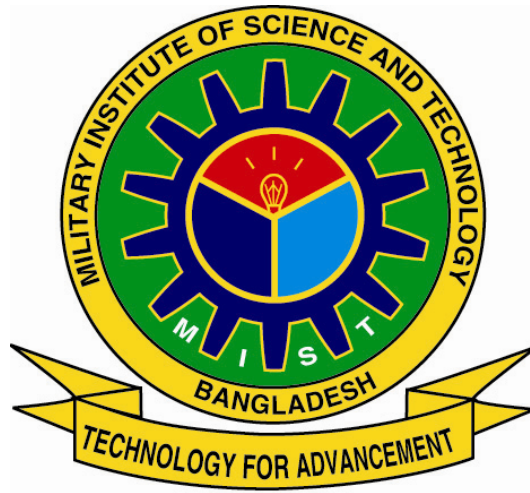# MILITARY INSTITUTE OF SCIENCE AND TECHNOLOGY

SYLLABUS

**BACHELOR OF SCIENCE IN
COMPUTER SCIENCE AND ENGINEERING (CSE)**

APPLICABLE FOR CSE- 12, 13 & 14 BATCHES

REVISED ON SEPTEMBER 2011

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING (CSE)
MILITARY INSTITUTE OF SCIENCE AND TECHNOLOGY (MIST)
MIRPUR CANTONMENT, DHAKA-1216, BANGLADESH**

Contact

Published by

Committee of Courses

PREFACE

Military Institute of Science and Technology (MIST) offers undergraduate programs. This syllabus is for the undergraduate students in the Department of Computer Science and Engineering (CSE) of MIST. Although this syllabus has been written mainly for the students, student advisers and teachers will find it valuable as a reference document. Also, anybody who desires to know about the course contents of CSE Department will find this book helpful.

This syllabus provides general information about MIST, its historical background and departments. Different aspects of the course system, such as rules and regulations relating to admission, grading system, requirement for degrees have been elaborated. It describes the course requirements, detailed course outline and courses offered in different terms.

The fields of Computer Science and Computer Engineering themselves are changing rapidly. So the departmental as well as the non-departmental courses for CSE students have been revised to cater to recent advancements in these fields. The introduction of a basic course on computer systems for a gentle introduction of the field to the newcomers is among the worth mentionable changes. Number of subjects in some semesters has also been reduced keeping the total credit hour almost unchanged. Moreover, students now have more freedom in subject selection to specialize in a certain direction in their final years.

The revised curriculum as incorporated in this syllabus is approved by the committee of courses. It will be placed before the academic council, MIST for necessary approval. This syllabus will be introduced for the CSE undergraduate students commencing their Level-1 Term-I classes in January 2012.

According to the policy of MIST, the syllabus is revised minimum once in every three years. Some of the information recorded in this syllabus is likely to be modified from time to time. Everybody concerned is strongly advised to be in touch with the advisers or the undersigned regarding modifications to be introduced later. It is hoped that this syllabus will be of much use to everybody concerned.

Dhaka, Bangladesh   Group Captain Md Afzal Hossain, psc
November 2011   Head, Department of CSE, MIST

CERTIFICATE
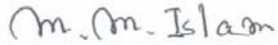
Certified that this syllabus of Bachelor of Science in Computer Science and Engineering (BSc in CSE) of Military Institute of Science and Technology (MIST) is prepared by the committee as under :

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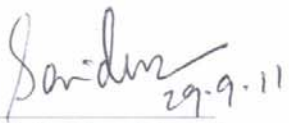
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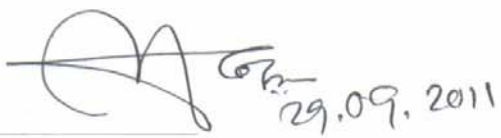
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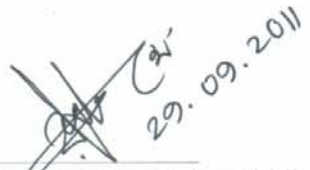
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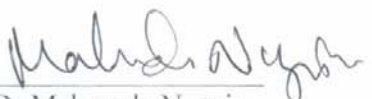Fahim Hasan Khan
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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

CHAPTER 1

GENERAL INFORMATION

1.1 Introduction

Military Institute of Science and Technology (MIST), the pioneer Technical Institutes of Armed Forces, started its journey from 19 April 1998. It was the visionary leadership of the Honourable Prime Minister of People's Republic of Bangladesh Sheikh Hasina to establish a Technical Institute of Armed Forces. Accordingly, the Honourable Prime Minister, People's Republic of Bangladesh, Sheikh Hasina unveiled the Foundation Plaque on 19 April 1998. MIST is located at Mirpur Cantonment, which is on the northwest of Dhaka City. Mirpur Cantonment is well known to be as an Education Village of Bangladesh Armed Forces, a hub of knowledge for military and civil professionals. First Academic Program at MIST was launched on 31 January 1999 with the maiden batch of Civil Engineering (CE). The pioneer batch comprised of only military students. Computer Science & Engineering (CSE) Program got underway from February 2000. Following those Programs, Electrical, Electronic & Communication Engineering (EECE) and Mechanical Engineering (ME) Programs including induction of Civil Students (both male and female) to various disciplines started from the session 2002-2003. Aeronautical Engineering (AE) program started at MIST from Academic Session 2008-2009.

1.2 Attributes of MIST

MIST is an educational entity where there is an opportunity of blending civil and military students with diversified skills, exposure, experience and outlook. Attributes those may be considered as strengths of MIST are:
- Rigorous admission and selection process for best possible screening.
- Interactive sessions in the classroom.
- Regular guest lectures and educational visits.
- Culture of timeliness, commitment and uninterrupted curriculum.
- Flexibility in choosing competent faculties through outsourcing.
- Well thought-out and continuous feedback and assessment system.
- Effective teaching through innovative method.
- Industrial attachment for on job training.
- Emphasis on code of conduct and dress code.
- Focus to develop students as a good human with all possible attributes of successful leader.
- Tranquil, pollution free and secure campus life.

1.3 Objectives

- To establish a prestigious academic institute for studies in different fields of engineering and technology for military personnel and civil officials/ students from home and abroad at degree and post graduate levels.
- To organize courses on military science and technology in various areas of interest.

- To hold examinations and confer certificates of diplomas/ degrees, other academic distinctions, to and on persons who have persuaded a course of study and have passed examinations conducted by the institute.
- To confer research degrees, award fellowship, scholarship, exhibition, prizes, medals and honorary degrees to persons who have carried out research works under conditions as prescribed in the MIST regulations.
- To make provisions for advisory, research and consultation service including supervisions, material testing and to enter into suitable agreement with any persons/organizations for this purpose.
- To co-operate with Universities / Technical Institutions (both military and civil) including signing of Memoranda of Understanding (MOU) at home and abroad, in the manner and purpose as the institute may determine.
- To do such other acts, related to above-mentioned objectives, as may be required in order to expand the objectives of the institute.

1.4 Location

MIST is located at Mirpur Cantonment, northwest edge of the greater Dhaka city, a hub of knowledge for the armed forces. Mirpur Cantonment is a small, calm and quiet education village and free from all possible pollution of a city life. A garland like lake with migratory birds, three sides with extended green fields in the summer and water bodies in the rainy season, whistling birds on the tree branches and overall bounty of nature adds to the already existing splendid academic atmosphere. Other neighboring academic institutions are National Defense College (NDC) and Defense Services Command and Staff College (DSCSC) - two international standard education centers.

1.5 Capabilities

- To conduct under-graduate programs leading to B.Sc. Engineering Degrees in the following disciplines:
  - Civil Engineering (CE)
  - Computer Science and Engineering (CSE)
  - Electrical, Electronic and Communication Engineering (EECE)
  - Mechanical Engineering (ME) and
  - Aeronautical Engineering (AE)

- To conduct post graduate program.
- To conduct diploma courses in surveying & mapping.
- To conduct diploma and certificate courses in CSE.
- To conduct professional advanced courses.

1.6 Affiliation

All academic programs of MIST are affiliated with the Bangladesh University of Professionals (BUP). All examinations are conducted as per the schedule approved by the same university. BUP also approves the results and awards certificates amongst the qualified students.

1.7 Eligibility of Students for Admission in MIST (Subject to review each year)

The students must fulfill the following requirements (as per the academic year 2011-12):

For Bangladeshi Students

Minimum qualifications to take part in the admission test are as follows:

1. Applicants must have passed SSC/Dhakhil/equivalent examination from Board of Intermediate and Secondary Education/ Madrasa Education Board/ Technical Education Board in Science group with minimum GPA 4.00 in a 5-point scale.

2. Applicants must have passed HSC/Alim/equivalent examination from Board of Intermediate and Secondary Education/ Madrasa Education Board/ Technical Education Board in Science group with minimum GPA 4.00 in a 5-point scale.

3. In HSC/Alim/equivalent examination the applicant must have obtained minimum "A" grade in any two (02) subjects out of four (04) subjects including Mathematics, Physics, Chemistry & English and minimum "A-" (A minus) grade in rest two (02) subjects.

4. Applicants with GCE "O" Level/equivalent background must have to qualify in minimum five (05) subjects including Mathematics, Physics, Chemistry and English with minimum "B" grade in average.

5. Applicants with GCE "A" Level/equivalent background must have to qualify in minimum three (03) subjects including Mathematics, Physics and Chemistry with minimum "B" grades separately.

6. Applicants who have passed HSC or equivalent examination in the current year or one year before the notification for admission can apply.

7. Sex: Male and female.

For Foreign Students

Maximum 3% of overall vacancies available will be kept reserved for the foreign students and will be offered to foreign countries through AFD of the Government of the People's Republic of Bangladesh. Applicants must fulfill the following requirements:

1. Educational qualifications as applicable for Bangladeshi civil students or equivalent.

2. Must have security clearance from respective Embassy/ High Commission in Bangladesh.
3. Sex: Male and female.

1.8 Admission Procedure

1.8.1 Syllabus for Admission Test

Admission test will be conducted on the basis of the syllabus of Mathematics, Physics, Chemistry and English (Comprehension and Functional) subjects of HSC examinations of all Boards of Secondary and Higher Secondary School Certificates. Admission test will be conducted out of 200 marks and the syllabus and distribution of marks is given below:

Serial	Subjects	Syllabus	Marks
1.	Mathematics	Syllabi of the current year of HSC Examinations of all Boards of Intermediate and Secondary Education	80
2.	Physics		60
3.	Chemistry		40
4.	English	Comprehension and functional	20
	Total =		**200**

1.8.2 Final Selection

Minimum qualifying marks in the written admission test is 40%. But in special circumstances for fulfillment of specified number of seats, President Admission Committee with approval from Commandant, MIST, may consider relaxation of this condition. Merit list of candidates for final selection and admission to MIST will be prepared on the basis of the following:

Written Admission Test	75%.
GPA of SSC/ Dakhil (without 4th subject) / "O"level/ equivalent examination	10%.
Total GPA of Mathematics, Physics and Chemistry of HSC/ Alim/ "A" level/ equivalent examination	15%.
Total	**100%**

In case of tie, merit position will be determined on the basis of marks obtained in admission test in Mathematics, Physics, Chemistry and English respectively. Further dispute will be solved giving priority of result of HSC over SSC examination.

1.8.3 Medical Checkup

Civil candidates selected through admission test will go for medical checkup in MIST/CMH. If the medical authority considers any candidate unfit for study in MIST due to critical/contagious/mental diseases as shown in medical policy of MIST will be declared unsuitable for admission.

1.9 Withdrawal Policy

The MIST has been established with an aim of providing quality education in various disciplines of Engineering leading to B.Sc Engineering to be conferred by BUP. A definite standard of education and general discipline will be followed in every level of the program. The unsuccessful students will therefore be withdrawn from the institute.

1.9.1 Definition of Terms

Permanent Withdrawal

It will imply a complete/permanent discontinuity from any course/program of the institute.

Temporary Withdrawal

It means that the student has been allowed by the Academic Council, MIST to discontinue temporarily from any course/program for a definite period. The student, so withdrawn, may re-enter the course as per terms and conditions as set by the authority.

Permanent Expulsion

It means expulsion permanently from the institution on disciplinary ground. A student, if expelled permanently will never be allowed to re-enter the course or similar program in MIST and be subjected to other terms and conditions as set by the authority while approving the permanent expulsion order.

Temporary Expulsion

It means expulsion from an academic course/program for a certain period on disciplinary ground. A student, if expelled temporarily, may be allowed to re-enter the course/program on expiry of the punishment period and on fulfillment of other terms and conditions (if any) as set by the authority while approving the temporary expulsion order.

1.9.2 General Policy of Withdrawal

The under graduate (B.Sc) Engineering programs, in the disciplines of CE, EECE, ME, CSE and AE are planned for 04 regular levels, comprising of 08 regular terms. It is expected that all students will earn degree by clearing all the offered courses in the stipulated time. In case of failure the following policies will be adopted:
- Students failing in maximum two courses/subjects in any level, each comprising of two regular terms will be allowed to appear in the referred/re-examination on failed course(s)/subject(s) after a short term as per academic schedule.
- Referred/re-examination, after a short term is to be conducted within 02 (two) weeks of commencement of the next academic session at the latest.
- Students failing in maximum one course/subject in the referred/re-examination will be promoted to the next higher level. The failed course/subject will be termed as "Backlog" subject and the students have to pass the "Backlog" subject in the next

scheduled referred/re-examination, but without any short term. Otherwise, he/she will be withdrawn permanently from the course/program.

- No student will be allowed to appear in the referred/re-examination in the same subject more than twice in the whole undergraduate program.
- Students in all levels will be allowed to appear in the referred/re-examination on two courses/subjects including the "Backlog" one.
- Students will be promoted to the second term of each level irrespective of their results in the first term of the level.
- Students failing in three or more courses/subjects in any level, comprising of two regular terms, will be allowed to repeat the level once. Students repeating a level will be granted exemption for that/those subject(s) in which they earned "B+" and above grade in the previous academic year. For a military student, repeating a level will be subject to the approval of the respective Services Headquarters.
- Students will be allowed to repeat a particular level only once in the whole undergraduate program.
- After level-4 referred/re-examination, if any military student fails in maximum one course/subject, but not the "Backlog" subject, then he/she will leave MIST and will be allowed to appear in the next scheduled referred/re-examination of the respective course. In that examination if he/she cannot pass the course/subject, or if he/she does not appear in the referred examination within 06 (six) years of registration will lose the scope of completing graduation. This failure will also be recorded in the dossier of military student officers.
- In case of sickness, which leads to missing of more than 40% classes or miss term final examination (supported by requisite medical documents), students may be allowed to withdraw temporarily from that term and repeat the whole level with the regular level in the next academic session, subject to the approval of Academic Council, MIST. However, he/she has to complete the whole undergraduate program within 06 (six) academic years from the date of his/her registration.
- Whatever may be the cases, students have to complete the whole undergraduate program within 06 (six) academic years from the date of registration.
- Failure to secure/achieve minimum CGPA of 2.20 in two consecutive levels will also lead to withdrawal of the student from the program.

1.9.3 Expulsion/Withdrawal on Disciplinary Ground

Unfair Means

Adoption of unfair means may result in expulsion of a student from the program and so from the institution. The Academic Council of MIST will authorize such expulsion on the basis of recommendation of the Disciplinary Committee, MIST and as per policy approved by the affiliating university. Following would be considered as unfair means adopted during examinations and other contexts:

- Communicating with fellow students for obtaining help in the examination.
- Copying from another student's script/report/paper.
- Copying from desk or palm of a hand or from other incriminating documents.
- Possession of any incriminating document whether used or not.

Influencing Grades
Academic council of MIST may expel/withdraw any student for approaching directly or indirectly in any form to influence a teacher or MIST authority for grades.

Other Indiscipline Behaviors
Academic council of MIST may withdraw/expel any student on disciplinary ground, if any form of indiscipline or unruly behavior is seen in him/her which may disrupt the academic environment/program or is considered detrimental to MIST's image.

Immediate Action by the Disciplinary Committee of MIST
The disciplinary committee, MIST may take immediate disciplinary action against any student of the institution. In case of withdrawal/expulsion, the matter will be referred to the academic council, MIST for post-facto approval.

1.9.4 Withdrawal on Own Accord

Permanent Withdrawal
A student who has already completed some courses and has not performed satisfactorily may apply for a permanent withdrawal.

Temporary Withdrawal
A student, if he/she applies, may be allowed to withdraw temporarily from the program, subject to the approval of academic council of MIST, but he/she has to complete the whole program within 06 (six) academic years from the date of his/her registration.

CHAPTER 2

THE DEPARTMENT OF COMPUTERSCIENCE AND ENGINEERING

2.1 Introduction

Computer plays vital and in fact indispensable role in all fields of modern human activities. Consequently, Computer Science and Engineering has established itself as one of' the most important branches of engineering. Recent development in computer has a considerable impact on society. It has already expanded to all fields of study starting from genetic engineering to space technology. Recent development in Artificial Intelligence has taken the human history a long way. That day is not very far when man can make machine like him.

The Department of Computer Science and Engineering is one of the pioneer Departments of this Institute providing top-quality education in Computer Science and Engineering (CSE) at its undergraduate program. ICT is the leading booming sector in present day. It is already declared as a thrust sector in Bangladesh. Keeping this in mind the department offers CSE courseto produce computer specialist.

In addition to the above, in future there will be opportunity for postgraduate studies and research leading to higher degrees i.e. M. Sc. (Engg), M. Engg, and Ph.D. There are financial assistance program for the poor and meritorious students too.

2.2 Historical Background

Department of CSE started from the academic session in 2000-2001 as department of CSIT with only military students. Civil students were admitted from the next session. It was renamed as Department of CSE in January 2003. Over the years, this ever-flourishing department has been providing the technical foundation, scholarly guidance and leadership skills that have resulted in a number of highly qualified and skilled computer graduates, proving their potentiality at home and abroad. With educated, sincere and enthusiastic faculty, a continuous enrolment of brilliant students and an amicable teacher-student interaction the department has become a unique one in its field. Major areas of specialties are software, hardware and networking.

2.3 Study Programs

The Department of Computer Science and Engineering offers the degree of B. Sc. Engg. The coursesand syllabus followed by this department for the above degree is themost modern ones like that of advanced countries as well as appropriateto the local needs. The syllabus is designed as to contain all thenecessary study materials so that a graduate can face the engineeringproblems readily after graduation. Also, the syllabus is reviewed and necessary changesare made in every three years by a "committee of courses" comprising the best academicians and experts of the field of Computer Science and Engineering coming from MIST and other leading Universities and Organizations.

2.4 Laboratory Facilities of the Department

The department endeavors to provide its faculty members and students adequate laboratory, library and other facilities. Departmental undergraduate courses are well supported by the following laboratories:

Software Engineering Lab: This department has a software engineering lab consisting of 60 computers as workstations. With co-located Artificial Intelligence and VLSI lab, class can be conducted for 70 students at a time providing each one PC.

Digital Lab: This department has a digital lab where sessional classes of different courses on digital electronics can be conducted. This lab is enriched with modern electronic equipment and facilities.

Multimedia Lab: This department has a multimedia lab with modern HP color laser printers, multimedia projector, scannerand document cameras. Student would be highly benefited through this lab in their project works.

Artificial Intelligence and VLSI Lab: There is an Artificial Intelligence and VLSI lab consisting of 70 computers as workstations in this department. With co-located software engineering lab, classes can be conducted for 70 students at a time providing each one PC and other equipment.

Network and Internet Lab: This department has a Network and Internet lab of 70 computers as workstations. All necessary network equipment and accessories are available in the lab for conducting sessional classes.

Microprocessor and Microcontroller Lab: This department has a Microprocessor and Microcontroller lab enriched with latest Micro kits.

Interfacing Lab: This department has an interfacing lab where sessional classes of different course on computer interfacing can be conducted. Moreover, students undertaking different interfacing project also are assisted by all required accessories and components. Regular project showcase are held in this lab.

Teacher's PC Lab. This department has an additional lab for the teachers, who will be mostly helping the students for thesis and/or project work.

Other Computing Resources: This department has IBM and HP servers connecting all the PCs of MIST by Intranet, providing internet and other services. It has all the necessary equipment for multimedia lab. We have 24 hours Internet facilities including Wi-Fi.

Labs Planned for Future Expansion: This department will have following labs in future:
  (1) Hardware Training Lab
  (2) Hardware Maintenance Lab
  (3) Image Processing Lab
  (4) Mobile Computing lab

Note: The laboratories of CSE Department are also being utilized by the students of other departmentsfor sessional classes and research work of relevant subject/courses.

2.5 Research Activities

The research work undertaken by the teachers and students of this department in the last few years is diversified in nature. The faculty members have a good number of publications in different national and international conferences and journals. MIST also regularly publishes an annual technical journal, GALAXY, where faculties and students of CSE department put their contributions.

2.6 Co-curricular Activities

Students of this department have achieved remarkable success in co-curricular activities like programming contests, software and hardware project competitions, software fair etc. Besides, students take part and show significant performance in debate, sports and cultural programs.

2.6.1 Programming Contests

CSE department programming team has been participating and in variousnational andinternational programming contests regularly and performing well. The Department team has been regularly participating in the Dhaka Regional final of ACM (Association forComputing Machinery) International Collegiate Programming Contest (ACM-ICPC). In ACM-ICPC Dhaka Regional 2008, MIST team achieved 7th position and ACM-ICPC Dhaka Regional 2009, MIST team placed 8th position.

2.6.2 Software and Hardware Project Competitions

CSE department studentsregularly participate in different software and hardware project competitions and perform well. Notably, in 2011, a software named"BANGLA TEXT TO BRAILLE TRANSLTOR" was developed by four CSE graduates from MIST (Md. Osman Gani, F M Mahbub-ul-Islam, SamiulAzam and Ahmad Imtiaz Khan). This software came up as the winner ofprestigious "BASIS IT Innovation Search Program 2011"and runner up of "National Digital Innovation Award 2011".

2.6.3 Sports and Cultural Programs

CSE Department became champion in inter-departmental Programming Contest-2010, Inter-departmental Table Tennis Competition-2011, Inter-departmental Basketball Competition-2011 and Inter-departmental Volleyball Competition-2011**.**

RULES AND REGULATIONS FOR UNDERGRADUATE PROGRAM

3.1 Number of Terms in an Academic Year (Level)

There will be two terms (Term I and Term II) in an academic year. Those who will not be able to clear all the subjects in a particular academic year (Term I and Term II) will require to appearin the referred examination (Re-examination) for fulfilling the condition as per policy to clear the subject(s).

3.2 Duration of Terms

The duration of each of Term will be as follows:

Ser	Events	Durations
1.	Classes before Mid Term	7 weeks
2.	Mid Term Vacation	1 week
3.	Classes after Mid Term	7 weeks
4.	Makeup Classes and Preparatory leave	2 weeks
5.	Term Final Examination	3 weeks
6.	Term End Vacation	2 week
	Total	**22 weeks**

The duration for Short Term and Re-examination will be as follows:

1.	Short term/ Preparatory Leave	6 weeks
2.	Examination	1 week
	Total	**7 Weeks**

3.3 Course Pattern and Credit Structure

The undergraduate program is covered by a set of theoretical courses along with a set of laboratory (sessional) courses to support them.

3.3.1 Course Designation System

Each course is designated by a maximum of four letter code identifying the department offering the course followed by a three-digit number having the following interpretation:
• The first digit corresponds to the year/level in which the course is normally taken by the students.
• The second digit is reserved for departmental use. It usually identifies a specific area/group of study within the department.
• The last digit is an odd number for theoretical courses and an even number for sessional courses.

The course designation system is illustrated as Follows:

CSE-101   **Discrete Mathematics**

Course Title
Odd digit designates a theoretical course
Reserved for departmental use
Signifies 1stYear/ 1stLevel course
Department identification code

CSE-206   **Data Structures Sessional**

Course Title
Even digit designates a sessional course
Reserved for departmental use
Signifies 2ndYear/ 2nd Level course
Department identification code

3.3.2   Assignment of Credits

The assignment of credits to a theoretical course follows a different rulefrom that of a sessional course.

1. For Theoretical Courses, one lecture per week per term is equivalent to one credit.
2. For Sessional Courses, one credits for sessional courses is half of the class hours per week per term.
3. Credits are also assigned to project and thesis work taken by the students. The amount of credits assigned to such work varies from one discipline to another.

3.3.3   Types of Courses

The courses included in the undergraduate curricula are divided into the following groups:

• Core Courses
In each discipline, a number of courses are identified as core courses, which form the nucleus of the respective bachelor's degree program. A student has to complete all of the designated core courses of his discipline.

• Prerequisite Courses
Some of the core courses are identified as prerequisite courses for a specific course. A prerequisite course is one, which is required to be completed before some other course(s) can be taken.

• Optional Courses

Apart from the core courses a required number of optional courses from a specified group have to be chosen.

3.4   The Grading System

3.4.1   The Letter Grade

The total performance of a student in a given course is based on a scheme of continuous assessment, for theory courses this continuous assessment is made through a set of quizzes, class evaluation, class participation, homework assignment and a term final examination. The assessments for laboratory courses are made by evaluating performance of the student at work during the class, viva-voce during laboratory hours and quizzes. Besides that, at the end there will be a final lab test. Each course has a certain number of credits, which describes its corresponding weight ages. A student's Performance is measured by the number of credits completed satisfactorily and by the weighted average of the grade points earned. A minimum grade point average (GPA) is essential for satisfactory progress. A minimum number of earned credits also have to be acquired in order to qualify for the degree. Letter grades and corresponding grade points will be given as follows:

Numerical Markings	Grade	Grade Points
80% and above	A+	4.0
75% to below 80%	A	3.75
70% to below 75%	A-	3.50
65% to below 70%	B+	3.25
60% to below 65%	B	3.00
55% to below 60%	B-	2.75
50% to below 55%	C+	2.50
45% to below 50%	C	2.25
40%to below 45%	D	2.00
below 40%	F*	0.00
Incomplete	I	-
Withdrawal	W	-
Project/ Thesis continuation	X	-

* Subject in which the student gets F grade shall not be regarded as earned credit hours for the calculation of Grade Point Average (GPA).

3.4.2   Distribution of Marks

For Theory Courses

Thirty percent (30%) of marks of theoretical course shall be allotted for continuous assessment, i.e. quizzes,class tests,home assignments, class evaluation and class participation. Illustration of the marks will be allotted to the Term Final Examination that is conducted centrally by the Bangladesh University of Professionals. There are internal and

external examiners for each course in the Term Final Examination of 3-hour duration. Distribution of marks for a given course is as follows.

Category	Marks %
Class Participation/ Observation	5
Class Attendance	5
Homework assignment and quizzes/class tests	20
Final Examination (3 hours)	70
Total	**100**

The number of quizzes/ class tests of a course shall be *n+1* where *n* is the number of credits of the course. Evaluation of performance in quizzes/ class tests will be on the basis of the best *n* quizzes. The scheme of continuous assessment that a particular teacher wishes to follow for a course will be announced as course outline on the first day of the term.

For Sessional Courses

The marks for the sessional courses will be distributed according to the type of the sessional course. The distribution of marks for three types of sessional is given below:

<u>Marks distribution of lab based sessionals</u>

Category	Marks %
Lab test	40
Quiz	20
Viva	10
Attendance	10
Home assignment / report	10
Class Performance / Observation	10
Total	**100**

<u>Marks distribution of project based sessionals</u>

Category	Marks %
Project	40
Quiz	10
Viva / Presentation	20
Attendance	10
Home assignment / report	10
Class Performance / Observation	10
Total	**100**

Marks distribution of programming based sessionals

Category	Marks %
Online - 1	25
Online - 2	25
Viva	10
Attendance	10
Observation	10
Class Performance	20
Total	**100**

Basis for awarding marks for class attendance for both theory and sessional courses will be as follows:

Attendance	Marks
90% and above	100%
85% lo less than 90%	90%
80% to less than 85%	80%
75% to less than 80%	70%
70% lo less than 75%	60%
65% to less than 70%	50%
60% to less than 65%	40%
Below 60%	0%

3.4.3 Calculation of CGPA

Grade Point Average (GPA) is the weighted average of the grade points obtained of all the courses passed/completed by a student. For example, if a student passes/completes *n* courses in a term having credits of C_1, C_2, ... ,C_n and his grade points in these courses are G_1.. G_2, ... G_n respectively, then

$$GPA = \frac{Grade\ points\ earned\ in\ the\ semester}{Credits\ completed\ in\ the\ semester}$$

$$= \frac{Summation\ of\ (Credit\ hours\ in\ a\ course\ x\ Grade\ point\ earned\ in\ that\ course)}{Total\ number\ of\ credit\ hours\ completed}$$

$$= \frac{\sum_{i=1}^{n} C_i * G_i}{\sum_{i=1}^{n} C_i}$$

The Cumulative Grade Point Average (CGPA) is the weighted average of the GPA obtained in all the terms passed/completed by a student. For example, if a student passes/ completes n terms having total credits of TC_1, TC_2, ... , TC_n and his GPA in these terms are GPA_1, GPA_2, ... , GPA_n, respectively then

$$CGPA = \frac{\sum_{i=1}^{n} TC_i * GPA_i}{\sum_{i=1}^{n} TC_i}$$

Numerical Example

Suppose a student has completed eight courses in a term and obtained the following grades:

Course	Credit C_i	Grade Points	G_i	C_i*G_i
EECE-163	3.00	A	3.75	11.25
EECE-164	0.75	A+	4.00	3.00
MATH-141	3.00	A-	3.50	10.5
PHY-103	3.00	B+	3.25	9.75
HUM-101	3.00	A	3.75	11.25
HUM-102	1.50	A	3.75	5.625
CSE-101	3.00	A	3.75	11.25
CSE-103	3.00	A-	3.50	10.5
CSE-104	1.5	B+	3.25	4.875
Total	**21.75**			**78**

$$GPA = \frac{78}{21.75} = 3.586$$

Suppose a student has completed four terms and obtained the following GPA:

Level	Term	Earned Credit Hours	Earned GPA	TC_i*GPA_i
		TC_i	GPA_i	
1	I	21.75	3.75	81.5625
1	II	20.75	3.61	74.9075
2	I	19.50	3.21	62.595
2	II	21.00	2.98	62.58
Total		83		281.645

$$CGPA = \frac{281.645}{83} = 3.39$$

3.4.4 Minimum Earned Credit and GPA Requirement for Obtaining Degree

Minimum credit hour requirements for the award of bachelor's degree in engineering (B.ScEngineering) and other discipline will be decided as per existing rules. The minimum GPA requirement for obtaining a Bachelor's degree in engineering is 2.20.

3.5 Attendance

All students are expected to attend classes regularly. The university believes that attendance is necessary for effective learning. The first responsibility of a student is to attend classes regularly, and one is required to attend at least 75% of all classes held in any course.

3.6 Teacher-Student Interaction

The academic system in MIST encourages students to come in close contact with the teachers. For promotion of high level of teacher-student's interaction, a course coordinator (CC) is assigned to each course. Students are free to discuss with CC about all academic matters. Students are also encouraged to meet other teachers any time for help and guidance for academic matters. Heads of the departments, Director of Administration, Director of Students Welfare (DSW), Dean and Commandant address the students at some intervals. More so, monthly Commandant's Parade is organized in MIST where all faculty members, staff and students are formed up, thereby increasing teacher-student interaction.

3.7 Conduct and Discipline

During their stay in MIST all students are required to abide by the existing rules, regulations and code of conduct. Students are strictly forbidden to form or be members of student organization or political party, club, society etc., other than those set up by MIST authority in order to enhance student's physical, intellectual, moral and ethical development. Zero tolerance in regards of sexual abuse and harassment in any forms and drug abuse and addiction are strictly observed in the campus.

3.8 Absence During a Term

A student should not be absent from quizzes, tests, etc. during the term. Such absence will naturally lead to reduction in points/marks, which count towards the final grade. Absence in the Term Final Examination will result in an F grade in the corresponding course. A student who has been absent for short periods, up to a maximum of three weeks due to illness, should approach the course teacher(s) or the course coordinator(s) for make-up quizzes or assignments immediately upon return to classes. Such request has to be supported by medical certificate from competent authority (e.g. CMH).

3.9 Recognition of Performance

As recognition of performance and ensure continued studies MIST awards following medals, scholarships and stipends.

Osmany Memorial Gold Medal
Osmany Memorial Gold Medal isawarded to the best student amongst all the MIST Medal holders.

MIST Medal
MIST Medal is awarded to all students earning CGPA 4 at the end of the entire program and the first position holder in each dept earning a minimum CGPA of 3.8.

Commandant's List
Commandant's List is awarded to all students earning CGPA ≥ 3.8 at the end of each academic level for level 1, 2 and 3 and all graduating students earning CGPA ≥ 3.8 considering results of entire program (level 1 to 4).

Dean's List
Dean's List is awarded to all students earning 3.7 ≤ CGPA < 3.8 at the end of each academic level for level 1, 2 and 3 and all graduating students earning 3.7 ≤ CGPA < 3.8 considering results of entire program (level 1 to 4).

Other Scholarships and Stipends
There are many other Scholarships and Stipendsfrom BUP and MIST are available for the students. A list is given below:

- Chancellor's (BUP) Scholarship.
- Vice Chancellor's (BUP) Scholarship/Stipend.
- MIST Scholarship.
- MIST Stipends.
- Osmany Memorial Trust Scholarship.
- Buro Bangladesh Stipend.
- Chief of Army Staff Scholarship.
- Chief of Army Staff Stipend.
- Chief of Naval Staff Scholarship.
- Chief of Air Staff Scholarship.
- Brig Gen Kamal Scholarship.

CHAPTER 4

COURSE REQUIREMENTS FOR UNDERGRADUATE COMPUTER SCIENCE AND ENGINEERING STUDENTS

Undergraduate students of the Department of Computer Science and Engineering (CSE) have to follow a particular course schedule, the term-wise distributions of which are given below:

LEVEL-1 TERM-I

	Course No	Course Title	Hours/Week		Credits	Pre-requisite	Page No
			Theory	Sessional			
1	CSE-100	Computer Fundamentals Sessional	-	3.00	1.50		25
2	EECE-163	Electrical Circuit Analysis	3.00	-	3.00		25
3	EECE-164	Electrical Circuit Analysis Sessional	-	1.50	0.75		26
4	ME-181	Basic Mechanical Engineering	2.00	-	2.00		26
5	ME-182	Basic Mechanical Engineering Sessional	-	1.50	0.75		26
6	MATH-141	Mathematics-I (Differential Calculus and Integral Calculus)	3.00	-	3.00		26
7	PHY-103	Physics	3.00	-	3.00		26
8	PHY-104	Physics Sessional	-	3.00	1.50		27
9	HUM-101	English	3.00	-	3.00		28
10	HUM-102	English Sessional	-	3.00	1.50		28
	Total				**20.00**		

LEVEL-1 TERM-II

	Course No	Course Title	Hours/Week		Credits	Pre-requisite	Page No
			Theory	Sessional			
1	CSE-101	Discrete Mathematics	3.00	-	3.00		29
2	CSE-105	Structured Programming Language	3.00	-	3.00	CSE-100	29
3	CSE-106	Structured Programming Language Sessional	-	3.00	1.50		29
4	EECE-169	Electronic Devices and Circuits	3.00	-	3.00	EECE-163	30
5	EECE-170	Electronic Devices and Circuits Sessional	-	1.50	0.75		30
6	CE-150	Engineering Drawing & CAD Sessional	-	3.00	1.50		30
7	CHEM-101	Chemistry	3.00	-	3.00		30
8	MATH-143	Mathematics-II (Ordinary and Partial Differential Equations)	3.00	-	3.00		31
9	HUM-103	Engineering Economics	2.00	-	2.00		31
	Total				**20.75**		

LEVEL-2 TERM-I

	Course No	Course Title	Hours/Week		Credits	Pre-requisite	Page No
			Theory	Sessional			
1	CSE-201	Digital Logic Design	3.00	-	3.00		32
2	CSE-202	Digital Logic Design Sessional	-	3.00	1.50		32
3	CSE-203	Data Structures	3.00	-	3.00	CSE-105	32
4	CSE-204	Data Structures Sessional	-	3.00	1.50		32
5	CSE-205	Object Oriented Programming Language	3.00	-	3.00	CSE-105	33
6	CSE-206	Object Oriented Programming Language Sessional	-	3.00	1.50		33
7	EECE-269	Electrical Drives and Instrumentation	3.00	-	3.00	EECE-169	33
8	EECE-270	Electrical Drives and Instrumentation Sessional	-	1.50	0.75		34
9	MATH-245	Mathematics-III (Vector Analysis, Matrices and Fourier Analysis)	3.00	-	3.00		34
	Total				**20.25**		

LEVEL-2 TERM-II

	Course No	Course Title	Hours/Week		Credits	Pre-requisite	Page No
			Theory	Sessional			
1	CSE-210	Assembly Language Programming Sessional	-	3.00	1.50		35
2	CSE-211	Digital Electronics and Pulse Technique	3.00	-	3.00	EECE-169	35
3	CSE-212	Digital Electronics and Pulse Technique Sessional	-	1.50	0.75		35
4	CSE-213	Computer Architecture	3.00	-	3.00	CSE-201	36
5	CSE-215	Algorithms	3.00	-	3.00	CSE-101, CSE-203	36
6	CSE-216	Algorithms Sessional	-	3.00	1.50		37
7	CSE-217	Theory of Computation	3.00	-	3.00		38
8	MATH-247	Mathematics-IV (Complex Variable and Laplace Transform)	3.00	-	3.00		38
9	HUM-201	Financial and Managerial Accounting	2.00	-	2.00		39
	Total				**20.75**		

LEVEL-3 TERM-I

	Course No	Course Title	Hours/Week		Credits	Pre-requisite	Page No
			Theory	Sessional			
1	CSE-300	Software Development Sessional	-	3.00	1.50		38
2	CSE-301	Database Management Systems	3.00	-	3.00		38
3	CSE-302	Database Management Systems Sessional	-	3.00	1.50		38
4	CSE-303	Compiler	3.00	-	3.00	CSE-217	38
5	CSE-304	Compiler Sessional	-	1.50	0.75		39
6	CSE-305	Microprocessors and Micro-controller	3.00	-	3.00	CSE-201	39
7	CSE-306	Microprocessors and Micro-controller Sessional	-	1.50	0.75		39
8	CSE-307	Operating System	3.00	-	3.00		40
9	CSE-308	Operating System Sessional	-	1.50	0.75		40
10	MATH-345	Mathematics-V (Statistics and Coordinate Geometry)	2.00	-	2.00		40
	Total				**19.25**		

LEVEL-3 TERM-II

	Course No	Course Title	Hours/Week		Credits	Pre-requisite	Page No
			Theory	Sessional			
1	CSE-311	Numerical Analysis	3.00	-	3.00		41
2	CSE-313	Mathematical Analysis for Computer Science	3.00	-	3.00		41
3	CSE-315	Digital System Design	3.00	-	3.00	CSE-305	41
4	CSE-316	Digital System Design Sessional	-	1.50	0.75		42
5	CSE-317	Data and Tele-Communication Engineering	3.00	-	3.00		42
6	CSE-318	Data and Tele-Communication Engineering Sessional	-	3.00	1.50		43
7	CSE-319	Software Engineering and Information System Design	4.00	-	4.00		43
8	CSE-320	Software Engineering and Information System Design Sessional	-	3.00	1.50		43
	Total				**19.75**		

*LEVEL-3 INDUSTRIAL TRAINING

	Course No	Course Title	Hours/Week		Credits	Pre-requisite	Page No
			Theory	Sessional			
	CSE-350	Industrial Training	-	4 Weeks	1.00		44

*Note: This course is mandatory. Evaluation report from industry is to be submitted at the end of the training and accordingly to be incorporated in the tabulation sheet.

LEVEL-4 TERM-I

| | Course No | Course Title | Hours/Week | | Credits | Pre-requisite | Page |
			Theory	Sessional			No
1	CSE-400	Project and Thesis	-	6.00	3.00		44
2	CSE-401	Artificial Intelligence	3.00	-	3.00		44
3	CSE-402	Artificial Intelligence Sessional	-	1.50	0.75		44
4	CSE-403	Computer Network	3.00	-	3.00	CSE-317	45
5	CSE-404	Computer Network Sessional	-	3.00	1.50		45
6	CSE-405	Simulation and Modeling	3.00	-	3.00		45
7	CSE-406	Simulation and Modeling Sessional	-	1.50	0.75		46
8	CSE-410	Internet Programming Sessional	-	1.50	0.75		46
9	CSE-4XX	Option-I	3.00	-	3.00		
10	HUM-40X	Option-II	2.00	-	2.00		
	Total				**20.75**		

Option-I

| | Course No | Course Title | Hours/Week | | Credits | Pre-requisite | Page |
			Theory	Sessional			No
1	CSE-421	Basic Graph Theory	3.00	-	3.00		46
2	CSE-423	Fault Tolerant System	3.00	-	3.00		46
3	CSE-425	Basic Multimedia Theory	3.00	-	3.00		47
4	CSE-427	Digital Image Processing	3.00	-	3.00		47
5	CSE-429	Data and Network Security	3.00	-	3.00		47
6	CSE-431	Object Oriented Software Engineering	3.00	-	3.00		48
7	CSE-433	Artificial Neural Networks and Fuzzy Systems	3.00	-	3.00		48
8	CSE-435	Parallel Algorithms	3.00	-	3.00		48

Option-II

| | Course No | Course Title | Hours/Week | | Credits | Pre-requisite | Page |
			Theory	Sessional			No
1	HUM-403	Government	2.00	-	2.00		49
2	HUM-405	Sociology	2.00	-	2.00		49
3	HUM-407	Engineering Ethics	2.00	-	2.00		50
4	HUM-409	Management Information System	2.00	-	2.00		50

LEVEL-4 TERM-II

	Course No	Course Title	Hours/Week		Credits	Pre-requisite	Page No
			Theory	Sessional			
1	CSE-400	Project and Thesis*	-	6.00	3.00		51
2	CSE-411	VLSI Design	3.00	-	3.00		51
3	CSE-412	VLSI Design Sessional	-	1.50	0.75		51
4	CSE-413	Computer Graphics	3.00	-	3.00		51
5	CSE-414	Computer Graphics Sessional	-	3.00	1.50		52
6	CSE-415	Computer Interfacing	3.00	-	3.00		52
7	CSE-416	Computer Interfacing Sessional	-	3.00	1.50		52
8	CSE-4XX	Option-III	3.00	-	3.00		
9	CSE-4XX	Option-III Sessional	-	1.50	0.75		
	Total				**19. 50**		

Option-III

	Course No	Course Title	Hours/Week		Credits	Pre-requisite	Page No
			Theory	Sessional			
1	CSE-441	Machine Learning	3.00	-	3.00		52
2	CSE-442	Machine Learning Sessional	-	1.50	0.75		53
3	CSE-443	Pattern Recognition	3.00	-	3.00		53
4	CSE-444	Pattern Recognition Sessional	-	1.50	0.75		53
5	CSE-445	Digital Signal Processing	3.00	-	3.00		53
6	CSE-446	Digital Signal Processing Sessional	-	1.50	0.75		54
7	CSE-447	Advanced Networks Programming	3.00	-	3.00		54
8	CSE-448	Advanced Networks Programming Sessional	-	1.50	0.75		54
9	CSE-449	Mobile and Ubiquitous Computing	3.00	-	3.00		55
10	CSE-450	Mobile and Ubiquitous Computing Sessional	-	1.50	0.75		55

*Note: Continuation from Level-4, Term-I

Summary

Level and Term	Hours/Week		Credits	No of Theory Courses
	Theory	Sessional		
Level-1 Term-I	14.00	12.00	20.00	5
Level-1 Term-II	17.00	7.50	20.75	6
Level-2 Term-I	15.00	10.50	20.25	5
Level-2 Term-II	17.00	7.50	20.75	6
Level-3 Term-I	14.00	10.50	19.25	5
Level-3 Term-II	16.00	9.50	20.75	5
Level-4 Term-I	14.00	13.50	20.75	5
Level-4 Term-II	12.00	15.00	19.50	4
Grand Total	**119.00**	**86.00**	**162.00**	**41**

DETAIL OUTLINE OF UNDERGRADUATE COURSES OFFERED BY THE DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

LEVEL-1 TERM-I

CSE-100   **3 hours in a week, 1.50 Cr.**
Computer Fundamental Sessional

Introduction to computations; Early history of computing devices; Computers; Major components of a computer; Hardware: processor, memory, I/O devices; Software: Operating system, application software; Report writing and Presentation; Basic architecture of a computer; Basic Information Technology; Number system: binary, octal, hexadecimal, binary arithmetic; Basic programming concepts; Program development stages: flow charts; Programming constructs: data types, operators, expressions, statements.

Reference Book(s):

1. Computer Fundamentals – Peter Norton.

EECE-163   **3 hours in a week, 3.00 Cr.**
Electrical Circuit Analysis

Fundamental electrical concepts and measuring units; Direct current (dc): Current, voltage, resistance, power and energy; Series/Parallel Circuits; Methods of network analysis and Network Theorems; Capacitors, Inductors and introduction to magnetic circuits.

Alternating current (ac): Instantaneous current, voltage and power for various combinations of R, L and C circuits; Effective current and voltage, average power; Phasor representation of sinusoidal quantities; Sinusoidal Single-Phase Circuit Analysis.

Reference Book(s):

1. Introductory Circuit Analysis - Robert L. Boylestad.
2. Alternating Current Circuits - Russel M Kerchner and George F Corcoran.

EECE-164   **3 hours in a week, 1.50 Cr.**
Electrical Circuit Analysis
Sessional

Laboratory works based on EECE-163

ME-181   **2 hours in a week, 2.00 Cr.**
Basic Mechanical Engineering

Sources of energy: conventional and renewable; Introduction to IC engines, Refrigeration and Air conditioning systems; Statics of particles and rigid bodies; Forces in trusses and frames; Relative motion; Kinematics of particles: Newton's Second Law of Motion; Kinematics of rigid bodies; Introduction to Robotics; Plane, rotational and spatial motion with applications to manipulators; Geometric configurations: structural elements, linkage, arms and grippers; Motion characteristics.

Reference Book(s):

1. A Textbook Of Thermal Enginering - R S Khurmi
2. Introduction to Thermal Engineering- J. P. Vasandani
3. Refrigeration And Air Conditioning- Ahmadul Ameen

ME-182   **3 hours in alternative week, 0.75 Cr.**
Basic Mechanical Engineering
Sessional

Laboratory works based on ME-181

MATH-141   **3 hours in a week, 3.00 Cr.**
Mathematics-I (Differential
Calculus and Integral Calculus)

DIFFERENTIAL CALCULUS

Limit, continuity and differentiability, successive differentiation of various types of functions, Leibnit'z theorem, Rolle's theorem, Mean Value theorem, expansion in finite and infinite forms, Lagrange's form of remainder, Cauchy's form of remainder (expansion of remainder), expansions of functions differentiation and integration, indeterminate form, partial differentiation, Euler's theorem, tangent and normal, sub tangent and subnormal in cartesian and polar coordinates, maxima and minima of functions of single variables, curvature, asymptotes.

INTEGRAL CALCULUS

Definition of integrations, integration by the method of substitution, integration by parts, standard integrals, integration by the method of successive reduction, definite integrals, definite integral

properties and its use in summing series, Walli's formula, improper integrals, Beta function and Gamma function, multiple integral and its application, area, volume of solid of revolution, area under a plane curve in Cartesian and polar coordinates, area of the region enclosed by two curves in Cartesian and polar coordinate, arc lengths of curves in Cartesian and polar coordinates.

Reference Book(s):

1. A text Book of Differential Calculus – Rahman and Bhattachrjee.
2. Differential Calculus – Shanti Narayan.
3. Differential Calculus – Dr. B. D. Sharma.
4. Differential Calculus – Das and Mukhajee.
5. Integral Calculus – Rahman and Bhattacharjee.
6. Integral Calculus – Abu Eusuf.
7. Integral Calculus – Das and Mukhajee.

PHY-103   3 hours in a week, 3.00 Cr.
Physics

Waves-Oscillations & Wave mechanics

Oscillations: Differential equation of simple harmonic oscillator, total energy and average energy, Combination of simple harmonic oscillations, spring-mass system, damped oscillation, forced oscillation, resonance, stationary wave, phase velocity, group velocity. Wave mechanics: Fundamental postulates of wave mechanics, Schroding's equation (time dependent and time independent), Operators, Uncertainty principle, energy of a free particle.

Optics and Laser

Theories of light: Interference of light, Young's double slit experiment, Fresnel's bi-prism. Interference in thin films, Newton's rings, Interferometers, Diffraction of light: Fresnel and Fraunhofer diffractions, Diffraction by single slit, diffraction by double slits, diffraction gratings, Resolving power of optical instruments, Polarization of light: production and analysis of polarized light, polarization by double refraction, Brewster's law, Malus law, Nicole prism, , optical activity and polarimeter. Laser, spontaneous and stimulated emission, Helium-Neon laser, laser applications, Fiber optics.

Structure of Matter and Electricity: Crystalline & non-crystalline solids, single crystal and polycrystalline solids, crystal system, co-ordination number, packing factor, Miller indices, defects in solids, Bragg's law, Bonds in solids, Introduction to energy band, distinction between metal, insulator and semiconductor. Electricity: Coulomb's law, electric field, Gauss' law and its application, electric potential, capacitors and capacitance, dielectrics on atomic view, dielectric and Gauss's law, Ohm's law, resistivity -an atomic view, current density and drift velocity, Ampere's law, Faraday's law; Lenz's law, self-inductance and mutual inductance.

Reference Book(s):

1. A Text Book of Optics - Brijlal and Subramannyam
2. Fundamentals of optics - Francis and harvey

3.   Waves and oscillation - Brijlal and Subramannyam
4.   Physics part-I - Resnick and Haliday
5.   Physics part-II - Resnick and Haliday
6.   Fundamentals of Physcs - Haliday, Resnick and Walker
7.   Electricity & Magnetism - K.K Tewari
8.   Elementary Solid State Physics -M Ali Omar

PHY-104   3 hours in a week, 1.50 Cr.
Physics Sessional

Laboratory works based on PHy-103

Reference Book(s):

1.   Practical Physics –Dr. Giasuddin.
2.   Practical Physics –C.L Arora.

HUM-101   3 hours in a week, 3.00 Cr.
English

English Phonetics, Vocabulary, English Grammar-determiners, modifiers, affixes, root word, head word, types of verbs, different types of Clauses, Sentence construction and different types of sentences, synthesis of sentences, Grammatical Correction; Comprehension, Business Communication, Quotation and Tenders, Job Letters.

Paragraph writing, Précis writing, Amplification, Report writing, Situational writing- posters and advertisements, notice and memorandum, message writing, Communication Today; Short stories and Literary articles written by some prominent writers, Research Study, research methodology.

Reference Book(s):

1.   Prose of Our Time – Ahsanul Haque, Sirajul Islam Chawdhury and M. Shamsuddoha.

HUM-102   3 hours in a week, 1.50 Cr.
English Sessional

Laboratory works based on HUM101

LEVEL-1 TERM-II

CSE-101   3 hours in a week, 3.00 Cr.
Discrete Mathematics

Set Theory; Logic; Propositional Calculus; Predicate Calculus; Nested Quantifiers; Methods of proof; Functions; Growth Function; Properties of integers; Mathematical reasoning; Induction; Recursion. Counting; Recurrence relations; Principles of inclusion and exclusion; Relations; Graphs and Trees. Introduction to Boolean Algebra; Ordered Set and Lattice; Algebraic System.

Reference Book(s):

1. Discrete Mathematics & Its Applications- Kenneth H Rosen

CSE-105   3 hours in a week, 3.00 Cr.
Structured Programming Language

Programming concepts; Program development stages; Flow charts; Number systems: binary, octal, decimal and hexadecimal systems; Structured programming language: data types, operators, expressions, control structures; Functions and program structure: Function basics, parameter passing conventions, scope rules and storage classes, recursion; Header files; Preprocessor; Pointers and arrays, Strings, Multidimensional array; User defined data types: structures, unions, enumerations; Input and Output: standard input and output, formatted input and output, file access; Variable length argument list; Command line parameters; Error Handling; Graphics; Linking; Library functions.

Reference Book(s):

1. Teach Yourself C - Herbert Schidlt
2. C: The Complete Reference - Herbert Schildt
3. Schaum's Outline of Programming with C - Byron Gottfried

CSE-106   3 hours in a week, 1.50 Cr.
Structured Programming Language Sessional

Laboratory works based on CSE-105

EECE-169
Electronic Devices and Circuits

3 hours in a week, 3.00 Cr.

Introduction to semiconductors, p-n junction diode, I–V characteristics; Diode applications: half and full wave rectifiers, clipping and clamping circuits, regulated power supply; Bipolar Junction Transistor (BJT): principle of operation, Transistor circuit configurations (CE, CB, CC), BJT biasing, BJT Transistor modeling, small-signal analysis of single and multi- stage amplifiers, frequency response of BJT amplifier.

Field Effect Transistors (FET): Principle of operation of JFET and MOSFET, Depletion and enhancement type MOSFETs, Switching circuits using FETs, CMOS, biasing of FETs, FET small signal analysis, Low and high frequency response of FETs; Operational amplifiers and its applications; Feedback and oscillators circuits; Operation, characteristics and application of SCR, TRIAC, DIAC and UJT; Introduction to IC fabrication processes.

Reference Book(s):

1. Electronic Devices and Circuit Theory -Robert L. Boylestad and Louis Nashelsky

EECE-170
Electronic Devices and Circuits
Sessional

3 hours in a week, 1.50 Cr.

Laboratory works based on EECE-169

CE-150
Engineering Drawing & CAD
Sessional

3 hours in a week, 1.50 Cr.

Introduction: Lettering, numbering and heading, instrument and their use, sectional views and isometric views of solid geometrical figures; Plan, elevation and section of multistoried buildings; Building services drawings, detailed drawing of lattice towers.

CHEM-101
CHEMISTRY

3 hours in a week, 3.00 Cr.

Atomic structure, quantum numbers, electronic configuration, periodic table; Properties and uses of noble gases; Different types of chemical bonds and their properties: Molecular structure of compounds: Selective organic reactions; Different types of solutions and their compositions; Phase rule. Phase diagram of mono component system; Properties of dilute solution; Thermo chemistry, chemical kinetics, chemical equilibrium; ionization of water and pi concept; Electrical properties of Solution.

Reference Book(s):

1. Chemistry of Engineering Material - Mominul Haque

MATH-143   3 hours in a week, 3.00 Cr.
Mathematics-II (Ordinary and Partial Differential Equations)

ORDINARY DIFFERENTIAL EQUATIONS

Formulation of Differential Equations; Degree and order of Ordinary differential equations; Solution of first order but higher degree differential equations, Solution of first order differential equations by various methods, Solution of general linear equations of second and higher orders with constant co-efficient, Solution of Homogeneous linear equations and its applications; Solution of differential equations by the methods based on the factorization of the operators, Frobenious methods, Bessel's functions, Legendre's polynomials and properties.

PARTIAL DIFFERENTIAL EQUATIONS

Introduction, Linear and non linear first order equations; Standard forms of linear equations of higher order; Equation of second order with variable coefficients; Wave equations, Particular solutions with boundary and initial conditions; Integral surface passing through given curve; Nonlinear PDE of order One (Complete, particular, singular and general integrals), Charpit's Method, Second order PDE and classifications to canonical (standard)- parabolic, elliptic, hyperbolic solution by separation of variables, Linear PDE with constant coefficients.

Reference Book(s):

1. Ordinary and Partial differential Equations – M. D. Raisenghania.
2. Differential Equations – M. L. Khanna.
3. Differential Equations – B. D. Sharma.
4. Differential Equations – P. N. Chatterjee.

HUM-103   2 hours in a week, 2.00 Cr.
Engineering Economics

Microeconomics: Definition of economics; Fundamentals of economics; Market and government in a modern economy; Basic elements of supply and demand; Choice and utility; indifference curve technique; Analysis of cost; Short run long run theory of production.

Macroeconomics: Key concept of macroeconomics; Saving, investment; National income analysis; Inflation, Unemployment.

Development: Theories of developments.

Reference Book(s):

1. Economics by Samuelson
2. Economics by John Sloman
3. Economic Development by Michael Todaro

CSE-201   3 hours in a week, 3.00 Cr.
Digital Logic Design

Number systems and codes; Digital logic: Boolean algebra, De-Morgan`s theorems, logic gates and their truth tables, canonical forms, combinational logic circuits, minimization techniques; Arithmetic and data handling logic circuits, decoders and encoders, multiplexers and de-mulitplexers; Flip-flops, race around problems; Counters; asynchronous counters, synchronous counters and their applications; Registers and basic memory unit; Synchronous and asynchronous logic design; Design of sequential circuit: State diagram; State minimizations and assignments; Pulse mode logic; Fundamental mode design; PLA design.

Reference Book(s):

1. Digital Logic and Computer Design-M. Morris Manno.
2. Digital Computer Electronics - Albert P. Malvino, Jerald A Brown

CSE-202   3 hours in a week, 1.50 Cr.
Digital Logic Design Sessional

Laboratory works based on CSE-201

CSE-203   3 hours in a week, 3.00 Cr.
Data Structures

Data Structures: Concept of data types and data structure, an abstract data types, necessity of structured data; Elementary data structures: arrays, lists: Different types of linked list and their operation, stacks, queues, graphs; Trees: Basic terminology, binary trees representations, binary tree traversal, threaded binary trees, application of trees, Advanced data structures: heaps, Fibonacci heaps, B-trees, Binary search trees, heap balanced tress, disjoint sets; Recursion, Sorting, searching; Hashing: Hashing functions, overflow handling; Files: file queries, sequential organizations.

Reference Book(s):

1. Data structures – SCHAUM's series
2. Data Structures - Reingold and Hansen
3. Data structures and algorithm – Hopcroft, Ullman
4. Introduction to Algorithms – Thomas H Cormen

CSE-204   3 hours in a week, 1.50 Cr.
Data Structures Sessional

Laboratory works based on CSE-203

CSE-205
Object Oriented Programming Language

3 hours in a week, 3.00 Cr.

Philosophy of Object Oriented Programming (OOP); Advantages of OOP over structured programming; Encapsulation, classes and objects, access specifiers, static and non-static members; Constructors, destructors and copy constructors; Array of objects, object pointers, and object references, In-line functions, friend functions, reference; Inheritance: single and multiple inheritance; Polymorphism: overloading, abstract classes, virtual functions and overriding; Exceptions; Object Oriented I/O, inserter, extractor; Template functions and classes; namespaces, overview of Standard Template Library; Multi-threaded Programming.

Reference language: C++, Java

Reference Book(s):

1. Teach Yourself C++ - Herbert Schildt
2. Turbo C/C++ Complete Reference - Herbert Schildt
3. Object-oriented Programming with C++ - E Balagurusamy

CSE-206
Object Oriented Programming Language Sessional

3 hours in a week, 1.50 Cr.

Laboratory works based on CSE-205

EECE-269
Electrical Drives and Instrumentation

3 hours in a week, 3.00 Cr.

Introduction to three phase circuits; Power factor and power equation (Δ and Y circuits); Transformers; Alternators; Synchronous motor and Induction motor; DC motor; Stepper motors; Thyristor and Microprocessor based speed control of motors.

Instrumentation amplifiers: Differential, logarithmic and chopper amplifiers; Frequency and voltage measurements using digital techniques; Recorders and display devices; Spectrum analyzers and Logic analyzers; Data acquisition and Interfacing lo microprocessor based systems; Transducers: Types, principles and application of photovoltaic, piezoelectric, thermoelectric, variable reactance and opto-electronic transducers; Noise reduction in instrumentation.

Reference Book(s):

1. A Text Book of Electrical technology - B.L Theraja
2. Electrical Machinery and Transformers - Irving L. Kossow
3. A Course in Electrical and Electronic Measurements and Instrumentation - A.K. Sawhney
4. Electronic Instrumentation and Measurements - David A. Bell

EECE-270   **3 hours in alternative week, 0.75 Cr.**
Electrical Drives and
Instrumentation Sessional

Laboratory works based on EECE-269

MATH-245   **3 hours in a week, 3.00 Cr.**
Mathematics-III (Vector Analysis,
Matrices and Fourier Analysis)

VECTOR ANALYSIS

Scalars and vectors, equality of vectors; Addition and subtraction of vectors; Multiplication of vectors by scalars; Scalar and vector product of two vectors and their geometrical interpretation: Triple products and multiple products; Linear dependence and independence of vectors. Differentiation and integration of vectors together with elementary applications; Definition of line, surface and volume integrals; Gradient, divergence and curl of point functions, various formulae, Gauss's theorem, Stoke's theorem, Green's theorem.

MATRICES AND FOURIER ANALYSIS

a. **Matrices:** Definition of matrix; Algebra of matrices; multiplication of matrices, transpose of a matrix, inverse of matrix; rank and elementary transformations of matrices; Solution of linear equations; linear dependance and independeance of vectors. quadratic forms, matrix polynomials, determination of characteristic root and vectors, null space and nulity of matrix, chracteristic subspace of matrix.

b. **Fourier Analysis:** Real and complex form of Fourier series; Finite transform; Fourier Integral; Fourier transforms and their uses in solving boundary value problems of wave equations.

Reference Book(s):

1. Vector Analysis – Dr. Muhammad Abdus Sattar.
2. Vector Analysis – M. D. Raisinghania.
3. Martices and Linear Transformations – Mohammad Iman Ali.
4. An Introduction to Matrices – S. C. Gupta.
5. Matrics – Frand Asyres, JR.

CSE-210   **3 hours in a week, 1.50 Cr.**
Assembly Language Programming
Sessional

System Architecture for Assembly language; Assembly programming basics; Assembly instruction types and their formats: Arithmetic, Logical, Transfer control and conditional processing, Stacks, branches, String processing, subroutine and parameter passing, macros, Input/Output; Interrupts; Procedures, file system and file I/O handling.

CSE-211   **3 hours in a week, 3.00 Cr.**
Digital Electronics and Pulse Technique

Diode Logic Gates, Transistor Switches, Transistor Gates, Open Collector and High Impedance Gates, MOS Gates; Digital Logic Families**:** TTL, ECL, IIL and CMOS Logic with Operation Details; Characteristics of Digital ICs**:** Propagation delay, Power dissipation, Figure of Merit, Fan out, and Noise immunity; Electronic Circuits for Flip Flops, Counters and Register, Memory Systems, PLAs; S/H circuits, A/D and D/A Converters with Applications; Linear Wave Shaping, Diode Wave Shaping Techniques, Clipping and Clamping Circuits, Comparator Circuits, Switching Circuits; Pulse Transformers, Pulse Transmission, Pulse Generation; Monostable, Bi-stable and Astable Multivibrator; Schmitt Trigger; Optically Coupled Oscillators; Non-linear applications of OPAMPs; Blocking Oscillators and Time-base Circuit.

Reference Book(s):

1. Pulse, Digital and Switching waveforms- Jacob Millman and Herbert Taub.
2. Microelectronics: Digital and Analog Circuits and Systems- Jacob Millman.

CSE-212   **3 hours in alternative week, 0.75 Cr.**
Digital Electronics and Pulse
Technique Sessional

Laboratory works based on CSE-211

CSE-213
Computer Architecture

3 hours in a week, 3.00 Cr.

Fundamentals of computer Design; Processor Design; Datapaths Design : single cycle and multicycle implementations; Control Unit design : hardwared and microprogrammed; Hazards; Exceptions; Fixed Point Arithmetic; Arithmetic Logic Unit (ALU) Design; System organization; Parallel Processing; Pipeline: pipelined datapath and control, superscalar and dynamic pipelining, Pipeline structure vector supercomputers; RISC Processor; Memory organization.

Reference Book(s):

1. Computer Organization and Design- David A Patterson
2. Computer Organization and Architecture- William Stalling

CSE-215
Algorithms

3 hours in a week, 3.00 Cr.

Techniques for analysis of algorithms; Algorithm and complexity; Asymptotic notations, orders, Methods for the design of efficient algorithms; Divide and conquer; Greedy method, Applications of greedy method; Dynamic programming, applications of dynamic programming; Back tracking; Branch and bound; Basic search and traversal techniques; Topological sorting; Connected components; Spanning trees; Shortest paths; Flow algorithms; Approximation algorithms; Parallel algorithms; Computational Geometry related Algorithms; Heuristic Algorithm; Algebraic simplification and transformations; Lower bound theory; NP-completeness, NP-hard and NP-complete problems.

Reference Book(s):

1. Introduction to Algorithms – Thomas H Corman
2. Fundamental of Computer Algorithm – Sartaj Sahni
3. Fundamentals of Algorithmics - Gilles Brassard, Paul Bratley
4. Fundamental Algorithms – Knuth

CSE-216
Algorithms Sessional

3 hours in a week, 1.50 Cr.

Laboratory works based on CSE-215

CSE-217
Theory of Computation

3 hours in a week, 3.00 Cr.

Language theory; Finite automata: deterministic finite automata, nondeterministic finite automata, equivalence and conversion of deterministic and nondeterministic finite automata, pushdown

automata; Context free languages; Context free grammars; Turing Machines: basic machines, configuration, computing with Turing machines, combining Turing machines; Undecidability.

Reference Book(s):

1. Introduction to Automata Theory, Languages and Computation - John Hopcroft

MATH-247   3 hours in a week, 3.00 Cr.
Mathematics-IV (Complex
Variable and Laplace Transform)

COMPLEX VARIABLE

Complex number system, General functions of a complex variable, Limits and continuity of a function of complex variable and related theorems, Complex function, differentiation and the Cauchy-Riemann Equations. Line integral of a complex function, Cauchy's Integral Formula, Liouville's Theorem, Taylor's and Laurent's Theorem, Singular Residues, Cauchy's Residue Theorem.

LAPLACE TRANSFORM

Definition. Laplace transforms of some elementary functions. Sufficient conditions for existence of Laplace transform. Inverse Laplace transforms. Laplace transforms of derivatives. The unit step function. Periodic function, some special theorems on Laplace transform, Partial fraction. Solutions of differential equations by Laplace transform. Evaluation of improper integral.

Reference Book(s):

1. Theory and Problems of Complex Variables – Marray R Sprigel.
2. Theory and functions of Complex Variables – Shanti Narayan.

HUM-201   2 hours in a week, 2.00 Cr.
Financial and Managerial Accounting

Financial Accounting: Objectives and importance of accounting; accounting as an information system. Computerized system applications in accounting. Recording system: Double entry mechanism; account and their classification; accounting equation. Accounting cycle: Journal, ledger, trial balance, preparation of financial statements considering adjusting and closing entries. Accounting concepts (principles) and conventions. Financial statement analysis and interpretation: Ratio analysis.

Cost and Management Accounting: Cost concepts and classification. Overhead cost: meaning and classification. Distribution of overhead cost: Overhead recovery method; Job order costing: preparation of job cost sheet and question price, Inventory valuation: absorption costing and variable costing technique. Cost-Volume-Profit analysis: meaning, breakeven analysis, contribution

margin approach, sensitivity analysis.

Short-term investment decisions; relevant and differential cost analysis. Long-term investment decisions: capital budgeting, various techniques of evaluation of investments.

Reference Book(s):

1. Accounting Principles- Jerry J. Weygandt, Donald E. Kieso, and Paul D. Kimmel.
2. Managerial Accounting 10/e Update Edition- Ray; Noreen, Eric Garrison.
3. Accounting: A Business Perspective- Roger H. Hermanson, James Don Edwards, and Michael W. Maher.
4. Fundamental Accounting Principles- Kermit Larson, John Wild, and Barbara Chiappetta.
5. Financial & Managerial Accounting- Jan R. Williams, Susan F. Haka, Mark S. Bettner, and Robert F. Meigs.

LEVEL-3 TERM-I

CSE-300   **3 hours in a week, 1.50 Cr.**
Software Development Sessional

Students will develop complete software in group/individually using an object oriented programming language. Theoretical concept will be taken from CSE-205.

CSE-301   **3 hours in a week, 3.00 Cr.**
Database Management Systems

Introduction of database systems; Models: Entity-Relationship model, Relational model; Relational algebra; SQL; Advanced SQL; Integrity constraint; Relational database design; File organization and retrieval, file indexing and hashing; Transaction manager; Concurrency controller; Recovery manager; Security system; Database administration; Introduction to advanced database management systems: distributed database, parallel database, data mining and warehousing, multimedia, object-oriented, object-relational, real-time database.

Reference Book(s):

Database System Concepts- Abraham Silbeschatz, Henry F. Korth, S. Sundarshan

CSE-302   **3 hours in a week, 1.50 Cr.**
Database Management Sessional

Laboratory works based on CS-E301.

CSE-303   **3 hours in a week, 3.00 Cr.**
Compiler

Introduction to compiling; Basic issues; Lexical analysis and Scanning; Syntax analysis; Syntax-directed

translation; Attribute Grammars and Semantic Analysis Semantic analysis; type-checking; issues with run-time environments – source language issues; Issues in the design of code generation, Intermediate code generation; Error management; Storage organization-storage allocation strategies, target machine run-time storage management; Code optimization: The principle sources of optimization, Peephole optimization, Optimization of basic blocks-Loops in flow graphs; Introduction to global data-flow analysis-Code improving transformations.

Reference Book(s):

Compilers Principles, Techniques and Tools -- Alfred V. Aho, Jeffrey D. Ullman

CSE-304   3 hours in alternative week, 0.75 Cr.
Compiler Sessional

Laboratory works based on CSE-303.

CSE-305   3 hours in a week, 3.00 Cr.
Microprocessors & Micro controllers

Architectural overview of Intel Family of general purpose Processors, Microprocessor and its operation, Common instruction types, addressing modes, timings, interrupts controllers and DMA interfacing ICs; Intel 8086 Microprocessor : Internal architecture, register structure, programming model, addressing modes, instruction set; I/O Pin diagram and Control signals; I/O port organization and accessing; Cache Memory, TLB Structure; Memory Management in Intel 80X86 Family; segmentation and Real Mode Memory Management : segmentation and segmented to physical address translation, Protected Mode Memory Management; segmentation and virtual addressing, segment selectors segment descriptor tables.

Intel 80386 and 80486 segment register formats, Paged memory operation, Linear to physical address translation; Interrupts and Exception in Intel 80X86 families of processors, type of Interrupts, Interrupts in real mode and protected mode, Interrupt descriptor tables, Interrupts Priorities; Input and Output : IO address spaces, Port organization, Memory mapped IO, Hand-shaking IO instruction, Protection issues in Intel 80X86 family-privilege levels; An overview of Pentium and alpha RISC processors.

Reference Book(s):

1. The Intel Microprocessors - Barry B Brey
2. Microprocessors and Interfacing - Douglas V. Hall

CSE-306   3 hours in alternative week, 0.75 Cr.

Microprocessors & Micro
controllers Sessional

Laboratory works based on CSE-305.

CSE-307
Operating System

3 hours in a week, 3.00 Cr.

Introduction of Operating System, types of OS; Process: process managements, process states, job and process scheduling, CPU scheduling algorithms, process coordination, critical section problems, semaphores, Inter-Process Communication (IPC), classical IPC problems, multiprocessing and time-sharing, message and mailbox etc.; Memory management: swapping, memory allocation schemes, Paging and segmentation, virtual memory, page replacement strategies, working sets, demand paging; Input/output: hardware/software, disk, disk scheduling algorithms, Secondary storage management, terminals, clocks; Deadlock: resource allocation, detection, prevention, avoidance and recovery; File management; Operating system security; Main Features of Windows NT, UNIX, VMS and VSE; Introduction to distributed operating systems.

Reference Book(s):

1. Modern Operating System- Andrew S. Tanenbaum
2. Operating Systems – William Stallings

CSE-308
Operating System Sessional

3 hours in alternative week, 0.75 Cr.

Laboratory works based on CSE-307.

MATH-345
Statistics and Coordinate Geometry

2 hours in a week, 2.00 Cr.

STATISTICS

Frequency distribution; Mean, median, mode and other measures of central tendency; Standard deviation and other measures of dispersion; Moments, skewness and kurtosis; Elementary probability theory and discontinuous probability distribution, (binomial. Poison and negative binomial); Characteristics of distributions; Elementary sampling theory; Estimation; Hypothesis testing and regression analysis.

CO-ORDINATE GEOMETRY

Transformation of co-ordinates, axes and its uses, equation of conics its reduction to standard forms, pair of straight lines, homogeneous equations of second degree, angle between the point of straight lines, pair of lines joining the origin to the point of intersection of two given curves, circles and system of circles, orthogonal circles, radical axis and its properties, radical centers, coaxial circles and limiting points, equations of parabola, ellipse in Cartesian and polar coordinates.

Reference Book(s):

1. Introduction to Statistics (3rd edition) by Ronald E Walpole, Macmillan, 1990.

2. Probability and Statistics for Engineers by Scheaffer & McClave.
3. Statistics and Random Processes by B. Praba, Aruna Chalam and Sujatha.
4. Quality Planning and Analysis – J. M. Juran & F. M. Gryna.
5. Co-ordinate Geometry – Rahman and Bhattacharjee.

LEVEL-3 TERM-II

CSE-311   3 hours in a week, 3.00 Cr.
Numerical Analysis

Introduction; Solution of algebraic and transcendental equations: method of iteration, False Position method, Newton-Rhapson method; Solution of simultaneous linear equations: Cramer's rule, iteration method, Gauss-Jordan Elimination method, Choleski's process; Interpolation: diagonal and horizontal difference, differences of a polynomial, Newton's formula for forward and backward interpolation, Spline interpolation; Integration: Gauss quadrature formula, Trapezoidal rule, Simpson's rule, Weddle's rule; Solution of ordinary differential equations: Euler's method, Picard's method, Milne's method, Taylor's series method, Runge-Kutta method; Least squares approximation of functions: linear and polynomial regression, fitting exponential and trigonometric functions.

Reference Book(s):

1. Numerical Methods for Engineers – Steven C Chapra, Raymokand P Canale
2. Numerical Methods – E Balagurusamy
3. Numerical Methods -- S. Balachandra Rao, C.K.Shantha
4. Numerical Methods for Scientific and Engineering Computation -- M.K. Jain, Iyengar, R.K. Jain

CSE-313   3 hours in a week, 3.00 Cr.
Mathematical Analysis for
Computer Science

Recurrent problems; Manipulation of sums; Number theory; Special numbers; generating functions; Probability Distributions and Expectations: total probability and Bayes' rule, discrete probability distributions, continuous probability distributions; Random variables; stochastic process; Markov chains (discrete parameter, continuous parameter, birth-death process); Queuing models (birth-death model, Monrovian model), open and closed queuing network; Application of queuing models.

Reference Book(s):

1. Concrete Mathematics - Knuth.
2. Introduction to Probability Models- Sheldon M. Ross

CSE-315   3 hours in a week, 3.00 Cr.
Digital System Design

Digital system design Hierarchy; ASM charts; Hardware description language; Design using MSI

and LSI components; Combinational and sequential circuit design with PLD's, Introduction to CPLD's & FPGA's; Design of memory subsystem using SRAM and DRAM; Design of various components of a computer: ALU, memory and control unit - hardwired and micro-programmed, Microprocessor based designs; Computer bus standards; Design using special purpose controllers.

Introduction to Embedded Systems; Product design; Product development process; Modularity in Design Research Directions: Architecture innovations; Application domains; User interfaces Case Studies;

Reference Book(s):

1. Digital Systems Design with FPGAs and CPLDs - Ian Grout
2. Digital Systems Design Using VHDL - Jr. Charles H. Roth, Lizy K. John
3. Digital Design and Computer Architecture - David Harris and Sarah Harris
4. High-Speed Digital System Design: A Handbook of Interconnect Theory and Design Practices - Stephen H. Hall, , Garrett W. Hall, James A. McCall
5. Digital Computer Architecture – Malvino, Brown

CSE-316   3 hours in alternative week, 0.75 Cr.
Digital System Design Sessional

Laboratory works based on CSE-315.

CSE-317   3 hours in a week, 3.00 Cr.
Data and Tele Communication Engineering

Introduction: communication models, data communication tasks, standards, protocols and organization; TCP/IP models; Data Transmission basics; Spectrum; Transmission impairments; Data rate and channel capacity; Data Encoding; Spread spectrum technique; Sampling theorem; Pulse code modulation techniques and speech digitization; Asynchronous and synchronous data transmission techniques; Error detection and correction techniques; DSL technology; Data Link Control.

Multiplexing; SONET and SDH; Point to point connections; Switching networks; WANs, ISPs and LANs; Types of communication; Client server communication, broadcast, unicast and multicast modes, simplex, duplex and half duplex information flow; Bandwidth; Transmission media: guided and unguided media; Telephone switching systems; VOIP; Cellular telephony; Optical fiber communication; Submarine cables; Digital Radio Microwave.

Reference Book(s):

1. Data Communication and Networking - Behrouz A Forouzan
2. Data and Computer Communication - William Stallings

CSE-318   3 hours in a week, 1.50 Cr.
Data and Tele Communication
Engineering Sessional

Laboratory works based on CSE-317.

CSE-319   4 hours in a week, 4.00 Cr.
Software Engineering and
Information System Design

Software Engineering:
Introduction to system engineering and software engineering; Software requirements analysis, modeling and specification; Software Designing: principles, concepts (abstraction, refinement, modularity, hierarchy etc.), models and specification; Software testing: objectives and principles, testability, testing design and implementation models and documentations, verification, validation and debugging; Quality factors and metrics for different software engineering phases; Software project management issues.

Information System Design:
Different types of information; Qualities of information; Analysis o Information requirements for modern organizations; Role, tasks and attributes of a Systems Analyst; Sources of information; Information gathering techniques; Editing; Handling of missing in formation; Requirements specifications; Steps of systems analysis; Concepts of feasibility analysis: Analysis of technical facilities; Cost-benefit analysis; Design of an information system; Network models for project time estimation: Estimation of confidence level: Simplex method for minimization of project time; Project effort analysis
methods; Designing of inputs and outputs; Hardware and software analysis; Project team organization;
Database Normalization; Ethics and privacy: Control and security.

Reference Book(s):

1. System Analysis and Design – Elias M. Awad
2. System Analysis and Design - Raja Raman
3. Software Engineering A Practical Approach - Rogers Pressman
4. System Analysis and Design Methods– Jeffery L. Whitten
5. Software Engineering – Ian Somerville
6. Software Engineering Fundamental - Ali Behforooz & Fredrick J. Hudson

CSE-320   3 hours in a week, 1.50 Cr.
Software Engineering and Information
System Design Sessional

Laboratory works based on CSE-319.

CSE-350   **4 weeks, 1.00 Cr.**
Industrial Training

This course is mandatory. Evaluation report from industry is to be submitted at the end of the training and accordingly to be incorporated in the tabulation sheet.

LEVEL-4 TERM-I

CSE-400   **3 hours in a week, 3.00 Cr.**
Project or Thesis

Study of problems in the field of Computer Science and Engineering.

CSE-401   **3 hours in a week, 3.00 Cr.**
Artificial Intelligence

Overview of AI, Knowledge representation, LISP and other AI programming languages; Review of Un-Informed Search Strategies and game playing; Informed search Strategies: A', Heuristic functions, Memory Bounded Search (IDA*, SMA*); Iterative improvement Search (Hill Climbing, Simulated Annealing), constraint satisfaction problems. Review of Propositional logic, first order Logic, Introduction to Planning, Partial Order Planning. Bayesian Rule and its use in probabilistic reasoning; Belief Networks and Decision Networks; Learning Decision Trees; Learning General Logical descriptions-Hypothesis, Examples, Current Best Hypothesis Search, Least Commitment Search; Learning Neural and Belief Networks ANN, Perceptions, MFFN (Back propagation, Applications of Neural Networks, Bayesian Methods for learning Belief Networks, Generic Algorithm, Reinforced learning. Introduction to Natural Language Processing.

Reference Book(s):

1. Artificial Intelligence: a modern approach - Stuart Jonathan Russell, Peter Norvig
2. Artificial Intelligence: a new synthesis - Nils J. Nilsson

CSE-402   **3 hours in alternative week, 0.75 Cr.**
Artificial Intelligence Sessional

Laboratory works based on CSE-401.

CSE-403
Computer Networks
3 hours in a week, 3.00 Cr.

Protocol hierarchies; Data link control: HLDC; DLL in Internet; DLL of ATM; LAN Protocols: Standards IEEE 802; Hubs, Bridges, and Switches, FDDI, Fast Ethernet; Routing Algorithm; Internetworking, WAN; Fragmentation; Firewalls; IPV4, IPV6, ARP, RARP, Mobile IP, Network layer of ATM; Transport Protocols; Transmission Control Protocol: Connection Management, Transmission Policy, Congestion Control, Timer Management; UDP; AAL of ATM; wireless networks, mobile computing, and high speed networks; Gigabit Ethernet; Domain Name System: Name servers; Email and Its privacy; SNMP; HTTP; World Wide Web; Network security: Cryptography, DES, IDEA, public key algorithm; Authentication; Digital signatures.

Reference Book(s):

1. Computer Networks - Andrew S. Tanenbaum
2. Computer Networks: Protocols, Standards, and Interfaces - Uyless Black
3. Internetworking with TCP/IP: Principles, Protocols, Architecture - D. E. Comer
4. TCP/IP Illustrated Vol. I - W. R. Stevens

CSE-404
Computer Network Sessional
3 hours in a week, 1.50 Cr.

Laboratory works based on CSE-403.

CSE-405
Simulation and Modeling
3 hours in a week, 3.00 Cr.

Simulation modeling basics: systems, models and simulation; Classification of simulation model; Steps in a simulation study; Concepts in discreet-event simulation: event scheduling vs. process interaction approaches, Time-advance mechanism, organization of a discreet-event simulation model; continuous simulation models; Combined discreet-continuous models; Monte Carlo simulation; Simulation of queuing systems. Building valid and credible simulation models: validation principles and techniques, statistical procedures (or comparing real-world observations and simulation outputs, input modeling; Generating random numbers and random variants; Output analysis. Simulation languages; Analysis and modeling of some practical systems. Concepts covered in lecture applied in computer laboratory assignments.

Reference Book(s):

1. Simulation Modeling and Analysis - Law A. M., Kelton W. D.
2. Computer Aided Modeling & simulation - J. A. Spriet
3. Computer Simulation and Modeling - R. S. Lehman
4. System Simulation - G. Cordon

CSE-406   3 hours in alternative week, 0.75 Cr.
Simulation and Modeling Sessional

Laboratory works based on CSE-405.

CSE-410   3 hours in alternative week, 0.75 Cr.
Internet Programming Sessional

Students will develop a complete website in group/individually using markup languages, server-side scripting languages and client-side scripting languages and host it using necessary server configuration.

Option-I

CSE-421   3 hours in a week, 3.00 Cr.
Basic Graph Theory

Graphs and simple graphs, digraphs, sub graphs, 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.

Reference Book(s):

1. Introduction to graph theory - Douglas B West.

CSE-423   3 hours in a week, 3.00 Cr.
Fault Tolerant System

Introduction of Fault Tolerant Systems and architectures; Goal and Application of Fault Tolerant computing, Fundamental Definitions, Design techniques to achieve fault Tolerance, 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.

Reference Book(s):

1. Design and Analysis of Fault Tolerant Digital System - Barry W. Johnson
2. Fault-Tolerant Systems - Israel Koren, C. Mani Krishna

CSE-425
Basic Multimedia Theory

3 hours in a week, 3.00 Cr.

Multimedia system-introduction; Coding and compression standards; Architecture issue multimedia; Operating systems issues in multimedia - real-time OS issues, synchronization, interrupt handling; Database issues in multimedia – indexing and storing multimedia data, disk placement, disk scheduling, searching for multimedia document; Networking issues in multimedia - Quality-of-service guarantees, resource reservation traffic specification, happing, and monitoring, admission control; Multicasting issues; Session directories; Protocols for controlling sessions; Security issues in multimedia -digital water – making partial encryption schemes for video streams; multimedia applications – audio and video conferencing, video on demand, voice over IP.

Reference Book(s):

1. Multimedia: Computing, Communications & Applications - Steinmetz R., Nahrstadt K

CSE-427
Digital Image Processing

3 hours in a week, 3.00 Cr.

Digital image fundamentals: visual perception, Light and Electromagnetic Spectrum, Image Sensing and Acquisition, Image Sampling and Quantization, Some basic relationships between pixels, Linear and Nonlinear operations; image transforms: First Fourier Transform (FFT),Discrete Cosine Transform (DCT), Karhunen and Loeve Transform (KLT), Wavelet transform and sub-band decomposition; image enhancement in the frequency domain and image restoration techniques, image compression techniques, image compression standards: JPEG,MPEG, H.261, and H.263, Image Segmentation.

Reference Book(s):

1. Digital Image Processing. Second Edition. Rafael C. Gonzalez

CSE-429
Data and Network Security

3 hours in a week, 3.00 Cr.

Overview, Symmetric cipher, Classical encryption technique, Block cipher and the data encryption standard (DES), Triple DES, Introduction to finite fields, Advanced Encryption Standard, Contemporary Symmetric Ciphers, confidentiality using symmetric encryption public, Key encryption and Hash functions, Public-key Cryptography, RSA algorithm, Key management, Diffie-Hellman key exchange, Other Public Key Cryptosystem, Message Authentication and Hash function, Hash Algorithm, Digital Signatures and Authentication protocols, Network Security practice, Authentication application, Wireless Network Security, Electrical Mail security, IP security, Web security, System security, Intruders, Malicious software and Firewall, Legal and Ethical Aspects.

Reference Book(s):

1. Cryptography and Network Security – William Stallings
2. Cryptography and Network Security- Behrouz A. Forouzan

CSE-431   3 hours in a week, 3.00 Cr.
Object Oriented Software Engineering

The object-oriented approach within the context of software engineering, the language, basic (procedural) elements of language: what an Eiffel program is, what the instruction set is, and how to declare and use entities (variables) and routines; The concepts underlying the object-oriented approach: modularity, inheritance, and dynamic binding, case study from the management information-system domain; Environment matters: system configuration, interfacing with external software, and garbage collection.

Advanced issues involving exception handling, repeated inheritance, typing problems, and parallelism; object-oriented software engineering process, concentrating on specific guidelines facilitate the translation OOAD to a maintainable Addresses verification and validation (V&V) issues of Eiffel software systems built in a software engineering context; Building reusable libraries; The building of a parallel linear algebra library (Paladin).

Reference Book(s):

1. Object-Oriented Software Engineering - Stephen Schach
2. Object Oriented Software Engineering: A Use Case Driven Approach - Ivar Jacobson
3. Object-Oriented Software Engineering: Practical Software Development using UML and Java
   - Timothy Lethbridge, Robert Laganiere, Robert Laganiere

CSE-433   3 hours in a week, 3.00 Cr.
Artificial Neural Networks and Fuzzy Systems

Biological nervous system: the brain and neurons, Introduction to artificial neural network and fuzzy systems, Theory and application of Artificial neural networks and fuzzy logic; Multi-layer perception: Back propagation algorithm, Self organization map, Radial basis network, Hop field network, Recurrent network, Fuzzy set theory, Failing Adaptive Linear (ADALINE) and Multiple Adaptive Linear (MADALINE) networks, Generating internal representation, Cascade correlation and counter-propagation networks, Higher order and bi-directional associated memory, Lyapunov energy function, attraction basin, Probabilistic updates: simulated annealing, Boltzmann machine, Adaptive Resonance Theory (ART) network. ARTI. ART2. Fuzzy ART mapping (ARTMAF) networks. K.ohonen'8 feature .l\ Learning Vector Quantization (LVQ) networks, Logic control: Adaptive fuzzy neural network; Genetic algorithm and evolution compacting, Applications to control; Pattern recognition; 'Nonlinear system modeling, Speech and image processing.

Reference Book(s):

1. Introduction to Artificial Neural Systems, Jacek M. Zurada
2. Artificial neural systems: foundations, paradigms, applications, and implementations, Patrick K. Simpson

CSE-435   3 hours in a week, 3.00 Cr.
Parallel Algorithms

General discussion of parallel computers architecture; Performance Analysis: communication time,

computation time, speed-up measures, scalability, load-Balancing, and Amdahl's Law; Debugging techniques and debuggers; Design and analysis of parallel algorithms, realistic parallel models, experimental parallel algorithmic; Emphasis on combinational problems; Algorithms for parallel sorting, searching, and matrix operations, and numerical computations are presented and analyzed; Real-time constraints and real-time scheduling algorithms are also discussed. Architectures for parallel computers and parallel algorithms for computational problems; Performance evaluation metrics for the performance of parallel processing.

Reference Book(s):

1. Introduction to Parallel Algorithms - Joseph JaJa
2. Parallel Algorithms -- Henri Casanova, Arnaud Legrand, Yves Robert
3. Efficient Parallel Algorithms -- Alan Gibbons, Wojciech Rytter

Option-II

HUM-403   2 hours in a week, 2.00 Cr.
Government

Some basic concepts of Government and politics; Political system; Organs of government; the Nature of the state; the Welfare state; Democracy; Separation of power; International relations.

Local government of Bangladesh; Fundamental rights; constitutions of Bangladesh; Care taker government; Bureaucracy

Reference Book(s):

1. Principles of Political Science by A C Kapur
2. Political theory by V D Mahjan
3. Bangladesh Politics: Problems and Issues by Ranaq Jahan

HUM-405   2 hours in a week, 2.00 Cr.
Sociology

Basic concepts of sociology; Science, technology and social evolution; Globalization and changing world; Techniques of production, Culture and civilization, Population and world resources; Historical background of emergence of Bangladesh.

Socialization; Poverty social exclusion and welfare; Women and Development; Crime, deviance and social control; Sustainable development; Group and Organization

Reference Book(s):

1. Sociology by Richard Schaefer
2. Sociology by Anthony Giddens
3. Sociology by C N Shankar Rao

HUM-407
Engineering Ethics

2 hours in a week, 2.00 Cr.

Definition and scopes of Ethics. Different branches of ethics. Social change and the emergence of new technologies. History and development of engineering ethics. Science and technology necessity and application. Study of ethics in engineering. Applied ethics in engineering. Human qualities of an engineer. Obligation of an engineer to the clients. Attitude of an engineer to other engineers. Measures to be taken in order to improve the quality of engineering profession.

Ethical expectation: Employers and employees, inter-professional relationship, Professional Organization – maintaining a commitment of ethical standards. Desired characteristics of a professional code. Institutionalization of ethical conduct. Case studies.

Reference Book(s):

1. Engineering Ethics – Carles E Haris

HUM-409
Management Information System

2 hours in a week, 2.00 Cr.

Introduction to Information Systems in Business: Why Study Information Systems? Why organizations need Information? Fundamental Information Systems; Managerial Overview: Computer Hardware and Software, Computer Systems, End User and Enterprise Computing, Application Software, End User Applications, Data and Telecommunications-Telecommunication and the Internetworked Enterprise; Database Management: Managing Data Resources, Technical Foundations of Database Management; The Internet and Electronic Commerce: Fundamentals of Electronic Commerce, Intranets and Extranets in Business.

Information Systems for Managerial Decision Support: Management Information and Decision Support Systems, Artificial Intelligence Technologies in Business; Information Systems for Strategic Advantage: Fundamentals of Strategic Advantage, Strategic Application and Issues in Information Technology; Managing IT: Enterprise and Global Management, Managing Information Resources and Technologies, Global Information Technology Management, Planning for Business Change with IT, Implementing Business Change with IT. Security and Ethical Challenges, Security and Control Issues in Information Systems, Ethical and Societal Challenges of Information Technology.

Reference Book(s):

1. Management Information Systems-Managing Information Technology in the Internetworked Enterprise - O' Brian
2. Management Information Systems- A Managerial Perspective – Uma G. Gupta
3. Management Information Systems – Post and Anderson

CSE-400   **3 hours in a week, 3.00 Cr.**
Project or Thesis

Study of problems in the field of Computer Science and Engineering.

CSE-411   **3 hours in a week, 3.00 Cr.**
VLSI Design

VLSI Design Methodology: Top-down Design Approach, Technology Trends and Design Automation Algorithms; Introduction to CMOS Inverters and Basic Gates; CMOS Fabrication Process and Layout; CMOS Circuit Characteristics and Performance Estimation; Buffer Circuit Design; Introduction Bi-CMOS Circuits; Complex CMOS Gates; CMOS Building Blocks - Adder, Comparator, Multiplier, Counter, and Shifter; Data Path and Memory structures.

Design Methodology and Tools; Hardware modeling - Hardware Modeling Languages, Logic Networks, State Diagrams, Data-flow and Sequencing Graphs, Behavioral Optimization; Floor Planning and Architecture Design; ASIC design using FPGA and PLDs.

Reference Book(s):

1. Modern VLSI Design – System-on-Chip Design - Wayne Wolf.
2. CMOS VLSI Design- A Circuit and System Perspective - Neil H.E. Weste, David Harris, and Ayan Banerjee.

CSE-412   **3 hours in alternate week, 0.75 Cr.**
VLSI Design Sessional

Laboratory works based on CSE-411.

CSE-413   **3 hours in a week, 3.00 Cr.**
Computer Graphics

Standard graphics primitives; Graphics hardware; Graphics pipeline; Coordinate convention; Scan conversion; Clipping; Modeling transformation; Viewing transformation; Projection transformation; Polygons and polygon meshes; Curves and surfaces; Hidden lines and surface removal; Fractals; Ray tracing; Light models; Color models; Graphics programming.

Reference Book(s):

1. Computer Graphics Principle and Practice -- James D Foley, Van Dam

2. Computer Graphics Using Open GL – F S Hill J R
3. OpenGL programming Guide-(Official guide to learning opengl)

CSE414   3 hours in alternate week, 0.75 Cr.
Computer Graphics Sessional

Laboratory works based on CSE-413.

CSE-415   3 hours in a week, 3.00 Cr.
Computer Interfacing

I/O system; I/O devices, designing I/O systems; Parallel data transfer, Programmable peripheral interface (interface to A/D and D/A converter), Sensors and Transducer, keyboard/display interface; Microcomputer based Industrial Process control System, Programmable timer; Programmable interrupt controller, DMA controller; floppy and hard-disk controller; serial communication interface; Barcode reader; Sound card; MIDI interface; Printer interface; ISA. PCI, AGP, PS/2 and USB interfaces; Interfacing with power circuits, stepper motors, opto-isolation, controlling semiconductor power switches MOSFET, BJT. SCR, Triac and Solenoids.

Reference Book(s):

1. Computer Peripherals, 3rd Edition **-** Barry M. Cook, Neil H. White
2. The Intel Microprocessors - Barry B Brey
3. Microprocessors and Interfacing, 2nd Edition - Douglas V. Hall

CSE416   3 hours in a week, 1.50 Cr.
Computer Interfacing Sessional

Laboratory works based on CSE-415.

Option-III

CSE-441   3 hours in a week, 3.00 Cr.
Machine Learning

Introduction to machine learning, Supervised, unsupervised and reinforcement learning, Unsupervised learning algorithms, Concept Learning, Decision Tree Learning, Attribute based and relational supervised learning algorithms, Artificial Neural network based learning algorithms, Bayesian Learning, Evaluating Hypothesis, Genetic algorithm and genetic programming,

Reinforcement learning algorithms, Computational learning theory.

Reference Book(s):

1. Machine Learning, Tom Michael Mitchell
2. Introduction to Machine Learning, Ethem Alpaydin

CSE-442   3 hours in alternate week, 0.75 Cr.
Machine Learning Sessional

Laboratory works based on CSE-441.

CSE-443   3 hours in a week, 3.00 Cr.
Pattern Recognition

Pattern Recognition: introduction, importance, Statistical and Neural Pattern Recognition: Bayesian classifier, Bayes decision theory, discriminate functions and decision surfaces, Bayesian classifier for normal distribution, Linear classifiers: discriminate functions and decision hyper planes, perception algorithm, least squares methods; Kessler's construction, Nonlinear classifiers: two and three layer perceptions, back propagation algorithm; Template matching: optimal path searching techniques. Dynamic programming methods, Correlation methods; Context dependent classification: observable and hidden Markov models and Viterbi algorithm. Three problems of HMM and their application in Speech Recognition, Syntactic Pattern Recognition, Clustering algorithms.

Reference Book(s):

1. Pattern recognition - Sergios Theodoridis, Konstantinos Koutroumbas
2. Pattern Recognition - William Gibson

CSE-444   3 hours in alternate week, 0.75 Cr.
Pattern Recognition Sessional

Laboratory works based on CSE-443.

CSE-445   3 hours in a week, 3.00 Cr.
Digital Signal Processing

Introduction to speech, image & data processing; Discrete time signals, sequences; Linear Constant Coefficient difference equation; Sampling continuous time signals; Two dimensional sequences and systems; Z-transform, Inverse Z-transform, H-transform; Frequency domain representation, discrete time systems and signals; Fourier series and Fourier Transform; Parseval's theorem; Equivalent noise definition of bandwidth; Convolution, Correlation and method of numerical integration; Computation of the DFT: Goertzel FFT, Chirp Z-transform algorithms.

Reference Book(s):

1. Digital Signal Processing - John G. Proakis & Dimitris Manolakis

2. Discrete-Time Signal processing - Allan Oppenheim & Ronald Schafer
3. Digital Signal Processing-A practical approach -   Emmanuel C. Ifeachor Barrie W. Jervis
4. Signals and Systems - Rodger Ziemer & William Tranter, D

CSE-446   3 hours in alternate week, 0.75 Cr.
Digital Signal Processing
Sessional

Laboratory works based on CSE-445.

CSE-447   3 hours in a week, 3.00 Cr.
Advanced Networks
Programming

Overview of TCP/IP Layers, Transport layers API, Network programming issues, Related RFCs and standards (27.9.2000 and 4.10.2000). Socket Programming: UNIX sockets, 1PC issues, Multiplexing, win sock sockets. Web programming issues: HTML, Forms, HTTP, related RFCs. XML, TLI Programming: Fundamentals. STREAMS, subsystem, drivers, modules, TCL Fundamentals, examples. RPC Programming: Basics, XDR, high/low level programming, richen WML. Per/ Programming-I low to run PERL programs, program elements, operators etc, loops, I/O, pipes, system calls, matching parsing, CGI applications. Java programming SDK, writing applets, classes, and JFC, GUI development with AWT/ swing, graphic and sound. Java Beans, JDBC database. Servlets security, programming of mobile agents, distributed computing and CORBA, PHP.

Reference Book(s):

1. Advanced Wireless Networks: Cognitive, Cooperative & Opportunistic 4G Technology - Savo Glisic, Beatriz Lorenzo
2. Beginning HTML, XHTML, CSS, and JavaScript - Jon Duckett
3. PHP and MySQL Web Development - Luke Welling and Laura Thomson
4. Computer Network Time Synchronization: The Network Time Protocol on Earth and in Space - David L. Mills

CSE-448   3 hours in alternate week, 0.75 Cr.
Advanced Networks
Programming Sessional

Laboratory works based on CSE-447.

CSE-449   3 hours in a week, 3.00 Cr.
Mobile and Ubiquitous Computing

Network and Transport Protocol for Wireless Networks, Mobile IP and Variants of TCP; Distributed Systems platforms for Mobile Computing, Proxy Based Architectures, Service Discovery, Interaction Platforms; Local and Wide area Technologies (Bluetooth, 802.11, GSM); File System support for Mobile Computing; Development in Context-aware and Ubiquitous computing; Smart Embedded devices, Information Appliance and Wearable computers; Sensing and Context Acquisition in Ubiquitous Computing; New Trends in Networking and Communication, Proximity-based Networking, Communication protocol for Wireless Sensor Networks; Human Interaction in Ubiquitous Computing Environments, Tangible User Interfaces, Privacy and Security. Technological Component of Location Based Service (LBS)-WAP, GPS, Cell Based Location, 3G wireless, VXML, SMS-MMS, Personal Area Networks (802.11, Bluetooth, IRFIDs), Micro-Electro-Mechanical System (MEMES), Recommender systems (Collaborative Filtering, Intelligent Agents).

Reference Book(s):

1. Context-Aware Mobile and Ubiquitous Computing for Enhanced Usability: Adaptive Technologies and Applications - Dragan Stojanovic
2. Information Security Theory and Practices. Smart Cards, Mobile and Ubiquitous Computing Systems - Damien Sauveron, Konstantinos Markantonakis, Angelos Bilas and Jean-Jacques Quisquater.
3. Handbook on Mobile and Ubiquitous Computing: Status and Perspective - Laurence T. Yang, Evi Syukur and Seng W. Loke

CSE-450   3 hours in alternate week, 0.75 Cr.
Mobile and Ubiquitous
Computing Sessional

Laboratory works based on CSE-449.