without prior permission, may, in some special cases, be allowed leave by the Vice Chancellor maximum for one semester with his discretion with 20% penalty of 9 credits tuition fees.

Students, who are in good academic standing (CGPA 2.00 or above in Undergraduate Programs and CGPA 2.50 or above in Graduate programs), but remain absent without prior permission, may, on compassionate ground, be approved leave of absence by the Vice Chancellor with penalty as follows:

- a. Leave of absence for one semester with penalty of 20% of the 9 credits tuition;
- b. Leave of absence for two consecutive semesters with penalty of 30% of the 9 credits tuition; and
- c. Leave of absence for three consecutive semesters with penalty of 40% of the 9 credits tuition;

If the span of the unauthorized absence exceeds three consecutive semesters no permission shall be accorded and the student will be "Officially Withdrawn" from the university.

A newly admitted student, on compassionate ground might be granted leave of absence for the first semester with a deferment fee of Tk.3,000/- (or as fixed time to time) whether he/she has applied for leave, deferment or drop/withdrawal of the first semester. Such leave of absence for the first semester would be granted by the Pro-Vice Chancellor and if the student concerned does not continue from the 2nd semester his/her admission shall be cancelled and he/she shall be dismissed from the university. Application for deferred admission will be accepted upto the last day of dropping a course/semester with 85% refund.

Absence from Examinations

In 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

Scholarships and Financial Aids

Since its inception, East West University has been awarding merit scholarships and need-based financial assistance to deserving students. Each year the university distributes at least 9% of its total earnings among 20% or more of its regular students. Such scholarships/financial including family concession and freedom fighter scholarships 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 scheme at any point of time.

According to the provision of the Private University Act, 2010, private universities are required to provide scholarships to 6 (six) percent of their enrolled poor but meritorious students (of which 3 percent is reserved for the wards of freedom fighters). Since its inception, the founders of East West University have adopted a policy of not only not paying any profit or dividend to themselves but to use a good proportion of its operating surplus towards nurturing merit and providing financial support to students in need. In the last twelve years, the scholarships and financial aid policy adopted by East West University have become sources 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 ways:

1. Merit Scholarships

EWU has generous merit scholarships/financial aid programs. A sum of Taka 4,42,34,142 (four crore forty two lakh thirty four thousand one hundred and forty two) only was awarded to 1050 students in 2012-2013 along. Full-year tuition waiver merit scholarships (for a maximum of one-fourth of the total credit requirement of the program for undergraduate students) were awarded to:

(i) Top scorers in undergraduate admission tests with a minimum score of 75% marks: five (5) from the Faculty of Business and Economics, and four (4) from

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

The continuation of this scholarship is contingent upon maintaining a minimum CGPA of 3.50 and abiding by the rules and regulations and the University's Code of Conduct for students at all time.

(ii) Candidates securing GPA 5.00 (excluding 4th subject) in both SSC and HSC (in the most recent relevant examination year) will be awarded 100% Merit Scholarship at entry level for 4 years subject to qualifying in the admission test and maintenance of minimum GPA 3.50 in each semester as a regular student;

(iii) Candidates securing 7 (seven) A's in 'O' Level Examination (at one sitting) and 3 (three) A's in 'A' Level Examination (in one year) will be awarded 100% Merit Scholarship at entry level for 4 years subject to qualifying in the admission test and maintenance of minimum GPA 3.50 in each semester as a regular student;

(iv) Divisional Quota: One poor but meritorious student from each Division securing GPA 5.00 in the most recent SSC and HSC Examination will be awarded a full-tuition free Merit Scholarship with lodging for four years of study at EWU subject to qualifying in the admission test. The continuation of this scholarship is contingent upon maintaining a minimum CGPA of 3.00 as a regular student and abiding by the rules and regulations and University's Code of Conduct for students at all time.

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

- a. Success in the EWU Admission Test.
- b. Maintenance of minimum GPA of 3.50 in each semester as a regular student.

c. Following East West University's Disciplinary Code for Students at all time;

(vi) 100% free merit scholarship to the students who receive Undergraduate degree from EWU with CGPA 4.00 for maximum of two years for study in Graduate programs at EWU subject to maintenance of CGPA 3.50 at all time as a regular student, to continue the scholarship. EWU provides the same benefits under same terms and conditions to the students having first classes in both Honors and Masters from public Universities who get admission to Graduate programs on a case by case basis.

(vii) A committee has been formed to assess and recommend for scholarship/financial aid who are from overseas and students who come from other systems.

(viii) Top 10% students (10% of the actual number of students of each batch of each department enrolled during the immediate past year or two semesters for one year programs, whichever is applicable) 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 3.90 and above will get full-tuition free Merit Scholarship for equal number of credits to be adjusted in the next three consecutive semesters.

All undergraduate students must register for at least 9 credits in a semester. The requirement is 12 credits in a semester for the students of B.Pharm. Program.

On the basis of the above principle, students of graduate programs also get Merit Scholarship but requirements of credit for the scholarships vary depending on the total credits of the program and the length of the program.

In case of a batch where 6 or less students fulfill the scholarship requirement (i.e., completed at least one-fourth of the degree requirement with a CGPA of 3.90 or better), only the top student will be entitled to receive one scholarship. The award will go to the best performer among students securing CGPA 3.90 or 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 (viii) 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 four 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' 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 |
| BSS in Sociology | 30 |
| BS in Applied Statistics | 31 |
| B.Sc. in Electronic & Telecommunication Engineering | 35 |
| B.Sc. in Information & Telecommunications Engineering | 35 |
| B.Sc. in Computer Science & Engineering | 35 |
| B.Sc. in Electrical & Electronic Engineering | 35 |
| Bachelor of Pharmacy | 39 |
| B.Sc. in Genetic Engineering & Biotechnology | 33 |

To be eligible for Merit Scholarship/Financial Aid a student of Graduate Program must earn credits as mentioned in the table below in the last three consecutive semesters (whichever is applicable to whom):

| Graduate Programs | Credits |
|--|----------------|
| MBA | 29 |
| EMBA | 24 |
| MBM | 29 |
| MDS | 18 |
| Master of Social Science in Economics | 18 |
| MA in English (45 credits Program) | 24 |
| MA in English (36 credits Program) | 18 |
| MA in English Language Teaching | 21-23 |
| MS in Applied Statistics | 18 |
| MS in CSE | 18 |
| MS in TE | 18-20 |
| Master of Population, Reproductive Health, Gender and Development (MPRHGD) | 18 |
| MS in Applied Physics and Electronics | 18 |

2.2 Directors' Scholarships

Board member may award 200% tuition fee waiver to two students (100% each) or more than two students distributing this 200% at his/her discretion each semester or

Board member may award maximum upto 18 credits tuition fee waiver in each semester or higher waiver requirement under his/her discretionary quota. The unutilized credits of any semester can be carried forward to other semester(s) within the same academic calendar year.

3. Financial 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 (sons and/or daughters of the same parents)/husband-wife study simultaneously at East West University, the second sibling/spouse is entitled to a half-tuition waiver. However, both must be admitted full-time into regular programs and both the sibling/husband-wife must study within the normal study time (the stipulated time for completing degree) required for the programs for which they are enrolled. The benefit commences on the date of admission of the second sibling/spouse and ceases on the discontinuation of the study of any one of them in EWU, after his/her Graduation/Dismissal/Suspension/Voluntary Withdrawal etc. or for any other reason. This benefit may extend up to the third sibling under the above-mentioned conditions.

Any one out of two siblings/spouse will be entitled to get either merit scholarship (if eligible) or half tuition fee waiver or financial aid (if eligible) whichever they prefer.

If either of the siblings/spouses 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) the sibling/spouse 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/spouse can maintain the minimum CGPA of 2.70 the sibling/spouse benefit would be awarded to the second sibling/spouse provided the first sibling/spouse is not currently receiving any merit scholarship/ financial aid from EWU. When both the siblings/husband-wife (both are newly admitted students) are admitted in the first semester at a time, sibling/spouse benefit will be awarded to the second sibling/spouse without applying the credit and CGPA requirement for them in the first semester. Credit and CGPA requirement will be applicable for them from the second semester. Scholarship/Financial Aid/Sibling/spouse benefit or any other financial benefits at EWU are not awarded simultaneously. However, a winner of Merit Scholarship, may enjoy the Scholarship by surrendering the sibling/spouse or other benefit. i.e. Any one out of two siblings/husband-wife will be entitled to get either merit scholarship (if eligible) or half tuition fee waiver or financial aid (if eligible) whichever they prefer. The benefit will be awarded at the time of Registration of Courses of both the siblings/husband-wife.

(c) Freedom Fighters' Scholarship

As a mark of respect to the valiant freedom fighters of the War of Liberation and Independence, the university reserves 3% admission quota for the wards of freedom fighters of all categories, subject to their fulfillments of the minimum admission requirement at East West University. The university also considers maximum 100% tuition waiver scholarship to the wards of wounded, deceased and financially needy freedom fighters, subject to the fulfillment of the following requirements:

The candidate must qualify in the EWU admission test; the candidate must provide proof that his/her

parent was a freedom fighter. The Tuition Fee waiver as above will then be continued provided that the CGPA in each semester remains 2.70 or more.

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 four courses) Financial Aid is discontinued if any student of undergraduate or graduate program violates the East West University Disciplinary Code for students and/or if his/her CGPA falls below 2.70. This is applicable for the beneficiaries of siblings/spouse/Freedom Fighters' Scholarship.

4. Benefit for EWU Employees

If the children of the employees study at EWU, only one child of an employee will be granted 50% tuition fee waiver during the entire tenure of the employee's service at EWU subject to fulfillment of admission and all other criteria for study at EWU. Granting of this tuition fee waiver will be effective on admission of the student but its continuation will be subject to fulfillment of Financial Aid requirements.

5. 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 | Lutfal 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 | Sherifunnessa 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 Shahab-Uddin 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 Banu Scholarship | Tk. 35,000 a year |
| 25 | Alhaji 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 |

| | | |
|-----|--------------------------|-------------------|
| 1 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 2 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 3 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 4 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 5 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 6 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 7 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 8 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 9 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 10 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 11 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 12 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 13 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 14 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 15 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 16 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 17 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 18 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 19 | Islahat Bank Scholarship | Tk. 27,000 a year |
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| 29 | Islahat Bank Scholarship | Tk. 27,000 a year |
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| 43 | Islahat Bank Scholarship | Tk. 27,000 a year |
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| 48 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 49 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 50 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 51 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 52 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 53 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 54 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 55 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 56 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 57 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 58 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 59 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 60 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 61 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 62 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 63 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 64 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 65 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 66 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 67 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 68 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 69 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 70 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 71 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 72 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 73 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 74 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 75 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 76 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 77 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 78 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 79 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 80 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 81 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 82 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 83 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 84 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 85 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 86 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 87 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 88 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 89 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 90 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 91 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 92 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 93 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 94 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 95 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 96 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 97 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 98 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 99 | Islahat Bank Scholarship | Tk. 27,000 a year |
| 100 | Islahat Bank Scholarship | Tk. 27,000 a year |

according to the criteria set by the university and is subject to change at its discretion. Selection of scholars and financial aid beneficiaries is done through a computerized system that ensures full transparency.

The Financial 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, financial aid programs and amount of scholarships distributed during the last five years.

Data in table show a declining trend in terms of both the number of recipients and the amount of scholarship disbursed. This is mostly due to declining number of students meeting the criteria for such Scholarships and Financial Aid. However, these figures (i.e. number of scholarship recipients and amount of scholarship) have been increased significantly from the academic year 2011-2012 with the introduction of 100% Scholarship for the wards of Freedom Fighters, relaxation of Merit Scholarship criteria and various other pro-scholarship schemes.

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

Various Scholarships and Financial Aid Programs at EWU

| Sl. | Name of Scholarship Financial Assistance | 2008-2009 | | 2009-2010 | | 2010-2011 | | 2011-2012 | | 2012-2013 | |
|-----|---|--------------------|-------------------|--------------------|-------------------|--------------------|-------------------|--------------------|-------------------|--------------------|-------------------|
| | | No. of Students | Amount (Tk.) | No. of Students | Amount (Tk.) | No. of Students | Amount (Tk.) | No. of Students | Amount (Tk.) | No. of Students | Amount (Tk.) |
| 1 | Merit Scholarship (Place holder+Merit scholarship awardees) | 183 | 8,787,268 | 177 | 8,626,770 | 154 | 8,897,640 | 290 | 12,988,699 | 396 | 16,835,466 |
| 2 | Medha Lalon Fund* | 62 | 1,605,000 | 65 | 1,692,100 | 59 | 1,734,300 | 84 | 2,525,600 | 88 | 2,736,300 |
| 3 | Financial Aid | 523 | 11,790,870 | 370 | 8,458,720 | 284 | 5,151,430 | 195 | 3,219,700 | 151 | 3,028,860 |
| 4 | Half-Tuition Family Assistance | 170 | 4,389,455 | 148 | 4,164,280 | 144 | 4,251,569 | 141 | 4,524,400 | 147 | 4,836,570 |
| 5 | Directors Quota | 53 | 2,381,797 | 58 | 2,908,186 | 55 | 2,857,710 | 60 | 2,798,304 | 71 | 3,089,290 |
| 6 | Special Assistance | 66 | 2,435,526 | 87 | 1,182,659 | 71 | 932,439 | 57 | 958,472 | 54 | 791,230 |
| 7 | Freedom Fighters' scholarship | 8 | 271,845 | 9 | 385,515 | 19 | 1,138,183 | 72 | 6,561,338 | 138 | 12,628,805 |
| 8 | Divisional Quota | 8 | 872,020 | 9 | 1,537,550 | 8 | 1,322,310 | 9 | 1,034,185 | 5 | 267,100 |
| | Total | 1073 | 32,533,781 | 923 | 28,955,780 | 794 | 26,285,581 | 908 | 34,610,698 | 1050 | 44,234,142 |
| | Percentage(%) of net Tuition receipts | 6.30% | | 4.63% | | 3.44% | | 4.03% | | 4.70% | |

* Percentage has been calculated excluding Medha Lalon Fund



Jubilant Gold Medalists at 12th Convocation of EWU

List of Courses

ACT 101: Financial Accounting

This course aims to disseminate accounting and reporting fundamentals to the beginners. Upon the completion of the course, the participants are expected to be expert in drafting financial statements independently with the style of reading financial statements and the regulatory (national and international) requirements. The course includes the topics 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 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, stockholder' equity: contributed capital shareholders' equity: retained earnings, dilutive securities and earning per share, investments, statement of cash flows, full disclosure in financial reporting.

Credits: 3; Prerequisite: ACT411

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 in 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, Foreign accounting, Accounting for human resources.

Credits: 3; Prerequisite: ACT 421

AST 101: Elements of Applied Statistics

Credits : 3

Introduction to statistics: meaning of statistics, scopes and limitations; concepts of descriptive and inferential statistics; basic concepts: data, sources of data- primary and secondary data; population, sample, parameter, statistic; variables and types of variable: qualitative and quantitative discrete, continuous; scales of measurements; classification of variable by scales of measurements. Organization and presentation of data: graphical presentation of qualitative and quantitative data; use of statistical software. Sorting data, grouping qualitative and quantitative data: construction of frequency

distribution and relative frequency distribution; graphical presentation of frequency distribution-histogram, frequency polygon, ogive.

Concept of distribution: location, scale (spread) and skew. Illustration with stem and leaf diagram; use of excel software. Descriptive measures of data; measures of location; measures of dispersion; moments and their interrelationship; measures of skewness and kurtosis. Three and five number summary; box-plot and modified box-plot; use of excel software.

Description of bivariate data: bivariate frequency distribution; graphical presentation of bivariate data; contingency table; concept of association between two variables; percentage table and interpretation of cell frequencies. Measures of association for nominal and ordinal variables; measures of association for interval or ratio variables; correlation; relationship between two variables: simple linear regression; use of excel software. Basic issues in inferential statistics.

Text Books:

1. Newbold, P (2004). Statistics for business and economics,
2. Weiss, N (2007). Introduction to statistics, 7th edition. Prentice-Hall.

AST 102: Elements of Probability

Credits : 3

Meaning of probability; definition and scope of probability; classical and frequency definitions; sample space; elements of set theory; axiomatic definition of probability; permutation and combinations; theorems of total and compound probability; conditional probability and stochastic independence; Bayes theorem; geometric probability. Random variables; probability function and probability density function; distribution function; joint probability function; marginal and conditional distributions. Mathematical expectations; expectations of sums and products of random variables; moment and cumulant generating functions; characteristic function; probability generating function; conditional expectation and variance; Cauchy-Schwartz, Markov and Chebyshev inequality. Detailed study of Bernoulli, binomial, Poisson, normal distributions; applications to biomedical, quality control, and agricultural problems with specific examples.

Text Books:

1. Mood, AM, Graybill, FA and Boes, DC (1974).

Introduction to the theory of statistics, 3rd edition. McGraw-Hill.

2. Hogg, RV and Craig, AT (2004). Introduction to mathematical statistics, 4th edition. Macmillan.

AST 130: Statistical Computing I

Credits : 3

Computing problems related to the courses AST 101 (Elements of Applied Statistics) and AST 102 (Elements of Probability).

AST 131: Statistical Computing II

Credits : 3

Computing problems related to the courses CSE 111 (Programming with Fortran and C), MAT 206 (Basic and Linear Algebra), and AST 106 (Principles of Economics).

AST 201: Probability Distributions and Simulation

Credits : 3

Discrete Probability Distributions: geometric, negative binomial, hypergeometric, multinomial, uniform, beta binomial, logarithmic series. Continuous Probability Distributions: uniform, exponential, gamma, beta, log-normal, Cauchy, Laplace (double) exponential, inverse Gaussian, Maxwell, Pareto, triangular, Rayleigh, Weibull, logistic, Gumbel. Bivariate

Distributions: bi-variate normal distribution and its properties. Some Other Bivariate Distributions: binomial and Poisson.

Concept of Truncated Distributions: compound and mixture distributions. Concept of Family of

Distributions: exponential family, location-scale family, Pearsonian, and Tukey lambda. Concept of Simulation: techniques of generating pseudo-random number; generating random numbers - direct method, indirect method, accept/reject algorithm.

Text Books :

1. Mood, AM, Graybill, FA and Boes, DC (1974). Introduction to the theory of statistics, 3rd edition. McGraw-Hill.
2. Hogg, RV and Craig, AT (2004). Introduction to mathematical statistics, 6th edition. Macmillan.
3. Naylor, TH (1966). Computer simulation techniques. Wiley.
4. Banks, J, Carson, J, Nelson, B, Nicole, D (2004). Discrete-events system simulation. Prentice-Hall.

AST 202: Sampling Distributions and Order Statistics

Credits : 3

Sampling and Sampling Distributions. Expectations of functions of random variables: expectation two ways, sums of random variables, product and quotient; Cumulative distribution function technique: distribution of minimum and maximum, distribution of sum of difference of two random variables, distribution of product and quotient; Moment generating function technique: description of technique, distribution of sums of independent random variables; The transformation $Y = g(X)$: distribution of $Y = g(X)$, probability integral transformation; Transformations: discrete random variables, continuous random variables; Sampling: basic concepts of random samples, inductive inference, populations and samples, distribution of samples, statistic and sample moments; Sample mean: mean and variance, law of large numbers, central limit theorem, Bernoulli and Poisson distribution, exponential distribution, uniform distribution, Cauchy distribution; Sampling from the normal distributions: role of normal distribution in statistics, sample mean, chi-square distribution, the F-distribution, Student's t-distribution. Non-central distributions: non-central chi-squared, t , and F distributions; definitions, derivations, properties.

Order Statistics:

Concepts of order statistics and their applications; distributions of different single order statistics; joint distribution of two or more order statistics; distributions of maximum, minimum, range, median, and other quantiles. Moments of order statistics; identities related to moments of order statistics; application of these results to different distributions, such as uniform, exponential, logistic, Weibull, etc. Estimation based on order statistics; BLUEs of the location and scale parameters; BLUEs based on selected order statistics; maximum likelihood estimation; approximate maximum likelihood estimation. Application to real life data.

Text Books:

1. Mood, AM, Graybill, FA and Boes, DC (1974). Introduction to the theory of statistics, 3rd edition. McGraw-Hill.
2. Hogg, RV and Craig, AT (2004). Introduction to mathematical statistics, 6th edition. Macmillan.
3. Arnold, BC, Balakrishnan, N and Nagaraja, HNA (1992). First course in order statistics. Wiley.

AST 203: Statistical Inference I

Credits : 3

Methods of finding estimators: methods of moments, maximum likelihood, and other methods; Properties of point estimators: closeness, mean-squared error, loss and risk functions; Sufficiency: sufficient statistics, factorization criterion, minimal sufficient statistics, ancillary statistics, sufficient, ancillary and complete statistics, exponential family; Unbiased estimation: lower bound of variance, sufficiency and completeness; Location and scale invariance. Equivalence principle; Bayes' estimators: posterior distribution, loss-function approach, minimax approach, optimum properties of maximum likelihood estimation; Confidence intervals: introduction and definition of confidence interval, pivotal quantity. Sampling from the normal distribution: confidence interval for the mean and variance, simultaneous confidence region for the mean and variance, confidence interval for the difference in means. Methods of finding confidence intervals: pivotal quantity method, statistical method; Large sample confidence intervals; Bayesian interval estimation. Methods of evaluating interval estimators: size and coverage probability. Simple hypothesis versus simple alternatives: most powerful tests, loss function. Composite hypotheses: generalized likelihood ratio test, uniformly most powerful tests, unbiased tests, method of finding tests; Sampling from normal distribution: tests on the mean, variance, several means, several variances; Chi-square tests: asymptotic distribution of generalized likelihood ratio, chi-square tests for goodness-of-fit, test of equality of two multinomial distributions and generalizations, tests of independence in contingency tables; Tests of hypotheses and confidence intervals;

Text Books:

1. Mood, AM, Graybill, FA and Boes, DC (1974). Introduction to the theory of statistics, 3rd edition. McGraw-Hill.
2. Casella, G and Berger, RL (2002). Statistical inference, 2nd edition. Duxbury.
3. Hogg, RV and Craig, AT (2004). Introduction to mathematical statistics, 6th edition. Macmillan.

AST 204: Agricultural Statistics and Design of Experiments

Credits : 3

Agricultural statistics: definition; basic and applied statistics; agricultural production; crops; crop yield; estimation of mean yields; crop cutting experiment; crop forecasting; livestock; livestock inventory.

administrative reporting; sample survey. Census of agriculture: objectives; scope; coverage; concepts and definitions. Statistics of selected agricultural crops; index number of agricultural production; weights, indices used; types of agricultural prices; collection and indices of agricultural prices.

Introduction to design of experiments: strategy of experimentation; some typical examples of experimental design; basic principles; guidelines for designing experiments.

Experiments with a single factor: the analysis of variance; analysis of fixed effects model; estimation of model parameters; unbalanced data; model adequacy checking; regression model, comparisons among treatment means, graphical comparisons of means, contrasts, orthogonal contrasts, multiple testing, Scheffe's method, comparing pairs of treatment means, comparing treatment means with a control; Determining sample size; operating characteristic curve, specifying standard deviation increase, confidence interval estimation method; Discovering dispersion effects; The regression approach to analysis of variance; least squares estimation of the model parameters, general regression significance test; Nonparametric methods in analysis of variance; the Kruskal-Wallis test.

Randomized blocks, Latin squares, and related designs: the randomized complete block designs (RCBD); statistical analysis of RCBD, model adequacy checking; estimating model parameters; Latin square design; Gareco-Latin square design; balanced incomplete block design (BIBD); statistical analysis of BIBD; least squares estimation of BIBD; recovery of intra-block information in the BIBD;

Text Books:

1. Idaiikkadar, NM (1979). Agricultural statistics: A handbook for developing countries. Pergamon.
2. Dillon, JL and Anderson, JR (1990). The analysis of response in crop and livestock production. Pergamon.
3. Montgomery, DC (2001). Design and analysis of experiments, 5th edition. Wiley.

AST 205: Introduction to Demography

Credits : 3

Basic concept of demography; Role and importance of demographic/population studies; Sources of demographic data: census, vital registration system, sample surveys, population registers and other

sources especially in Bangladesh. History of census taking and vital registration in the sub-continent. Uses of data from these sources; strength and weakness of data from them. Growth of population in Bangladesh since 1901.

Errors in demographic data: types of errors and methods of testing the accuracy of demographic data. Quality checking and adjustment of population data. Post enumeration check (PEC) and detection of errors and deficiencies in data and the needed adjustments and corrections.

Fertility: Basic measures of fertility. Crude birth rate, age specific fertility rates (ASFR), general fertility rate (GFR), total fertility rate (TFR), gross reproduction rate (GRR) and net reproduction rate (NRR), child-woman ratio. Concept of fecundity and its relationship with fertility.

Demographic theory: Transition theory and the present situation in Bangladesh. Malthus' theory and its criticism. Mortality: Basic measures of mortality: crude death rate (CDR), age specific death rates (ASDR), infant mortality rate, child mortality rate, neo-natal mortality rate. Standardized death rate its need and use. Direct and indirect standardization of rates. Commonly used ratios: Sex ratio, child-woman ratio, dependency ratio, density of population.

Fertility and mortality in Bangladesh since 1951: Reduction in fertility and mortality in Bangladesh in recent years. Role of socio-economic development on fertility and mortality. Nuptiality: Marriage, types of marriage, age of marriage, age at marriage and its effect on fertility, celibacy, widowhood, divorce and separation, their effect on fertility and population growth.

Migration: Definition, internal and international migration. Sources of migration data. Factors affecting both internal and international migration, laws of migration. Impact of migration on origin and destination, its effect on population growth, age and sex structure, labor supply, employment and unemployment, wage levels, and other socio-economic effects.

Migration of Bangladeshis abroad and its impact on overall economic development of the country.

Text Books:

1. Shryock, S and others (1975). The methods and materials of demography, volume I and II. U.S. Department of Commerce Publication.

2. Bogue, DJ (1969). Principles of demography. Wiley.
3. Siegel, SJ and Swanson, DA (2004). The methods and materials of demograph, 2nd edition.

AST 206: Introductory Sampling Methods

Credits : 3

Role of sampling theory; requirements of a good sample design; units; population; sampling units; sampling frame and related problems; uses of sample survey; Random or probability sampling and non-random or purposive sampling; Bias; precision and accuracy of estimates; different types of errors associated with sampling and complete enumeration. Simple random sampling: advantages and disadvantages; drawing of samples; with and without replacement sampling- estimates, standard errors and confidence intervals; simple random sampling for proportion and ratio estimate, standard error and confidence interval; determination of sample size for specified precision. Systematic sampling: use, limitation, estimates, bias, standard error and efficiency; comparison with simple random sampling; systematic sampling for populations with linear trend; methods for dealing with population with linear trend or periodic variation.

Stratification: reasons for stratification; formulation and number of strata; stratified random sampling estimates, standard error and confidence interval; allocation of samples to strata equal allocation, proportional allocation, Neyman allocation and optimum allocation; stratified sampling for proportions; post stratification and quota sampling.

Use of supplementary information: ratio estimation examples, estimate bias, mean squared error, approximate variance; conditions for unbiased ratio estimation; unbiased ratio-type estimates; necessity and limitation of ratio estimates; ratio estimates in stratified random sampling; comparison of the combined and separate estimates; product and difference estimation.

Regression estimation: examples, assumptions, properties and limitations; bias and approximate variance; estimate of the variance; regression estimates in stratified sampling combined and separate estimates; comparative merits and demerits of ratio and regression estimates.

Cluster sampling: reasons, formation of clusters, size of clusters; simple cluster sampling with equal and unequal sized clusters estimates, bias, standard

error and efficiency; comparison with simple random sampling and systematic sampling; determination of optimum cluster size. Stratified cluster sampling: advantages, estimates, bias, standard error and efficiency; comparison with simple random sampling, systematic sampling and usual stratified random sampling.

Text Books:

1. Cochran, WG (1977). Sampling techniques, 3rd edition. Wiley.
2. Lohr, SL (1998). Sampling: design and analysis. Duxbury.

AST 207: Data Analysis using S Language and MATLAB

Credits : 3

R Programming.

R Language Essentials: expressions and objects, functions and arguments, vectors, missing values, matrices and arrays, factors, lists, data frames, indexing, conditional selection, indexing of data frames, subset and transform, grouped data and data frames, sorting, implicit loops; The Graphics Subsystems: plot layout, building a plot from pieces, using par, combining plots; Session Management: the workspace, getting help, packages, built-in data, attach and detach; Data Entry: reading from a text file, the data editor, interfacing to other programs;

Probability and Distributions: random sampling, probability calculations and combinatorics, discrete and continuous distributions, densities, cumulative distribution functions, quantiles, random numbers; Descriptive Statistics and Graphics: summary statistics for a single group, graphical display distributions - histograms, empirical cumulative distributions,

Q-Q plots, boxplots, summary statistics by groups, graphics for grouped data, generating tables, graphical display of tables (barplot, dotplot, pie chart); One- and Two-Sample

Tests: one-sample test, Wilcoxon signed-ranked test, two-sample t-test, comparison of variances, the paired t-test; Regression and Correlation: simple and multiple linear regression, residuals and fitted values, prediction and confidence bands; ANOVA and Kruskal-Wallis: one-way analysis of variance, pairwise comparisons and multiple testing, two-way analysis of variance.

MATLAB programming

Introduction; command window, script m_files; array operation; matrix operation; logical operation; function m_files; data analysis, interpolation, polynomials, roots, multiplication; addition, division, derivatives, numerical analysis: plotting, minimizing, optimization, integration, differentiation, differential equation; two or three dimensional graphs: plot, line styles, markers, color, grids, axes box, labels, legends, color maps, mesh, and surface plots. R and MATLAB programming for statistical computing: frequency table, measures of central tendency, measures of dispersions, graphical presentations of data, the probability density function, cumulative density function, the quantile function, simulating data from probability distributions, goodness of fit test, parametric and non-parametric test procedures for one sample and two sample data, p-value, contingency tables, fitting linear models, analysis of variance, estimation of parameters.

Text Books:

1. R Core Team (2011). Introduction to R (can be downloaded from <http://www.cran.r-project.org>).
2. Martinez, WL (2002). Computational statistics handbook with MATLAB. Chapman & Hall.

AST 230: Statistical Computing III

Credits : 3

Computing problems related to the courses AST 201 (Probability Distributions and Simulation) and AST 206 (Introductory Sampling Methods).

AST 231: Statistical Computing IV

Credits : 3

Computing problems related to the courses AST 202 (Sampling Distributions and Order Statistics), AST 205 (Introduction to Demography), and AST 207 (Data Analysis using S language and MATLAB).

AST 232: Statistical Computing V

Credits : 3

Computing problems related to the courses AST 203 (Statistical Inference I) and AST 204 (Agricultural Statistics and Design of Experiments).

AST 301: Design and Analysis of Factorial Experiments

Credits : 3

Introduction to Factorial Designs: basic definition and principles; the advantage of factorials; the two-factor factorial design; statistical analysis of fixed effects model, model adequacy checking, estimating the model parameters, choice of sample size, the assumption of no interaction in a two-factor model, one observation per cell; the general factorial design; fitting response curve and surfaces; blocking in a factorial design. Factorial design, factorials with mixed levels. Response Surface Methods: introduction to response surface methodology; the method of steepest ascent; the analysis of second-order response surface; experimental designs for fitting response surfaces; mixture experiments; robust designs.

Experiments with Random Factors: the random effects model; the two-factor factorial with random random factors; the two-factor mixed model; sample size determination with random effects; rules for expected mean squares; approximate f tests; approximate confidence intervals on variance components; the modified large-sample method; maximum likelihood estimation of variance components. Nested and Split-Plot Designs: the two-stage nested designs; statistical analysis, diagnostic checking, variance components; general m-staged nested design; designs with both nested and factorial factors; the split-plot design; split-plot designs with more than two factors; the split-split-plot design, the strip-split-plot design.

Analysis of Covariance: description of the procedure; factorial experiments with covariates.

Text Books:

1. Montgomery, DC (2001). Design and analysis of experiments,
2. Bailey, R (2008). Design of comparative experiments. Cambridge. 3rd edition.Wiley.

AST 302: Advanced Sampling Techniques

Credits : 3

Sampling of unequal clusters with unequal probability with and without replacement different selection methods: PPS selection, Brewer's, Durbin's, Samford's, PPS systematic, Raj's, Murthy's and Rao-Hartley-Cochran methods of selection; detailed study on the related formulae, estimates, variances, estimates of variances for these methods.

Two-stage sampling with equal and unequal sized clusters-estimates and standard errors; estimation for proportions; stratified two-stage sampling. Multistage sampling: different two and three stage sampling schemes; the concept of self-weighting estimates; assumptions for self-weighting estimates; sampling schemes resulting in self-weighting estimates. Multiphase sampling: reasons for adopting this technique.

Two-phase or double sampling; ratio and regression estimators for double sampling and respective standard errors; double sampling for stratification. Repeated sampling; sampling from the same population on two occasions, more than two occasions. Interpenetrating sub sampling, Concept of base line survey and panel survey.

Sampling and non-sampling errors: sources and types of non-sampling error; non-sampling bias; non-response error; control of non-response; techniques for adjustments of non response; Politz-Simon's technique; response bias and response variance. Role of design and model in sampling: design unbiasedness; model unbiasedness. Special sampling schemes: inverse sampling; capture-recapture method; network sampling; snowball sampling; adaptive cluster sampling; rank set sampling. Resampling methodologies: bootstrap, Jackknife and Gibbs sampling.

Text Books:

1. Cochran, WG (1977). Sampling techniques, 3rd edition. Wiley.
2. Lohr, SL (1998). Sampling: design and analysis. Duxbury.

AST 303: Applied Regression Analysis

Credits : 3

Fitting a straight line by least squares: straight line relationship between two variables, Linear regression, analysis of variance, confidence intervals and tests for intercept and regression coefficients, F-test for significance of regression. Checking the straight line fit: lack of fit and pure error, testing homogeneity of pure error, basic plots for examining residuals, non-normality checks on residuals, checks for time effects, non-constant variance, need for transformation and curvature, Durbin-Watson tests. Linear regression in matrix terms: fitting a straight line in matrix terms, singularity of $X'X$ matrix, analysis of variance in matrix terms, variances of

intercept and regression coefficients from the matrix calculation, variance of \hat{Y} using matrix development, the general regression situation, least square properties, confidence intervals versus regions. Extra sum of squares and tests for several parameters being zero: The extra sum of square principle, sum of squares of a set of linear functions. More on checking fitted models: the hat matrix H and various types of residuals, detection of inertial observations - Cook's statistics. Special topics on multiple linear regression: testing a general linear hypothesis, generalized least squares and weighted least squares, restricted least squares. Selecting the "Best" regression equation: all possible regression and "best subset" regression, stepwise regression, backward elimination, significance levels for selection procedures. Illconditioning in regression data: centering regression data, centering and scaling regression data, detecting and measuring multicollinearity. Ridge regression: basic form of ridge regression;

Text Books:

1. Draper, NR and Smith, H (1999). Applied regression analysis, 3rd edition. Wiley

AST 304: Epidemiology

Credits : 3

Concepts of epidemiology; strategy of epidemiologic disease, health and public health; natural history of disease; causal concepts; epidemiologic variables: person, place and time. Methods of Epidemiologic Research: Epidemiologic research; Etiologic research; Types of epidemiologic research; experiments, quasi-experiments, observational studies; Design options of observational studies; subject selection, methods of observations; Typology of observational study designs; basic designs, hybrid designs, incomplete designs; Measures of Disease Frequency: Basic incidence measures; risk and rate; Estimation of average rates;

Estimation of risk; Prevalence measures; Mortality measures. Measures of Association: Ratio measures. Difference measures; Measures of potential impact. Summary of epidemiologic measures. Validity of Epidemiologic Research: Validity and precision. Internal validity; Direction of bias; Classification of bias; Selection bias; direction, examples; Information bias; examples of misclassification in only the outcome variable, general formulation of misclassification bias, independent misclassification of both exposure and disease; Confounding; working

... of a confounder, risk factors, single risk factors; confounding; Confounding involving several factors; definition of joint confounding, variable confounding and control of confounding. Principles and measures of Epidemiologic Analysis: Statistical measures about effect measures; hypothesis testing procedures, confidence interval procedures; Control of confounding factors; definition of controls, reasons for controls, options for controls; Stratified analysis; Testing for overall association, point estimation of overall association, interval estimation of effect, regression to several exposure categories; Matching in epidemiologic research; definition and types of matching, advantages and disadvantages of category matching, R-to-1 matching; Interaction, effect modification, and Synergism; synergism, statistical interaction and effect modification; Theoretical considerations of modeling; linear logistic regression model, maximum likelihood estimation and inference, logistic regression model for follow-up and case-control studies, confounder summarization.

Text Books:

Greenbaum, DG, Kupper, LL and Morgenstern, H (1982). Epidemiologic research. Van Nostrand Reinhold.

AST 305: Population Studies

Credits : 3

Adjustment of demographic data: Sources and types of errors and deficiencies in data; General methods of evaluation and detection of error and deficiencies in data; Methods of checking completeness and other types of errors in demographic data and their adjustment. Graduation of data: Meaning and its need, techniques of graduation, graduation of age distribution. Life table: Its concept, structure and calculation, complete life table (life table by single year of age) and abridged life table, multiple decrement life tables, working life table, different life table functions and inter-relationships among them, use of life table, etc. Force of mortality: idea and definition calculation of life table with the help of force of mortality. Population growth, techniques to measure it, doubling time concept in demography. Population estimates and projections. Different techniques of population projection- component method, arithmetic/linear method, geometric method, exponential method, matrix method, etc., need of population projections. Stable and stationary population, their characteristics and uses. Lotka's characteristics equation, intrinsic birth and death rates, effect of uniform drop in force of mortality on the growth rate, effects of changes in fertility and

mortality on the age distribution of population. Model life tables, Coale and Demeney regional model life tables. Population in Bangladesh: History of growth of population in Bangladesh; Implications of the growth of population in Bangladesh; Population policy in Bangladesh; Level, trends and determinants in fertility, mortality and migration in Bangladesh; Interrelationship between population and development; Future prospects of population and population control in Bangladesh; Aged and aging of population in Bangladesh;

Text Books

1. Shryock, S and others (1975). The methods and materials of demography, volume I and II. U.S. Department of Commerce Publication.
2. Bogue, DJ (1969). Principles of demography. Wiley.

AST 306: Social Statistics and Social Development

Credits : 3

National income: concepts, measurement and problems; social accounting matrix. Income distribution and wealth: causes of concentration; meaning of inequality; measures of inequality; frequency of income; Lorenz curve of income; Gini coefficient; Atkinson's index, etc.

Poverty: conceptual issues of poverty; measurement of different poverty indices. Introduction to psychometrics: measurement in psychology and education; intelligent and achievement tests; test scores; equivalence of scores; Z-score and T-score; intelligent quotient.

Definition, nature and importance of anthropology; role and functions of family. Social inequality: inequality by sex, age, rank, caste, race, class, power, rule and social connections. Social Sector Development Policies: Development in agriculture, industry (a) growth performance, outlay and yield (b) agrarian structure and its changes (c) plan outlay; rural development; human development; women and youth development; land reforms in Bangladesh; infrastructure development; ADP allocation to social sectors; fiscal policies for development.

Text Books:

1. Atkinson, AB (1978). The economics of inequality. Clarendon Press.
2. Atkinson, AB (1980). Wealth, income and inequality.

AST 307: Research Planning, Monitoring and Evaluation

Credits : 3

Concept, aims and objectives of research; types of research; steps involved in research; selection and formulation of research problems; proposal writing; examining the designs of some known researches.

Questionnaire, check lists, FGD guidelines etc.; preparation of questionnaires. Preparation of manuals for interviewer. Enumerators training, monitoring and supervision for controlling the quality of data; how to avoid non-response. Report writing; content and organizations of the report; heading and subheadings; techniques of writing conclusion, summary, recommendations, footnotes references, appendix, etc. Examining some local and international reports.

The concept of monitoring and evaluation (M & E): objectives, usefulness and scope of M & E. Views of different schools on M & E. Performance monitoring versus performance evaluation.

Timing and type of M & E: summative, formative, continuous, participatory, diagnostic, log frame, etc.; baseline, ongoing and end line evaluation; impact evaluation; M & E of ongoing programs (activities, inputs, outputs, effect); follow-up for remedies, and post programs evaluation.

Monitoring and evaluation plan and data sources: indicators for monitoring and evaluation. What are indicators? Identification of indicators and characteristics of ideal indicators; factors influencing indicator selection. Implementing monitoring and evaluation exercise: data sources and tools: surveys, questionnaires, checklists, etc. Quality control; setting up and developing low cost M & E and documentation. Application: monitoring and evaluation in population, health, nutrition, and other socioeconomic programs relating to education, industry and parity.

Text Books:

1. Blankenberg, F (1993). Introduction into the planning, monitoring and evaluation system, April, Dhaka.
2. Bhola, S (1990). Evaluating literacy for development, projects, programs and campaigns. UIE and DSE, UIE Handbook and Reference Book 3, Hamburg.

AST 308: Data Analysis using SPSS, SAS, and Stata

Credits : 3

SPSS

Introduction to SPSS: Meaning, Application and Background of SPSS; Reading the Data set: Reading SPSS Data, Reading Data from Spreadsheet formats, Reading Data from Simple Database formats, Reading Data from other Statistical Programs, e.g, STATA, SAS, etc; Defining the Variable: Variable type, Variable name, Variable formats, Variable Labels, Value Labels; Transformation Expressions: Numeric Expressions, Arithmetic Operations, Numeric Functions, Arithmetic Functions, Statistical Functions, Random Variable and Distribution Functions, Missing Values in Numeric Expressions, Logical Expressions, Logical Functions, Relational Operators, NOT Logical Operator, AND and OR Logical Operators, Other Functions; Working with Date and Time: Date and Time formats, Arithmetic

Operations with date and time variables, Date and Time functions; Working with Commands: Introduction, Syntax Diagrams, Command Specification, Running Commands, Subcommands, Keywords, Delimiters, Command Order; Different commands in SPSS: Get, Save, Save Outlet, Split Files, Sort Cases, Add Files, Match Files, Import, Compute, Recode, If, Select If, Do If, End If, List, Aggregate, Sample selection, Report; Graphical Presentation: Simple Bar Graphs, Line Graphs, Graphs for cumulating frequency and Pie Graphs; Statistical Analysis: Univariate Analysis - Frequencies, Descriptive Statistics, Multiple Response, Bivariate Analysis - Crosstabs, Correlation; Means; Statistical Tests (Parametric and Non-parametric); ANOVA; Regression; Logistic Regression. SAS

Introduction to SAS: Overview of the SAS data step, Syntax of SAS procedures, Comment statements, Reading the Data set, External _les (Reading and writing raw and system _les): Data in the program itself, Reading ASCII data from an external file, _le options, Writing ASCII or raw data to an external _le, creating and reading a permanent data sets, defining the variable: variable type, variable name, variable formats, variable labels, value labels, Writing with large data sets, Data set sub setting, concatenating, Merging and Updating; Working with arrays, Restructuring SAS data sets using arrays, Describing data: Describing data, More descriptive statistics, Frequency distributions, Bar graph and plotting data, Creating summary data sets with proc means and proc univariate, Outputting statistics other than means; Analyzing categorical data: Questionnaire

diagnosis and analysis, Adding variable and value labels, Recording data, Two-way and multiple tables; Working with date and longitudinal data: Processing date variables, Longitudinal data; SAS procedures: Correlation and Regression, t-tests and non-parametric comparisons, Analysis of variance, Repeated measures designs, Multiple regression models, Logistic Regression.

Introduction to STATA: An example of STATA session, Documentation and help files, searching for information; Data management: example commands, creating a new data set, specifying subsets of data with in and if qualifiers, generating and replacing variables, using functions, converting numeric and string formats, creating new categorical and ordinal variables, importing data from other programs, renaming STATA _les, transporting, reshaping or accessing data, weighting observations, creating random data and random samples, managing memory; Graphs: example commands, histograms, scatter plots, line plots, connected-line plots, other two-way plots, box plots, pie and bar charts, removing and combining graphs;

Summary statistics and tables: example commands, summary statistics for measurement variables, exploratory data analysis, normality tests and transformations, frequency tables and two-way cross tabulations, multiple tables and multi-way cross tabulations, tables of means, medians and other summary statistics; ANOVA and other comparison methods: example commands, one-sample tests, two-sample tests, one-way and two-way analysis of variance, analysis of covariance (ANCOVA); Linear regression analysis: example commands, regression table, multiple regression, predicted values and residuals, basic graphs for regression, correlations, hypothesis tests, dummy variables, categorical variables and interactions, stepwise regression, polynomial regression; Regression diagnostics: example commands, diagnostic plots, diagnostic case statistics; Introduction to programming: basic concepts and tools, matrix algebra, bootstrapping and Monte Carlo simulation.

Text Books:

1. Cody, RP and Smith, JK (2005). Applied Statistics and the SAS programming language, 5th edition. Prentice Hall.
2. Norusis, MJ (1988). SPSS/PC for the IBM PC/XT/AT.
3. Hamilton, L. C. (2006), Statistics with STATA, Thomson Brooks/Cole.
4. Rabe-Hesketh, S and Everitt, BS (2007). A handbook of statistical analyses using stata, 4th edition. Chapman Hall/CRC.

AST 401: Advanced Probability and Stochastic Process

Credits : 3

Modern probability: probability as a set function; Borelfield and extension of probability measure; probability measure notion of random variables; probability space; distribution function; expectations and moments. Convergence of random variables; strong and weak laws of large numbers; limiting distribution; generating function; central limit theorem; Laplace transformation. Markov Chains: introduction, transition probability matrices of a Markov chain, First step analysis; Some special Markov chains; Regular transition probability matrices; The classification of states; Basic limit theorem of Markov chain; Reducible Markov chains; Poisson process: the Poisson distribution, counting and Poisson process; the law of rare events; distribution associated with Poisson process; spatial Poisson process; compound and marked Poisson processes. Continuous time Markov chains: pure birth processes; pure death processes; birth and death processes; limiting behavior of birth and death processes; birth and death process with absorbing states; finite state continuous time Markov chains. Renewal theory and its applications : introduction, distribution of $N(t)$, limit theorems and their applications, renewal reward process regenerative process, semi-Markov process.

Text Books:

1. Ross, S (2003). Introduction to probability models, 8th edition. Elsevier.
2. Grimmett, G and Stirzaker, D (2001). Probability and random processes, 3rd edition. Oxford University Press, USA.

AST 402: Statistical Inference II

Credits : 4

Nonparametric Methods

Inferences concerning cumulative distribution function: empirical cumulative distribution function, Kolmogorov-Smirnov goodness-of-fit test, confidence bands for cumulative distribution function; Inferences concerning quantiles: point and interval estimate of quantile, tests of hypothesis concerning quantiles; Tolerance limits; Equality of two distributions: two-sample sign test, run test, median test, rank-sum test; Bayesian Inference Bayes' theorem; prior ignorance; likelihood; odds ratio; Bayes' factor;

Bayesian inference for discrete random variable; Bayes' theorem for binomial distribution with discrete prior; Bayesian inference for continuous random variable; Bayesian inference for normal mean; Bayesian inference for difference between means; Comparing Bayesian and frequentist inference for proportion, for mean.

Decision Theory

Fundamental concept of decision theory; action space; Bayes decision rule and related examples. Role of sufficient statistics; James-Stein estimator; Minimax rule. Robust statistics The meaning of robustness, deviations from parametric models and estimation theory; Influence function (IF), gross-error sensitivity, local-shift sensitivity, rejection point, asymptotic variance, breakdown point. Identification of outliers; Definitions of M-, L-, and R-estimators.

Text Books

1. Bolstad, WM (2004). Introduction to Bayesian statistics. Wiley .
2. Casella, G and Berger, RL (2002). Statistical inference, 2nd edition. Duxbury.
3. Lee, PM (1997). Bayesian statistics: An introduction, 2nd edition. Hodder Arnold.

AST 403: Applied Multivariate Data Analysis

Credits : 3

Preliminaries of multivariate analysis: applications of multivariate techniques; The organization of data; data display and pictorial representations; distance. Random vectors and random sampling: some basic of matrix and vector algebra; positive Definite matrices; a square-root matrix; random vectors and matrices; mean vectors and covariance matrices; matrix inequalities and maximization; the geometry of the sample; random sample and expected values of sample means and covariance matrix; generalized variance; sample mean, covariance, and correlation as matrix operations; sample values of linear combinations of variables. The multivariate normal distribution: the multivariate normal density and its properties; sampling from a multivariate normal distribution and maximum likelihood estimation; sampling distribution and large sample behavior of sample mean vector and sample variance covariance matrix; assessing the assumption of normality; detecting outliers and data cleaning; transformation to near normality. Inferences about a mean vector: the plausibility of mean vector as a value for a normal

population mean; Hotelling T and likelihood ratio tests; confidence regions and simultaneous comparisons of component means; large sample inference about a population mean vector; inferences about mean vectors when some observations are missing; time dependence in multivariate data. Comparisons of several multivariate means: paired comparisons and a repeated measures design; comparing mean vectors from two populations; comparison of several multivariate population means (one-way MANOVA); simultaneous confidence intervals for treatment effects; two-way multivariate analysis of variance; profiles analysis; repeated measures designs and growth curves; Multivariate linear regression models: the classical linear regression model; least squares estimation; inferences about regression model; inferences from the estimated regression function; model checking; multivariate multiple regression; comparing two formulations of the regression model; multiple regression model with time dependent errors.

Text Books:

1. Johnson, RA and Wichern, DW (1999). Applied multivariate statistical analysis, 4th edition. Prentice-Hall.
2. Srivastava, MS (2002). Methods of multivariate statistics. Wiley.

AST 404: Econometric Methods

Credits : 3

Multicollinearity: nature of multicollinearity; estimation in the presence of multicollinearity; practical consequences of multicollinearity; detection of multicollinearity; remedial measures. Heteroscedasticity: nature of heteroscedasticity; method of generalized least squares; consequences of using ordinary least squares in the presence of heteroscedasticity; detection of heteroscedasticity; remedial measures; Autocorrelation: nature of the problem; OLS estimation in the presence of autocorrelation; the BLUE estimator in the presence of autocorrelation; consequences of using OLS in the presence of autocorrelation; detection of autocorrelation; remedial measures; autoregressive conditional heteroscedasticity (ARCH) model. Econometric modeling: average economic regression (AER); types and consequences of specification errors; tests of specification errors; errors of measurement; model selection - Leamer's approach; Hendry's approach; diagnostic tests, tests of non-nested hypothesis. Regression Models for Dummy Variables: Models for one quantitative and one

qualitative variables, one quantitative and two qualitative variables; Comparing two regressions (dummy variable approach); Interaction effects; Use of dummy variables in seasonal analysis; piecewise linear regression; regression on dummy dependent variables; linear probability model; the logit model; the probit model; the tobit model. Dynamic econometric model: the role of "time" or "lag" in econometrics; the Koyck approach to distributed-lag models; Estimation of autoregressive models; The method of instrumental variables; Detecting autocorrelation in autoregressive models - Durbin h test; The Almon approach to distributed lag models; Simultaneous equation model: the nature of simultaneous equation model; simultaneous equation bias; identification problem; rules for identification; a test for simultaneity; a test for exogeneity; simultaneous-equation methods; recessive models and ordinary least squares; method of indirect least squares (ILS); method of two-stage least squares (2SLS).

Text Books:

1. Draper, NR and Smith, H (1999). Applied regression analysis, 2nd edition, Wiley
2. Gujarati, DN (2004). Basic econometrics, 27th edition. McGraw-Hill.

AST 405: Lifetime Data Analysis

Credits : 3

Basic concepts and models: lifetime distributions - continuous models, discrete models, a general formulation; Some important models - exponential, Weibull, log-normal, loglogistic, gamma distributions, log-location-scale models, inverse Gaussian distributions re models, mixture; Regression models. Observation schemes, censoring, and likelihood: right censoring and maximum likelihood; other forms of incomplete data; truncation and selection effects; information and design issues. Nonparametric and graphical procedures: nonparametric estimation of survivor function and quantiles; descriptive and diagnostic plots; estimation of hazard or density functions; methods of truncated and interval censored data; life tables. Inference procedures for parametric models: inference procedures for exponential distributions; gamma distributions; inverse Gaussian distributions; grouped, interval censored, or truncated data; mixture models; threshold parameters; prediction intervals. Inference procedure for log-location-scale distributions: inference for location-scale distributions; Weibull and extreme-value distributions; log-normal and log-

logistic distributions; comparison of distributions; models with additional shape parameters; planning experiment for life tests. Parametric regression models: introduction to log-location-scale regression models, proportional hazards regression models; graphical methods and model assessment; inference for log-location-scale models; extensions of log-location-scale models; hazard based models. Text Books

1. Lawless, J (2003). Statistical models and methods for lifetime data, 2 Wiley.
2. Kalbeisch, J and Prentice, R (2003). The statistical analysis of failure time data, 2nd edition. Wiley.

AST 406: Industrial Statistics and Operations Research

Credits : 3

Industrial Statistics

Fundamental concepts of industrial statistics and its purposes; industrial quality control: total quality control; statistical quality control; chance and assignable causes of variation; statistical process control. control chart: concept of control chart; statistical basis of the control chart; basic principles; choice of control limits; sample size and sampling frequency; rational subgroups; analysis of patterns on control charts; sensitizing rules for control charts; necessary steps for constructing control charts; types of control charts (control charts with standard given and control charts with no standard given); control charts for attributes: concepts of nonconformity; nonconforming unit; defect; defective unit; p-chart; d-chart; c-chart; u-chart; basic concepts of control charts for variables; statistical basis and interpretation of, R and S charts.

Acceptance sampling: basic concepts of acceptance sampling; OC curve and its uses; types of OC curves; properties of OC curves. Single sampling plan: basic concepts of single sampling plan for attributes; construction of type A and type B OC curves under single sampling plan for attributes; specific points on the OC curve (AQL, LTPD); rectifying inspection; AOQ; AOQL; ATI; ASN; designing a single sampling plan; double sampling plan: basic concepts of double sampling plan; OC curve; ASN: AOQ; ATI; designing a double sampling plan; introduction to multiple sampling plan and sequential sampling analysis; acceptance sampling plan by variables: basic concepts of acceptance sampling plan; types of sampling plans; designing a variable sampling plan with a specified OC curve.

Operations Research

Nature and impact of OR approach; phases of OR. Concept of linear programming problem (LPP); construction of LPP; solution of LPP: graphical and the simplex method; revised simplex method; Big-M method, two phase method; concept of convergence, degeneracy and cycling. Duality: dual primal relationship and formulation of dual problems. Sensitivity analysis: introduction to sensitivity analysis. Game theory: finite and infinite games; zero sum games; two person zero sum games; pay off matrix; maximum and minimum criterion of optimal solution of a game; dominance property; algebraic method for the solution of a game; equivalence of rectangular game matrix and linear programming. Application in real life situation using TORA software.

Text Books:

1. Montgomery, DC (2004). Introduction to statistical quality control. Wiley.
2. Taha, HA (2006). Operations research an introduction, 8th edition. Prentice-Hall.
3. Hillier, FS and Lieberman, GJ (2001). Introduction to operations research, 7th edition. McGraw-Hill.

AST 407: Actuarial Statistics

Credits : 3

The meaning of Actuarial Science; role of insurance in the economy; role of an actuary. Fundamentals of theory of interest: Definition of simple interest and compound interest and their comparisons; accumulated value factors and present value factors; effective and nominal rates of interest and their interrelationship; effective and nominal rates of discount; relation between interest and discount. Equations of value and use of the time diagram in solutions of problems in interest. Problems involving unknown length of investment and unknown rate of interest. Annuity; different types of annuities certain; present and accumulated values of immediate annuity and annuity due; present value of deferred annuities and variable annuities; analysis of annuities payable at a different frequency than interest is convertible. Perpetuity. Capital redemption policies. Amortization schedules and sinking funds, including the determination of outstanding principal, the split of payments into principal and interest, and the determination of required periodic payments. Actuarial mathematics: discrete life annuity and its applications; present values of different life annuities. Life assurance; present values of various life assurances in terms of commutation functions;

related problems. Net premiums; net premiums for various life assurances; premiums payable m times a year; determination of premiums for pension benefits; related problems. O_{ce} premiums; relation between o_{ce} and net premiums; the equation of payments. Basic concepts of valuation and distribution of surplus. Construction of actuarial tables: introduction to the mortality table. Principles of construction of mortality table. Fundamental assumptions underlying exposure formulas and the implications of these assumptions. Techniques of calculating exposures from individual records including considerations involving selection of studies.

Text Books

1. Kellison, SG (1991). The theory of interest, 2nd edition. McGraw-Hill/Irwin.
2. Bathen, RW (1978). Mortality table construction. Prentice Hall.

AST 408: Modeling Time Series Data

Credits : 3

Introduction: examples of time series, objectives of time series analysis; Simple descriptive Techniques: types of variation, stationary time series, the time plot, transformations, analyzing series which contain a trend, analyzing series which contain seasonal variation, autocorrelation, other tests of randomness. Time series models: estimating autoregressive and autocorrelation functions, fitting an autoregressive process, fitting a moving average process, estimating parameters of an ARMA model, estimating parameter of an ARIMA model, Box-Jenkins seasonal ARIMA models, residual analysis, general remarks on model building; Forecasting: introduction, univariate procedures, multivariate procedures, comparative review of forecasting procedures, prediction theory.

Text Books

1. Makridakis, S, Wheelwright, C and Hyndman, R (1997). Forecasting: methods and applications, 3rd edition. Wiley.
2. Chatfield, C (2003). The analysis of time series, 6th edition. Chapman & Hall.

AST 409: Generalized Linear Models

Credits : 3

Generalized linear models: exponential family of distributions; Estimation: method of maximum likelihood, method of least squares, estimation of

generalized linear models; Inference: sampling distribution for scores, sampling distribution for maximum likelihood estimators, confidence intervals for model parameters, adequacy of a model, sampling distribution for log-likelihood statistic, log-likelihood ratio statistic (deviance), assessing goodness of fit, hypothesis testing; Multiple regression: maximum likelihood estimation, log-likelihood ratio statistic; Models for binary responses: probability distributions, generalized linear models, logistic response models, general logistic regression, maximum likelihood estimation and log-likelihood ratio statistic, other criteria for goodness of fit, least square methods; Multinomial distributions; Nominal logistic regression models; Ordinal logistic regression models; Models for count Data: probability distributions, log-linear models, maximum likelihood estimation, hypothesis testing and goodness of fit.

Text Books:

1. Dobson, A (2001). An introduction to generalized linear models, 2 man & Hall.

AST 432: Statistical Computing XI

Credits : 3

Computing problems related to the courses AST 406 (Industrial Statistics and Operations Research), AST 407 (Actuarial Statistics), and AST 409 (Generalized Linear Models).

AST 450: Project and Seminar

Credits : 3

Each student will be required to prepare a project report and present the report in a seminar. For the project work, each student will be assigned to a teacher at the beginning of the academic year. Submission and evaluation should be made before the commencement of final examination. Fifty percent weight of the course will be allotted to project work and the remaining fifty percent will be for seminar presentation. The internal members of the examination committee will evaluate the performance in the seminars and the report will be evaluated by one internal examiner and one external examiner nominated by the examination committee.

BUS 101: Introduction to Business

This is a compulsory general education course for students of all degree programs of EWU. It aims to

provide a comprehensive introduction to the basic concepts and issues related to business operations and developments.

It acts as a general basis and foundation level course on which more focused and concentrated studies can be applied. Topics include: Business and its importance, forms of business ownership, business environment and globalization, ethics, international business, fundamentals of management, human resources management, motivation, marketing, financial management and investment, and fundamentals of accounting.

Credits: 3; Prerequisite: None

BUS 231: Business Communication

Study of communication as a tool of administration and management, practice in writing a wide variety of types and forms of communication, and inclusion of oral and visual components to provide and integrate approach. This course aims at teaching the basic principles and applications of business communication. It equips students with major communication tools. Enhancement of students' written and oral skills is one of the most important aspects of this course. It helps students to improve their ability to communicate more effectively and efficiently. The knowledge of writing and presenting business documents prepares students for the challenges of the new millennium. It certainly will provide students with a competitive edge in this fast growing business world.

Credits: 3; Prerequisite: ENG 102

BUS 321: Business for Engineering & Technology

Credits: 3; Prerequisite: None

This course should be taught with emphasis on engineering technological dimensions and practical examples drawn from engineering organizations and practices. Topics to be covered: Business Environment (Types of Business, Entrepreneurship skills, the external environment of business, SWOT and PEST Analysis, Steps in setting up a new business). General Management (Managerial Roles and Organization Structure, Typical Structure of a manufacturing organization, Managerial tools for Decision making, Leadership, Motivation models, Strategic planning). Operational Management (

Product and Services, product design and process selection, Faculty location and layout, Operational planning and scheduling, quality management, inventory and material management, productivity measurement and improvement). Financial Management (Basic accounting and financial concepts, Introduction to Financial Statement, Financial Statement Analysis).

BUS 361: Legal Environment of Business

This subject is designed and taught to give the students and an appreciation of legal environment in relation to business activities. The student will undertake studies in some of the core law paper essential for business. The course examines the principles of law of contract and different legal regimes regulating special types of contracts such as law of agencies, law of sale of goods, law of company and partnership etc. Then the course examines some legal regimes having application for international business transaction in particular laws concerning international sale of goods: CIF and FOB contract, laws concerning international carries of goods by sea and laws concerning financing of trade are reviewed under this course. In addition, labors laws and alternative ways of dispute solution are also considered in this course. Other than making the students familiar with basic laws concerning business affairs, efforts are being made to allow them to appreciate the application of those laws in real business practice. Students are being asked to solve some commercial disputes (specially designed to suit the course) and, secondly, students are introduced with the basic court structure of the country and the dispute settlement procedure.

Credits: 3; Prerequisites: BUS-231, MGT-101

BUS 498: Project Work

The coordinating instructor must assign a specific topic to an individual student. The student must submit a proposal at least a semester before he/she actually starts working on this project report. Students completing 105 credits may be allowed to enroll in this course with the permission of the chairperson and course instructor.

Credits: 3;

BUS 499: Internship

This working experience enables students to apply the principles and practices of business in the local

setting. This will provide students with the opportunity to get real life exposure in the contemporary business environment of Bangladesh. Students completing 105 credits with a minimum CGPA of 2.5 may be allowed to enroll into this course with the permission of the chairperson and course instructor.

Credits: 3;

CHE 101: Introduction to Chemistry

Atomic Properties and Binding Forces: Atomic 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 108: Chemistry for Biologists - I

Credits: 3+1= 4; Prerequisites: None

Inorganic chemistry: 1. Atomic structure: Bohr and Rutherford atom models; Electronic configuration; Atomic radii; ionic radii; Ionization potential; Electron affinity; Electronegativity; Oxidation states. 2. Ionic bonds (general characteristics), types of ions; Covalent bond (general characteristics); Coordinate covalent bond; Valence bond approach; Sigma and Pi bonds; Bond length; Bond order; Hydrogen bonds; Van der Wall's force; Metallic bond; Concept of coordination compounds; Werner's theory; Bonding in coordination compounds.

of various inorganic elements in some vital complexes of biological importance e.g. hemoglobin, cytochromes, vitamin, chlorophylls.

Organic chemistry: 1. Chemical bonding considered: Atomic and molecular orbitals; Polarity of bonds; Bond length and bond strength; Bond energy; bond moment and dipole moment; Nucleophiles and electrophiles and their importance in biological systems; Characteristics and type of organic reactions: Addition, elimination, substitution and rearrangement reactions. 2. Aliphatic hydrocarbons (Petroleum and related products); Aliphatic alcohols; Aldehydes and ketones; Acids and their derivative. 3. Basic principles of stereochemistry: Cis-trans isomers; Plane polarized light; Optical activity; Chirality and chiral molecules; R/S designation; Absolute configuration.

Physical chemistry: 1. The basics: mole concept; Avogadro's number; Normality, Molarity, Molality, Periodic table. 2. Acid and bases: The Bronsted-Lowry acids and bases; The Arrhenius concept; Lewis acids and bases; Physical properties of water; Ionic product of water and pH scale; Ionization of acids and bases; Acid-base indicators; common ion effect; Buffer solution; Buffer capacity; Henderson-Hasselbach equation. 3. Conductance: Faraday's law of electrolysis; conductivity and its measurement; Equivalent and molar conductance; Variant of equivalent conductivity with concentrations of weak and strong electrolytes. 4. Colligative properties: Dilute solutions; Lowering of vapor pressure; Elevation of boiling point and depression of freezing point; Boyle's and Charles' law; Raoult's law.

Laboratory experiments in Chemistry for Biologists I (1 credit): Preparation of various types of solutions, preparation of molar solutions using solid and liquid components, separation of ingredients of a mixture, identification of metal and nonmetals using simple tests, estimation of chemical compounds using titration methods and using redox reactions, identification of common organic compounds by functional groups, testing gas laws and colligative properties.
Suggested reading:

1. Organic Chemistry (10th edition, 2009) - T. W. Graham Solomons and Craig Fryhle; Publisher: Wiley.
2. Inorganic Chemistry (4th edition, 2010) - Gary L. Miessler and Donald A. Tarr; Publisher: Prentice Hall.

3. Physical Chemistry (9th Edition, 2009) - Peter Atkins and Julio de Paula; Publisher: W. H. Freeman.

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.

CHE 208: Chemistry for Biologists - II

Credits: 3+1=4, Prerequisites: CHE 108

Organic chemistry: 1. Aromatic hydrocarbons: Halogen and other derivatives (nucleophilic substitution); Nitrobenzene (electrophilic

substitution). 2. Aromatic alcohols: Aldehydes and Ketones, Phenols and Quinones. 3. Amines: Diazonium salts and their reactions; Phenyl hydrazines; Sulfonic acids. 4. Drugs: Some esters and amides: Aspirin and other salicylates; Oil of wintergreen, Alkaloids: Opiates such as morphine, heroine and LSD; Vincristine, Antibiotics: Penicillin, cephalosporin, tetracycline and chloramphenicol; Steroids: Anti-inflammatory agents; Oral contraceptives. 5. Polymers: Classes of synthetic polymer (addition polymers, condensation polymer); Fibers and Fabrics; Plastics; Natural and synthetic rubbers; Copolymers; Polymer structure and properties.

Physical chemistry - Further aspects: 1. Thermodynamics: Application to chemical reactions, Reaction spontaneity, First and Second law of thermodynamics, Entropy, Enthalpy, Calorimetry, Concept of free energy and spontaneous reactions; Chemical equilibrium; Applications of thermodynamics to biochemistry. 2. Chemical kinetics: Order of a reaction: Zero, first and second order reactions, molecularity of a reaction, pseudo first order reaction, half life; Rate laws; Steady state approximation and reaction mechanism; Temperature dependence of reaction rate; kinetics of enzyme catalyzed reactions; Catalysis. 3. Electrochemistry: Electrochemical cells; Electromotive force of a cell; Free energy, entropy and enthalpy change of cell reactions; Nernst equation; Standard electrode potential; Redox potential and biology. 4. Quantum theory and photochemistry: Light energy and its interaction with matter; Excitation and emission; The Frank-Condon principle; chromophores; d-d transitions. (II, II) and (II, n) transition; fluorescence and phosphorescence.

Laboratory experiments in Chemistry for Biologists II (1 credit): Identification and quantification of some common organic compounds, extraction of organic compounds from natural products, synthesis of organic compounds under control conditions, chemical synthesis of polymers, measuring energy using a calorimeter, determination of reaction rate, and construction and testing of Galvanic cells.

Suggested reading:

1. Organic Chemistry (10th edition, 2009) - T. W. Graham Solomons and Craig Fryhle; Publisher: Wiley.
2. Inorganic Chemistry (4th edition, 2010) - Gary L. Miessler and Donald A. Tarr; Publisher: Prentice Hall.
3. Physical Chemistry (9th Edition, 2009) - Peter Atkins and Julio de Paula; Publisher: W. H. Freeman.

CSE 101: Introduction to Computers I

Introduction to skills and concepts for effective use of Information and Communications Technology. Skills include standard applications such as email, word processing, spreadsheet analysis, PowerPoint presentation, database management, HTML, e-commerce, networking, internet, and web browsing. Concepts include digital representation of information, computer basics, introduction to operating systems, and introductory programming. The course is mostly a lab based course.

Credits: 3; Pre-requisite: None. [This course is for BA, ECO, and ENG students]

CSE 102: Introduction to Computers II

Fundamental of Information Systems, Operating Systems, Programming Languages, Database Systems, Computer Networks, Computer Graphics, HTML, Java script, ASP, Web Design, E-Commerce, Multimedia and other recent developments in computing fields. The course is mostly a lab based course.

Credits: 3; Pre-requisite: CSE 101. [This course is for BA, ECO, and ENG students]

CSE 105: Structured Programming

Introduction to Computer. Algorithm development and flow-chart construction for problem solving using computer. Information representation within computer: binary number system, binary arithmetic, binary codes. Structured programming concept: data types, variables, constants, operators, expressions, assignments, type conversion in assignments, formatted input/output, decision making and branching, decision making and looping, arrays, character string, functions, program structure, recursion, pointers, pointer to functions, advanced data types, user defined data types, advanced operators, records, file management, dynamic variables, linked lists. Programming for scientific and engineering problem solving. Reference language: C. The course includes lab works based on them taught.

Credits: 3+1=4; Prerequisite: None

CSE 107: Object Oriented Programming

Philosophy of Object Oriented Programming (OOP) Advantages of OOP over structured programming

static and non-static members; Constructors, destructors and copy constructors; Array of objects, pointers, and object references; Inheritance: single and multiple inheritance; Polymorphism: overloading, abstract classes, virtual functions and overriding; Exceptions; Object Oriented I/O; Operator functions and classes; Multi-threaded programming. Reference languages: C++ and Java.

The course includes lab works based on theory taught.

Credits: 3+1=4; Prerequisite: CSE105

CSE 108: Computer and Software Fundamentals

Credits: 3+1= 4; Prerequisites: None

Computer Fundamentals: 1. Introduction: Brief history and types of computers, application areas. Working principle of a computer system, Single and multi-user systems. 2. Hardware: Organization and architecture, Motherboards and Microprocessors. Memory units; Primary memory, Secondary memory, I/O Devices, Peripheral devices, AT/XT, ISA, EISA. Bus Architecture. 3. Software: Classification, system software, Operating system concepts, importance, components and basic functions of DOS, Windows and UNIX operating system. Application software, database, spreadsheet and word-processing software. 4. Applications: Multimedia systems, Computer networks; Basic concepts on LAN and WAN and Internet systems, Internet services, On-line and Off-line E-mail and WWW. 5. Selection of computer: Hardware, software and cost consideration. 6. Maintenance: Power supply stability, grounding. Effect of surge, sag current and its protection. Effect of static charge on computer devices, handling of computers cards and chips, computer viruses and protections, Software troubleshooting and maintenance. Programming languages.

Programming and Computer Application Laboratory: Simple exercise on DOS, Windows and UNIX operating systems, Development of programs in C and C++ programming languages. The student will also acquire practical experience on word processing, spreadsheet analysis, database and statistical packages and their applications.

Suggested reading:

1. Practical Computing for Biologists (1st edition, 2010) - Steven Haddock, Casey Dunn, Publisher: Sinauer Associates, Inc.

2. Basic Computer Course (1st edition, 2011) - Jain, Jain and Geeth; Publisher: Motilal UK Books of India.

3. The Essentials of Computer Organization And Architecture (2nd edition, 2006) - Linda Null and Julia Lobur, Publisher: Jones & Bartlett Pub.

4. Computer Science Illuminated (1st edition, 2002) - Nell Dale; Publisher: Jones and Bartlett Publishers, Inc.

5. Explorations In Computer Science (2nd edition, 2005) - Mark Meyer; Publisher: Jones & Bartlett Learning;

6. Programming for the Absolute Beginner (1st edition, 2007)- Jerry Lee Ford Jr. ; Publisher: Course Technology PTR.

CSE 109: Electrical Circuits

DC circuits: Concepts of resistance, voltage, current, and power. Ohm's law, Kirchhoff's current and voltage laws. Series and parallel resistive circuits, voltage and current division rules, Wye-Delta transformation. Circuit solution using mesh and nodal analysis. Superposition theorem and Thévenin's and Norton's theorems with their applications in circuits having independent and dependent sources; maximum power transfer theorem.

Single Phase AC circuits: Sinusoids and their characteristics. Average and RMS values of time varying signals. Phasor algebra. Phasor representations of sinusoids and circuit elements, impedance and admittance. Analysis of AC circuits in phasor domain using Kirchhoff's current and voltage laws, mesh and node techniques, and Thevenin's and Norton's theorems. Instantaneous and average AC power, maximum power transfer.

The course includes lab works based on theory taught.

Credits: 3+1=4; Pre-requisite: None.

CSE 1.1.1: Programming with FORTRAN and C **Credit: 3**

Introduction to Programming: algorithm, flowchart, code (Program); Levels of programming: machine level, assembly level and high level language; Execution of code: translator, compiler, interpreter, assembler; Steps of Execution: compilation, link, run.

Fortran: early development; standardization; strengths and weakness; precautions, creating source code, compiling, linking ; Basic Fortran concepts: statements, expression and assignments, integer and real data, types, DO loops, formatted output, functions, IF blocks, arrays; Program structure and

layout: Fortran character set, statement and lines, statement types and order; Constants, variables, and arrays; Character handling logic: character facilities, substrings, expressions, assignment statements, relational and logical expressions; Control statements: control structures, IF-Blocks, DO-Loops, logical IF statements; Procedures: intrinsic functions, statement functions, external procedures, variables as dummy arguments, arrays as arguments, subroutine, CALL, RETURN, FUNCTION statements; Input/output facilities: files, I/O units, records, external files, internal files, format specifications, format data descriptors; DATA statements; an overview of C: the origins of the C language, compilers versus interpreters; Variables, constants, operators, and expressions: data types, declaration of variables, assignment statements, constants, operators, expressions; Program control statements: C statements, conditional statements- if, switch, loop statements- while, do/while, for, break, exit, continue, labels; Functions: the return statement, function arguments, arguments to main, returning pointers, pointers to functions; Arrays: single-dimension arrays, passing single dimension arrays to functions, two- and multi-dimensional arrays, arrays and pointers, allocated arrays, array initialization; Applications of Fortran and C programming in Data Analysis: frequency distributions, data summary, e.g., mean, median, maximum, minimum, matrix operations, calculation of different rates, fitting simple linear regression, sorting a vector, optimizing non-linear functions using Newton-Raphson iterative procedure, fitting different distributions which requires iterative procedures, numerical integration and differentiation.

Text Books:

1. Page, CG (1999). Professional programmer's guide to Fortran77. University of Leicester.
2. Dietel, PJ and Deitel, HM (2010). C how to program, 7th edition. Pearson.

CSE 205: Discrete Mathematics

Mathematical logic: propositional calculus, predicate calculus. Set theory: sets, relations, partial ordered sets, functions. Counting: Permutations, Combinations, principles of inclusion and exclusion. Discrete Probability. Algorithm and Growth of functions. Mathematical reasoning: induction, contradiction, recursion. Recurrence Relations. Graph theory: graphs, paths, trees. Algebraic structures:

binary operations, semi groups, groups, permutation groups, rings and fields, lattices.

Credits: 3+0=3; Prerequisite: CSE107

CSE 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, 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 work based on theory taught.

Credits: 3+1=4; Prerequisite: CSE 205.

CSE 225: Numerical Methods

Introduction to Numerical Methods: root finding using bisection, Regular-Falsi, Newton-Raphson's, Secant, and Jacobi methods. Error analysis. Solutions of simultaneous linear equations using Gauss-Jordan elimination method. Interpolation: Lagrange's polynomials, Newton's polynomials, and Splines. Least squares curve fitting. Numerical Integrations: trapezoidal rule, Simpson's rule, Rhombus integration, and quadratures. Finite Differences: forward, backward, and center differences and Richardson's extrapolation. Solutions of ordinary and partial differential equations using finite difference technique. Solution of eigenvalue equation. The course includes lab works based on theory taught.

Credits: 3+1=4; Prerequisite: CSE 105, MAT 102.

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; Prerequisite: CSE 207.

CSE 248: 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; Prerequisite: CSE 109, MAT 205

CSE 251: Electronic Circuits

The junction diode: operating principle and current-voltage characteristics. Diode circuits: Half and full wave rectifiers, rectifier with capacitor filter. 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. 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. 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.

The course includes lab works based on theory taught.

Credits: 3+1=4; Pre-requisite: CSE 109.

CSE 301: Database Systems

Fundamental concepts. System organization and implementation of database systems. Entity-relationship model and Relational model. Relational algebra. Query languages, query optimization. File organizations and retrieval. Database design.

Concurrency control. Security issues involving distributed database systems.

The course includes lab works based on theory taught.

Credits: 3+1=4; Prerequisite: CSE 205.

CSE 325: Operating Systems

Principles of operating systems; Process management, memory management, auxiliary C 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.

The course includes lab works based on theory taught.

Credits : 3+1 = 4

CSE 345: Digital Logic Design

Review of Binary number system 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. Circuit structure and operation of a CMOS inverter, basic CMOS logic gate circuits, noise margin and propagation delay.

The course includes lab works based on theory taught.

Credits: 3+1=4; Prerequisite: CSE205, CSE251.

CSE 350: Data Communications

Signal and random processes. Review of Fourier Transform. Hilbert Transform. Continuous wave modulation: AM, PM, FM. Sampling theorem. Pulse modulation: PAM, PDM, PPM, PCM, companding, delta modulation, differential PCM. Multiple access techniques: TDM, FDM. Digital modulation: ASK, PSK, BPSK, QPSK, FSK, MSK, constellation, bit error rate (BER). Noise. Echo cancellation. Intersymbol Interference. Concept of channel coding and capacity.

Credits: 3+0=3; Prerequisite: CSE251, CSE248.

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.

Credits: 3+0=3; Prerequisite: CSE 325, CSE 345.

CSE 365: 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, breath-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. The course includes lab works based on theory taught.

Credits: 3+1=4; Prerequisite: CSE245.

CSE 375: 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+0=3; Prerequisite: CSE 245.

CSE 405: Computer Networks

Computer network architectures, protocol layers. Transmission media, encoding systems, error detection, multiplexing, switching. Data link, multiple access channel protocols. Routing, Congestion Control, QoS guarantees. 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; Prerequisite: 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+1 = 4; Prerequisite: CSE 325.

CSE 411: Software Engineering and Information System Design

Concepts of Software Engineering, Software Engineering paradigms, Different phases of software System Development, Different types of information qualities of information. Project Management Concepts, Software process and project Metrics. Software Project Planning, Risk Analysis and management, Project Scheduling and Tracking. Analysis Concepts and principles: requirement analysis, Analysis modeling, data modeling.

Design concepts and principles, Architectural design. User Interface design, Object Oriented software development and design: Iterative Development and the Unified Process. Sequential waterfall life cycle. Inception. Use case model for requirement writing. Elaboration using System Sequence Diagram, Domain Model. Visualizing concept classes. UML diagrams. Interaction and Collaboration Diagram for design. Software. Designing Objects with responsibilities. GRASP patterns with General Principles in assigning responsibilities: Information expert, Creator, Controller, Coupling and High Cohesion, Creating design class diagrams and mapping design to codes. Advanced GRASP patterns: Polymorphism, Pure Fabrication, Indirection, Project Variation. GoF Design Patterns.

Design patterns: Polymorphism, Pure Fabrication, Factory, Project Variation. GoF Design Patterns: Factory, Singleton, Strategy, Composite, Builder, and Observer. Software Testing: White Box and Black Box testing. Basis Path Testing. Testing for specialized environment. Software testing strategies: Unit Testing, Integration Testing, Validation Testing, System Testing, Art of debugging. Analysis of System Maintenance and upgrading: Software repair, downtime, error and faults, specification and correction, Maintenance cost models, documentation. Software Quality Assurance, Quality factors. Software quality measures. Cost impact of Software defects. Concepts of Software reliability, availability and safety. Function based metrics and bang metrics. Metrics for analysis and design model. Metrics for source code, testing and maintenance. The course includes lab works based on theory taught.

Credits: 3+1=4; Prerequisite: CSE 301.

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+0=3; Prerequisite: CSE 245.

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. Curved Surfaces. The course includes lab works based on theory taught. Credits: 3+0=3; Prerequisite: MAT104, 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+0=3; Prerequisite: STA 102, CSE245.

CSE 432 Digital Signal Processing

Digital filters: Digital filter structure, finite impulse response filter design techniques, infinite impulse response filter design techniques. Spectral estimation: Nonparametric method- discrete random processes, autocorrelation sequence, periodogram; parametric method- autoregressive (AR) method, forward/backward linear prediction, autoregressive and moving average (ARMA) method. Adaptive signal processing: least mean-square algorithm and recursive least square algorithm. Echo cancellation. The course includes lab works based on theory taught.

Credits: 3+1=4; Prerequisite: CSE248.

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+1 = 4; Prerequisite: CSE 107.

CSE 434: Enterprise Application Design and Development

This module gives an overview of some of the different tiered application architectures (1, 2, 3, N

tiers) and some sample designs. The course teaches some of the foundation skills required for building medium to large scale web-based applications, with a B2B e-commerce focus. The course introduces 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+0=3; Prerequisite: CSE411

CSE 435: Software Quality Assurance

Software processes and products: ISO and IEEE classifications of software life cycle processes, software products and their characteristics. Models of different classes of software products, Development process and its products, Software Supporting life cycle processes. Software quality and its models: ISO software quality model, software quality characteristics and sub-characteristics. Software product metrics; internal, external and quality in use metrics. Management components of software quality: The Software Management process, its activities and tasks according to ISO and IEEE standards. Project integration management. Project quality management. Project quality control. Process metrics. Software quality assurance components in the project life cycle: Integrating quality activities in the project life cycle. Reviews. Software testing - strategies, implementation. Documentation control. Assuring the quality of software maintenance components.

Credits: 3+0=3; Prerequisite: CSE411

CSE 436: Multimedia Design and Development

Multimedia hardware issues; analogue and digital A/V; audio, video, animation, text compression techniques; multimedia authoring packages; copyright and legal issues; accessibility; process of multimedia production. Repositioning content; plug ins; streaming audio and video. Resolution, graphic file formats; basic graphic editing techniques: selection, cut, copy, paste, layers effects; repositioning for the Web. File formats and compression. Basic introduction to A/V editing. Media integration and animation using a time based authoring package; creating movies and animation;

basic A/V integration techniques; animation effects; repositioning for the Web.

Credits: 3+0=3; Prerequisite: CSE411 [Not applicable for EEE students].

CSE 437: Advanced Computer Architecture

Pipelined CPU architecture. Instruction set design and pipeline structure. Dynamic scheduling using score boarding and Tomasulo's algorithm. Software instruction scheduling and software pipelining. Caches: associativity, allocation and replacement policies, sub-block placement. Multilevel caches, multilevel inclusion. Uniprocessor cache coherency issues: self-modifying code, peripherals, address translation. Vectorising compilers and their capabilities; applications to parallelisation and memory hierarchy optimisation. Implementations of shared memory: the cache coherency problem. Update vs invalidation. The bus-based 'snooping' protocol design space. Scalable shared memory using directory-based cache coherency. Alternative approaches.

Credits: 3+0=3; Prerequisite: CSE360.

CSE 438: Digital Image Processing

Introduction to theories, algorithms, and practical solutions of digital image/video perception, Color Space, Image Sampling, Quantization, Image Quality Measurement, Image Quality Enhancement, Discrete Fourier Transform, Frequency-Domain Filtering, Image Transform, Discrete Cosine Transform, KL Transform, Image Feature Extraction and Representation: Edge and Line, Region Segmentation and Representation, Morphological Image Processing, Image and Video Compression. Students will gain understanding in algorithm design, mathematical tools, and practical implementations of various digital image applications. Considerations of practical system requirements (e.g. medical, satellite, consumer) will be discussed. Related standards such as JPEG and MPEG will be reviewed.

Credits: 3+0=3; Prerequisite: CSE248.

CSE 439: Advanced Digital Logic Design

Graph-based representation of logic functions: binary and multiple-valued decision diagrams and their use

Logic minimization. Logic functions with various properties and equivalence classes of logic functions. Representation of sequential networks. Delay and synchronous behavior. Multi-valued input and two-valued output functions. Heuristic optimization of sequential 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; Prerequisite: CSE345

CSE 440: Data Compression

Information theory: entropy; Lossless data compression techniques: Huffman coding, arithmetic coding, and dictionary methods; Use of context, structure, and prediction to improve compression; Digital signal processing: Fourier and discrete cosine transforms, wavelet transforms, quantization; Fidelity and distortion metrics, rate-distortion analysis; Image compression: vector quantization, DCT coding, wavelet coding; Video compression: motion compensation and prediction; Audio compression. Image, video, and audio compression standards.

Credits: 3+0=3; Prerequisite: CSE245.

CSE 441: Component Based Design and Development

Concepts, foundations, and architectures of component-based software development (CBSD) and its related technologies; Components and objects; White box versus black box abstraction and reuse; Component-driven architecture development; JavaBeans component model; .NET component model; Component-Based Software Development Process; A model of frameworks; Component Composition and Integration; Components in Product Line Architecture; UML Components

Credits: 3+0=3; Prerequisite: CSE 301.

CSE 442: Microprocessors and Microcontrollers

Introduction to 8-bit, 16-bit, and 32-bit microprocessors: architecture, addressing modes, instruction set, interrupts, multi-tasking, and virtual memory. Memory interface. Bus interface. Arithmetic co-processor. Interpret and design hardware and software for simple real-time design systems using microcontroller; fundamentals of microcontroller and operation, transfer of information from register to

register to memory for each instruction. Interpret and design digital systems incorporating a microcontroller and peripherals (i.e., RAM, ROM, ADC, DAC, etc). The operation of microcontroller hardware, including digital I/O ports, register banks, special function registers, internal and external memory, timer, counters, and interrupts.

The course includes lab works based on theory taught.

Credits: 3+1=4; Prerequisite: CSE360

CSE 444: Fault Tolerant System

Introduction of Fault Tolerant Systems and architectures; Fault detection and location in combinational and sequential circuits; Fault test generation for combinational and sequential circuits; Digital simulation as a diagnostic tool; Automatic test pattern generator; Fault modeling; Automatic test equipment, faults in memory, memory test pattern and reliability; Performance monitoring, self checking circuits, burst error correction and triple modular redundancy; Maintenance processors.

Credits: 3+0=3; Prerequisite: CSE345.

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. [This course is only for EEE students]

CSE 451: Advanced Data Communication

Synchronous and asynchronous communications; Hardware interfaces, multiplexers, concentrators and buffers; Communication mediums and their

characteristics; Data communication services: SMDS and ATM; Error control codes: linear block codes, cyclic codes, MLDC codes, convolution codes, Trellis code modulation; Digital switching: space and time division switching; Radio system design; Fiber optics communication: transmitter, receivers, network components, WDM; Line coding, trunks, multiplexing, switching, ATM switches; Satellite communications: frequency bands and characteristics, types of satellites, transmission impairments, capacity allocation; Multiple access techniques.

Credits: 3+0=3; Prerequisite: CSE350

CSE 452: Distributed Systems and Algorithms

Distributed computer system concepts and architecture: Hardware and software concepts of distributed processing, distributed models, centralized, network, and distributed systems. Networking and internetworking. Remote invocation and operating system support: remote procedure call, DOS support. Distributed computer fundamentals: concurrent processes, synchronization, distributed mutual exclusion, global clock, synchronous and asynchronous communication, process synchronization and rendezvous.

Distributed file systems: data and file replication, remote access and update propagation, primary based protocols, replicated write protocols, transaction models, distributed transactions.

Credits: 3+0=3; Prerequisite: CSE245, CSE325.

CSE 453: Wireless Network

Detection Theory, Digital Communications: Characterization of communication signals and systems; Wireless LAN: topologies, medium access control, routing for ad-hoc network; Wireless Sensor Networks: applications, topologies, routing, and congestion control; Bluetooth Communication; Microwave Communications; Cellular Networks; Satellite Communications: Overview of satellite communication systems, including analog and digital transmission, Advanced Telecommunication Networks: Methods and research issues in the performance evaluation and management of high-speed and mobile communication networks, Information Theory, Analysis and Design of Communication Networks.

Credits: 3+0=3; Prerequisite: CSE405.

CSE 454: Multimedia Communication

Basics of analog and digital video: color video formation and specification, analog TV system, video raster, digital video formats. Frequency domain analysis of video signals; Scene, camera, and motion modeling, 3D motion and projected 2D motion; basic compression techniques; Waveform-based coding; Video compression standards (H.261 and H.263, MPEG1, MPEG2, MPEG4, MPEG7) and Error control in video communications. Real-time Communication Protocols: RTP/RTCP and RTSP; VoIP Protocols: SIP and H323.

Credits: 3+0=3; Prerequisite: CSE405.

CSE 455: Optical Networks

Optical Communication Networks: Principles and Challenges; Broadcast (Local) Networks: Single-Hop Networks, Multihop Networks, Channel - Sharing and Multicasting; Switched (Wavelength-Routed) Networks: Elements of Virtual Topology Design, Virtual Topology: LP, Cost, Reconfiguration, Wavelength Conversion; Potpourri: Multi-Wavelength Ring Networks, All-Optical Cycle Elimination, All-Optical Cycle Elimination, Optical TDM Networks.

Credits: 3+0=3; Prerequisite: CSE405.

CSE 456: Wide Area Networks

This course provides an in-depth presentation of the fundamental technology, architecture, and protocols necessary for wide-area networking. It covers network topology, transmission media, media access control, interconnection devices, and fundamental communications standards. It addresses important WAN concepts such as switching, DWDM, and interconnection of different LAN and WAN technologies. It also examines typical WAN technologies such as HDLC, PPP, Frame Relay, xDSL, DOCSYS, SMDS, ATM, SONET/SDH, and WiMAX.

Credits: 3+0=3; Prerequisite: CSE405

CSE 457: Cellular Networks

This course introduces the principles of cellular communications systems. Second generation (2G) digital, mobile cellular, and personal communications systems (PCS) concepts are discussed, including the cellular concept, frequency reuse, propagation, multiple access, power control, handoff, and traffic engineering. 3G cellular standards to support high-

... data services are presented. IEEE 802.11 WLAN, IEEE 802.15 (Fixed and Mobile) WiMAX, IEEE 802.15 Bluetooth are discussed for their roles in 3G. Cellular standards are examined, including U.S. 2G code-division multiple access (CDMA) IS-95A, 2.5G IS-95B, IS-95C, cdma2000 1x, and 1x-EVDO. Other standards discussed include European 2G time-division multiple access (TDMA) Global System for Mobile communication (GSM), 2.5G General Packet Radio Service (GPRS), 2.5G Enhanced Data Rates for GSM Evolution (EDGE), and 3G wideband-CDMA (W-CDMA).

Credits: 3+0=3; Prerequisite: CSE405.

CSE 460: Programming Language Principles

A study of the fundamental concepts and general principles underlying current programming languages and models. Topics include control and data abstractions, language processing and binding, indeterminacy and delayed evaluation, and languages and models for parallel and distributed processing, programming language semantics and type theory, modules and languages for expressing module interfaces, separate compilation schemes, systems for object-oriented design, general specification languages, high-level constructs for concurrent programming, concurrency specification languages. A variety of computational paradigms are discussed: functional programming, logic programming, object-oriented programming and data flow programming.

Credits: 3+0=3; prerequisite: CSE107.

CSE 464: Advance Database System

Introduction to the principles of database management systems. Topics include database system architecture, data models, theory of database, buffer management, join processing, query optimization, selectivity estimation, concurrency control, crash recovery, distributed database systems, distributed query processing, replication (and its dangers), decision support: bitmap indices, database tuning, high-dimensional indexing, Nearest neighbor queries, storage strategies, and deductive database systems.

Credits: 3+0=3; Prerequisite: CSE 301.

CSE 470: Expert Systems

Basic principles of Expert Systems. A review of expert knowledge-based problem-solving systems. An

analysis of the architecture, knowledge and problem solving style of each system in order to classify and compare them. Rule-based expert systems, diagnosis strategies, truth maintenance. Natural Language Processing, Medical diagnostics, Financial design, and Manufacturing planning.

Credits: 3+0=3; Prerequisite: CSE365.

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+0 = 3; Prerequisite: CSE365.

CSE 475: Machine Learning

Overview of learning; Concept learning, version spaces; Inductive bias, PAC learning; Decision trees, Occam's razor; Neural networks; Bayesian learning, MAP and ML learners, MDL, Gibbs sampling; Bayes nets; Combining learned classifiers, Weighted majority, Bagging; Biological learning, Genetic programming; Instance based learning, Radial basis function; Support vector machines; Learning rules, Inductive logic programming; Reinforcement learning.

Credits: 3+0=3; Prerequisite: CSE365.

CSE 476: Soft Computing

Introduction to Soft Computing. Fuzzy Logic: Fuzzy Sets, Fuzzy Reasoning, Fuzzy Inference, application of Fuzzy Logic. Genetic Algorithms: Description of GAs, application of GAs. Neural Networks: Artificial neurons, Hopfield Nets, Perceptrons, gradient descent, multilayer nets, supervised learning, backpropagation, overfitting, Reinforcement Learning, Unsupervised Learning, Clustering and Classification, applications of Neural Networks. Hybrid Systems: ANFIS, Fuzzy Filtered NN and Neural Fuzzy Systems, GA tuned Fuzzy Systems, Adaptive Fuzzy Clustering. The course includes lab works based on theory taught.

Credits: 3+1=4; Prerequisite: CSE365

CSE 477: Data Mining

An introduction to data mining; Data preparation, model building, and data mining techniques such as clustering, decisions trees and neural networks; Induction of predictive models from data: classification, regression, and probability estimation; Application case studies; Data-mining software tools review and comparison.

Credits: 3+0=3; Prerequisite: CSE365.

CSE 478: Stochastic Processes

Random walks, probability distribution and expectations, discontinuous probability distributions, continuous probability distributions, discrete time Markov chain and continuous time Markov chain, Brownian motion and diffusions, Poisson processes, birth-death process in queuing, health/sickness models, renewal theory, queuing Models, application to Black-Scholes model.

Credits: 3+0=3; Prerequisite: STA 102, CSE245.

CSE 480: Web Database Programming

Introduction to web programming concepts, HTML, DHTML, XHTML and XML, Cascading style sheets. Dynamic documents with JavaScript. Introduction to client-side and server-side programming using PHP, client server architecture, database access through web. Web-based applications are developed with emphasis on accessing database servers. The course includes lab works based on theory taught.

Credits: 3+1 = 4; Prerequisite: CSE301.

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+0=3; Prerequisite: CSE 245.

CSE 483: Graph Theory

Graphs: simple graphs, digraphs, subgraphs, vertex-degrees, walks, paths and cycles; Trees, spanning trees in graphs, distance in graphs; Complementary graphs, cut-vertices, bridges and blocks, k-connected graphs; Euler tours, Hamiltonian cycles, Chinese Postman Problem, Traveling Salesman Problem; Chromatic number, chromatic polynomials, chromatic index, Vizing's theorem, planar graphs, perfect graphs.

Credits 3+0=3; Prerequisite: 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, the Voronoi diagram and other planner graph, updating and deleting from geometric structures.

Credits 3+0=3; Prerequisite: MAT104, CSE 245.

CSE 485: Advanced Algorithm

Computational complexity, Parameterized complexity, Algorithms for combinatorial optimization, practical computing and heuristics, Approximation algorithms, LP based approximation algorithms, randomized algorithms, Experimental algorithms, String algorithms, network optimization, parallel algorithms, online algorithms, external memory, cache, and streaming algorithms. Techniques to be covered include amortization, randomization, fingerprinting, word-level parallelism, bit scaling, dynamic programming, network flow, linear programming, fixed-parameter algorithms.

Credits:3+0=3; Prerequisite: CSE245

CSE 486: Bioinformatics Algorithms

Exact string matching. Suffix Trees and Arrays, their use in bioinformatics. Sequence analysis: space-efficient pairwise alignment, multiple sequence alignment with provable properties. Various classical phylogenetic methods: ultrametric trees, additive trees, and perfect phylogeny. Genome rearrangement. Population genetics: haplotypes

inference and reconstruction of networks with recombination. Biological networks and related algorithmic problems, gene regulation, and structural bioinformatics.

Credits: 3+0=3; Prerequisite: CHE109, CSE245

CSE 490: VLSI Design

VLSI design methodology: top-down design approach, technology trends and design automation algorithms; Introduction to CMOS inverters and basic gates; Brief overview of CMOS fabrication process: layout and design rules; Basic CMOS circuit characteristics and performance estimation; Buffer circuit design; Complex CMOS gates, CMOS building blocks: adder, multiplier; data path and memory structures. Hardware modeling: hardware modeling languages, logic networks, state diagrams, data-flow and sequencing graphs, behavioral optimization. Architectural Synthesis: circuit specification, strategies for architectural optimization, data-path synthesis, control unit synthesis and synthesis of pipelined circuits. ASIC design using FPGA and PLDs.

Credits: 3+1 = 4; Pre-requisites: CSE345.

CSE 492: Robotics

Introduction to Robotics. Robotic manipulation, spatial descriptions and transformations, direct kinematics: the arm equation, inverse kinematics: solving the arc equation, workspace analysis and trajectory planning, Sensing and motion control through feedback, differential motion and static manipulator dynamics, robot control, task planning, programming and communications through cross-compiling.

Credits: 3+0=3; Prerequisite: MAT104, CSE365.

CSE 493: Embedded Systems

Characteristics and design of embedded systems; Formal models and specification languages for capturing system behavior; Techniques for specification, exploration and refinement; Interfacing of devices, System partitioning and hardware/software co-design; Tools for validation, verification, and simulation; Quality and performance metrics.

Credits: 3+1 = 4; Prerequisite: CSE442.

CSE 497: Thesis/Project

Students will be assigned a thesis or a project topic under the supervision of a faculty member. Students must complete thesis or project within two consecutive semesters.

Credits: 0+4=4; Prerequisite: Students must complete at least 110 credits.

CSE 498: Social and Professional Issues in 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+0=3; Prerequisite: None.

CSE 499: Internship

Students will be placed for internship of one semester duration in an organization doing purely technical works in the field of Computer Science and Engineering. The student will be assigned a faculty supervisor to monitor the progress of the internship work.

Credits: 0+4=4; Prerequisite: Students must complete at theory courses.

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 on acquainting students with 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 fail to work) in the short, medium and long run. The focus is on how firms select their strategies to maximize profits. Although both the theoretical models and the empirical application deal 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 taxes 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.

Credits 3; 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 NGO 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.

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

...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, multicollinearity, heteroscedasticity 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. Monte-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-Scitovsky compensation criteria; consumer and product surplus for measuring welfare change; market failure; theory of second best and its implications for policy reforms; importance of property rights and Coase theorem; poverty and distribution of income; relationship between entitlement and welfare; the extent of inequality in Bangladesh.

Credits 3; Prerequisite: ECO467.

ECO 492: Law and Economics

Applications of economic theory to problems and issues in both civil and criminal law and the effect of legal rules on the allocation of resources. It includes property rights, liability and negligence assignment, the use of administrative and common law to

investigate 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 member. 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

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, small and large signal models, amplification and amplifier configurations, and frequency response. **Op-Amp:** ideal op-amp, inverter, non-inverter, difference amplifier, integrator, differentiator, and weighted summer. Open and

closed loop gain and frequency response of Op-Amps.

The course includes lab work based on theory taught.

Credits: 3+1=4; Pre-requisite: EEE 201.

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; Pre-requisite: EEE 201.

EEE 201: 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. Laplace transform and inverse transform, concept of poles, basic theorems for Laplace transform, introduction to circuit analysis in S-domain. Series and parallel resonance.

The course includes lab work based on theory taught.

Credits: 3+1=4; Pre-requisite: EEE 101.

EEE 202: Electronic Circuits II

BJT: physical operation, terminal characteristics, biasing, small and large signal models. **Integrated circuits:** current sources, current mirrors, small signal, and high frequency analysis. Introduction to cascode amplifiers and advanced mirror circuits, e.g. Wilson. **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:** application of positive feedback, sinusoidal oscillators, Wien bridge, and LC-crystal oscillator. Classification of power amplifiers: class A,

AB, B, power conversion efficiency, impedance matching by transformer coupling. The course includes lab work based on theory taught. Credits: 3+1=4; Pre-requisite: EEE 102.

EEE 203: Numerical Techniques in Engineering

Introduction to Numerical Methods: root finding using bisection, Regula-Falsi, Newton-Raphson's method, Secant method, and Jacobi. Interpolation: Lagrange's polynomial, Newton's Polynomial, and Spline. Curve fitting: Least squares. Differentiation and Integration: numerical Integration - trapezoidal rule, Simpson's rule, recursive/Rhomberg integration, and quadrature. Finite Difference: forward, backward and center difference, error analysis, and Richardson's extrapolation. Introduction to Finite element method. Applications: system solution using ordinary and partial differential equations and eigen-analysis. The course includes lab work based on theory taught.

Credit: 3+1=4; Prerequisite: CSE 105.

EEE 205: 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. CMOS logic family: description, noise margin, propagation delay. Brief introduction to RTL, DTL, TTL, ECL logic families. The course includes lab work based on theory taught.

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

EEE 301: Electrical Machines Fundamentals

Electromechanical Fundamentals: Faraday's law of electromagnetic induction, Fleming's rule and Lenz's law, Elementary generator: electromagnetic force (EMF) generation, direction of EMF & left hand rule, back EMF. DC motor: operating principle, classification, torque-speed characteristics, starting and speed regulation. Transformer: Ideal transformer - transformation ratio, no-load & load phasor diagrams, Actual transformer- equivalent circuit, regulation, short circuit & open circuit tests. Three phase induction motor: operating principle, equivalent circuit, phasor diagram, torque-speed

characteristics, no-load & blocked rotor tests, starting, braking & speed control. Single phase induction motor: operating principle, equivalent circuit, starting.

The course includes lab work based on theory taught.

Credits: 3+1=4; Pre-requisite: EEE 201.

EEE 303: Signals and Linear Systems

Classification of continuous time signals, basic operations on signals, elementary signals, representation of signals using impulse functions. Classification of continuous time systems, properties of linear time invariant (LTI) systems. System representation by differential equations. Impulse response and convolution integral. Fourier series: different forms, properties, response of LTI systems to periodic inputs. Fourier transformation: properties, system transfer function, applications of Fourier transform in system analysis. Laplace transformation: region of convergence, properties, analysis of LTI systems using Laplace transformation.

Credits: 3+0=3; Pre-requisites: EEE 201, MAT 205.

EEE 304: Synchronous Machines and Power System Fundamentals

Synchronous Generator: operating principle-excitation system, Equivalent circuit, vector diagrams at different loads, regulation, synchronous impedance, parallel operation: necessary conditions, synchronization. Synchronous Motor: operating principle, effect of changing excitation, V-curves, effect of loading. Transmission line representation: Equivalent circuit of short, medium and long transmission line. Network representation: Single line and reactance diagram and per unit representation. Network calculation: Node equations, Matrix partitioning, Bus admittance & impedance matrix. Load flow study: Gauss-Seidel method. Fault analysis: Symmetrical components, Symmetrical 3-phase fault calculation, sequence network, unsymmetrical fault calculation. Power system stability: Swing equation, Power angle equation, Equal area criterion of stability.

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 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, concepts of displacement current. Boundary conditions for time-varying systems. Potentials used with varying charges and currents. Retarded potentials, Maxwell's equations in different coordinate systems. 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 Poynting's theorem. Transmission line analogy, reflection from conducting and conducting dielectric boundary; Display lines in dielectrics, liquids and solids, plane wave propagation through the ionosphere. Introduction to radiation.

Credits: 3+0=3; Pre-requisites: MAT 102, MAT 104.

EEE 307: Telecommunication Engineering

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-requisites: EEE 303, STAT 102.

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-requisite: PHY 209.

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 work based on theory taught.

Credits: 3+1=4; Pre-requisite: EEE 303.

EEE 311: 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 work based on theory taught.

Credits: 3+1 = 4; Pre-requisites: EEE 202, EEE 205.

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-requisite: EEE 205.

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. Solution & analysis of various problems by using Matlab. The course includes lab work based on theory taught.

Credits: 3+1=4; Pre-requisite: EEE 303.

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: ENG 102.

EEE 411: Quantum Phenomena in Nanostructures

Fundamentals of Quantum Mechanics: Concept of effective mass; bra-ket notations of state vectors; Schrödinger 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

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 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: 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, nanostructures 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 magneto-optic devices.

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

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 308.

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 work based on the concepts introduced.

Credits: 3+1=4; Pre-requisite: EEE 205.

EEE 417: 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-requisite: EEE 308.

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 202.

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 309, EEE 311.

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 Yag-Uda antenna.

The course includes lab work based on the concepts introduced.

Credits: 3+1=4; Pre-requisite: EEE 305.

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.

error performance of base band digital systems in presence of AWGN and ISI; Error control 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 densities; Bandwidth requirements and timing requirements; Reliability objectives; System gain; 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 work based on the concepts introduced.

Credits: 3+1=4; Pre-requisite: 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 work based on the concepts introduced.

Credits: 3+1=4; Pre-requisite: 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 work based on the concepts introduced.

Credits: 3+1=4; Pre-requisites: EEE 305, 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, subpixel location estimation) restoration (degradation, inverse fitting and weiner filtering), binary image processing: thresholding, runlength encoding, distance transforms, medical axis transforms, morphological operations, region segmentation and representation: split and merge 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 work based on the concepts introduced.

Credits: 3+0=3; Pre-requisite: EEE 309.

EEE 426: Advanced Telecommunication Engineering

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 205.

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 work 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 protocols/mechanisms/techniques are commonly found in networks (particularly Internet) protocols and why are they used? Signaling, randomization, indirect 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 capacity Measurement. Workload models; traffic and topology characterization, analysis (LRD, heavy tails). The course includes lab work based on the concepts introduced.

Credits: 3+1=4; Pre-requisite: EEE 205.

EEE 434: Computer Architecture

Information representation and transfer, instructions and data access methods, the control unit: hardware and micro programmed, memory organization, bus systems, channels, interrupts, DMA, Von Neumann SISD organization, RISC and CISC machines. Pipelined machines, interleaved memory access, caches, Hardware and architectural issues of parallel machines, Array processors, associative processors, multiprocessors, systolic processors, data flow computers and interconnection networks. High level

message concept of computer architecture.
The course includes lab work based on the concepts mentioned.

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

EEE 441: Power Stations

variation 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 standby units, large or small units. Number and size 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 304.

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 instruments transformer for relays. Problems of high speed relaying of transmission lines. Over current relays. Directional relays. Distance relays. Sequence and negative sequence relays. Balanced current relaying of parallel line. Ground fault relaying. Pilot relaying principles. Carrier pilot relaying. Operating characteristics of different types of relays. Apparatus protection; circuits and relay setting. Generator motor protection; Transformer protection. Bus protection; line protection.

Credits 3+1=4; Pre-requisite: EEE 304.

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 motors, amplidyne 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 coordination: lightning and switching surges, basic insulation level, surge diverters, arresters, protector tubes and metal oxide varistors.

Credits: 3+0=3; Pre-requisite: EEE 304.

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 interfacing, AC-DC-AC link.

Credits: 3+0=3; Pre-requisite: EEE 202, EEE 304.

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: EEE 304, STAT 102.

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 work based on the concepts introduced.

Credits: 3+1=4; Pre-requisites: EEE 202, EEE 304.

ENG 099: Remedial English

Remedial English is an intensive course for students who need to improve their academic English. Writing lessons will focus on identifying students' mistakes commonly made in writing and show how to correct them. This will be a helpful revision course in grammar too. Students will improve their ability to write clear sentences using varied structures, and will practice linking these together into more complex

sequences and paragraphs. Besides, specific lessons will be dedicated to improving students' reading skills and the fluency of their spoken English.

Credits: None; Prerequisite: none

ENG 100: Improving Oral Communication Skills

In these classes, students develop their ability to speak with greater confidence, particularly in academic situations. Also, the course is designed to help students to improve their ability to listen to lectures in English. It is useful for students who need to give presentations as part of their course. It looks at common areas of difficulty such as structuring a presentation, designing effective visual materials and questioning techniques. Besides, it will train students for extempore talk, debating, and facing and taking interviews along with a number of notions and functions of essential oral communication skills

Credits: 3; Prerequisite: None

ENG 101: Basic English

This course is designed students to provide the opportunity for understanding and improving all four skills in English with special emphasis on reading and writing. Lessons are balanced in this way: Grammar and vocabulary lessons to improve the students' accuracy in real-life settings; speaking and listening lessons to improve their confidence, fluency and presentation skills; and reading and critical thinking lessons to provide integrated language practice involving diverse topical issues. Overall, students' capacity to organize and present ideas in English is developed.

Credits: 3; Prerequisite: ENG 099 for students who are required to do ENG 099, (no pre-requisite for English department students, and students who are not required to do ENG 099)

ENG 102: Composition and Communication Skills

In this composition course, students will study the principles of writing and analyzing non-fiction prose, focusing on argument and academic research strategies. As students, one should be able to write a literate and well-argued essay and should be able to read a literary text with some understanding and sensitivity. For practical purposes, this means that

students should be able to write an effectively organized and substantial essay that is generally grammatically and syntactically sound, and acquire the capacity to identify and discuss prose features. In English 102, students will acquire and polish the tools fundamental to effective writing and reading that will help them participate successfully in the discourse systems of the university and beyond.

Credits: 3; Prerequisite: ENG 101

ENG 145: Introduction to Linguistics

The course aims to provide an overview of key areas of Applied Linguistics. Phonetics and phonology, morphology, syntax, discourse analysis, semantics, language and society, language change, brain and language and other related ideas will be addressed from the point of view of current theory and practice. Through lecture input, video observation and practical tasks, students will acquire a basic understanding of these issues to develop critical and analytical skills for language study.

Credits: 3; Prerequisite: None

ENG 154: English Phonetics and Phonology

The course introduces central themes relating to sound patterns and pronunciation in languages. Students have the opportunity to acquire knowledge and understanding of the production of sounds, and to acquire the skills necessary to describe, define and transcribe consonants, vowels and certain prosodic features such as stress and rhythm. The course includes the study of variation in sound patterns, such as those which are characteristics of various accents of English. Students are also introduced to the distribution of sounds in languages and to fundamental concepts and analytical techniques related to contrast and meaning in sound structures.

Credits: 3; Prerequisite: ENG 145

ENG 155: Improving Reading and Writing Skills

All students need to be able to meet the linguistic demands of a course of study - and this need is critical if they are studying in a second or foreign language. This course focuses on the central problem of written and oral communication in academic contexts, and gives students an opportunity to develop their understanding of the language and

teaching issues that are central to studying in English. The course draws on a range of practical insights and tips on preparing for academic demands of different English literature and linguistics courses, test-taking strategies, time management, and guidelines for preparing long assignments.

Credits: 3; Prerequisite: ENG 102

ENG 191: Introduction to Literature: Fiction and Non-Fiction Prose

This course introduces students to the major genres of literature such as short and long fiction and non-fiction prose with a view to introducing students to the forms and styles of these genres of literature.

Credits: 3; Prerequisite: None

ENG 192: Introduction to Literature: Poetry and Drama

This course aims at familiarizing students with two major genres of literature: Poetry and Drama. It covers different elements/aspects of poetry and drama such as language use in poetry, differences between prose and poetry, poetic diction, figures of speech, sound effects in poetry, different types of drama (tragedy, comedy, tragi-comedy, history, melodrama etc), elements of drama (dialogue, action, conflict, dramatic irony, plot construction etc).

Credits: 3; Prerequisite: None

ENG 200: Advanced Verbal Communication Skills

The ability to deliver effective speeches and presentations is a critical factor in job advancement and success. Preparation, including adopting different oral communication strategies, audience analysis and adaptation, enhances the effectiveness of speaking in public. In this course, students will learn how to develop and deliver messages and how to use supporting materials. Students will also learn how to lessen anxiety and leave a lasting impression on audiences, whether large or small.

Credits: 3; Prerequisite: None

ENG 201: Theories of Writing

The course familiarizes students with current theories of writing. It offers a perspective on the writing profession's theoretical evolution from process to

cohesion to cognition to social construction. Students will be asked to apply the theories learnt to their own writing practices.

Credits: 3; Prerequisite: ENG 155

ENG 205: History of the English Language

The purpose of this course is to introduce students to major developments in 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

This course is designed to acquaint students with the forms and techniques of satire, from Augustan to contemporary literature. Students will be able to distinguish satire from other literary forms and identify elements of satire in a variety of genres. The course also enables students to recognize the target(s) and purposes of satire and introduces them to the devices and degrees of humor used to achieve the satirical tones in texts. The students will also learn to identify and analyze satire in other forms of media such as cartoons and comic strips, music, the internet and cinema.

Credits: 3; Prerequisite: ENG 191+ ENG 192

ENG 222: Introduction to Bangla Literature

বাংলা সাহিত্য

বাংলা ভাষা ও সাহিত্য সম্পর্কে শিক্ষার্থীদের কৌতূহল এবং আগ্রহ বৃদ্ধির জন্য এই কোর্সটির পরিকল্পনা করা হয়েছে। বাংলা সাহিত্যের কালক্রম, প্রতিনিধিত্বমূলক রচনা এখানে পাঠ্যসূচিভুক্ত হয়েছে। কোর্সটি অধ্যয়ন করে বাংলা সাহিত্যের বিভিন্ন শাখা সম্পর্কে শিক্ষার্থীদের যেমন জ্ঞান অর্জিত হবে, তেমনই ইংরেজী ও বাংলা সাহিত্য সম্পর্কে একটা তুলনামূলক ধারণা লাভ করা যাবে।

উপন্যাস : সৈয়দ ওয়ালীউল্লাহ : লালসালু ।

নাটক : মুনীর চৌধুরী : কবর ।

কবিতা : রবীন্দ্রনাথ ঠাকুর : পৃথিবী, সোনার তরী ।

নজরুল ইসলাম : মানুষ ।

কবিগুরু : মৃত্যুর আগে, আট বছর আগে একদিন ।
কবিগুরু : ইলেকট্রার গান ।
কবিগুরু : মেতাহের হোসেন চৌধুরী : সংস্কৃতি কথা ।
কবিগুরু : রবীন্দ্রনাথ ঠাকুর : শান্তি, রবিবার ।
কবিগুরু : মুখোপাধ্যায় : বিবাহের বিজ্ঞাপন ।
কবিগুরু : মিত্র : বিকৃতধার ফাঁদে ।
কবিগুরু : জগদীশ্বর : জগৎগৃহ ।
কবিগুরু : 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, meeting minutes, publicity material and proposals. In addition, the course will enable students to understand interviews, discussions, telephone conversations and recorded messages (Listening skills), read business documents to understand their gist and to extract specific information (Reading skills), write effective reports, proposals and email, describe information presented in diagrammatic form (Writing skills), discuss business problems and negotiate agreement, and prepare and deliver a short presentation (Speaking skills).

Credits: 3; Prerequisite: ENG 102

ENG 230: Nineteenth Century Novel

This course includes the major novelists of the period and their representative works. The course usually starts with Jane Austen and then moves chronologically 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 the poems. At the end of the semester students are expected to be able to independently examine and judge individual poems of the Romantic period.

Credit: 3; Prerequisite: ENG 192

ENG 255: Second Language Acquisition (SLA)

The aim of the course is to look at some major areas related to second language acquisition or learning—mainly from an applied linguistic perspective. It covers the areas in breadth rather than in depth. By the end of the course, student should become familiar with the major theories relating to second language acquisition and gain an understanding of the complex relationship between theory and practice in language education.

Credits: 3; Prerequisite: ENG 145+ENG 207

ENG 301: Elizabethan and Restoration Drama

In the course students will not only read plays from the two periods but will gain a perspective on the historical, religious and political backgrounds of these periods of English history also. Texts include selections from Thomas Kyd, Christopher Marlowe, William Shakespeare, Ben Jonson, and William Congreve.

Credits: 3; Prerequisite: ENG 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 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 course seeks to train students in journalistic writings such as short news reports with interesting captions/headings, subtitling, translating reports obtained from foreign news agencies, preparing long reports for the press or electronic media, writing special features for the media, and editing. It will focus on both objective reporting or distancing oneself from the report and subjective reporting or taking a position while reporting. The course will train students to take active parts in press briefings/conferences and prepare reports on the briefings, interview persons, conduct surveys and prepare reports for the media. The course will give training in the art of news-casting with emphasis on pronunciation, stress, intonation, confidence, and naturalness.

Credits: 3; Prerequisite: ENG 102

ENG 315: Seventeenth and Eighteenth Century Poetry

This course will survey the major poets of the 17th and 18th century in English literature and will discuss the salient aspects of metaphysical and neo-classical poetry as well as Milton's poetics. The poets who will be studied in detail include Donne, Marvell, Herbert, Swinburne, 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. It also aims at introducing students to the ideas of English for specific purposes such as English for academic or professional purposes, Engineering, or English for Business.

Credits: 3; Prerequisite: ENG 303 + ENG 306

ENG 319: Translation Studies

The aim of this course is to train students in the art of translation to meet the growing need of translators. It covers recent theoretical developments in the art of translation, and focuses on the use of theoretical insight in the practice of translating literary and non-literary texts from English to Bangla and vice-versa. Students will examine some works of translation and compare translations with original works. They will be required to translate some short stories, poems, or parts of some longer literary and non-literary texts from English to Bangla and vice-versa.

Credits: 3; Prerequisite: ENG 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 tries to understand the exceptional nature of the novels of the first half of the 20th century. An attempt will also be made to assess the contribution of such major novelists as Conrad, Woolf, Lawrence and Joyce. Students are expected to learn how to understand the characteristics of the modern novel, recognize concepts and themes prevalent, identify central issues and problems of the societies which the novels explore, formulate criteria for interpretation

and evaluation of modern novels and compare and contrast characters, themes, settings, styles, and techniques

Credits: 3; Prerequisite: ENG 230

ENG 405: Creative Writing:

This is an introductory course on writing poetry and short fiction. The course will give students the opportunity to explore how poetry and short stories can express ideas and emotions and transform the mundane and commonplace into works of art. Keeping in mind the tensions between aesthetic and communicative values of words and the demands of finding one's voice, students will discover the surprises, challenges and pleasures that lie hidden behind all creative work of art shaped by language. Students will read some selected models of poetry and short story, but will be encouraged to be creative.

Credits: 3; Prerequisite: ENG 155+ENG 309

ENG 410: Continental Literature

The course aims at familiarizing students with some major writers of Continental Literature. It includes works of Flaubert, Tolstoy, Brecht, Pirandello, 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 important issues and considerations in language policy and planning. It considers the nature and function of 'official' languages and the relationship 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 the means to resolve its problems. It closely examines classroom methodology, curriculum and teaching 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 (1620-1851)

The course covers the earliest writings in American literature starting from the colonial period to the 19th century. Writers include, among others, Ann Bradstreet, Jonathan Edwards, Nathaniel Hawthorne, Henry Wadsworth Longfellow, Henry David Thoreau, Henry James, Mark Twain and Walt Whitman.

Credits: 3; Prerequisite: ENG 191+ENG192 + at least 2 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 Durning, 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

In the course students will interrogate the category of postcolonial theory and literature to discern the pitfalls of using such a broad terminology. They will also enquire into the different forms of literature and writing that can be encompassed within this category. Texts to be studied will include selections from Edward Said, Homi Bhabha, Sara Suleri, Gayatri Spivak, Chandra Mohanty Talpade, Salman Rushdie, Chinua Achebe, R.K. Narayan, Meena Alexander and Bharati Mukherjee.

Credits 3; Prerequisite: Completion of at least 12 literature courses.

ENG 436: ELT Project

The purpose of this course is to provide students with some practical training in doing ELT research. Students are required to do a mini-research project in any one of the following areas under a teacher's guidance: (a) Needs analysis, (b) Designing a communicative syllabus, (c) Evaluating a syllabus, (d)

Evaluating materials and designing materials, (e) Evaluating teaching, (f) Evaluating tests and designing reading, writing, speaking and listening tests, (g) Learner's learning style preferences, and (h) Learner's beliefs and expectations.

Credits: 3; Prerequisite: 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, Arnold, Sartre & Nietzsche.

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 Forster, 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. It aims to place the major emphasis on the major English canonical poets of the modernist period. One important component of the course will entail exploring modernism as an all-encompassing cultural movement and relate the poems we read to this movement. Moreover, we will also explore how the individual poets of this period influence and compete with each other. Particular emphasis will be placed on close reading of some of the selected poems. Poets may include, among others, T S Eliot, W.B. Yeats, Ted Hughes, H.D, Marianne Moore, Dylan Thomas and W.H. Auden.

Credits: 3; Prerequisite: ENG 320+ 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 the affinities of Modern English Drama with contemporary European drama. Students are also required to read texts under the historical, political, social and philosophical forces under the traits of Modernism. Since this is an advanced course they are expected to relate Modern drama with their previous reading of Elizabethan, Caroline, Jacobean and Restoration drama. Writers may include, among others, G. B. Shaw, J. M. Synge, Samuel Beckett, George Osborne and Harold Pinter.

Credits: 3; Prerequisite: ENG 301 & ENG 310

ENG 451: Computer Assisted Language Learning (CALL)

The aims of this course are to equip students with the ability to assess the potential of IT in language teaching; to provide them with principles for using IT effectively; to introduce students to, and explore with them, a range of issues involved in the use of IT in language teaching; and to familiarise them with recent research into IT applications in language teaching. In addition, students will develop increased understanding of the technical, practical and conceptual aspects of IT applications in language teaching; familiarity with relevant software; 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. Authors may include, among others, John Fowles, A.S. Byatt, Harold Pinter, Tom Stoppard, Philip Larkin, Ted Hughes, Sylvia Plath and J. G. Farrell.

Credits: 3; Prerequisite: 5 Literature courses

ENG 455: Comparative Literature

This course includes non-English writers like R.K. Narayan, V.S. Naipaul, Arundhati 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.

The course introduces students to the history of feminist literary criticism and to the challenges and problems it has been facing. The course familiarizes students with the major trends and main conception of the feminist movement and prepares them to understand the readings included in the syllabus better. The course also aims to overview the productions of popular culture which are thematically connected to those literary pieces that are included in the readings, with the aim to observe to what extent and by what means are gender roles being modified. This course will also explore the relationship between Anglo-American and European feminist literary theory and Third World feminisms. As such, it will examine the tensions, negotiations and new articulations (specifically as transnational feminism) that can be read through the lens of historical developments from the nineteenth century to the present. In particular, the history of Euro-American colonialism, anti-colonial movements, nationalism, decolonization, development and modernization projects post-World War II, crises of global capitalism, new social movements, and neo-liberalism will provide broad frameworks for understanding transnational feminism.

Credits: 3; Pre-requisite: 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 components; The propagation of electromagnetic waves; Formal definition of information; Fourier analysis of spectra of signals; Information data rate and bandwidth of a signal; Channel capacity and multiplexing 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, R.C. 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, R.C. 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, Saunderson'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, Saunderson'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 282 Renewable Energy Technology

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 interfacing, AC-DC-AC link.

Credits : 3; Pre-requisite: ETE 219.

ETE 283 Mechatronics

Principles, modeling, interfacing and signal conditioning of motion sensors and actuators; hardware-in-the-loop simulation and rapid

prototyping of real-time closed-loop computer control of electromechanical systems; modeling, analysis and identification of discrete-time or samples-data dynamic systems; commonly used digital controller design methods; introduction to nonlinear effects and their compensation in mechatronic systems.

Credits : 3; Pre-requisite: ETE 216.

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; Prerequisite: 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 coordinates (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.K.K. 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 multiplexing; 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 distortionless 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; Prerequisite: 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; Prerequisite: 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 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 and 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, parasitics 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.

ETE 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. Blanchard, 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 multiport analysis techniques. Impedance Matching: Design of matching networks including lumped elements, stubs and transmission line sections, circuit tuning. Passive Components: Theory of operation, practical design and implementation of power dividers, directional couplers and hybrids, resonators as well as system applications of these devices. Noise and distortion in RF Systems: Effects on channel capacity. Active Circuits: Theory of operation, practical design and implementation of amplifiers for low-noise or power applications, detectors, mixers; 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 complementary 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 432 Antenna Engineering:

Radiation mechanism of antenna; basic antenna parameters, Classification of antennas; wire antennas, dipole antenna, array antenna, Yagi-Uda array antenna; Slot, horn and reflector antennas.

Planner antennas: microstrip patch antennas; Design of microstrip and array antennas; Antenna in mobile communication, control of tilt angle and radio coverage.

Lab Work based on the theory course.

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 comparison of FDM/TDM systems and CDMA. Discussion of GSM standards: signaling and call control; mobility management; location tracing. Wireless data networking, packet error modeling on fading channels, performance analysis of link and transport layer protocols over wireless channels; wireless data in GSM, IS-95, GPRS and EDGE.

Credits: 3; Prerequisite: ETE 314.

Recommended Textbook: 1. Modern Wireless Communications, Simon Haykin and Michael Moler, Pearson Education.

2. Wireless Communications & Networking, J.W. Han 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 detector amplifiers, fiber optic communication systems and link budget using direct detection, fiber optic connectors, couplers, multiplexers and splitters, wavelength converters, routers, optical amplifiers, coherent and WDM systems. This course includes lab

...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, Thiagarajan 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 459: Teletraffic Engineering

Queueing Theory: Review of basics of probability theory, Basics of stochastic processes, Markovian stochastic processes in discrete and continuous time, Arrival and service processes in queueing theory; Little's result. Traffic Flows in Networks: Traffic Units and Parameters, Holding Time and Call Intensity, Offered Traffic and Carried Traffic, Congestion and Delay, Traffic Variations, Subscriber Behavior. Classical Loss Systems: Poisson Traffic Model, Erlang's Model, Binomial, and Engset's Models, Limited Availability, and Gradings PJ Formula, Link Systems in Switching Networks, Dimensioning Tables and Charts, Computerized Aids. Delay Systems: Classical Waiting Time Systems, Classification of Queueing Models, Infinite Source Delay-Loss Systems, Limited Source

Delay-Loss Systems. Traffic Measurements: Measurements Recommended by ITU-T, Measurement of Holding Times, and Traffic Intensity, Measurement Accuracy. Multi-Dimensional Traffic: Multidimensional Traffic Models, Overflow Traffic Modeling, ATM Traffic Characteristics, and Modeling

Credits: 3; Prerequisite: ETE 302.

Textbook: 1. Lecture Notes

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, Artech

House, Boston-London, 1994, 174 pp.

Pre-requisite: STA 102 (Probability and Statistics)

ETE 451: IP Telephony

Introduction to Voice Over IP: Introduction, Trends in Voice and Data Convergence, The Public Switched Telephone Network (PSTN), The Voice Over IP Business Case, Emerging Next Generation Carriers, Introduction to Voice Over IP in the Enterprise, Voice Over other Packet technologies, Emerging Voice Transports. Networking Protocols: Introduction to TCP/IP, Routing in IP Networks, Call Control in IP Networks, QoS related Networking Protocols, Examples of Real World LAN/WAN topologies with Voice Over IP services. Voice Encoding Standards: Overview of encoding standards used for Voice Over IP, G.711 Pulse Code Modulation (PCM), Linear Predictive Coders (LPCs), Code-Excited Linear Predictive Coders (CELPs), G.723.1 and G.729. VoIP Issues: Jitter and Delay in Voice Over IP, Echo Cancellation, Packet Size, Gateway for Voice-to-IP and IP-to-Voice conversations, Real World Implementation Examples: Carrier implementations of VoIP, Enterprise implementations, Vendor offerings - Overview of Cisco's AVVID architecture and equipment, VoIP in the Enterprise Call Center, Case Study - Voice Over IP in the distributed Enterprise.

Credits : 3; Pre-requisite: ETE 302.

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 CSA. 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. 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 loading. 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. Tanenbaum, 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 non-trivial dependencies; Closure of a set of dependencies; Closure of a set of attributes. Normal Forms:- 1NF, 2NF, 3NF, BCNF Non-lossless 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 300.

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.

ETE 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 direction, blackboard systems, PS implementation. Rule 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.

ETE 477: 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.

ETE 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(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; Prerequisite: All Required Courses.

FIN 101: Principles of Finance

This course is designed to provide the basic concepts, principles, analytical methods and tools that are used in basic financial management. The course includes the following topics- the study of financial environment including financial markets, instruments and institutions, risk and return, valuation of financial assets, introduction to capital budgeting and financial statement analysis.

Credits: 3; Prerequisites: ACT 101, STA 101, ECO 101.

FIN 201: Business Finance

This course has been designed to develop understanding of both theoretical and practical issues of financial decision making tools for the students. After completing this course, students are expected to be able to make many financial decisions both at strategic and operation level related to cost of capital, analyzing company's current financial policies and redesign a more effective financial planning and controlling mechanism through ratio analysis, short-term liability management, management of working capital, managing the very basics of operation process like management of inventory, management of receivables, designing credit policy that improves the market share and cash flow, usability of financial and operating leverage to multiply the return to the shareholders.

Credits: 3; Prerequisites: FIN 101

FIN 335: Financial Institutions and Markets

Financial Markets facilitate the flow of funds in order to finance the investment by individual, corporations and Governments. Financial Institutions are the key players in Financial Markets. Hence an understanding of money markets, capital markets: equity market and bond market, financial instruments traded in these markets, valuation and risks of these instruments, determination of interest rates, term structure of interest rates, primary market and stock offering, secondary market and market microstructure, mutual funds operations, pension funds operations, discussions of major financial institutions and the understanding of the Financial Markets and Institutions in Bangladesh with its regulatory environment are the major focus of this course.

Credits: 3; Prerequisites: ECO 102, FIN 201

FIN 350: Real Estate Finance

Real estate assets account for about one-third of the value of all capital assets in the world. Therefore, this immensely important course provides students with a comprehensive understanding of real estate valuation, house price dynamics, real estate brokerage, real estate liabilities, decision-making and public policies associated with real estate investment, using modern finance and economics tools. Topics of studies includes: real estate properties - cash-flow uncertainties, debt sources and tax features etc, commercial real estate markets, financing and valuation of real estate, commercial real estate investment strategies, residential real estate markets and housing prices, real estate brokerage markets, mortgage and structured finance markets, applications of basic tools of finance to evaluate the mortgage, lease, and asset-based contracts. pricing of these contracts, strategy to securitize both debt and real estate equity, and recent topics like housing market bubble and crisis in real estate sector across the globe.

Credits: 3; Prerequisite: FIN-201

FIN 380: Management of Commercial Banks

With the increasing importance of commercial banking in the economic development, it has become necessary for students to know about the managerial issues of banks. This course is designed to acquaint

the students with the basic ideas, practice and principles of banking in Bangladesh. The topics include banking environment, deposit products, interest rate, credit management, investment function, capital and risk management, liquidity management, off balance sheet activities, banking regulation etc.

Credits: 3; Prerequisite: FIN-201

FIN 408: Financial Analysis and Control

This course is designed to provide students with tools and techniques for proper analysis of financial statement of business organizations. The analysis will focus from the point of view of the primary users of financial statements: equity and credit analysts, corporate managers and those trained to be managers, requiring an understanding of how financial statement provides information regarding an enterprise and its functions, understanding and analysis of basic financial statements, such as, the income statement, balance sheet, and statement of cash flows, foundation of ratio and financial analysis, analysis of inventories, long-lived assets, financial liabilities, inter-corporate investments, and accounting-and-finance based measures of risk.

Credit: 3; Prerequisites: ACT 201, FIN 201

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 Pooling, 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 is designed to equip the students with the underlying concepts, theories, and models related to the analysis and management of investment in financial market place. The emphasis is placed on understanding how an investment professional would allocate funds in constructing and managing investment portfolio. The course gives emphasis on three major areas. Investment issues and environment, revisiting the linkage between real and financial economy in the wake of global financial crisis, a review of financial products, a comprehensive review of mutual fund and merchant banking operations with especial focus on Bangladesh, understanding the mechanism of stock exchanges with focus on Dhaka Stock Exchange; risk-return tradeoff, portfolio construction and optimization models like modern portfolio theory, capital assets pricing model, index models etc., fixed income securities analysis: duration, convexity, maturity matching, and measuring portfolio performances; option market ideas and strategies, market efficiency, technical analysis and behavioral finance.

Credits : 3; Prerequisites: FIN-201, MAT-211, STA-217

FIN 435: Managerial Finance

This course is designed to orient students with tools and techniques that financial managers use for making decisions in companies and firms with efficiency. After completing the course, the students are expected to learn about an overview of managerial finance, corporate firm and goals of corporate firm, managerial goals, agency conflict, agency costs, ethical issues in managerial finance and firm's value, capital budgeting decision, risk and refinements in capital budgeting, leverage and firm's capital structure, dividend decision, firm's exposure to hybrid and derivative securities: preferred stock, warrants, convertibles and options; lease financing, corporate merger analysis: rationale for merger, types of merger, merger valuation, setting the bid price, tactics to prevent a hostile takeover.

Credits: 3; Prerequisite: FIN 201

FIN 450: Cases in Financial Management

The decision making process of a financial manager is rather a practical issue than theoretical. So class

room discussion on theoretical issues is not sufficient to equip the students to face the challenges of real world. Hence the objective of this course is to enhance the capability of students to deal with practical financial problems by assigning them some real world financial cases, so that they can have a virtual experience in practical decision making of a financial manager by solving those cases along with their course work. It will include case problems on capital budgeting, financial planning, cost of capital, capital structure, dividend policy, mergers and acquisitions, financial distress and financial restructuring and real options. Students are expected to apply the financial tools and techniques to analyze real world financial cases, make their own decision and judgment, prepare reports and make case presentation extensively.

Credit: 3; Prerequisite: FIN 201

FIN/ITB 465 : International Financial Management

This course focuses on the theoretical and practical aspects of financial management of multinational companies along with due importance on the global financial architecture and its components. Topics include among others: global financial systems and its operation, international financial markets, international capital market, the foreign exchange market, international arbitrage and parity conditions, history and growth of MNCs, international investment and financing opportunities, use of currency derivatives in the management of foreign exchange exposure, foreign direct investment and cross-border transactions, valuation and international restructuring, country risk analysis, and International capital structure, cost of capital, capital budgeting and cash management decisions.

Credits: 3; Prerequisite: FIN-201

FIN 475: Option and Future

This course provides a thorough introduction to the valuation, characteristics and use of different financial derivatives. Topics include forward and futures contract, option, swap and other derivatives; forward contract: forward market, participants, quotation, premium or discount, relationship between forward and spot price, arbitrage arguments; futures contract: futures market, clearing houses, positions, taxation, open interest, making to market, basis, spreads; options: characteristics and principles, pricing relationship and graphical presentation of option's payoff, factor affecting prices of options,

early exercise, equity as a call option, put-call parity and synthetic construction of options, effects of dividends; trading strategies involving options; option pricing models: risk neutral argument, binomial option pricing model, the Black and Scholes options pricing model; options on stock indices, currencies, and futures; credit derivatives, interest rate derivatives, and real options.

Credits: 3; Prerequisite: FIN 425

GEB 101: Basic Biology

Credits 3 Prerequisites: none

This course introduces some of the basic biological concepts needed to prepare the student for a deeper understanding of life at the molecular level. The course will begin with an overview of a scientific view of the origin of life and progress into descriptions of the range of life forms found today. Finally, the course will emphasize evolutionary theory, both as found in worldwide life and as it applies to the behavior of life and the molecules of life in the laboratory.

GEB 103: Cell Biology 1

Credits: 3; Prerequisites: None

Cells and Genomes.: The universal features of cells on earth. The diversity of genomes and the tree of life. Genetic information. Basic cell chemistry and biosynthesis: The chemical components of a cell. Catalysis and the use of energy in cells. How cells obtain energy from molecules. Proteins: The structure and shape of proteins and protein function. Nucleic acids: The structure and function of nuclei acids and chromosomes and DNA replication. How cells read the genome: From DNA to RNA. The uses and functions of RNA. Originally a RNA world? From RNA to proteins. Manipulation of Cells, DNA, RNA and proteins.

GEB 104: Basic Microbiology

Credits: 3+1=4, Prerequisites: None

Basic microbiology will give the students a historical overview of the field of microbiology and its scientific, medical and industrial importance. The remarkable range of the field will be addressed both in class and in lab. Theoretical discussions in class will focus on the biology of microorganisms. Laboratory experiments will focus on the different techniques of how the structure and behavior of microorganisms can be observed and manipulated such as with the different nutrient requirements, the use of antibiotics and the growth of phage.

GEB 105: Cell Biology-II

Credits: 3; Prerequisites: GEB 103

Cell Biology II will be mostly concerned with the nucleus of eukaryotic cells. Of particular emphasis will be the nucleic acids of DNA and RNA. Basic biochemistry, especially of nucleic acids will be introduced. How nucleic acids function and how they can be manipulated will be the main emphasis of the course. Also discussed will be an introduction into current topics of bioinformatics and how that is informing our view of our biological world.

GEB 201: Basic Biochemistry

Credits: 3+1=4, Prerequisite: CHE 108, GEB 103

Basic biochemistry will emphasize the metabolism of the cell. It will focus on how molecules are produced by the cell and how molecules absorbed by the cell are broken down. The energetics of metabolism and ATP metabolism will be a primary topic. Also, the course will integrate with the other courses in the department to give the student a different perspective of some topics such as nucleic acid metabolism that were covered in other courses.

GEB 202: Molecular Biology

Credits: 3+1=4; Prerequisites: CHE 108

The molecular structure and biology of genomes will be the primary topic. Comparisons will be made between the different organization of genomes of prokaryotes, eukaryotes and viruses to show both the required features that all show up and how the problems facing all organisms can be addressed by nature with different solutions. The laboratory course will introduce the basic techniques available to manipulate DNA and to do introductory work in recombinant DNA.

GEB 203: Animal Physiology

Credits: 3 Prerequisites: GEB 103, CHE108

Some of the basic concepts in human physiology will be addressed. Particular emphasis will be placed on the molecular aspects of physiology as they are the ones most likely to be directly addressed using genetic engineering and biotechnological techniques. Also, the basic physiology of some of the experimental animals commonly used in genetic engineering such as *Drosophila melanogaster* will be introduced.

GEB 204: General Genetics and Genetic Analysis

Credits: 3+1=4; Prerequisites: GEB 201, GEB 202

The basic biology of Mendelian and non-Mendelian genetics will be studied in both theory and laboratory work. The theory of the biochemistry of genetics in several different biological systems will be introduced both to show their common features and differences. Also, how these concepts apply to current medical and scientific technologies and problems will be shown.

GEB 301: Plant Physiology

Credits: 3; Prerequisites: GEB 101, GEB 103

Agriculture is perhaps the most rapidly growing area of genetic engineering. Plant model systems are also at the forefront of molecular biology. An emphasis will be placed on some of the distinct features of plants such as the fundamentally different genetics of their reproduction, their structural cell characteristics and their differences in biochemistry such as nitrogen fixation and photosynthesis.

GEB 302: Fundamentals of Genetic Engineering & Biotechnology

Credits: 3; Prerequisites: None

This is a course designed to give the necessary theoretical understanding for a variety of current biotechnological technologies in the fields. The topics covered will include cell tissue culture techniques and recombinant DNA technology and gene cloning. Also, the course will be updated frequently to give the student the basics necessary to understand recent developments and trends in the various fields of biotechnology.

GEB 304: Immunology

Credits: 3+1=4; Prerequisites: GEB 203

Immunology is perhaps one of the most interesting and important of all medical fields. Also, it is central to biotechnology. This course will cover the basics of medical immunology. Some of the rapidly expanding ways that antibodies are being used in both medicine and diagnostic technology will be introduced. The uses of genetic engineering in humans to reverse immunological disorders and control viral diseases such as Aids will also be addressed.

GEB 305: General Virology

Credits: 3; Prerequisites: GEB 104

General Virology will introduce the general themes of the basic biology of these molecular life forms. Different examples from bacteria, plants and animals will be examined in detail to illustrate both the features they have in common and the remarkable differences between them. Also, the course will touch on some of the ways viruses are being used as biotechnological tools.

GEB 306: Environmental Biology

Credits: 3; Prerequisites: GEB 101 and GEB105

Some of the topics included will be the basic concepts in ecology and environmental biology and its effects on and causes by man, the future of biosphere and global climate changes. Both the benefits and disadvantages of our technology will be discussed as well as some of the possible uses for it in the near term future. Also, the ethics of these changes, such as the changes occurring as a result of population growth will be discussed.

GEB 308: Separation Technologies and Analytical Methods

Credits: 3+1=4; Prerequisites: GEB 201

This course will give an overview of the state of the art of biotechnological technologies. This rapidly advancing field often requires exceedingly expensive equipment. However, it is well within the scope of this department to clearly cover the scientific principles involved. Also the student will be prepared to understand the results generated. Available technologies in molecular separation and analysis will be used in the labs both to illustrate the general principles involved in these technologies and to give a deeper understanding of other biological principles covered in other core courses.

GEB 402: Advances in Recombinant Gene Technology

Credits: 3+1; Prerequisites: GEB 202 and GEB 302

The student will be introduced to both a theoretical understanding and a "hands on" experience of DNA manipulation. Recombinant DNA will be illustrated, both as it is known to occur in nature and as it is

practiced in the lab. The course will cover in detail some of the key concepts such as gene regulation and the different ways in nature that genes can move both within an organism and between organism. Students will have the opportunity to practice many of the same techniques routinely used in state of the art scientific research.

GEB 403: Animal and Plant Tissue Culture

Credits: 3+1=4; Prerequisites: GEB 203 and GEB 301.

Tissue culture is an extremely valuable set of techniques with scientific, agricultural and medical applications. The student will be brought up to date on the state of the art of the applications of these techniques in the various disciplines. Also the labs will provide "hands on" experience in using some of the basic techniques that will be encountered in modern research and industrial laboratories.

GEB 406: Genomics, Proteomics and Bioinformatics

Credits: 3; Prerequisites: GEB 202 and GEB 302

This extraordinarily interesting topic is one of the most rapidly advancing areas of science. The advent of cheap DNA sequencing techniques and huge data banks of DNA sequences has led to an explosion of information about disease, evolution and DNA sequence functions. The different ways of examining or "reading" these DNA sequences will be introduced. Students will be given the necessary background information and opportunity to access the on-line tools available to examine DNA (and protein) sequences themselves.

GEB 407: Industrial Biotechnology of Microbial Systems

Credits: 3; Prerequisites: GEB 104

Current industrial applications of microbial systems in production of complex drug molecules, vaccines and commercial products will be explored. Also, the chemical applications of industrial microbiology for the commercial large scale production of simple molecules such as ethanol for fuel will be covered as will more traditional uses such as the production of food. Some of the more traditional uses such as waste management and some of the newer uses such as ore leaching will also be covered.

GEB 408: GMOs, Biosafety Regulations and Environmental Management

Credits: 3; Prerequisites: GEB 306

Genetically Modified Organisms (GMOs) are an increasing common fact of agriculture. Also, they are being produced unintentionally by the widespread use of antibiotics and perhaps other chemicals being introduced into the environment. The practical and ethical issues involved in these facts and possible solutions and other potential uses for GMOs will be surveyed. Also covered will be new ways of detecting organisms that can not be cultured and what uses this information can give.

GEB 410: Current topics in Genetic Engineering and Biotechnology;

Credits: 3 All required courses numbered 100-300.

Students will either choose or be assigned current Genetic Engineering and Biotechnology journal articles from top rated international journals for presentation to the class.

GEB 420: Biochemistry & Molecular Biology of Diseases

Credits: 3 All required courses numbered 100-300.

An introduction to the medical pathology of a number of important diseases including diabetes, cancer, heart disease, AIDS, diarrheal diseases and some lesser known diseases. The emphasis will be on developing an understanding of the diseases at the molecular level, both as lessons in advanced physiology and to bring light to the various molecular approaches being used to treat these diseases. Student will also gain an appreciation of the potentials for future biotechnological advances in treating these and other diseases.

GEB 421: Methods in Enzymology

Credits: 3; Prerequisite: All required courses numbered 100-300.

The biochemical features of enzymes will be covered in detail. Protein enzymes, the basis of all life, are finding increasing use as industrial agents. To prepare for their use in industrial and pharmaceutical applications, the different concepts concerning both their biochemistry and modern industrial applications will be covered in ways that will provide the student with a more profound understanding of the molecules that are found in all genetic engineering and molecular biological work

GEB 422: Developmental Biology

Credits: 3; Prerequisite: All required courses numbered 100-300.

The general principles of the cell differentiation and the development of complex organisms from a single fertilized cell will be covered. Both plant and animal topics will be covered. The topics will include both a description of the visible developmental features and a description of our understanding of the complex genetics and epigenetics involved. Also covered will be how knowledge from more simple developmental systems such as *Drosophila* are giving/helping processes found to be involved also in humans.

GEB 423: Human Molecular Genetics and Molecular Diagnostics

Credits: 3; Prerequisite: All required courses numbered 100-300.

The current revolution in DNA informatics is proving of particular value in diagnosing human disease. It is absolutely true to say that there are increasing numbers of people alive today because it was possible to diagnose their disease early by the use of DNA technology. How the information necessary for these diagnoses are being discovered and their medical applications is one of the centers of concern today in genetic research. This course will attempt to give the student the basic information necessary to understand a field that is expected to revolutionize medicine in the next few years as it becomes economically feasible to sequence a patient's genomic DNA, perhaps as early as at birth.

GEB 424: Microbial Genetics

Credits: 3; Prerequisite: All required courses numbered 100-300.

This course will focus on the general principles of microbial genetics. Special emphasis will be given to processes and features unique to prokaryotes. Also, the use of prokaryotic systems as research tools will be discussed in detail.

GEB 425: Plant Development Biotechnology

Credits: 3; Prerequisites: GEB 301

Special emphasis will be given in this course to techniques with agricultural applications. Both the

propagation of existing strains and development of new strains will be covered as will the possibilities of biotechnology in developing new types of crop improvements..

GEB 426: Pharmaceutical Biotechnology

Credits: 3; Prerequisites: GEB 201

Pharmacologically important proteins, monoclonal antibodies, proteomics in pharmacology, analytical methods for pharmaceutical biotechnology, formulation of bioactive proteins and peptides, various types of recombinant insulin, protein drug delivery systems, pharmaceutically important phospholipids, pulmonary drug delivery systems for biopharmaceuticals, polymeric system for oral protein and polypeptide delivery; harvest, propagation, isolation and utilization of vaccine antigens; current status of gene therapy, vectors used in gene therapy, antisense oligonucleotides as drugs, delivery of antisense to target cells, regulatory and compendial issues, challenges and the future directions of pharmaceutical biotechnology.

GEB 427: Stem Cells and Tissue Engineering

Credits: 3; Prerequisites: GEB 203

Properties of stem cells, embryonic stem cells, isolation of stem cells from tissues, special culture media and culture conditions for stem cells, synthetic versus stem cell-derived skin, scaffold materials used in tissue engineering, production of stem cell derived era, nose and bladder, use of stem cell in cell therapy, treating Parkinson's disease by stem cell therapy, stem cell in repairing damaged organs such as heart, muscle and bone, regulatory issues in stem cell research, future of stem cells research and tissue engineering.

GEB 428: Forensic Biology

Credits: 3; Prerequisites: GEB 302

Forensic Biology and Toxicology is concerned with the application of the techniques of molecular biology (DNA profiling) and analytical chemistry (drug and alcohol analysis) to the fight against crime.

The major provides in-depth study of modern molecular genetics including practical training in the techniques of genetic analysis such as the polymerase chain reaction (PCR) and the use of STRs (short tandem repeats) and SNPs (single nucleotide polymorphisms) to identify regions of DNA. The application of these techniques to the analysis of ancient DNA is also discussed. Training is provided by forensic science professionals in forensic pathology, forensic anthropology, forensic toxicology and forensic botany with an emphasis on the gathering of evidence and its presentation in court.

GEB 489: Industrial Training/Internship

Credits: 3; Prerequisite: All required courses numbered 100-300.

Each student will be placed on industrial training for one semester in an organization of related industry. The student must complete the training within one consecutive semester.

GEB 490 Research Proposal

Credits: 3 All required courses numbered 100-300.

Student will research an approved current topic and provide a realistic research proposal of some significance and present and defend this proposal. The general format will be the student will present a seminar on the background material and the proposed research to the entire student body and then defend the proposal before a committee of faculty members. The student will be evaluated on their seminar, committee defense and submitted written proposal.

GEB ELECTIVE UPPER LEVEL COURSES

GEB 499: Research Project

Credits: 3; Prerequisite: All required courses numbered 100-300.

Individual research projects will be arranged for a student to actively pursue original laboratory research of some significance.

GEN 201: Bangladesh Studies

The objective of this course is to familiarize the students with the notion of our glorious struggle for the independence of Bangladesh as well as the thematic areas of national importance and public good. The course will be offered from an interdisciplinary perspective with the aim of covering a wide range of issues including the pre-colonial and colonial historical episodes leading to the emergence of the nation-state; geographic features, natural resources, and environmental aspects; education, society, and politico-cultural change, economic and social inequality, and urbanization; functioning of state focusing judicial, administrative, and legislative systems and governance; socio-economic development focusing on economic growth plans (rural and urban), poverty eradication, livelihoods, social transformation, social safety net, local governance, role of NGOs, civil society, and development agencies and partners.

Credits: 3; Prerequisite: ENG 102

GEN 204 : Western Thought

The aim of the course is to introduce students to some masterpieces of western literature. The course includes selections from William Shakespeare, Charles Dickens, Anthon Chekov, Guy de Mupassant, Robert Frost, T.S. Eliot.

Credits: 3; Prerequisite: None

GEN 205 : Introduction to Psychology

This introductory course on Psychology aims at familiarizing the students of other disciplines with the central concepts and theories of Psychology. It covers both the traditional areas of Psychology and applied topics, including the biological foundations of behavior, sensation, perception, learning, memory, abnormal behavior and treatment and health psychology. The course will not only provide the students with a conceptual overview of understanding human behavior and mental processes, but also a pathway to self-understanding, offer the potentials of a future career, and will give them an opportunity for intellectual discovery.

Credits: 3; Prerequisite: ENG102

GEN 207 : Industrial Psychology

Industrial Psychology (I/O Psychology) is the applied field in which the principles of psychology are used to provide insights into how organizations function, and why they do, what they do. This course is based on the science of peoples' behavior at work and the application of psychological principles of organizational and work settings. The purpose of I/O Psychology is to show 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 will provide an opportunity for cultivating the skills of evaluating arguments and developing the habits of cooperative rather than adversarial argumentation for problem solving and effective deliberation. The topics to be discussed include: Definition, Nature and Scope of Philosophy; Thinking as the way we make sense of the world; Problem Solving as Thinking Critically; Theories of Reality; Knowledge; Values; Theories of Truth; Proofs for the existence of God; Problem of Freedom of Will; Mind-Body Relation; Existentialism, Pragmatism and Logical Positivism as philosophical trends.

Credits: 3; Prerequisite: None

GEN 210 : International Relations

The study of International Relations attempts to analyze world events and speculate future in a systemic way. The basic objective of this course is to understand the world that is fast changing. Towards this end, this course intends to equip the students with knowledge and analytical tools necessary to comprehend, evaluate, and respond to an

increasingly complex array of problems both at the national and international levels. The course focuses on such key areas as Theories of International Relations, Concept of Power, War and Peace, Diplomacy, United Nations, Regional Organizations, Nuclear Arms Race, Inter-State Conflict and Cooperation, International Terrorism and Counter Terrorism, Third World Poverty, International Development, and Globalization.

Credits: 3; Prerequisite: ENG 102

GEN 211 : Concepts of Journalism & Media Studies

The broad objective of the course is to examine the basic tenets of newspaper journalism on one hand and media studies on the other. Journalism: the specific objective of the course in Journalism is to show 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: The students will be introduced to the various forms of media including print and electronic such as newspaper, radio and television; conceptual learning about operating system of different form of media especially the applications of information technology in TV; news script writing for print and TV media.

Credits: 3; Prerequisite: ENG 102

GEN 213: Introduction to German Language

This course will intends provide an opportunity of gaining elementary competence in German language. It will enable the course participants to verbally act and react in simple everyday life situation.

Credits 3; Prerequisite: None

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 a basic competence in Spanish language. 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 important 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 give a basic functional knowledge of Arabic. Interest in the Arabic language has increased greatly throughout the world.

Credits 3; Prerequisite: None

GEN 223: Contemporary Security Studies in Asia-Pacific

This course focuses 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---nuclear 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 224 : বাংলা ভাষা (Bangla Language)

স্নাতক (Undergraduate) পর্যায়ের ছাত্রছাত্রীদের বাংলা ভাষায় লিখন ও সৃজনশীলতা বৃদ্ধির লক্ষ্যে এই কোর্সটি প্রণীত হয়েছে। মাতৃভাষায় দক্ষতা বৃদ্ধি যে-কোনো মানুষের প্রকাশ ক্ষমতার পূর্বশর্ত। মাতৃভাষায় দক্ষতা অন্য ভাষা শিক্ষণের ক্ষেত্রেও পূর্বশর্ত হিসেবে কাজ করে। সৈদিক বিবেচনা করে এই কোর্সে বাংলা ভাষার অতি আবশ্যিক কতিপয় বিষয় পাঠ্যসূচির অন্তর্ভুক্ত হয়েছে। এই কোর্সে বাংলা ভাষার ধ্বনি, শব্দগঠন, বানানের নিয়ম, উচ্চারণরীতি, প্রয়োগ-অপপ্রয়োগ, পরিভাষা, সমার্থ শব্দ, চিঠিপত্র ও দরখাস্ত লিখন, সাহিত্যের বিভিন্ন রূপকল্প (কবিতা, উপন্যাস, ছোটগল্প, নাটক, প্রবন্ধ) অন্তর্ভুক্ত করা হয়েছে।

Prerequisite: None

Credit: 3

GEN 225: Demography and Economic Statistics

The course is designed to introduce students to basic concepts of demographic measurement and modeling used to study changes in population size and composition. The course covers basic measures of mortality, fertility and migration; life table

construction; multiple decrement life tables; stable populations; population projections; and age patterns of vital events. Students will learn to apply

demographic methods through a series of weekly problem sets.

This course covers basic descriptive statistical techniques used in analyzing data in the perspective of social science. Statistics is the science of collecting, organizing, summarizing, and analyzing information in order to draw conclusions. Statistics is a discipline that plays a major role in many different areas. For example, it is used in sports to help a sports team make informed decisions about their competition. It is used to predict the outcome of elections and to help determine government policies. Statistics assists in determining the effectiveness of new medications. It is used by agronomists to find higher yielding varieties of crops. Animal scientists use statistics to find new feeding regimes for animals. Statistics plays a major role in economics in testing hypotheses about economic relations. Statistical models are used by economists to predict economic output, interest rates, stock and commodity prices, and many other economic variables. The above applications will be highlighted in this course.

Credit: 3, prerequisite: none

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 morality 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 morality, codes of professional conduct-purpose of a code of conduct, critical elements in the development of a code of professional conduct, rules of professional conduct, professional standards.

Credits: 3; Pre-requisite: ENG 102

HRM 301: Human Resource Management

This course covers the concept of Human Resource Management and its importance; factors in organizational performance; HR planning; job design; recruitment and selection; training and development; performance appraisal; compensation and motivation; health and safety; international HRM; labor relation and the future of HRM.

Credits: 3; Prerequisites: MGT 101, MGT 251

HRM 411: Human Resource Planning

This course introduces the importance of human resource planning in overall human resource management of an organization. Topics covered in this course: reasons and importance of human resource planning; various forecasting techniques of manpower planning; demand and supply methods of human resources and availability; methods of calculating manpower needs for future requirements; approaches to manpower monitoring and controlling; HR auditing; International HRM; career development issues and role of succession planning in human resource planning.

Credits: 3; Prerequisites: MGT 251, HRM 301, MAT 211, STA 101.

HRM 412: Compensation Management

This course examines the strategic choices in managing total compensation. The total

compensation model introduced serves as an integrated framework throughout the course. The major topics to be discussed include: meaning of compensation, dimensions of compensation system, work and rewards, identifying job contents and determining payment, compensation survey, performance appraisal, designing pay structure, employee incentives and fringe benefits.

Credits: 3 Prerequisites: MGT 251, HRM 301

HRM 414: Industrial Relations

This course has two major areas - Theoretical Part and Labour Code Part. Major topics covered under Theoretical Part are: Industrial Revolution and Nature of Industrial Relations; Theories of Industrial Relations; Trade Unions; Collective Bargaining; and International Labour Organization (ILO). Different legal provisions of The Bangladesh Labour Code, 2006 have been covered under Labour Code Parts which are Definition of different terms; Employment and Conditions of Service; Employment of Adolescent; Maternity Benefit; Special Provisions relating to Health, Hygiene and Safety; Welfare Measure; Working Hour and Leave; Wages and Payment; Wage Board; Compensation for Injury by Accident; Trade Unions and Industrial Relations; Settlement of Disputes, Labour Court, Labour Appellate Tribunal, Legal Proceedings; Workers' Participation in Companies Profits; Provident Fund; Offence, Penalties and Procedure etc.

Credits: 3; Prerequisites: MGT 251, HRM 301, BUS 361.

HRM 415: Training & Development

The course is basically a ToT (Training of the Trainers) course i.e. it has been designed for the trainers. Training is a process and as a process it includes some steps. These steps are Training Needs Assessment; Designing Training Programs; Implementing Training Programs; Evaluating Training Programs; Checking and Ensuring the implementation of learning from Training Programs. This course demands the detail discussion of each of these different steps of training process. Other topics of this course are training policy; performance model; strategic significance of training; learning organization; learning approaches in training; methods of training; special issues of training and development; and special issues of training and development in Bangladesh.

Credits: 3; Prerequisites: MGT 251, HRM 301.

HRM 416: Strategic Human Resource Management

This course addresses the strategic role that human resource management plays in creating competitive advantages for firms. Major topics include Strategy formulation and implementation; Role of HRM in supporting the corporate strategies; Impact of workforce diversity and globalization; Finding the HR fit in the organizational goal setting and mission achievement; HR inputs in the organizational strategic management process; Human Resource Management in the face of rapid technological changes; globalization and rising employee expectation.

Credits: 3; Prerequisites: MGT 251, HRM 301, HRM 411, HRM 412

HRM 418: Job Analysis and Performance Appraisal

This course deals with analyzing job for selecting right people for the organization and evaluating employee performance for rewarding. Course topics include Job analysis and Job evaluation; Job analysis and selection; competency modeling; Measuring employee behavior and performance; Various appraisal methods and systems; Developing and administering an effective performance appraisal system; Linking performance with reward; Motivating employees through rewards; Legal issues in performance appraisal administration; Emerging issues and innovations.

Credit: 3 Prerequisites: MGT 251, HRM301

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.

Credit: 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,

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, R.C. 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, Prentice 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:- 1NF, 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 175.

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; Prerequisite: 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 coordinates (Rectangular, Cylindrical and Spherical), Gauss's theorem, electrostatic potential, Laplace 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.K.K. 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 distortionless 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; Prerequisite: 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 Farnik, 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; TDMA System application examples; Idea of cryptography.
Credits: 3; Prerequisite: 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 processes, 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, parasitics 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 multiport analysis techniques. Impedance Matching: Design of matching networks including lumped elements, stubs and transmission line sections, circuit tuning. Passive Components: Theory of operation, practical design and implementation of power dividers, directional couplers and hybrids, resonators as well as system applications of these devices. Noise and distortion in RF Systems: Theory of noise in RF circuits, distortion of RF signals, dynamic range limitations, effects on channel capacity. Active Circuits: Theory of operation, practical design and implementation of amplifiers for low-noise or power applications, detectors, mixers; Overview of microwave tubes and solid state devices. Non-Reciprocal Devices: Theory of operation and implementation of isolators, circulators and variable attenuators and phase shifters. Microwave Systems: Receiver and system performance calculations, RF link analysis, end-to-end microwave system ("the physical channel") analysis. Applications: Antennas, propagation and microwave filter synthesis. 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 comparison of FDM/TDM systems and CDMA. Discussion of GSM standards; signaling and call control; mobility management; location tracing. Wireless data networking, packet error modeling on fading channels, performance analysis of link and transport layer protocols over wireless channels; wireless data in GSM, IS-95, GPRS and EDGE.

The course includes lab work based on theory taught.

Credits: 3; 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, coherent 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, Thiagarajan Viswanathan, Prentice-Hall of India.

Reference Book: Signaling in Telecommunication Networks, John G. van Bosse, John G. Bosse, Bosse Van Bosse, John Wiley & Sons.

ICE 446: Satellite Communications

Orbits: Kepler's Laws, Newton's Law, Orbital ParamECEs, 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. Tanenbaum, 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 service, will be discussed. The H.32x series, standards for audiovisual communication systems in various network environments, will be described. Current research results in multimedia communications will be reviewed through student seminars in the last weeks of the course.

The 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 complementary 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. Tanenbaum, 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 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: 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 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 on industrial training/internship for two semesters in an organization of related industry instead of doing Research Project.

Credits: 4; Prerequisite: 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 in international trade. Major topics will include balance of payments, exchange rate regimes, Spot market, Forward market, BP curve, J-curve and the practices of IMF, World Bank, ADB, IDB, and other multilateral institutions.

Credits: 3; Prerequisite: ITB301, FIN201

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 today's global economy. This course offers a complete and proper understanding of the meaning of International competitiveness, analyzes the implications it holds for an economy's progress, examines how it may be pursued and sustained at both the sectoral 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 Ewens, 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 determinant, 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 eigenvectors: Concepts on eigenvalues and eigenvectors, 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 206: Basic Algebra and Linear Algebra Credit 3

Part A: Basic Algebra

Theory of numbers: unique factorization theorem; congruencies; Euler's phi-function. Inequalities: order properties of real numbers; Weierstrass', Chebysev's and Cauchy's inequalities; inequalities involving means. Complex numbers: field properties; geometric representation of complex numbers; operations of complex numbers. Summation of algebraic and trigonometric finite series. Theory of

equations: relations between roots and coefficients; symmetric functions of roots; Descartes rule of signs; rational roots; Newton's method.

Part B: Linear Algebra

Vectors: operations with vectors; scalar product; norm of a vector; vectors in n-space, Euclidian n-space; vector space and sub-space; linear combinations of vectors; spanning set; linear dependence and independence; basis and dimension; inner product spaces; orthogonal and orthonormal basis; Gram-Smidtorthogonalization process; System of linear equation: homogeneous and non-homogeneous. Introduction of matrix; solution using Gauss, Gauss-Jordan elementary operations; definition and operations using matrices; different types of matrices. Transpose of a matrix; trace of a matrix; determinant of a square matrix; adjoint of a square matrix; inverse of a matrix; properties of inverse. Elementary matrix and method for finding inverse using elementary operations and by partitioning; solution of system of linear equations by matrix inverse and Cramer's rule. Rank of matrices and related theory; linear transformation; eigenvalue and eigenvectors; diagonalization, orthogonaldiagonalization. Fundamentals of quadratic forms and it's application in statistics; differentiation of matrix; g-inverse.

Text Books

1. Anton, H and Rorres, C (2005). Elementary linear algebra,

2. Searle, SR (1982). Matrix algebra useful for statistics.Wiley.

3. Ayres, F (1995). Theory and problems of modern algebra.McGraw-Hill.4th edition.Wiley.

MAT 211: Mathematics for Business and Economics II

Equilibrium Analysis: Partial market Equilibrium, General market Equilibrium. Marginal Analysis in Business and Economics, First derivatives and graphs. Second derivatives and Graphs. Optimization problems (Unconstrained): One or more than one choice variables. Optimization with equality constraints. Economic Dynamics and integral calculus. Linear programming: General Formulation of Linear Programming Model, Solving LP problem Using Graphical Method and Simplex Method. Duality of 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 responsibility, planning setting objectives, implementing plans, organizing, organization design, managing change, human resource management-directing, motivating, leading managing workgroups, controlling- controlled principles, processes and problems, managing in a changing environment.

Credits: 3; Prerequisites: BUS 101, ENG101

MGT 251: Organizational Behavior

This course exposes students to advanced behavioral science theories and applications in management. The course includes Introduction to Organizational Behavior, Foundation of Individual Behavior, Perception of Individual decision making, Value attitudes and job satisfaction, Power and Politics, Conflict in organization, Motivation from concepts to applications, Foundation of group behavior, Understanding team work, Basic approaches and contemporary issues in leadership, Understanding interpersonal communication in organization, Understanding organizational Culture, Understanding

cultural diversity, Stress and work life balance, Human resources policies and practices.

Credits: 3; Prerequisites: MGT101

MGT 321: Industrial Management

This course should be taught with emphasis on engineering and technological dimensions and practical examples drawn from engineering organizations and practices. Topics to be covered: Business Environment (Types of Business, Entrepreneurship skills, the external environment of business, SWOT and PEST Analysis, Steps in setting up a new business). General Management (Managerial Roles and Skills, Five Basic Functions of Management, Organization Structure, Typical structure of a manufacturing organization, Managerial tools for Decision Making, Leadership, Motivation models, Strategic Planning). Operations Management (Product and Services, Product design and process selection, Facility location and layout, Operation planning and scheduling, quality management, inventory and material management, productivity measurement and improvement). Financial Management (Basic accounting and financial concepts, Introduction to Financial Statements, Financial statement analysis).

Credits: 3+0=3; Pre-requisite: ENG102

MGT 337: Production Operations Management

This course is designed to provide the students with an understanding of the foundation of the operations function in both manufacturing and service. The course provides a general introduction and frameworks to manage manufacturing and service operations efficiently. Topics include Introduction to Operation Management, Operation strategy, Forecasting Models, Material Requirement Planning (MRP), Production Scheduling, Facility Location and Layout Planning, Decision Analysis, PERT/CPM Analysis, Gant Chart, Supply Chain Management.

Credits: 3; Prerequisites: MAT 100, STA 101, STA217, MGT 101

MGT 402: Management Science

Survey of the current literature in Management Science examines principles and practices of scientific management. Selected topics in this course include:

MBO, quantitative methods, markov decision problems, simulation and queuing theory.

Credits: 3; Prerequisite: STA 217, MGT101

MGT 405: Organizational Development and Change

Provides an understanding of basics of organizational development, organizational renewal and change, intervention process. The objective of this course is to provide students with an integrated and comprehensive view of the field of organizational development.

Credits: 3; Prerequisite: MGT251

MGT 410: International Labor Management

This course provides an overview of the history and development of labor relations, the structure of union organizations, and process of negotiations and contract administration. Topics include the study of labor management in developed market economies, international bargaining, ethics and employee relations. This course is a balanced approach from international or management viewpoint and an analysis from a behavioral, institutional and economic perspective.

Credits: 3; Prerequisite: BUS361, MGT101

MGT 421: Entrepreneurship Development

The objective of the course is to prepare students for the possibility of starting their own entrepreneurial ventures. The course includes topics on theories and characteristics of entrepreneurship, environmental conditions, scanning and evaluation of investment opportunities, forms of business ownership, government regulations sources and procedure of assistance, market study of production process, organization and staff planning, project appraisal and management information systems. The emphasis of the course is on improving the skills of the innovative individuals who identifies a market opportunity and mobilizes factors of production .

Credits: 3; Prerequisite: MGT101

MGT 425 : Total Quality Management

Examines major issues of TQM principles and theories. Topics include Demings, Jurans, Croosbys

TQM principles, JIT, HRM, Leadership theories, Quality and operational research.

Credits: 3; Prerequisite: MGT101

MGT 437: Small Business Management

Managing small firms is a multidisciplinary activity. Planning activity binds all other activities together. Besides planning, the course covers topics such as: setting up, business basics, finance, control and the growing business.

Credits: 3; Prerequisite: MGT101

MGT 448: Managing Globalization

This course contains topics on organizational strategy; global competitive advantage; management dynamics: structuring, staffing, & sharing values; and cases regarding global management. This course also covers cultural and behavioral aspects of globalization, functional aspects of globalization and socio- ethical issues relating global management.

Credits: 3; Prerequisite: ITB301 MGT101

MGT 465: Leadership Management

This program responds to the leadership development needs of government and non-government organizations. This program provides a means by which students may discover and refine abilities fundamental to effective leadership.

Credits: 3; Prerequisite: MGT251

MGT 480: Strategic Management

Analysis of policy formulation and implementation from a company wide stand point. Emphasis on integration of knowledge and approaches across functional areas, both endogenous factors, which affect company policy and the role of the firm in the society.

Credits: 3; Prerequisite: 99 credits

MIS 101: Introduction to Management Information Systems

The primary objective of this Course is to give an idea of different components of the information

Systems & the applications of computer in different areas of businesses. The course will include the following topics: Information system concepts, Application of IS and IT in Business, Hardware, software, database, personnel and procedures component of IS and their role in Business, IT infrastructure and emerging technologies, Security and control issues in IS, Privacy issue in IS, Introduction to e-commerce and Database, Introduction to networking and networking in details, IT ethics, Ethics and system quality, Different types of collaboration, office automation and virtual work environment. It will also include fundamental of spreadsheet analysis, Inventory control system, auditing formula, Business forecasting tools such as sensitivity analysis, goal seek, scenario manager and different types of look up application in business.

Credits: 3; Prerequisite: CSE101

MIS 305: Enterprise Information Systems

This course provides an introduction to management information systems, what they are, how they affect the organization and its employees, and how they can make businesses more competitive and efficient. The course will focus on ways in which advances in information technology and communications networks continue to recast the role and value of information systems in business and management. Example topics include: organizational and technical foundations of information systems, systems development, information management, infrastructure management, system security, and creative business applications of information technology. Database management system, E-commerce, ERP, designing database, filtering data, query management, enhancing decision making etc.

Credits: 3; Prerequisite: MIS 101

MIS 401: Structural Programming

The course introduces students to basic programming concepts. Topics include Definition of Structure programming, Pseudo-code, Flowcharts, Data type, Expression, Variable & Reserve word, Memory variable address, print function, Input, Array & Boolean expression, If statement, If else statement, Repetition structures (looping), Function & procedure: Definition, argument/parameter, call by value / call by reference, String operation, pointer. The course includes lab work based on theory taught.

Credits: 3; Prerequisite: MIS 305.

MIS 402: System Analysis and Design

This course aims to familiarize the students with the role as A system analyst and System Designer who can play an important role to introduce and manage an Automated modern organizations. This course will help to understand the requirements of a business entity and then design and implement an effective information system to assist that business in its business functions. It also course covers the traditional structured analysis and design approach and the emerging, prevailing object oriented approach. The course presents a variety of methodologies and techniques in modern systems design and analysis

Credits: 3; Prerequisites: MIS 305, MIS 401

MIS 403: Object Oriented Programming

The objective of this course is to teach students to program well in an object-oriented style. It will include object oriented concepts: classes, objects, methods, polymorphism and inheritance with C++/Java. This course will cover syntax, idioms and patterns of C++/Java so that students are comfortable with object oriented programming. This course includes extensive lab works based on theoretical concepts of object oriented programming. Credits: 3; Prerequisites: MIS 305, MIS 401

MIS 404: Networking and Operating Systems

The main object of this course is to understand the basic computer network and different network operating system. To provide students with necessary understanding of computer networks essential to system and network design and network management. Topics include what is network and Why, Communication Model such as OSI and TCP/IP, Types of Network, Network service and software, Network architecture, Signal and data communication, Network media, Network devices, DHCP, DNS, Network protocol, IP addressing and subnetting, Name resolution, IP routing, Network security and Operating systems.

Credits: 3; Prerequisite: MIS 305.

MIS 406: Relational Database Management Systems

The main objective of this course is provide a theoretical and practical guidelines to the students with the background; how to design, implement, and

use of database management systems in business. Upon successful completion of this course, students will have the skills to analyze business requirements and produce a viable model and implementation of a database to meet such requirements. This course focuses on Basic Concept of Relational Database - Database Design & E-R Model, Use of Structured Query Language (SQL), Data Mining & Information Retrieval and also give a guidelines to prepare a Practical DBM Project

Credits: 3; Prerequisite: MIS 305

MIS 407: System Integration & Security and Internet

This course will introduce Business and system specification, existing hardware and software platform, Enterprise application integration, file system of different Operating System, integration features of various systems including hardware and software, security features of different hardware and software, history and current management of Internet engines, Internet services, Electronic business and business promotions, Internet software development and security.

Credits: 3; Prerequisites: MIS 305, MIS 404.

MIS 408: Internetworking with TCP/IP and Implementing Exchange Server

Introducing to TCP/IP identifying machine with IP routing, IP address resolution, host name resolution, Net BIOS name resolution, DHCP, WINS, Internet working, integration of heterogeneous bandwidth environment, SNMP services, Trouble shooting and administration of exchange server.

Credits: 3; Prerequisites: MIS 305, MIS 407.

MIS 409: Client/Server Administration

Domain model in the enterprise, server managing, uses (logical and global) management, resource management, server and client, internet services, inter-network routing, system performance, network monitoring, and server and client trouble shooting.

Credits: 3; Prerequisite: MIS 408

MIS 410: Database Systems

Students successfully completing this course should be able to study the physical and logical database designs with the help of PHP and MySQL. This course will also help to understand and use data manipulation language to query, update, and manage

a database. This course will also help to develop an understanding of essential DBMS concepts such as: database security, integrity, concurrency, distributed database, and intelligent database, Client/Server (Database Server), Data Warehousing. This course includes lab works based on practical theories of DBMS.

Credits: 3; Prerequisites: MIS 401, MIS 406

MIS 415: Decision Support Systems

The course is will introduce with decision support systems; show their relationship to other computer-based information systems, demonstrate DSS development approaches, and show students how to utilize DSS capacities to support different types of decisions. This course covers the topics like DSS components; Decision making and DSS; DSS software and hardware; developing DSS; DSS models; types of DSS; group DSS; executive information systems; data mining; artificial intelligence and expert systems.

Credits: 3; Prerequisite: MIS 305

MIS 419: E-Commerce and Web Programming

The course will include the following topics: E-Business and managing web, different types of E-Business and strategic impact of E-Business, different business model for E-business, E-Commerce in Bangladesh, legal consideration, web application, corporate web server management, Electronic payment system (EPS), Different types of e-services, EDI, EFT, online product promotion, different form of web marketing, E-Supply Chains, Collaborative Commerce, Intra-business EC, Corporate Portals, Role of bank in E-commerce, Mobile commerce in details and web technology. More Emphasis will be given to static and dynamic web development technique using HTML, DHTML, JavaScript, PHP, Joomla, Web page Maker, Sochik software, Macromedia Dreamweaver MX and other web development tools. Other topics will include Domain registration and hosting issues, search engine optimization (SEO), online shopping cart/check out and payment system development etc.

Credits: 3 ; Prerequisites: MIS 305, MIS 401

MKT 101: Principles of Marketing

This course is designed to introduce fundamental marketing concepts, theories and analytical tools critical to manage profitable customer relationships.

today's highly competitive and complex business environment. It provides an overview of all the marketing activities involved in the provision of products to final and organizational consumers. A diverse range of marketing topics is covered in this course including marketing strategy and planning, the marketing environment and how to monitor it, consumer and organizational behavior, marketing research, market segmentation and development of target markets, new product development, pricing, distribution, promotion and international marketing.
Credits: 3; Prerequisite: BUS 101.

MKT 201: Marketing Management

This course aims at developing a solid understanding of the basic terminology, concepts, tools, and frameworks in marketing. A broad range of marketing issues in a variety of consumer, industrial, and service environments is covered. Topics include consumer buying behavior, market segmentation, product positioning, marketing mix, sales force management, and market research techniques.
Credits: 3; Prerequisite: MKT 101

MKT 401: Sales Management

The course is designed to introduce the students with the traits, competence, skills and working methodology of sales people. Special attention will be paid on the growing importance of strategic selling in this age of information. The focus will be on the four components of selling strategy: Relationship strategy, Product strategy, Customer strategy and Presentation strategy. A significant portion of the course will encompass students' hands on learning using sales role playing situation. Sales Management issues like sales budget, sales territories and quota, designing and managing the sales force will be covered to provide a holistic viewpoint. Management of sales not only focuses on sales procedure and salespeople solely rather it emphasizes on ways to integrate the activities of the sales department, to a broad aspect of the marketing department.
Credits: 3; Prerequisite: MKT 201

MKT 402: Integrated Marketing Communication

The Integrated Marketing Communication program is designed for students interested in integrated study of advertising, direct marketing, public relations, publicity, personal selling, sales promotion and digital marketing communication technologies. Emphasis is placed on the ways IMC is used to ensure consistency of messages and complementary use of media in order to maximize the impact on consumers and other audiences. Topics include an evaluation of the role of promotion in marketing and the economy; the formulation and analysis of promotional goals;

planning, organizing, and controlling the promotion function; creative planning; and budgeting and media selection.

Credits: 3; Prerequisite: MKT 201

MKT 408/ITB 408: International Marketing

This course provides a practical overview of the key elements of international marketing and issues businesses face when entering and operating in foreign markets. The course demonstrates awareness of local, regional and international issues that affect businesses. The course also demonstrates the knowledge of international marketing theories that will assist in research, analysis, planning, implementation and evaluation of global operations.

Credits: 3; Prerequisite: MKT 201, ITB 301

MKT 410: Consumer Behavior

Consumer behavior is a broad field that studies how individuals, groups, and organizations acquire, consume and dispose off goods and services. So, the knowledge of consumer behavior has important implications for marketing managers in the areas of environmental analysis, product positioning, segmentation of the market, and design of the marketing mix.

This course examines the underlying psychological, sociological and economic factors which influence consumer behavior. Therefore, it assists the students in solving marketing problem and participating in marketing research.

Credit 3; Pre-requisites: MKT 201.

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

Marketing research serves as a central basis for firm's marketing strategy. It helps managers in addressing marketing problems such as: market segmentation, developing advertising and pricing policies, designing and positioning new products, etc. This course familiarizes the students with the techniques by which data are collected, analyzed, and made available for decision-making use by marketing managers. The approach is to provide a practical orientation to the marketing research process through hands-on assignments and projects.

Credit 3; Pre-requisites: STA 217, MKT 201.

MKT 416: Brand Management

This course is designed to develop the necessary knowledge and skills for creating and managing brands which resonate with customers and allow the marketing organization to build and maintain customer equity in the 21st century. More specifically the course will outline a range of branding theories, concepts, strategies and practices addressing across a range of real world contexts, product types and industries. Topics include assessing brand meaning, brand equity, Customer Based Brand Equity, brand positioning, brand sense, blue ocean strategies, leveraging secondary brand association, evaluating brand extensions, brand audit and building brands via social media.

Credits: 3; Prerequisite: MKT 201

MKT 418: Supply Chain Management

This course aims to discuss about the end-to-end supply chain issues and practices. This course gives emphasis on approaches to create long term relationship with the value chain partners to make the marketing offer available at different stages and also suggest strategies to gain competitive advantage through ensuring maximum utilization of organizational resources. The course includes issues related to supply chain customer services, product characteristics as determinants of supply chain decisions, use of information system to capitalize on supply chain strengths, transportation fundamentals, inventory and warehousing management, distribution channel management, supply chain integration and co-ordination.

Credits: 3; Prerequisite: MKT 201

MKT 430: Strategic Marketing

This course provides students with solid experience in creating market-driven and market-driving strategies for the future success of a business. A focus is on discovering and developing a set of unique competencies for a firm that, through strategic differentiation, leads to sustainable competitive advantage in the marketplace. Students are provided ample opportunity to develop and practice creative

problem-solving and decision-making skills to simulate the requirements of today's complex market environment. Industry analyses will be performed that include the following: internal/external analysis, customer analysis, competitor analysis, market/submarket analysis, and comparative strategy assessment.

Credits: 3; Prerequisites: MKT 201, STA101

PHRM 101: Physical Pharmacy I

This course has the objective to get the students well versed with some of the basic concepts of Physical Chemistry having application in pharmacy, which includes states of matter, solutions, pH, buffer and chemical kinetics. The course has been designed to offer comfort for the students in understanding some of the very cardinal areas of drug manufacturing, realizing the vast roles of numerous chemical kinetics and spelling out some of the unique mechanisms that govern the ADME process.

Credits: 4; Prerequisite: None

PHRM 102: Cell Biology & Anatomy

This course deals with the molecular and cellular processes that occur for the development of human beings. The course will give an overview of basic structure and function of cells, cellular inclusions with anatomical focus. It also deals with anatomical structures and functions of tissues, organs and body systems, steps and histological perspectives of human development.

Credits: 3; Prerequisite: None

PHRM 103: Organic Pharmacy I

The course is designed to study the basic concepts of organic chemistry, atoms and structure, properties, reactions and mechanisms of some important organic reactions to generate compounds of pharmaceutical importance. The study is focused on aliphatic, aromatic and heterocyclic compounds. Synthesis and pharmaceutical uses of sulfa drugs, paracetamol, aspirin etc. will also be discussed.

Credits: 4; Prerequisite: None

PHRM 201: Human Physiology I

The essential concern of physiology is how living things work and, as physiology relates to man, it is the study of the normal functioning of the human body. Human Physiology I emphasizes the basic functions of organs, the interactions and coordination of these diverse functions, and attempts to analyze these functions in terms of physical and chemical processes. The overall objective of the course is to provide the students with an understanding of the specific functions of the major organs and systems of the body.

Credits: 4; Prerequisite: PHRM 102

PHRM 202: Basic Microbiology

This course is designed to introduce students to the historical perspective in terms of major innovations in the field of Microbiology. Basic tools like microscopes of various types, their principles and uses will be covered in this course. Simultaneously, morphology, nutritional requirements, growth of bacteria, virus, fungi, moulds and yeast will be briefly studied.

Credits: 4; Prerequisite: None

PHRM 203: Pharmaceutical Analysis -I

The aim of this course is to enable the students 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 of the stability of drugs formulations, mechanism and rate of degradation by varied processes and different formulation approaches dealing with stabilization.

Credits: 4; Prerequisite: PHRM 101

PHRM 205: Inorganic Pharmacy

The course offers knowledge of various inorganic compounds, which are used in different physiological systems. The mechanisms of action of inorganic compounds in our body, their physical and chemical properties, methods of preparation, assay in laboratory and their application as drugs will be discussed in this course.

Credits: 4; Prerequisite: None

PHRM 206: Biochemistry

The course offers the students to understand the nature of carbohydrates, proteins, lipids, nucleic acids, their structures, reactions, uses, metabolism and synthesis. The course will focus on energy changes, electron transport and ATP generation,

enzyme substrate reaction, competitive and non-competitive inhibition processes. Vitamins, minerals, hormones and their uses as drug molecules will also be discussed.

Credits: 4; Prerequisite: PHRM 103

PHRM 207: Pharmacognosy I

The course is focused on the natural products employed both in traditional and allopathic system of medicine. The basic research of pharmaceutical raw materials from plants and animals and origin of medicine will be discussed. The students will be familiar with varieties of molecular armature having different potential bioactivity. They will get an idea how the concept and development of novel molecular armature of modern medicine come from natural bioactive molecules.

Pharmaceutical use of different phytoconstituents with existing plant classification systems will be discussed in this course.

Credits: 4; Prerequisite: None

PHRM 208: Human Physiology II

This course will deal with the transport, metabolism (wherever applicable) of major biomolecules e.g., carbohydrates, lipids, proteins and nucleic acids including their building blocks (monomers). Mechanism of action of hormones; physiological role of different hormones; regulation of hormone secretion; different hormonal disorders and their control will also be discussed.

Credits: 4; Prerequisite: PHRM 201

PHRM 209: Statistics for Pharmaceutical Sciences

The objective of the course is to equip students with the basic statistical knowledge. The overall objective is to enable the students to understand and use the concepts of statistics as a decision-making and problem-solving tool in pharmaceutical manufacturing, quality assurance, research and marketing.

Credits: 3; Prerequisite: PHRM 204

PHRM 210: Pharmaceutics I

The objective of the course is to give an introduction to basic aspects of Pharmacy, drug, dosage form and drug delivery systems. The students will understand the overall concepts and outlines of pharmaceutical dosage forms and related excipients from this course.

Credit: 4; Prerequisite: PHRM 204

PHRM 211: Organic Pharmacy II

The course is designed to provide advanced knowledge of organic chemistry to the students of Pharmacy. The course includes studies of mechanism of organic reactions like SN1, SN2, E1, E2 etc., stereochemistry, heterocyclic compounds (five membered, six membered fused ring systems) and the chemistry of natural compounds (polyhydroxy alcohols, alkaloids, terpenes etc.).

Credit: 3; Prerequisite: PHRM103

PHRM 301: Pharmacology I

In this course we set out general principles for explaining how drugs work in the living system, the interaction between drugs and different types of drug-receptors in the body. The primary objective of this course is to give the knowledge of drugs, but most importantly, those that are relevant to effective and safe use for medicinal purposes. This course includes physiological and biochemical effects of drugs and their mechanism of actions.

Credits: 3; Prerequisite: PHRM 208

PHRM 302: Medicinal Chemistry I

This course has been developed to make undergraduate students familiar with design and syntheses of organic and heterocycles having potential bioactivities. The course encompasses the chemistry of medicines including structure activity relationship, biochemical and physicochemical properties of different therapeutic classes of medicines.

Credits: 3; Prerequisite: PHRM 211

PHRM 303: Pharmacognosy II

This course includes phytochemistry and pharmaceutical uses of the plant constituents like alkaloids, glycerides, volatile oils and related terpenoids, flavonoids, resin and tannin containing drugs. Its scope includes study of physical, chemical, biochemical and therapeutic properties as well as biosynthesis of drugs from natural sources especially from plants.

Credits: 3; Prerequisite: PHRM 207

PHRM 304: Medicinal Chemistry II

The course aims at providing an idea about the discovery, synthesis and structural modification of drugs. It enables the students to understand the concepts of how the chemical natures of small

molecules influence or exhibit biological activities and how the structural modification influences potential activity. It also emphasizes the influences of the structures on the mechanism of actions of the chemical compounds. Along with these, this course also gives an idea about some name reactions that are used to synthesize many compounds important for the medical science.

Credits: 4; Prerequisite: PHRM 302

PHRM 305: Pharmaceutical Microbiology

This course offers a general overview of the applied aspects of microbiology including sterilization processes, sterility tests of various pharmaceutical products, aseptic techniques and immunological preparations. The objective of this course is to provide a practical and theoretical foundation in the area of pharmaceutical microbiology.

Credits: 4; Prerequisite PHRM 202

PHRM 306: Pharmacology II

The course gives a basic idea about the different types of compounds used in infectious diseases, central nervous system disorders and cardiovascular system disorders. It includes the specific examples along with the mechanism of action, pharmacokinetic profiles, indications, contraindications, side effects etc. of the individual molecules. In the lab classes, this course emphasizes the actions of some compounds commonly used as medical practices. This provides the basic idea of research about the activities of the unknown compounds.

Credits: 4; Prerequisite: PHRM 301

PHRM 307: Pharmaceutical Technology I

This course intends to introduce the students to three major aspects of industrial manufacturing of drugs dosage forms, preformulation studies and drug product developments etc. Here students will be familiar with industrial manufacturing of liquid dosage forms, suspensions, emulsions and suppositories.

Credits: 3; Prerequisite: PHRM 210

PHRM 308: Pharmaceutics II

The overall objective of this course is to enable students to acquire knowledge and understanding of different types of solid dosage forms. The solid

dosage forms include formulation and manufacturing of different types of tablets and capsules, drug release mechanisms, microencapsulation, sustained release dosage forms, advantages, disadvantages and evaluation of these dosage forms.

Credits: 4; Prerequisite: PHRM 210

PHRM 309: Pharmaceutical Analysis II

The objective of the course is to equip the students with the knowledge of pharmaceutical analysis of the dosage forms following more precise methods such as volumetric analysis, aquametry, nonaqueous titrations, spectrophotometry and fluorometry.

Credits: 4; Prerequisite: PHRM 203

PHRM 310: Toxicology

This course has been designed to explain the fundamental principles of toxicology, some basic toxicology terminologies, routes of exposure of different toxicants, and different levels of exposures. The course also emphasizes the toxicokinetics (disposition, metabolism and elimination) and toxicodynamics of various toxicants with a comprehensive knowledge and understanding of the different types and levels of toxicity effects and their mechanisms, e.g. toxicity or poisoning of heavy metals, organic compounds, carcinogens, environmental toxins, etc. It also covers the mechanism of cytotoxicity of various toxicants and responses of different organs to these along with evaluation of toxicity of these agents.

Credits: 3; Prerequisite: PHRM 301

PHRM 311: Clinical & Hospital Pharmacy

The primary objective of the course is to provide students with a comprehensive idea about a hospital and its organizational pattern, drug distribution system and inventory management & documentation. This course also emphasizes overall understanding of practice of clinical pharmacy including stages of life, management of different types of diseases in hospital settings, mechanism of drug interaction & adverse drug reactions and their managements. The case studies of different diseases of different age groups are also to be discussed in this course.

Credits: 3; Prerequisite: PHRM 301

PHRM 312: Pharmaceutical Analysis III

This course is offered to give the detailed knowledge of the principle, methodology and application of thin layer chromatography (TLC), column chromatography, gas chromatography, ion-exchange chromatography etc. The principle, instrumentation of infra-red (IR) spectroscopy, chemical structures/functional groups showing IR spectra, and their applications in pharmaceutical analysis will also be discussed.

Credits: 3; Prerequisite: PHRM 309

PHRM 401: Pharmaceutical Management and Marketing

This course has been designed with an objective to orient the students to the fundamental principles of Marketing Management and its application to the pharmaceutical industry. The course will help to develop a conceptual framework about how pharmaceutical marketing works with respect to various external factors like economic, social, political, legal, technological and ethical factors.

Credits: 3; Prerequisite: PHRM 301

PHRM 402: Pharmaceutical Technology II

The course is introduced to educate the students regarding the engineering aspects of pharmaceutical production technology and the principles involved in drying, freeze drying, filtration, centrifugation, mixing and pelletization etc.

Credits: 4; Prerequisites: PHRM 307

PHRM 403: Drug Design and Development

This course will give a preliminary idea about the necessity of drug design based on lead compounds, modification of the lead structures to improve the activity and to reduce the side-effects. It will also enable the students learn various processes of molecular modification to improve drug receptor interactions and pharmacokinetic properties giving emphasis on some special processes like simplification and rigidification of lead structures, isosteric and bioisosteric approaches, QSAR, pro-drug approach and their role in drug discovery and development. The use of computers in drug

designing and applications of combinatorial chemistry in drug design will also be discussed.

Credits: 3; Prerequisite: PHRM 304

PHRM 404: Pharmaceutical Research

The course is introduced as a means of providing an opportunity for exposure to investigational research. The course is designed principally to help students in practicing the various research patterns in graduate studies. The student undertakes a research project, involves him/herself in through field/lab procedures intensively under the guidance of faculty members and submits a report in a research paper format.

Credits: 5; Prerequisite: Minimum 90 Credits Completed.

PHRM 405: Pharmacy Quality Assurance

Quality assurance (QA) is an essential component in the process of pharmaceutical manufacturing. Its coverage starts from the raw materials to the finished products store. Now-a-days its coverage extends up to intake of those medicines by patients. This course will provide insights on WHO's good manufacturing practice (GMP), the standard principles of quality control (QC), good laboratory practice (GLP) and good clinical practice (GCP). This course will also deal with validation of manufacturing processes, in-process control methods, analytical methodologies, instruments and chemicals and reagents used in pharmaceutical industries. Additionally, this course will describe the procedures to perform stability studies of new products and stored samples. Finally, this course will shed some light on the most recent concept of total quality management (TQM).

Credits: 3; Prerequisite: PHRM 307, PHRM 308, PHRM 309

PHRM 406: Biopharmaceutics & Pharmacokinetics

This course explores how the functions of drugs in the body are influenced by physiological and biochemical processes. It will give an overview of time course of drug action in human body. It incorporates the basic techniques to determine the dose in normal and pathological conditions and has an orientation where the knowledge can be applied in a clinical set-up (case based analysis).

Credit: 4; Prerequisite: PHRM 308

PHRM 407: Pharmaceutical Biotechnology

The course offers modern biotechnological approaches like recombinant DNA technology, gene therapy, antisense oligonucleotide therapy, vaccine technology; immobilization of enzymes and fermentation technology. Gene cloning will also be introduced in terms of their innovations and uses/applications for pharmaceutical purposes.

Credits: 3; Prerequisite: PHRM 206, PHRM 305

PHRM 409: Advanced Pharmaceutical Analysis

The objective of this course is to orient students with the principles, instrumentation and applications of NMR Spectroscopy and Mass Spectrometry in order to understand characterization of the structure of unknown compounds by the combined application of all spectroscopic methods. It will also enable the students to understand the principles, instrumentation and application of HPLC in advanced pharmaceutical analysis. Some advanced analytical techniques for pharmaceutical products like Atomic Absorption Spectroscopy and Radioimmunoassay will also be discussed in detail.

Credits: 4; Prerequisite: PHRM 312

PHRM 410: Pharmacy Law and Ethics

This course provides an insight into how pharmacy had evolved in relation to the evolution of civilizations, myths and histories contained in them, code of ethics as followed by a pharmacist, and various relevant regulations evolved in this sub-continent, especially in the country to control the production, sale and use of medicines. Knowledge of this historical development of pharmacy with the moral philosophy and ethical principles, the status of pharmacy practice, regulatory bodies like Pharmacy Council of Bangladesh and Drug Administration, study of the drug policies, various regulations and laws relating to the practice of pharmacy, standing of controlling drug advertisements and price of drugs, the national and global position of drug abuse and their control measures etc. are to be dealt with in this course.

Credits: 3; Prerequisite: None

PHRM 411: Cosmetology

This course provides an in-depth understanding of the technology and advancements on various common cosmetics preparations. The students will understand the art of compounding and quality control procedures of cosmetic preparations. As a science, cosmetics manufacture has grown considerably in recent years. In this course, the students will be able to enhance their knowledge and skill by a thorough and wide-ranging approach to new developments.

Credits: 4; Prerequisites: PHRM 307, PHRM 308

PHRM 412: Medicinal Chemistry III

The objectives of this course are to help the students understand the role of stereochemistry in case of showing the optimal medicinal activity, asymmetric synthesis, stereoselective and stereospecific reactions, pharmaceutical importance of stereospecificity. Besides, this course will also enable the students to learn about some important classes of drugs like synthetic antibacterial agents viz. quinolones, nitrofurans, methenamine and its salts, urinary analgesics etc.; antiviral drugs, antithyroid drugs, immunosuppressive agents, agents used in gene therapy; their syntheses, structure activity relationships and pharmaceutical importance from an advanced level. Some outstanding reactions for organic syntheses will also be discussed.

Credits: 3; Prerequisites: PHRM 304

PHRM 413: Pharmacology III

The course gives a basic idea about many important therapeutic classes of compounds used in common disorders. Its main focus is on the drugs acting on the gastrointestinal tract, respiratory tract and on various hormonal compounds, contraceptives, anticancer drugs etc. where it includes specific examples along with the mechanism of actions, pharmacokinetic profiles, indications, contraindications, side effects etc. of the individual molecules. It also provides an idea about some other important classes of drugs like vitamins, chelating agents, vaccines, gene therapy products etc. In the lab classes, this course will emphasize the actions of some compounds commonly used as medical practices related to the theory topics. This will provide some basic idea of research about the activities of the unknown compounds.

Credits: 4; Prerequisites: PHRM 301

PHRM 414: Pharmaceutical Engineering

This course provides an insight into how pharmaceutical industries adopt various engineering operations, the pharmaceutical machineries involved and the correct procedures a pharmacist should follow as per the standard GMP. After completion of this course, a student will be able to understand the theories and mechanisms behind these engineering operations vis-à-vis select or design the machineries as required.

Credits: 3; Prerequisites: None

PHY 100: Introductory Physics

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 momentum and torque, Newton's law of gravitation, Kepler's laws.

Waves and Oscillations: Simple harmonic motion; damped 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 108: Physics for Biologists - I

Credits: 3+1; Prerequisites: MAT 102

General principles: Rotational dynamics, moment of inertia, and angular momentum - Momentum and impulses for linear and angular momentum; Work and energy; Fluid dynamics; simple harmonic, damped and driven systems - Mechanical waves, wave equation, harmonic waves, longitudinal and

transverse waves; Sound waves - Wave superposition and interference, standing waves and normal modes; Introduction to Fourier concepts; Sound, intensity, beats, Doppler effect, musical tones and acoustics; Electric Charge and fields, Gauss Law and flux, Electric potential, Capacitors and dielectrics, Current, resistance and EMF, DC circuits, Magnetic fields and forces, Amperes Law and magnetic field sources, EM Induction Maxwell's equations, Inductance, AC circuits and resonance.

The course includes lab work based on theory taught.
Credits: 3; (Theory)+1(Lab)=4

Suggested Readings:

1. Vector Analysis, Schaum's Outlines.
2. Fundamentals of Physics, Halliday, Resnick and Walker, 6th Extended Edition.
3. University Physics, Sears, Zemansky and Young.
4. Intermediate Physics for Medicine and Biology (4th Edition, 2007) - Russell K. Hobbie and Bradley J. Roth; Publisher: Springer

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.

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, Zemansky and Young, Addison Wesley Publishing Company.

PHY 208: Physics for Biologists - II

Credits: 3+1=4; Prerequisites: PHY 108, MAT 205
Physical principles: Concept of EM waves, Propagation of EM waves; Introduction to quantum physics - Break down of classical physics and the emergence of quantum theory, de Broglie waves, Compton Effect, Concept of wave function, Schrödinger Equation and its simple applications; Angular momentum and hydrogen atom; Imaging systems, microscopes and telescopes, Interference and diffraction, Introduction to lasers and holography.

The course includes lab work based on theory taught.
Credits: 3; (Theory)+1(Lab)=4

Suggested Readings:

1. Arthur Beiser. Concepts of Modern Physics. McGraw-Hill, ISBN: 9780071234603.
2. David Griffiths. Introduction to Quantum Mechanics, PEARSON Education, 2nd Edition, 2009. ISBN: 978-81-7758 230-7.

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.

POP 201: Health Challenges of Adolescents and Youths

Reproductive Health and Rights: Definition, concepts of reproductive health, reproductive rights and ICPD. Population dynamics, scopes and components of reproductive health, MDGs, indicator and source of data.

Family Planning: Definition and rationale of family planning, unmet need for family planning, health impact of family planning, relevance of family planning to population policies; ICPD principles, male involvement and Islamic view on family planning, definition of sexual health, principles of quality controls.

Maternal Health: Maternal mortality and morbidity-causes, trend, health and social significance, safe motherhood policies and programs, unsafe abortion-causes, incidence and prevention, emergency obstetric care and post abortion care.

STIs/HIV/AIDS, Tobacco and Food Habit: Epidemiology, causes, risk factors, way of prevention, high risk group AND policy of HIV/AIDS, socio cultural determinants and health effects of tobacco use among young people, food safety vs street foods-scope of hygiene and health promotion among adolescents and youths.

Human Sexuality and Gender Relation: Interrelationship between human sexuality and gender relations, violence against women (sexual and gender based violence), access to information, education and services to achieve good health including sexual health and exercise reproductive rights and responsibilities, laws on marriage and divorce.

Adolescents' Sexual and Reproductive Health (ASRH): Definition and basic concept, ASRH: issues, current status, magnitude of problems, teen-age pregnancy, unsafe abortion, STIs/HIV/AIDS, policies and programmes for adolescents on SRH: information and services to meeting SRH needs of adolescents.

Adolescents and Youth Friendly Health Services: Youth-friendly services: The opportunities and obstacles, role of Government, UN and other agencies, MDG, national policy focus on adolescent and youth health, national policies on HIV/ AIDS and STD related issues.

Male involvement in Sexual and Reproductive Health: Present status of male participation in RH/FP, problems and issues in male involvement, current policies and programmes to promote male involvement, need for advocacy, broader

information/education programmes to promote male participation in RH/FP.

Global Landmark events on Reproductive Health Policies and Programs: Reproductive health (ICPD, 1994), Safe Motherhood Conference, Nairobi (1987), Reproductive health (Beijing, 1995), Safe Motherhood Inter-Agency Technical Consultation, Colombo (1997), Reproductive health policies and strategies in Bangladesh.

Credits: 3; Pre-requisite: None

POP 202: Introduction to public health.

Public Health and Epidemiology: Basic concepts - Health, Public Health and Primary Health Care: concepts and definitions; scopes and opportunities on a historical perspective; Epidemiology: definition, conceptual evolution from study of epidemics to a health research methodology; Chain of infection, Epidemic and Endemic diseases.

Defining Health problems - Epidemiological and statistical methods; Epidemiological studies: Measures of disease frequency and trends: rates, ratios, incidence and prevalence, sampling, errors; validity and reliability; Communicable and non-communicable diseases; Morbidity and Mortality, Sources of Data. Causation of diseases and

Transmission of Infections - The concept of multiple causation, ecological, establishing a cause of a disease; Ecological triad: host, age and environment; Disease communicability, magnitude and variation of disease spread; Direct and indirect transmission, exposure and its potentials; Carrier and resistance to infection; Movement of Disease in Time, Place and Person, population at risk, Emerging (new viral infections) and re-emerging diseases (tuberculosis, malaria).

Organizing and presenting health related data: Concepts and Tools - Presentation of health data in tabular and graphical formats, Presentation of health information as numbers and proportions, Comparison of magnitude of different health problems' Basic concepts and measures of statistical inference, Use of bio-statistical methods in epidemiology.

Prevention and Control measures - The scope of prevention: Chronic non communicable disease; Levels of prevention: primordial, primary, secondary and tertiary prevention; Preventing spread of communicable diseases; Ten most common public health problems of Bangladesh; Screening, surveillance and Control of environment

Ecology - Basic principle of law of ecology; Spectrum of infection; Biological gradient of disease; Human ecology; Frontier of ecosystem: Atmospheric ecology. Environmental and Occupational Epidemiology-Environment and Health; Exposure, dose and risk assessment; Injury epidemiology; Zoonosis and veterinary public health.

Health Policy and Planning with Practical on Public Health Research - Health policy: use of epidemiological information for the purpose; Program planning: the planning cycles; Practical on public health research.

Credits: 3; Pre-requisite: None

SOC 101: Introduction to Sociology

Introduction: Definition of Sociology. Nature and scope of Sociology. Origin and development of Sociology. Relationships with other Social Sciences. The emergence of Sociology and Fourfold origin of Sociology

Basic Concepts of Sociology: Group, Association, Institution, Community, Norms and Values, Role and Status, Folkways and Mores, Society and Organization

Culture: Definition. Elements of culture (norms, values, symbols, language). Material and Non-Material Culture. Cultural Lag, Cultural Evolution. Diversity and integration. Counter Culture, Cultural Relativism, Ethnocentrism, Cultural Integration).

Sub-culture. Basic elements of Bangladesh Culture, Cultural Traits and Complex.

Social Structure: Definitions of Social Structure. Levels of social structure (Micro and Macro). Components of social structure. Theories of Social Structure. Patterns of social relationships (exchange, Cooperation, Conflict, Competition, Domination and Subordination). Impact of structure upon individual.

Socialization: Definition. Nature and nurture. Dynamics of socialization. Socialization and early life cycle (Mead, Piaget, Erikson). Agents of socialization.

Social Groups and Social Interaction: Definition. Types of groups. Group dynamics. Functions of groups. Definition; Agencies of Social Control

Social Control: Definition of Social Control; Agencies of Social Control; Deviance and Crime. Explanation of deviance. Normal and Deviant careers.

Social Stratification: Definition. Types and theories of Stratification (Conflict, functional and other theories).

Social Institutions: Family; Functions of Family. Definitions of Family. Types of Family. State, Nature of State, Political Parties, Social Institutions, Economic Institutions; Education and Cultural

Institutions.

Social Change and Technology: Definition. Perspectives of change. Sources of Change. Modernization. Theories of Social Change, Evolution, Progress and Development.

SOC 102: Introduction to Anthropology

The Anthropological Approach: Anthropology as a Field of Knowledge. Modes of Anthropological Understanding: Theory, Interpretation and Science. Different branches of Anthropology.

An Evolutionary Perspective: Human Evolution: The hominid lineage, The primate behavioral lineage, Language, and symbols. The Growth of Culture: Pre-historians as anthropologists, Paleolithic peoples, Food-producing, Urbanism and the Rise of states.

Culture, Society, and the Individual: Theories of Culture: Evolutionism, Diffusionism, Parallelism, Culture and people: Some basic concepts, The Anthropological concept of culture, The relation of culture to society. Language and Communication: the nature and organization of language, and from language to culture. Culture and the individual: culture and personality, and beyond cultural determinism.

Marriage, Family and Kinship: Marriage, Types of marriage, Why is Marriage Universal? Restrictions on Marriage: The Universal Incest Taboo, Childhood Familiarity Theory, Freud's Psychoanalytic Theory, Family-Disruption Theory, Cooperation Theory, Inbreeding Theory, Form of Marriage. The Family, Variation in Family Form. Kinship and the Structure of Kinship and Kinship Terminology

Religion and Magic: Origin of Religion, Elements of Religion. The Universality of Religion, Variation in Religious Beliefs and Practices, Functions of Religion, Theories of Religion, Magical Practices and Its influence on Society, Rituals and Rites. Religion and Adaptation, Religious Changes and Revitalization Change.

Tribal Peoples: Toward a Systematic View: The Tribal World as Mosaic, as Ladder, and as System. Modes of subsistence. Modes of adaptation: Contemporary hunter-gatherers, tropical horticulturalists, and pastoral adaptations. How cultures change: cultural ecology-cultural materialism.

The Tribal World: Economic systems: systems of production, the economics of distribution, and the integration of economic systems. Social structure: kinship in tribal societies, descent systems, kinship and social relations, marriage, family, and community. Marriage in comparative perspective: marriage

contracts and transactions, incest, exogamy and alliance. Power and politics: the processes of politics, worlds of women, and worlds of men. Structures of inequality: law and social control, religion, ritual, myth, and cosmos. The integration of societies. The structure of cultures. Ethnic minorities and the notion of tribe in colonial politics.

Anthropology and the Present: Response to cataclysm: the tribal world and the expansion of the west, the peasants, and the creation of the third world. Cities: anthropology of cities, anthropology in cities. Social science and the postcolonial world. Decolonizing anthropology and toward Human Survival.

SOC 103: Liberation War of Bangladesh

Historical Background: The rise of Bengali nationalism. Internal colonialism in Pakistan. Economic disparity. Conflicts of power elite with vernacular elite.

Movements: Language movement 1952. Constitutional movement 1962. Autonomy movement 1966. Mass movement 1969. Non cooperation movement 1971. Liberation war of 1971.

Genocide: Mass killing. War rape. Destruction. Freedom fighters. Guerilla warfare. Mass participation in war. Women's participation in the liberation struggle. Participation of ethnic minorities in the liberation struggle. Collaboration of a section of the local population with the Pakistani army: Rajakar, Al Badar, Al Shams.

Role of foreign powers: India, USSR, USA, and China.

SOC 104: Social Problems of Bangladesh

Introduction: Definition. Nature of social problems. Theoretical perspective on social problems. Roles of media. Research and statistics in identifying social problem.

Population: World population growth. Consequences of population growth. Bangladesh population. Impact upon society and environment.

Social Deviance: Theories of deviance. Sources of deviance. Labeling theory. Conflict theory.

Environment: Worldwide environmental problems. Depletion of natural resources. Forms of environmental pollutions. Climate change. Culture and environment. Social structure and environment. Environmental problems of Bangladesh. Solutions of problems.

Drug: Types and effects of drugs. Social factors associated with drug use. Social consequences of drug use. Drug use status of Bangladesh and its solutions.

Poverty: Nature and scope of poverty. Definitions of poverty. Causes of poverty in affluent and poor countries. Poverty of Bangladesh. Solution of poverty.

Social Inequality: Nature of inequality in society; Dimensions of inequality (class, age, sex, and minority) - Causes of inequality- solution to the problem.

Education: Nature of the problem. Education as a source of inequality in society. Education as a source of development. Access to education. Quality of education. Problems of universal equality of education in Bangladesh.

Urban Social Problems: Development of Slum, Mental illness, Alienation, Anomie, Urban Crime, Prostitution, AIDS/HIV.

Crime and Justice: Definitions. Types of crime. Crime rates. Causes of crime in Bangladesh. Correctional systems- Labeling theory. Nature of justice system in Bangladesh.

Politics and Social Unrest: Political Parties, Politics and Social Unrest, Student Politics, Terrorism and Violence.

SOC 105: Peasant Societies

Concept of Peasant and Peasant Society: Definitional criteria. Peasant society. Primitive peasant. Peasant economies. Peasant family. Peasant personality. Peasant belief system. Peasant culture.

Theories of Peasant Society: Chaynov, Lenin, Thorner, Shanin; Peasant Movements (s), Peasant Mobility; Impact of migration and Globalization on peasant society.

Characteristics of Peasants: In pre-feudal, feudal and capitalist societies.

Peasant Social Organization: Peasant family types. Kinship. Community. Values. Ritual. Corporate system.

Economic System and Institution: Land distribution. Tenure system and inheritance laws. Production process. Role of family in agriculture. Savings, credit, and investment. Distribution and market exchange. Capitalism and its impact upon society.

Social Stratification: Patterns of stratification. Social mobility. Basis of stratification. Power structure. Sources of power. Nature of policies in peasant society.

Changing Peasant Society: Factors affecting social change in peasant societies. Emergence of market economy. Rural urban Migration. Changing power

structure. Cultural patterns and mobility.

Agrarian Development Approaches: Agrarian development theories. Constraints of development both in and out of Bangladesh.

Development Programs: Identification of major government and NGO programs (programs: introduction of new technology, and education.). Achievements and failure of programs. The quality of peasant life.

SOC 201: Sociology of Family, Marriage, and Kinship

Introduction: Definitions of Family, Marriage and Kinship and Theories of Morgan, Karl Marx and Engels, Maine, Bechofen, Westermarck, Universality of the Family.

Family: Origin of the family and marriage, structure and function of family. Contemporary Family Patterns in Bangladesh, Power Authority and Leadership in the Family, Family Crisis and Family Laws in Practice

Marriage: Types, Forms Marital Arrangement, Rules and Rites relating to marriage, System of mate selection, Cultural diversity of marriage, Structural Variety in Marriage.

Kinship Structure: Basis of Kinship, Kinship Organization, Kinship Terminology. Role of Kinship in every sphere of life (Social, economic, political). Theories of Kinship. Kinship in modern societies.

Variation in Family Structure: Types of family: nuclear and extended. Family and economy. Family structure in non-industrial society. Family structure in Industrial society. Changing pattern and other correlates.

Functions of the Family: Procreation. Socialization of children. Emotional support. Regulating sexual activity. Assignment of status and social roles. Changing family functions.

Family Crisis: Power, authority and leadership in the family, Family Violence. Violence against Women and Children. Forms of Violence. Divorce and Separation: causes and trends, legal aspects of divorce, Impact of divorce upon children. Single Parent Family. Remarriage. Family Laws in practice.

Contemporary Family Pattern in Bangladesh: Urban-rural families. Changing trends. Trends of dissolution of the family.

SOC 202: Social Psychology

Introduction: Definition. Nature and scope of Social Psychology. Origin and development of Social Psychology as a scientific discipline. Relation of Social Psychology with other social and biological sciences.

Schools of Psychology: Development of schools of modern social psychology. Methods of Social Psychology. Psychology of cognition.

Sensation and Perception: Types. Theories of Sensation and Perception, Stages of perception, Social and Cultural Determinants of Perception. Significance of stimulus and response. Meaning and various types of instincts. Development of self socialization of individual.

Social Interaction: Theories of social interaction. Group dynamics, Process of leadership, Types of Leadership, Types of group. Group solidarity. Morale and cohesiveness. Group leadership.

Motivation: Biogenic and Sociogenic motivation. Motivational Cycles.

Behaviour: Instinctive Behavior vs. learned behavior, Learning, Definition of Learning, Theories of Learning (Thorndike, Pavlov, Skinner), Socialization and its agencies.

Mass Behavior: Crowd; Audience; Mob; Fashion; Fad. Collective Behavior: Public Opinion, Process, Factors and Agencies of Public Opinion, Propaganda, Rumor.

Attitude: Attitude Formation and Attitude Change. Scales to measure attitude (Thurstone Scale, Bogardus Scale, Likert Scale).

Personality: Theories of personality (Kardiner, Linton, Mead, Benedict, Adler, Harney and Freud). Personality and culture (Horno, Linton, Mead, Kardiner). Personality and class. Personality measurement.

SOC 203: Social Group and Social Development

Introduction: Definition, objectives, principles, types, nature, and its significance in individual and social development.

History of Social Group Work: History of Social Group Work and other methods of social group work.

Nature of Group: Definition, types, and importance of group life. Difference between group process and group work process.

Group Dynamics: Definition, use of the knowledge of group dynamics by social group workers.

Functions of Group Work: Preventive, curative, rehabilitative, educational promotional and development.

Techniques of Group Work: Program planning, concepts, principles, methods and program planning in Social Group Work.

Leadership: Concepts, types, functions in group work. Leadership skill and role of group leader and group worker.

Recording: Purpose, principles, and methods. Analysis of records for decision-making. Supervision and administration of Social Group Work.

Group Work Therapy: Concepts, methods and various forms.

Working with Various Groups: Children, adolescents, drug addicts, and correctional institutions.

Present Status: Trends and issues in Social Group Work in Bangladesh.

SOC 204: Research Methodology

Introduction: Sources of Knowledge. Definition of Social Research. Purpose of Social Research. Theory and Research- Value Judgment in Research. Concepts, Variables. Propositions. Levels of Measurements (Nominal, Ordinal, Interval, and Ratio).

Types of Research: Pure. Applied. Exploratory. Action. Experimental. Evaluative. Monitoring.

Research Design (Steps of Research): Formulation of the Problem. Review of Literature. Objectives. Theoretical Framework. Hypothesis. Methodology. Analysis Plan. Report Writing.

Hypothesis: Formulation. Sources of hypothesis. Types of hypothesis. Hypothesis testing.

Techniques of Data Collection: Survey. Observation. Content analysis. Field research.

Survey: Construction of interview schedule/questionnaire. Characteristics of a good interview schedule/questionnaire. Validity and reliability of research instrument. Assessment of validity: face validity, criterion validity, construct validity, internal and external validity. Assessing reliability: alternate and parallel methods, test-retest methods, and consistency test.

Sampling: Concept. Sampling frame. Probability and non-probability sampling. Types of probability sampling. Determination of sample size.

Construction of Scales: Likert, Thurstone, Guttman etc. Use and misuse of scale. Validity and reliability of scale.

Qualitative Methods: Observation (Different kinds). Case study. Historical. Content Analysis. Participatory Research Appraisal (PRA). Rapid Rural Appraisal (RRA). Interview guide. Techniques of qualitative Interviews. Analysis of Qualitative Data- Report Writing.

Data Analysis: Coding. Data entry into computer. Use of computer particularly SPSS.

SOC 205: Rural Sociology

Introduction: Definition. Scope and its importance. Origin and its growth as a separate discipline.

Theoretical perspective of Rural Sociology.

Agrarian structure: Land ownership pattern. Land reforms (China, South Korea, Bangladesh). Changing agrarian structure. Development of capitalist agriculture. Obstacles and prospects.

Peasant Society and Change: Theories of Peasantry and Peasant Mobility (Chaynov, Lenin, Thorner, Shanin); Peasant Movement.

Rural Social Structure: Pre-British, British, Post-British, and Post-liberation. Village organization and leadership. Class structure. Social mobility and Stratification.

Rural Power Structure: Definition and Nature of Rural Power Structure. Contemporary Changes in Rural Power Structure. Characteristics of Rural Elites, Nature of Rural elite. Relationship between Rural Elite and National Power Structure. Power. Patron-client relationship. Kinship Relationship and Rural Structure. Nature and Functions of village Samaj. Social inequality, Stratification and Class.

Rural Institutions: Family, Education, Religion, Formal and Non-formal Credit, Samaj & Salish, Cooperatives, Local Government Institutions.

Rural Work and Livelihood: Natural and social sources of livelihoods, Changing patterns of livelihoods. Patterns of rural livelihood in Bangladesh.

Social Change in Rural Society: Rural-Urban interaction. Changes in economy and Culture. Social institutions and life style. Theories of social change. Nature of change in rural Bangladesh. Factors associated with change. Consequences of change. Contemporary changes in Bangladesh. Migration. Impact of Globalization on Peasant Society.

Rural Development Programs in Bangladesh: Village AID. Comilla Approach. Integrated Rural Development Program, Implementation of Technology in Agriculture, NGO Participation: Grameen Bank, BRAC, Gonoshasthaya Kendra, and Microcredit Program of NGOs, Evaluation of the Programs.

SOC 206: Statistics for Sociology

Introduction: Need for statistical understanding. Nature of social statistics. Importance of statistics in Sociology/Social Work.

Levels of Measurement: Types of graphs. Primary and secondary data. Qualitative and quantitative data. Organizing data. Preparing tables.

Measures of Central Tendency: Mean. Median. Mode. Use of these measures in sociology.

Measures of Dispersion: Range. Inequalities Range. Mean deviation. Quartile deviation. Standard deviation. Index of Dispersion (D).

Proportional Reduction of Error (PRE): Lamda. Goodman. Kruskal's Tau-Y (Ty). Gamma. Eta etc.

Correlation and Regression: Zero-order correlation. Rank correlation. Partial and Multiple regressions. Scattered diagram. Regression line. Least Squares. Principle for Regression. Partial and Multiple Regression. Coefficient R². Standard error estimation. Stepwise regression. Forward and backward regression.

Probability and Sampling: Simple probability sampling. Binomial Distribution. Different types of sampling. Sampling size and bias.

Tests: Inferences from single and two samples. Students' T' test. Z' test. etc.

Analysis of Variance (ANOVA): One way and two way analysis of Variance. F Test.

SOC 207: Early Social Thought

Plato (427-347 B.C.): Biographical sketch, Approach to knowledge, Method, Human nature, Family, Social stratification, Education, State Social change, etc.

Aristotle (384-322): Biographical sketch, Greek humanism, Ethics, Human nature, Politics, Family, Slavery and State.

St. Augustine (A.D. 354-430): Biographical sketch, Method, Human nature, Politics, Family, Social change, and Influence of Augustine.

Thomas Aquinas (A.D.1225-1275): Biographical sketch, Problems and methods, Politics, Economics, Family, Thomism.

Ibn Khaldun (1332-1406): Biographical sketch, Muslim civilization, The new science of history, Society, Social Solidarity, Politics, Economic, Family,

Renaissance and Reformation: Concepts of renaissance and reformation; Authority, reason, and experience; Human nature, Politics; Economics: Family; and The scientific revolution.

Machiaveli (1469-1527): Biographical sketch, Concept of State, Nature and Origin and development State.

Hobbes (1588-1679): Biographical sketch, Social Contract Theory and Thought, Rise of the State

John Locke (1632-1704): Biographical sketch, Emergence of the age of science, Cartesian rationalism, Locke's method, Human nature, Politics, Property, and Education.

Giambattista Vico (1668-1744): Biographical sketch, Methods of new science, Law of three ages, the unity of culture, Human nature, Government and law.

Rousseau (1712-1778): Biographical sketch, Social Contract Theory and Rise of the State.

SOC 208: Social Inequality

Concepts and Definitions: Social inequality. Forms of Social stratification (Slavery. Estate. Caste. Class. Status). Power. Strata. Rank. Hierarchy. Prestige. Determinants and dimensions of social inequality.

Theories: Aristotle to Rousseau. Functional theories: Durkheim, Kingsley Davis and Moore, Max Weber, and Parsons. Conflict theories: Marx, Dahrendorf, and Equilibrium approach of Lenski.

Social Classes: Approaches to the measurement of social classes: Marx, Weber and others.

Origin of Social Inequality: Ideas of primitive communism and egalitarian society. Ownership pattern and rise of social inequality. Hunting and gathering societies. Simple and advanced horticulture societies. Agrarian societies. Caste and social inequality. Class in industrial societies.

Racial and Ethnic Inequality: Concepts of Race. Ethnicity and minority group. Prejudice and discrimination. Patterns of race and ethnic relations and social inequality.

Gender and Social Inequality: Relative position on man and women in society and division of labor. Prejudice and discrimination. Biological, psychological and cultural evidences of social inequality, Feminist perspectives on gender inequality. Theories of sex role socialization: functionalism, symbolic interactions, and conflict.

Occupation and Social Status: Occupation defined. Occupation and stratification. Occupational mobility. Types and causes. Caste system.

SOC 209: Industrial Sociology

Introduction: Nature and scope of Industrial Sociology. Foundation of Industrial Sociology. Relationship with rural and urban sociology. Approaches of Industrial Sociology.

Industrialization: The pre-industrial and industrial revolution. Industrializing and industrial society. Structural and functional dimension of industrial society. Pre-conditions and major barriers of industrialization. Industrialization of Bangladesh.

The Social Structure of Industrial Society: Role differentiation and distribution. Internationalization of new values: rational work, discipline, and industrial bureaucracy. Industrial Management.

Problems of Industrial Society: Forces of stability and strains. Industrial conflict. Marginality and Individualization. Alienation and Anomie. Problems of

employment and unemployment.

Social Organization of Industry: Industrial organization. Bureaucracy. Management and human relations. Hawthorne study. Industrial interest group. Organizational behavior.

Industrial Relations: Trends, issues and theories of industrial relations. Industrial conflict. Trade unionism. Collective bargaining. Psychological approach. Marxist approach of industrial relations.

Social Security: Health and medical care in industry. Problems of housing. Education and rehabilitation.

Industrialization in Bangladesh: Causes, trends, and problems of industrialization. Comparison with developing and developed countries.

SOC 210: Community, Communication, and Culture Introduction

Concepts and definition of Communication - Interpersonal, Group, Public and Mass communication; Emergence of Mass communication in modern days Communication world

Communication theories: Linear model of communication and divergence model of communication, Magic bullet theories, Spiral of silence theories, Agenda setting theories, Media Gratification theories etc.

Communication format and functions: Understand the psyche of the society and culture, The environment in which the communication media exists, Communication media of different forms and their influence or impact in different norms and cultural level and situation of different societies. People's media habits and their access to different media in different cultural level of societies.

Culture and Globalization and media: Political implication of media and culture, Media conglomerates and the globalization of cultural markets, Commodification of culture, culture as a form of political resistance, Post colonial theory and the impact of free trade agreements on culture and cultural policy.

Media of different age: Age without media, Traditional or ancient media, Indigenous media of popular media, Alternative media, Mass media, Media of information age

Communication methods: Concepts and understanding of communication research; research design and procedure, steps of research project; Qualitative and quantitative research, survey and laboratory research and experiential design; Content analysis, participatory research, interviews, case studies, focus group discussion etc.

SOC 211: 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

SOC 212: Social Ecology, Environment and Society

The objective of this course is to help students learn basic environmental problems and ecological principles, develop their ability to use these principles to interpret ecological problems and understand the repercussions of environmental mismanagement. Topics include: Environment science, input reduction, population bomb, resources, ecology and population, abundance control, community diversity, energy flow, type of species, demography, resource management, biodiversity, pollution, controlling pollution, water pollution, air pollution, ethics.

Credits: 3; Prerequisite: None

SOC 213: Women in Development

The course focuses on conceptual overview and practical tools for understanding the role of women in development process. It discusses the interrelationship between various development issues and gender. The course helps students to become aware of gender issues in both theoretical and Bangladesh contexts. It also attempts to help students to contribute to the efforts to eliminate all forms of gender discrimination in Bangladesh society. The course 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 and Women Development Policy and Programme in Bangladesh. Topics include: Sex and Gender, Society; Patriarchy; Men-Women relationship in the patriarchal society, Theories of WID, WAD and GAD, Gender role, division of labour and gender needs. Women's reproductive health and right, Adolescence health care in relation to gender,

Health and nutritional and HIV/AIDS issues in relation with gender, Gender and poverty, Gender and environment, Violence against women, One stop crisis centre visit/ Visit to a village, Case preparation, CEDAW and its clauses, Constitutional and fundamental rights of women, Beijing platform for action(PFA), Anti-dowry laws, and labour laws.

Credits: 3; Prerequisite: ENG101

SOC 214: Introduction to Development Studies

The course provides an introductory look at the theories and concepts, which form the foundation of development. The student throughout the course will be facilitated to critically assess contemporary development issues such as poverty, gender discrimination and lack of access to natural resources. Key theoretical concepts such as modernization, liberalism, development projects and human rights will be addressed along with the usefulness of social research.

Credits: 3; Prerequisite: ENG 102

SOC 215: Principles of Social and 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

SOC 216: 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 nation perspective the course will also

shed light on the debate between the Asian and Western Value systems, and thus provide a comprehensive view of people's perceptions of the globalizing world.

Credits: 3; Prerequisite: ENG 102

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

The socio-cultural and political existence of South Asian countries is often challenged by religious and cultural intolerance in recent times, although they are theoretically multi-ethnic and multi-religious countries. As a result, the socio-cultural and philosophical foundation of ethnic minorities is often neglected in the political processes in the name of democracy and economic development. In other words, the cultural identity of the ethnic and religious minorities is controlled through the politics of social exclusion and isolation. In many cases, the notion of social exclusion and isolation between the majority and minority has even spread into the thinking of the rural people of these countries. The policy of social exclusion has been used mostly to maintain and control the politics within the countries of South Asia.

This course will examine how the democratic processes uphold or fail to uphold cultural diversity within the socio-cultural and political conditions of these countries. It will also explore how religious and cultural identities and the social and philosophical foundations of the ethnic communities are addressed in the political processes in South Asia. More specifically, this course will critically examine the issues of social inclusion and exclusion, the socio-political and historical contexts and the ethical and development practices of diverse ethnic communities and development.

Credit: 3; Prerequisite: ENG102, GEN206

SOC 301: Qualitative Research Methodology

The Foundations of Qualitative Research: Defining Qualitative Research. The historical development of Qualitative Research. Key methodological and philosophical issues in Qualitative Research.

The Applications of Qualitative Methods to Social Research: Theoretical and applied research. The functions of Qualitative Research. The functions of

different Qualitative methods. Combining qualitative and quantitative methods.

Design Issues: Defining the research questions.

Building around research settings and populations. Selecting the time frame for research. Choosing a data collection method. Resourcing and timetabling Quantitative Research methods.

Designing and Selecting Samples: Sampling strategies for Qualitative Research. Study populations. Samples frames. Designing a purposive sample. Implementing the sample design.

Designing Fieldwork Strategies and Materials: Structuring data collection. Designing topic guides. Incorporating other research instruments and materials. Preparing for Fieldwork and refining Fieldwork strategies.

In-Depth Interviews: The in-depth interview. The staging of an interview. Asking questions to achieve breadth and depth. Question formulation. Further techniques for achieving depth.

Focus Groups: Features and types of focus group. Group processes and the stages of a focus group. Conducting the discussion. Using the group process. Group composition and size. Practicalities in organizing the group.

Analysis: Practices, Principles and Processes. Traditions and approaches within Qualitative Analysis. Computer assisted Qualitative Methods. The key requirements of analytic tools.

Carrying Out Qualitative Analysis: Data management. Descriptive accounts. Explanatory accounts. Analysing group data.

Generalizing from Qualitative Research: Definitions of generalization. Approaches to generalizations. Reliability and validity. Generalizing from qualitative data.

Reporting and Presenting Qualitative Data: Challenges facing the qualitative reporter. Forms of research outputs. Writing a qualitative research report. Displaying Qualitative Evidence-some general features and principles. Oral presentations.

SOC 302: Social Structure of Bangladesh

Introduction: Definition and theories of social structure. Importance of studying social structure. Nature and foundations of early civilizations in the sub-continent. Social structure of pre-British Bengal. Origin and evolution of Bengal village. Pattern of settlement. Distinctive feature of Bengal village. Self

sufficient village economy and its critique. Growth of trade and commercial centers in Bengal. Rise of merchant Class. Cultural centers. Nature of cities.

British colonial rule and its impacts in Bengali: Permanent Settlement Act and new agrarian structure. Emergence of new class structure. Decline of indigenous economy. New education and legal systems. Emergence of new social class. Bengal Renaissance. Peasant movement.

Evolution of Social Structure since 1947. Neo-colonialism under Pakistan. language movement. Liberation War.

Changing pattern of Social Structure in Bangladesh. Land reform. Urbanization. Industrialization. New leadership. Power structure. Emerging social stratification.

Growth of Urban Centres, Major Characteristics of Social Structure of Bangladesh.

SOC 303: Urban Sociology

Introduction: Definition of urbanism and urbanization. Subject matter of Urban Sociology. Urban growth. Theoretical approaches to the study of urbanism: structural, behavioral, demographic and ecological approach.

Patterns of Historic Cities: Ancient cities, medieval cities, pre-industrial cities, industrial cities, colonial cities, modern mega cities.

World Urbanization: The Process of urbanization in the Western and Oriental societies. Impact of feudalism and capitalism. Industrial revolution and colonization on urbanization in the West and East. Pattern of third world urbanization. Pattern of Bangladesh urbanization.

Urban Institutions and Problems: Family and marriage. Education. Municipality. Local Government. Urban economic organization. Labor force market.

Neighborhood: Definition and approaches. Types of neighborhood. Functions of neighborhood. Social psychology of urban life.

Urban Problems: Urban Crime. Unrest and social control. Urban Poverty. Housing. Homelessness. Slums. Culture of Poverty. Prostitution.

Social Stratification and the Metropolis: Class differences and special location: wealthy, middle class, working class. Working poor. Ethnicity and residential segregation. Women and urban political economy. Women and the environment.

Theories of Urbanization: Theories of Louis Wirth, B.F. Hoselitz, Kingsley Davis and Hauser, Breese, Walton and Carns- P. Gutkind.

Theories of Growth of City: "Concentric Zone".

Theory of Burgess; "Sector Model". Theory of Hoyt; "Multiple-Nuclei Model". Theory of Harris and Uman;
 Urban Planning: Regional Planning. Urban Planning in Bangladesh.

SOC 304: Sociology of Environment

Introduction: Definition, scope and importance of environmental sociology. Concepts: ecology, ecosphere, ecosystem, species, population. Habitual and niche-food web. Interaction with man and environment. Social and physical environment.

Environmental Theories and Debates: Classical doctrines and geographic Determinism. Development of environmentalism. Ecocentrism versus technocentrism. Tragedy of common's doctrine. Blue print for survival. Limits of growth. Global 2000 Report. Bright global future. Stockholm and Rio.

Population Explosion and Environmental Disaster: Determinants and consequences of population growth. Population structure. Balance between population and resource management. North-south differences of population. Dynamics of ecological balance. Family planning.

Major Environmental Issues: Industrialization and urbanization. Land use. Water Pollution. Depletion of underground water level. River, water, and wetlands. Agriculture. Forest depletion and its impact. Fisheries and shrimp cultivation. Energy, flood, cyclone, earthquake, greenhouse effects, and Climate change.

Gender and Environment: Impact of environmental hazards upon men, women and Children. Response to hazards.

Management of Environmental Hazards and Disaster: Poverty alleviation, flood control, and drainage program. Cyclone management. Relief and rehabilitation. Aforestation. Restructuring of Industrial system.

International Politics and Environment: Rich world vs. poor world, Polluters and Sufferers. Problems of formulating international policies. International movement for saving the environment.

Government policies and their Implementation.

Environmental Laws and Justice

SOC 305: Medical Sociology

Introduction: Definition, subject matter and importance of medical sociology. Relation of medical sociology with other branches of sociology. Status of medical sociology in Bangladesh.

Basic Concepts in Medical Sociology: Disease, illness,

health, sickness, medical pluralism, ethno medicine. Epidemiology.

Methods of Medical Sociology: Theories, models, paradigms and concepts of medical sociology-methods and problems in studying medical sociology.

Belief system associated disease and medicine: Ancient belief system, medieval belief system, and modern belief system. Present folk belief system and Bangladesh perspective.

Changing Pattern of Health Seeking Behavior: Incubation prayer, exorcism, witchcraft, amulet, blowing breath on water, herbal medicine, homeopathic treatment, allopathic treatment, social medicine, and yoga.

Etiology of Illness: Germ and Bug theory. Epidemiological triad, Multicausation theory. Culture blaming approach.

Social Structure and Medical System: Medicine under capitalism and Socialism. Medical system of Bangladesh (Govt. and private).

Gender and Health: Medicalization of reproductive health. Gender- cultural ideology and different medical practices.

Drug Policy of Bangladesh: Salient features of drug policy of Bangladesh. Weakness of Bangladesh drug policy. Measures for improved drug policy.

Health Policy and Primary Health Care in Bangladesh: Salient features of health policy of Bangladesh. Weakness and its improvement measures. Existing health care facilities in Bangladesh. Role of NGOs and Gono Shasthya Kendra to offer health care facilities in rural Bangladesh.

Models of Health and Illness: Medical Model of Health and Illness, Social Model of Health and Illness.

Dimensions, Determinants and Indicators of Health.

Remedial Measures: Evolution of Medicine, Ethnomedicine, Folk Medicine, Alternate Healing System in Cross Cultural Context.

Health Seeking Behavior: Health belief system, Health Service Utilization Model

Political Economy of Health: Doctor-Patient Relationship, Constraints on People's Access to Health Services.

SOC 306: Social Problem Analysis

Social Problem: Definition, nature, characteristics and classification. Approaches to the analysis of social problems.

Social Science and Social Technology: Definition,

nature, characteristics, aims and functions. The role of a social science and social technology to analysis social problems. Social Work as a practice of social science.

Fundamental Concepts: Cultural conflict, class conflict, maladjustment of role and dignity, unequal distribution of wealth and opportunity, family disorganization.

Some Social Problems: Deviant and criminal behavior, drug addiction, slums and resultant problems, urban poverty, destitution and dependency, prostitution, over population, malnutrition, unemployment, suicide, violence, old age problem etc.

Introduction to New Technology and Modernization: Concepts and theory, influences of new technology and modernization.

Review of research reports on social problems, solutions of social problems.

SOC 307: Bangladesh: Society and Culture

Introduction: Characteristics of urban and rural societies. Difference between urban and rural social structure of Bangladesh. Differential values, norms, rituals and beliefs.

Nature of Society: Concept of family. Community and society. Objectives of society. Relationships between individual and society. Urban and rural social institutions. Voluntary social welfare agencies and types of agencies.

Social stratification. Concept of social stratification. Changes in stratification system and its impact on social life of Bangladesh. Importance of studying social stratification.

Culture of Bangladesh: Basic characteristics of Bangladesh culture. Urban and rural cultural differences, various sub-cultures. Cultural conflict. Tribes of Bangladesh. Tribal culture of Bangladesh. Folk Culture: Special features and their influences on the life and behavior of common people. Conflict of folk-culture with the modern one.

Social Institution of Bangladesh: Marriage. Property. Religion, Samaj, Informal power structure and Social Welfare.

Social Problems in Bangladesh: Poverty. Over population. Beggary. Illiteracy and ignorance. Superstitions. Unemployment. Prostitution. Drug addiction. Juvenile delinquencies. Repression on women.

Social Change: Theories of social change. Causes, trends, effects of cultural change of Bangladesh.

Cultural lag theory.

Historical Background of Cultural Change: Socio-economic conditions during the British period. Emergence of middle class, Renaissance of Bengal and contribution of various people.

SOC 308: Social Services in Bangladesh

Basic Concepts Related to Social Welfare: Social Problem. Social disorganization. Social anomie. Social security. Social assistance, and Social insurance, Social services.

Growth and Development of Social Welfare Services in Bangladesh: Government and Non-governmental Social Welfare Services.

Concept of Family Welfare: Growth and Development of family welfare services in Bangladesh. Family needs and problems. Social Work with families.

Concept of Women Welfare: Role and status of Women in Bangladesh. Impact of social change on role and status of women in Bangladesh. Women Welfare Services in Bangladesh. Needs of women development programs in Bangladesh.

Concept of Child Welfare: Needs of children physical, psychological, social and emotional hazard of children. Children welfare services in Bangladesh. Institutional care: maternal and child care, day care, baby home, community health education, adoption and foster care. Problems of socially, mentally, and physically handicapped children and special services for them. International convention on the rights of child.

Growth and Development of Youth: Needs of youth in the areas of family adjustment, marriage, employment, recreation etc. Impact of social change on the youth, roles of youth in development, policy and planning for youth welfare. The role of youth development, policy planning for youth welfare. The role of social worker in youth welfare.

Development of Services in Bangladesh: Bangladesh Probin Hitushy Shanga, SOS Shishu Pally, ACSR, UCEP, SWID. Prevention and correctional juvenile delinquency, disabled services and labor welfare in Bangladesh.

National Council of Social Welfare: Historical Background. Composition and functions. Growth in aid program of the government for voluntary agencies. Evaluation of activities of National Council of Social Welfare. Social Welfare program provided by the Directorate of Social Service.

SOC 309: Sociology of Education

Introduction: Concepts and definition of Sociology of Education, Scope of Sociology of Education, Emergence of Sociology of Education as a Sub-discipline within Sociology, Education and Colonialism

Theoretical Perspectives

- Sociological interpretations of Schooling: The Functional Perspective
- Marxist and Neo-Marxist Theories of Education
- Cultural Theories of Education
- A Weberian Approach to Education
- Cultural Capital and Pierre Bourdieu
- Critical Pedagogy
- Education, Modernization and Development
- Indigenous Knowledge and the Education

Education, Work, and the Labor Market

- Power, Politics and Professionalization
- Universal Education and Cultural Diversity
- Culture as Pedagogy of Pleasure and Meaning
- Formal Education and Non-formal Education

Education, Class, Gender and Educational Practices

- Social Class and Education
- Participation of women in Science and technology
- Teaching for Democratic Citizenship
- Feminist Pedagogy
- Gender Development and Education

Education, Curriculum Planning, Culture and Politics

- Popular Culture and Public life
- Curriculum Politics, Hegemony and Strategies
- Art or Culture

Pedagogy, Classroom and Education

- Pedagogy and Classroom
- Pedagogy and the Working Class Identity
- Pedagogy and Ethnic Minorities
- Education and Empowerment
- Educational Media

Education and Foreign Aid: Multilateral Organizations and Bilateral Organizations, Non-governmental organizations

Schooling in Developed and Developing Countries: Schooling in Asia, Schooling in Africa, Schooling in Canada and USA

SOC 310: Sociology of Organization

Introduction: Definition, scope and methods of research on organization.

Organizations in Historical Perspectives: Organization

in pre-capitalist society. Industrialism and organization. Complex organization.

Theoretical Models: Beginning of organizational models. Psychological, technological, cultural and functional system-action. Analysis of organization. Neo Marxist critique.

Structural Elements of Organization: Individual, dyad, groups, action, role status, position, ends, means-goals, norms, values, laws, customs, conventions, association, institutions and community, stratification and hierarchy.

Forms of Social Organization: Formal and Informal Organization. Closed and open organizations.

Economic, political, cultural, educational and other types of organizations.

Technology and Organization: Organization and socio-technical system. Environment and organizational structure. Technology and alienation.

Bureaucracy: Nature and characteristics of bureaucracy. Function and dysfunction. Limits of Tylorism and Fordism.

Decision Making Process in the Organizational Resources: Power authority and organizational goal. Communication and the process of decision making. Control and autonomy.

Organizational Behavior: Behavioral model of human beings. Models of organizational behavior. Organizational culture.

Patterns of Interaction: Organizational role. Non compliance of roles. Types of conflict. Strategies. Conflict management.

Organization and Underdevelopment in the Developing Countries: Theories of organization. Underdevelopment and development.

Organizational Problems: Corruption. Industrial relations. Multinational corporation and developing countries.

SOC 311: Feminist Thought

Liberal Feminism: The roots. Historical development. Liberal Feminism in the eighteenth century: same education. Liberal Feminism in the nineteenth century: same civil rights and economic opportunities. Liberal Feminism in the twentieth century: pluses and minuses of treating women the same as men. Critiques of Liberal Feminism.

Marxist Feminism: Concepts, theories, feminist implications. Friedrich Engels. The Origin of the Family, Private Property, and the State. Family under capitalism. Socialization of domestic labor vs wages for housework. Critiques of Marxist Feminism.

Radical Feminism:

a) Reproduction and mothering: reproduction as the cause of women's oppression. The case for and against biological motherhood.

b) Gender and sexuality: androgyny as the solution to patriarchal imposition. Going beyond androgyny. Pornography. Lesbianism.

c) Critiques of Radical Feminism.

Psychoanalytic Feminism: Roots. Feminist critiques of Freud. Pursuing psychoanalysis in feminist directions: Freud's biological determinism. Dual parenting. Woman's morality.

Existentialist Feminism: Sartre's Being and Nothingness as backdrop to *The Second Sex*. Simone de Beauvoir: Existentialism for women. Destiny and history of women. Critiques of Existentialist Feminism.

Recent Feminist Theorising: Black Feminisms. Post-colonial Feminist Theory. Post-modern Feminist Theory.

SOC 312: Social Demography

Introduction: Concept of demography. Why study demography? Sources of population data. Population census. Registration of vital events. Sample survey.

Demographic Perspectives: The Malthusian perspective. The Marxist perspective. Other early modern population theories. The theory of demographic transition. Critique of demographic transition theory. Brief history of world population. Population growth of Bangladesh.

Population Theories: Mercantilist Theory, Malthusian Theory, Marxist View on Population, Optimum Population Theory

Fertility: Concept. Crude birth rate. General fertility rate. Age specific fertility rate. Total fertility rate. Social class and fertility. Gross reproductive rate. Net reproductive rate. Causes of high and low fertility. Determinants of fertility. Zero population growth.

Fertility Theories: Demographic Transition Theory (Davis-Blake Model, Thompson-Notestein Model), New Home Economic Theory (Schultz's Model, Caldwell's Intergenerational Wealth Flows Theory); Fertility Regulation Costs (Easterline Model), Measurement of Fertility.

Mortality: Components of mortality (lifespan, longevity). Causes of death. Crude death rate. Age specific death rate. Social class differentials in mortality. Sex differentials in mortality. Age differentials in mortality. Urban and rural differentials in mortality. Determinants of mortality, Measurement of Mortality

Migration: Definition. Types of migration: internal and international. Causes of migration. Characteristics of migrants. Where do people migrate? Consequences of migration. Theories of Migration (Everett Lee's Push-Pull Dichotomy, Peterson Greenwood Hypothesis, Lewis Model, Fei-Ranis Model). Rural-Urban Migration.

Population Structure: What is age/sex structure? Population pyramid. Stable and stationary population. Population projections. Impact of migration on the age/sex structure. Impact of mortality on the age/sex structure. Fertility determinants of the age/sex structure.

Population Growth and Economic Development: The debate: Population growth a stimulus to economic development. Population growth unrelated to economic development. Population growth detrimental to economic development. Population growth and food crisis.

Population Growth and Urbanization: Demographic components of urbanization. Impact of population process on urbanization. Impact of urbanization on the human condition.

Population Policy: What is population policy? Who needs a population policy? Family planning and beyond family planning. Population program of Bangladesh- its strengths and weaknesses. Nature, Objectives and Strategies of Population Policy with Reference to Bangladesh; Instruments of Population Control, Evaluation of Current Population Policy in Bangladesh.

SOC 313: Criminology

Introduction: Definition, nature, scope and importance of criminology. Relationships with other discipline, Emergence of criminology as a separate discipline

Research Methods in Criminology: Survey methods, Observation, Experimental and Quasi Experimental Methods, Agency Records, Content analysis and Secondary data, Case study.

Measuring Crime and Victimization: Crime known to police, Measuring crime through surveys, National Crime Victimization Survey, Surveys of offenders, Problems of official data

Sociology of Law: Theories of origin of Law. Penal code.

Crime and Criminals: Legal and sociological definition of crime, classification of crime, Characteristics of crime, crime immorality and sin

School of Criminology: Pre-Classical, Classical, Neo-

Classical, Positive and Clinical school, Sociological School

Theories of Crime and Deviance: Biological theory: Lombroso, Ferri, Garofalo,

Psychological theory: Freud; Economic Theory: Crime and Poverty Sutherland's Theory of Differential Association, Social Disorganization, Social Control theory, Merton's Strain theory, Sub-culture theory, Deterrence and Rational Choice theory. The Labeling perspective of Crime and Delinquency

Penology: Police, Court, Probation and Parole, Corporal and Capital Punishment, Imprisonment. Correctional Institutions. Sutherland's Theory of Differential Association, Social Disorganization, Social Control theory, Merton's Strain theory, Sub-culture theory, Deterrence and Rational Choice theory

The Labeling perspective of Crime and Delinquency

White Color Crime: Definition, Typology of white color crime, Types of white color crime in Bangladesh and Measures to control white color crime in Bangladesh

Juvenile Delinquency: Definition, Causes of juvenile delinquency, Controlling juvenile delinquency in Bangladesh

Crime in Bangladesh: Causes of Crime in Bangladesh, Poverty and Crime, Politics and Crime, Drug Abuse and Dug Trafficking, Women and Child Trafficking, Violence against Women, Religious Militancy, Cyber Crime, Money Laundering

Crime Prevention: Theories of Crime Prevention

SOC 314: Sociology of Aging

Concept of aging: Cross Cultural issues, Gerontology and its relationship with Sociology of of Aging, Historic respective of the Sociology and the Aged. The importance of Sociological work with the aged.

Areas of Sociological Interest in the Aging: The social consequences of physical aging, Long term care, community health and short-term health care. Malnutrition among older people, Managing chronics diseases and promoting well-being in old age. The challenge facing older women.

Methods and Strategies on Sociology of Aging: Social theories of aging. Engagement Theory, Activity Theory, Continuity Theory, Cognitive Theory, Exchange Theory, Aging Clock Theory, Death, Dying, Bereavement and Widowhood. The Disengagement Theory. Multiple-stress theory

Aging and social policy: Policies of Bangladesh and developed countries.

Demography of Aging: Health and aging, aging and family, Economy of aging

SOC 315: Principles of Economic Sociology

The classic in Economic Sociology: The role of interest in Social analysis, Classical economic sociology and its predecessors: Alexis de Tocqueville, Karl Marx, Max Weber, Emile Durkheim, Georg Simmel.

After the classic: Josep Schumpeter, Karl Polanyi, Talcott Parsons.

Contemporary Economic Sociology: New economic sociology, Mark Granovetter on Embeddedness, Contribution I: Using Structural Sociology and Network, Contribution II: Using Organization Theory, Contribution III: Using Cultural Sociology, Contribution IV: Building a Historical and Comparative Tradition in Economic Sociology, Contribution V: James Coleman and Interest- Based Sociology. Recent Development of Economic Sociology in Europe.

Economic Organization: On the Social organization of the Economy: Capitalism, Industrial Districts, Globalization,

Economic and Sociological Approach to Market: Economists on the market- Sociological perspective: The Market in Classical Political Economy(from Adam Smith to Marx), The marginalist Revolution: The creation of the modern concept of the market. The Austrian Schools: The market as a process. Keynes's Critique of mainstream view of markets. Industrial Organization and the concept of market structure. Post war developments in research on markets. Sociologists on Markets: Weber on Markets, Harrison White on the market, Markets as networks, Markets as Parts of fields(Bourdieu and Others), Prices and price Formation.

Politics and the Economy: The State and its Role in the Economy, The Economy in Public Choice and new Institutional Economics The View of the Classical Sociologist on the Economy,, New Economy Sociaology on the State and the Economy, Fiscal Sociology: Joseph Schumpeter's "The crisis of the tax State", Max Weber's Fiscal Sociology, and Fiscal Sociology Today.

Law and the Economy: Legal Foundation for Modern capitalism, Legal Institutions and Economic Sociology, and Law and Economics

Culture and Economic Development: Concept of Culture and the economy, Values and Norms to Economic Culture, Culture and Economic Development and Economic Culture and Modernization.

SOC 316: Globalization, Migration, Development and Refugee issues

Theories and approach: World system and global approaches. Understanding global migration Models of migration. Transition theories, the postmodernist view, the changing global migration. Regionalization the state in international system, the typology of migrants. Globalization and its affect on the structure of societies.

Migration and its affect on rural and urban communities. The new immigration; Various pattern and citizenship. The historical background of Migration in Asia. The regional origins of Labor migration. Social and political consequences of Migration.

Migration: Migration histories of Bangladesh, an overview of migration in Bangladesh & its impact and key issues. Biharies and Rohingya issues. Sociology of migration and immigration. Migration and migration policy in Asia. Gender and migration in Asia; Internal session migration, livelihood and vulnerability, Internal migration policies in Asia. Internal migration and the development nexus; the case of Bangladesh, migration to the Middle East

Europe USA, Australia, migration in local context. Economic and social mobility, Migration, Kinship, marriages, force marriage issues. Migration and women in local economy.

Migration histories of Sylhet region, migration and dependency, history of migration, migration and production, impact of migration on infrastructure. Migration and its effect on non agricultural production, effect on employment occupational structure of migrants households, effects on social economic, demographic and political power.

SOC 317: Sociology of Science and Technology

Understanding Sociology of Science: Sociological Construction of Science and Technology Change and Development, Building Society and Technology.

Technology and Society: Technology and the Industrial Revolution, Role of technology in the rationalization of society

Theories of Technology and Social Change: Technological Determination, Social Constructivism, Institutionalism, Feminist Critiques

Science, Technology and Culture: Evolution of science and technology in culture, Cultural studies of Western science, Paradigmatic Thought in Eurocentric Science.

Science, Technology and Knowledge: Evolutionary

Approach of Science and technology, Knowledge for Development and change.

Science, Technology, Society and Property Rights: Science, Creativity and Intellectual Property Rights.

Science, Biotechnology, Biodiversity and Indigenous Knowledge: Biotechnology, the Cultural and Symbolic Dimensions, Biodiversity and people's Science/indigenous knowledge, Genetic Modification, Genetic Modification, Biopollution and Biosafety and Future of Biodiversity.

Gender, Science and Technology: Science, Nature and gender, Technology and Gender needs, Technology inputs for women's enterprise, integrating gender in technological development,

Computer technology and Society: Community, Democracy, and the Nation State in Cyberspaces.

SOC 401: Classical Sociological Theories

Nature Classification and Construction of Theory in Sociology

Events Contributed to the Birth of Sociology: Renaissance, Enlightenment, and Reformation in Europe; French and industrial revolution.

Emergence of Sociology: Saint Simon and Utopian Socialists, Reaction to radicalism.

Auguste Comte (1767-1814). Biographical sketch, Comte's positivism, Coining of the term Sociology, Hierarchy of the sciences, Three stages of development, Social static and dynamics, Religion of humanity, and Family.

Herbert Spencer: Biographical sketch, Biological foundation, The evolutionary doctrine, Organic analogy: homogeneity to heterogeneity; The principles of noninterference.

Other pioneers: Le Play, Taylor and Morgan, Gumpłowicz, Small, Sumner, Ward, Toennies, Simmel, etc.

Karl Marx (1818-1883): Biographical sketch, Modes of production, Historical and dialectical materialism, Concept of man, Alienation and forms of property, Social formation, Class and class conflicts, Surplus value, Revolution, Dictatorship of proletariat, State, Socialism and communism.

Max Weber (1864-1920): Biographical sketch, Methodology, Ideal type, Economy and society, Protestantism and capitalism, Power-authority, and Bureaucracy.

V. Pareto (1848-1923): Psycho-analysis, Logico-experimental method, and Social system: its structure and dynamics. Circulation of Elites, Action.

E. Durkheim (1858-1917): Biographical sketch, Social

facts and his methodology, Collective forces in social life, Social differentiation and division of labor, Social solidarity, suicide, and religion and society.

C.H.Cooley and W.I. Thomas: Cooley: Looking glass self, primary group, class, cast; Thomas: Situational definition and study of action, Individual and social disorganization, and Types of personality.

SOC 402: Sociology of Poverty

Definition of Poverty: Problems of definition. Absolute and relative poverty. Theories of poverty.

The Context of Poverty: Political context of poverty. Extent of poverty in Bangladesh. International comparison of poverty. Trends in urban and rural poverty.

Social Causes of Poverty: Social determinants of poverty. Underdevelopment, income distribution and poverty. Misdistribution of resources. Bad governance. Low level of production. Lack of access to technology.

Measurement of Poverty and Poverty Line: Quantitative measures. Qualitative measures. Concept of poverty line. Approaches to poverty line. Food ratio method. Relative Deprivation.

Effects of Poverty: Poverty cycle, depression, increased vulnerability to natural and social disaster, extremism, fatalism, hunger and starvation, human trafficking, high crime, corruption, political violence, low literacy, drug abuse, low life expectancy, and Increased discrimination.

Principles of Anti-Poverty Measures: Poverty alleviation vs. social policy measures. The role of distributive policies. The role of self help programs. The role of institutional structures. The informal sectors. Need of sustainability. Effects of anti-poverty policies.

Racism and Poverty: Racism and ethnic minorities. Inequality in industrial society. Disadvantage and deprivation. Underclass ethnic minorities. Inequality in colonial societies.

Racism, Ethnicity and Poverty: Debate over culture of poverty vs. Blaming the Victim

Population, Urbanization and Poverty: Demographic transition. Fertility and income distribution. Urbanization and poverty.

Households, Family and Poverty: Individual and households. Household size and structure. Equivalence scales. Life cycle changes. Intra-household transfer. Dependency. Ageing and poverty.

Poverty Alleviation Strategies in Bangladesh: Government initiatives. NGO interventions- Antipoverty programs, Failure and Success of Anti poverty programs. Local anti poverty strategies.

SOC 403: Political Sociology

Introduction: Definition, scope and importance of political sociology. Origin and development of political sociology. Its relationships with sociology, Political science and other social sciences.

Methodological problems in Political Sociology. Approaches to sociological analysis of issues. Marxist-Functionalist-System theory.

Key Concepts of Political Sociology: Political culture, political ideology, political behavior, political change, political development, political movement, political socialization, political polarization, political modernization, political communication, political mobilization, political integration, political revolution, political consensus, political reform, political awareness, political upliftment, and political economy.

Theories Regarding the Origin of State: Khaldun, Hegel, Marx, Engels, Openheimer, Morgan, Lowie, Gumplowicz and Devy.

Factors in Making of the State: Major theoretical and empirical observations.

State, Institutions and Organizations, Their relationships: State and family. State and property. State and law. State and religion. State and education. State and bureaucracy. State and government. State and political party. State and economic system.

State in Transition: State in primitive, pastoral, agricultural and industrial societies. State in oriental and occidental societies. Forms of state and forms of government. Political system. Democracy and dictatorship. Authoritarianism. Welfare state. Dependent state.

Sociology of Modern State: Representation and electoral system. Political parties and social class. Political parties and pressure groups. Leadership and elite class. Military bureaucracy, technocracy and political bureaucracy. Power politics. Separation of power. Bases of power. Authority and Legitimacy.

Problems of Power: Political power at local, national and international levels.

Sociology of Political Change: Evolution and revolution. Political ideologies and political behavior. Contemporary social movements: liberalism, conservatism, fascism, socialism and communism: Social movements and problem of bureaucracy.

Political Sociology of Bangladesh: Political elites. Student Movements in political development. Role of professional and intellectual groups in political modernization. Role of military elites. Problems and prospects of institution of democracy in Bangladesh.

SOC 404: Marxist Sociology

Introduction: Concept of man. Marx as a sociologist

Dialectical Method: Hegel, Feurbach and Marx

Historical Materialism: Marxist conception of history.

Teleology. Theory and practice. Importance in sociological analysis.

Alienation: Species being. Causes and process of alienation. Elimination of alienation.

Theory of Value as a Social Relation: Labor theory of value. Forms of property. Mode of production and relations of production. Concept of class and class struggle. Social stratification and its relevance to Bangladesh.

Concept of Commodity: Feurbach concept of fetishism. The fetish character of commodity (Marx).

Marx's Theory of the State: Emergence of state and law. The theory of revolution. Dictatorship of proletariat. Socialism. Communism, Marx on colonialism, imperialism, religion, ideology, and science.

SOC 405: Social Forestry

Concept of Forest: Definition. Relationship between forest and people. Relevance of forest to society.

Emergence of Social Forestry in Sociological Study: Definition. Objective of social forestry. Social forestry and environment. A new dimension in forestry.

Types of Social Forestry: Agro-forest, community forest, and homestead forest. Social forestry programs in selected countries: India, China, Tanzania and Bangladesh. GO and NGO roles in social forestry.

Social Forestry and Development: Social forestry and alleviation of forestry. Local resources, social structure and development perspectives in forestry development programs.

Forest Management Systems and Policies: Traditional forest management system. Weakness of the system. Changing direction in forest management policy. Present forest management policies of Bangladesh.

Rural Household Consumption and Social Forestry: Fuel, food, fodder, medicinal herbs, and construction materials. Relevance of all these to Bangladesh.

Social Forestry, Women and Development: Historical perspectives. Traditional relationships of forest with women. The anticipatory role of women in social forestry, such as planning, management, fuel collection, fodder gathering and conservatism activities.

Environment and Social Forestry: The Role of Social Forestry in balancing development and environment.

SOC 406: Sociology of Development

Definition: Indices of development. Human Development Index (HDI). Development and underdevelopment. Historical overview.

Theories of Modernization: Distinction between traditional and modern. Early modernization theories. Critique of modernization theory. Convergence theory.

Dependency Theories: Process of underdevelopment: Baran, Sweezy, and Frank. Critique of underdevelopment theories: Cardoso and Warren. World System Theory: Wallerstein. Neo Marxist Theories.

Institutional Patterns of Underdevelopment: Pre-capitalist economic formation. Capitalism and neo-colonialism. Military intervention and role of military bureaucracy.

Industrialization: Historical development of industries. Distinctive features of industrialization. Industrialization in developing societies. Theories of Harbin and Kerr.

Food and Population: Growth of population and scarcity of food. Manpower utilization and underdeveloped agriculture.

Foreign Aid and Trade: AID and dependency: World Bank, IMF and WTO. Role of multinational and transnational corporations.

Globalization and Development: concept of globalization. Resource management. Crisis environment. Globalization from below: NGOs.

Sustainable development and globalization. Critique of development policies.

Development in Bangladesh: Development policy and strategy. Politics of development. Population program. Foreign AID, MNCs and NGOs.

SOC 407: Contemporary Sociological Theories

Introduction: Theory defined; Structure of Sociological theory: concepts, propositions, generalization and laws, Building blocks of theory, Sociological theory and problems of social order, and Schools of sociological theories.

Functionalism: Introduction, Intellectual roots: Comte, Spencer, Pareto, Durkheim, Radcliffe Brown, Malinowski, and Nadel.

Modern functionalism: Parsons: Systems of action, Pattern variables, Functional system problems, AGIL, Social change. Merton: Paradigm for functional



analysis, Grand Theories, Theories of middle range, Clarifying functional analysis.

Neo-functionalism: J. Alexander

Conflict Theory: Introduction, Intellectual roots: Simmel, Marx, Weber, Chicago school. Marx: Theory of class conflict and critique of society, Economic basis of society. Economic, cultural and ideological basis of conflict. Evolution of classless society, Class society and state.

Conflict theory and analytical sociology: Dahrenforf: determinants of conflicts, social explanation, and conflict groups; Coser: the origin of conflict, consequences and functions of conflict; Collins: the nature of conflict, social institutions and balance of resources. Conclusion.

Symbolic Interactionism: Introduction. Intellectual roots: Freud, Simmel, Thomas and Znaniecki, Cooley. Mead: the self, self interaction, the development of self, symbolic meaning. Blumer: interpretation, basic premises, structure and process, methodology; Synthesis of Marx, Mead and Freud. Conclusion.

Ethnomethodology and Phenomenology: Introduction; Intellectual roots. Phenomenological connection: Husserl, Schutz, Weber, Berger Luckmann. Gerefinkel: ethno- methodology defined, Conducting ethnomethodological inquiry, ethnomethodological explanation, Ethnomethodology and symbolic interaction; Conclusion.

Critical Theorizing: Critical strains in Marx's thought; Frankfurt School: Lucacs, Horkheimer and Adorno; Marcus, Eric Fromm, Gramsci, and Althusser.

Sociological Theory of J. Habermas: Modernity. An Unfinished Project. The Rationalization of Life World, Civil Society and the Political Public Sphere.

Theories of Gender and Difference: Representation of gender: Early challenges to social science; Feminist methodology, Epistemologies and standpoint theories (Smith), Challenges to critical feminist theory. Black Feminist Thought: Patricia Hill Collins. Black skin, white Masks: Frantz Fanon.

Exchange Theorizing: Early exchange theory: Frazer, Malinowski, Levi-strauss, and Marx; Behavioristic exchange theory: Homans; Dialectic exchange theory: Blau.

Structuralist Theorizing: Early structuralist theory: Marx Durkheim, Simmel, and Levi-Strauss. Structuration theory: Giddens; Cultural structuralist theory: Bourdieu.

Post-modern Theory: Modernity. Post-modern critique

of science. Economic post-modernism and Cultural post-modernism.

Current Trends in Sociological Theories: Emerging trends in mainstream and substantive theories, Status of theory in Bangladesh sociology.

Contemporary Feminist Theory: (Mary Wollstonecraft, Kate Millet, Juliet Mitchell, Karen Warren, Jessie Bernard, Vandana Shiva)

SOC 408: Sociology of Gender Planning and Development

Social Construction of Gender: Male dominance, female subordination. Ideology of domesticity, private and public division. Parda: Honour and shame. Control and subordination of women through religion, patriarchy, class, sexuality. Images of ideal wifehood, daughterhood, motherhood. Representation of women in media. Pornography. Trafficking in women and children. Politics of reproduction

Gender Theories: Liberal, Radical, Socialist, Marxist, Psychoanalytic, Externalist, Post-modern, Black, Third World and Eco-feminism

Social Organization of Gender and Planning: Sexual division of labour and capitalism. Differentiation and devaluation of women's work. Discrimination at work and lower wages. Gender Planning and Work.

Status of Women in the Family: Socialisation as women. Life cycle as daughter, wife, mother. Marriage, divorce, widowhood. Number of children, fertility, son preference, birth control. Family, access to resources, decision making, division of work, economic contribution, role conflict. Dowry, domesticity, inheritance. Discrimination regarding access to resources. Social construction of sexuality. Domestic violence.

Legal Status of Women: Constitutional rights. International law. Industrial labor employment law. Property law, penal laws. Limited access to law. Traditional salish and fatwa. Legal aid system.

Developmental Approach: Women in Development (WID). Women and Development (WAD). Gender and Development (GAD). Women and Human Rights. UN initiatives. Impact of globalization. NGO programs for women. CEDAW, From Beijing +5 to Beijing +15.

Women's Movement: Suffragette movement (Emmeline Pankhurst). Women's organizations. Resistance against male oppression.

NGO Efforts towards Women Development: Role of

leading NGOs towards women empowerment and development: Grameen Bank, Gono Shashthaya, BRAC, ASA, Proshika.

Women Scenario in Bangladesh: Economic-social, legal and political status. Empowerment of women in Bangladesh. Implementation of UN Charter.

SOC 409: Sociology of Mass Communication

Concept: Definition. Taking Media Seriously. Mass communication as a subject-matter of sociology.

Theoretical Perspectives of Mass Communication: Marxist perspectives. Functionalist theory. Critical theory. Recent Approaches to the Study of Mass Communication: Media Hegemony. Media Elite Relationship. Manufacturing Consent Model of Herman and Chomsky.

Media Organizations: Political economy of media organization. Corporate take-over and control of global ideology.

Media Messages: Contents of the messages. Manifest and latent goals of messages. Producers of messages. Impact of messages.

Media Processes: Newscasting as propaganda. Deconstructing Television/ Radio. Advertising: Selling Consumerism. Film and Society. Internet

Effects of Mass Media: Theories of media effects. Media campaign. Public opinion. Diffusion of knowledge in developing countries. Violence and Media / Censorship

Media in Society: Media and Minorities. Gendered Media

Media Policy: Role of media in social change and development. Media imperialism and conflict. Present role of media in Bangladesh.

SOC 413: Research Monograph

Credits : 6

A student will prepare a research monograph on a subject of her/his choice with the approval of the department and teacher supervisor. The research monograph should be completed before the semester's final examination. It will be worth 6 credit hours.

SOC 414: Practicum/Internship

Credits : 6

Although internship is not a common practice in sociology, we intend to introduce it in the program in order to provide reflective learning environment and to practice community interaction for the benefit of the students. This will help them apply their newly gained theoretical knowledge and understanding in the the country and beyond.

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 208: Statistics for Biologists

Credits: 3; Prerequisite: MAT 101

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.

Suggested readings:

1. Statistics for Biologists(3rd edition, 1989) - R. C. Campbell; Publisher: Cambridge University Press.

STA 217: Statistics for Business and Economics

Introduction to modern theory and methodology of statistics in areas of economics and business.

Topics include: Components of Time Series, Determination of Trend and Seasonal Indexes, Deseasonalizing data and Forecasting. Methods of Selecting a sample, Construction of Sampling Distribution of the Sample Means, Central Limit Theorem, Confidence Interval of Means and Proportion, Determination of Sample Size. Hypothesis Testing Procedure, One and Two Tailed Tests, Type I and Type II Error. Characteristics of Student t Distribution. Testing of Hypothesis about a Population Mean, Difference between Two Means, and Difference between Paired Observations.

Idea of Analysis of Variance, Characteristics of the F Distribution, Test of Hypothesis Concerning Equality of Two Variances, One and Two Way ANOVA techniques and relevant Tests, Characteristics of the Chi-Square Distribution. Test of Contingency Tables, Wilcoxon Rank-Sum Test, Kruskal-Wallis Test, Testing Significance of Correlation and Rank Correlation Coefficients, An Introduction to Decision theory.

Credits: 3, Prerequisite: STA 101, MAT 311

Text Book: Statistical Techniques in Business and Economics,

Douglas A.Lind, William G. Marchal and Samuel A. Wathen.

Latest Edition.

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