Faridpur Engineering College

Syllabus For
Department of Computer Science and Engineering

Faculty of Engineering and Technology

University of Dhaka

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CHAPTER 1

Department of Computer Science and Engineering

RULES AND REGULATIONS FOR B.SC. IN COMPUTER SCIENCE AND ENGINEERING

1.1 Introduction

Computer Science and Engineering combines the intellectual challenge of a young discipline with the excitement of an innovative and rapidly expanding technology. It is rich in challenges and applications, since computing systems are everywhere: in science and engineering, medicine, design and manufacturing, commerce and public services, defense, transportation, arts and the media, entertainment, and the home. The rules and regulations administering undergraduate curricula through Course System began applicable for students admitted to Faridpur Engineering College in First Year classes and subsequent sessions.

1.1.1 The Course System

The undergraduate curriculum at Faridpur Engineering College is based on the course system. The salient features of the course system are;

i. Reduction of the number of theoretical courses and examination papers around five in each semester,
ii. Continuous evaluation of student's performance,
iii. Introduction of Letter Grades and Grade Points instead of numerical grades,
iv. Introduction of some additional optional courses and thus enable students to select courses according to his/her interest as far as possible,
v. Opportunity for students to choose fewer or more courses that the normal course load depending on his/her capabilities and needs,
vi. Flexibility to allow the student to progress at his/her own pace depending on his/her ability or convenience, subject to the regulations on credit and minimum grade point average (GPA) requirements, and
vii. Promotion of teacher-student contact.

In the curriculum for the undergraduate programmes, besides the professional courses pertaining to each discipline, there is a storing emphasis on acquiring a thorough knowledge in the basic science of Mathematics, Physics and Chemistry. Due importance is also given for the study of several subjects in Humanities and Social Sciences which, it is expected will help the student to interact more positively with the society in which he/she/lives. Thus, the course contents of the undergraduate programmes provide a harmonious blend of both basic sciences and their applications as well as their social relevance.

The first two Semester of bachelor's degree programmes consist of courses in basic sciences, mathematics, humanities and social sciences, basic engineering and architecture subjects. The third and subsequent Semester build directly on the knowledge of the basic subjects gained in the first two Semester and go on to develop competence in specific disciplines.

1.1.3 The Course Outline

Duration of the Program: 4 years.
Total Semester: 8 (2 semester per year).
Total Credits: 161.50
Class: 14 active weeks
Preparatory Leave: 2 weeks (No separate break for in-course examinations)
Teaching of the courses:

a. For each credit of a theory course, there will be 1 class per week of 1-hour duration.
b. Total classes in a semester for each credit of a theory course will be 14 (15x1).
c. Total Contact Hours in a semester for each 1 credit theory course: 14x1=14.

d. For each 1 credit lab course, there will be 1 class per week of 3 hours duration.
e. Total classes in a semester for each 1 credit lab course in 14 weeks: 14x1=14.
f. Total Contact Hours in a semester for each 1 credit lab course: 14x3=14.

Evaluation of the courses:
The answer scripts will be evaluated by two examiners. The average mark will be considered as the achieved mark. The script will be evaluated by a third examiner if the difference of marks received from these two examiners is more than 20%. In case of third examination, average of nearest two marks will be considered as the achieved mark.

1.2 Students Admission
Students will be admitted in undergraduate curricula in the Departments of Computer Science and Engineeringat Faridpur Engineering College as per rules of the Faculty of Engineering and Technology, University of Dhaka. The Registrar's Office of University of Dhakaserves Admissions Office and deals with course registration in addition to student admission.

1.3 Number of Semester in a Year
There will be two Semesters in an academic year.

1.3.1 Duration of Semester
The duration of each of Semester will be 18 weeks which will be used as follows:

Classes	14 weeks
Recess before Semester Final Examination	02 weeks
Semester Final Examination (approximately)	02 weeks
Total =	18 Weeks

1.4 Course Pattern and Credit Structure
The entire undergraduate programme is covered through a set of theoretical and laboratory/sessional/studio courses.

1.4.1 Course Designation and Numbering System
Each course is designated by a two to four letter word identifying the department, which offers it followed by a three-digit number with the following criteria:

(a) The first digit will correspond to the year/level in which the course is normally taken by the students.
(b) The second digit will be reserved for departmental use for such things as to identify different areas within a department.
(c) The last digit will usually be odd for theoretical and even for laboratory or sessional courses.

1.4.2 Assignment of Credits
(a) Theoretical Courses:
One lecture per week per semester will be equivalent to one credit.
(b) Laboratory/sessional/Design:
Credits for laboratory/sessional or design courses will be half of the class hours per week per semester.

Credits are also assigned to project and thesis work taken by students. The amount of credits assigned to such work may vary from discipline to discipline.

The curriculum does not demand the same rate of academic progress from all students for obtaining the degree but only lays down the pace expected of a normal student. A student whose background or capacity for assimilation is lower will be permitted to complete the programme at a slower pace by studying a lesser number of courses during a given semester (subject to a minimum course load). He may keep pace with his class by taking during the Short Semester those courses which he had dropped during the Regular Semester, or by covering the entire degree programme over an extended period without developing any felling of inferiority complex.

1.5 Types of Course
The courses included in undergraduate curricula are divided into several groups as follows:

1.5.1 Core Courses
In each discipline a number of courses will be identified as core courses which form the nucleus of the respective bachelor's degree programme. A student has to complete all of the designated core courses for his/her discipline.

1.5.2 Pre-requisite Courses
Some of the core courses are identified as pre-requisite courses. A pre-requisite course is one which is required to be completed before some other course(s) can be taken. Any such course, on which one or more subsequent courses build up, may be offered in each of the two regular Semester.

1.5.3 Optional Courses
Apart from the core courses, students will have to complete a number of courses which are optional in nature in that students will have some choice to choose the required number of courses from a specified group/number of courses.

1.6 Course Offering and Instruction
Each course is conducted by a teacher. The course teacher is responsible for maintaining the expected standard of the course and for the assessment of student's performance.

For a course strength necessitating two or more parallel classes or sections, one of the course teachers or any other member of the teaching staff of the department may be designated as course coordinator. He/She has the full responsibility for coordinating the work of the other members of the department involving in that course.

1.7 Departmental Monitoring Committee
Consistent with its resilient policy to keep pace with new developments in the field of science and technology, the College will update its course curriculum at frequent intervals (at least every three years). Such updating aims not only to include the expanding frontiers of knowledge in the various fields but also to accommodate the changing social, industrial and professional need of the country. This can be done through deletion and modification of some of the courses and also through the introduction of new ones.

1.8 Teacher Student Contact
The proposed system encourages students to come in close contact with teachers. For promotion of teacher-student contact, each student is assigned to an Adviser and the student is free to discuss with his/her adviser all academic matters, especially those related to courses taken and classes being attended by him/her. Students are also encouraged to meet with other teachers any time for help on academic matters.

1.10 Registration Requirements
Any student who makes use of classroom or laboratory facilities or faculty time is required to register formally. Being admitted to the university, each student is assigned to a student adviser. The students can register for courses he/she intends to make during a given semester only on the basis of the advice and consent of his/her adviser.

1.10.1 Registration Procedure
Students must register for each class in which they will participate. Each student will fill up his/her Course Registration Form in consolation with and under the guidance of his/her adviser. The original copy of the Course Registration Form will be submitted to the Registrar's Office, and then the requisite number of photocopies will be made by the Registrar's Office for distribution. The date, time and venue will be announced in advance by the Registrar's Office. Much counseling and advising are accomplished at registration time. It is absolutely necessary that all students present themselves at the registration desk at the specified time.

1.10.2 Limits on the Credit Hours to be Taken
A student must be enrolled in at least 15 credit hours. He/She may be allowed to enroll in up to a maximum of 24 credit hours if recommended by his/her Adviser. A student must enroll for the prescribed sessional/laboratory courses in the respective Semester within the allowed credit hour limits.

1.10.3 Pre-condition for Registration
A student will be allowed to register in those courses subject to the capacity constraints and satisfaction of pre-requisite courses. Registration will be done at the beginning of each semester. The Registration programme with dates and venue will be announced in advance. Late registration is, however, permitted during the first week on payment of a late registration fee. Students having outstanding dues to university or a hall of residence shall not be permitted to register. All students have, therefore, to clear their dues and get a clearance or no dues certificate, On the production of which, they will be given necessary Course Registration Forms and complete the course registration procedure. Registration Forms will normally be available in the Register's Office. However, for the First-Year students, prior department-wise ennoblement/admission is mandatory. An orientation programme will be conducted for them at the beginning of the first semester when they will be handed over the registration package on production enrollment slip/proof of admission.

1.10.4 Pre-registration
Pre-registration for courses to be offered by the students in a particular semester will be done on specified dates before the end of the previous semester. All students in consolation with their course advisers are required to complete the pre-registration formalities, failing which a fine of Tk. xxxx (amount may be decided by the authority) will have to be paid before registration in the next semester. Further a student who does not pre-register may not get the courses desired by his/her subsequently.

3.10.5 Registration Deadline
Student must register for the courses to be taken before the commencement of each semester and no late registration will be accepted after one week of classes. Late registration after this date will not be accepted unless the student submits a written appeal to the Registrar through the concerned Head and can document extenuating circumstances such as medical problems (physically incapacitated and not able to be presented) from the Chief Medical Officer of the University or some other academic commitments which precluded enrolling prior to the last date of registration.

1.10.6 Penalty for Late Registration
Students who fail to register during the designated dates for registration are charged a late registration fee of Tk. xx.xx (amount may be decided by the authority). This extra fee will not be waived whatever be the reason for late registration.

1.10.7 Course Adjustment Procedure
A student will have some limited options to add or delete courses from his/her registration list, within the first two weeks from the beginning of the semester. He/She may add courses only within the first two weeks of a regular Semester and only the first week of a short Semester. In case of dropping a course, a student will be allowed to do so within four weeks after the commencement of a regular Semester and two weeks after the commencement of a short Semester. Adjustment of initially registered courses in any Semester can be done by duly completing the Course Adjustment Form. These forms will normally be available in the Registrar's Office. For freshman students such forms can be included in the registration packet at the of orientation.

Any student willing to add or drop courses will have to fill up a Course Adjustment Form in consultation with under the guidance of his/her adviser. The original copy of the Course Adjustment Form will be submitted to the Registrar's Office, and then the requisite number of photo copies will be made by the Registrar's Office for distribution to the concerned Adviser, Head, Dean, Controller of Examination and the students.

All changes in courses must be approved by the Adviser and the Head of the department concerned. The Course Adjustment Form will have to be submitted to the Registrar's Office after duly filled in the signed by the concerned persons. To add/drop a course, respective teacher's consent will be required.

1.10.8 Withdrawal from a Semester

If a student is unable to complete the Semester Final Examination due to serious illness or serious accident, He/She may apply to the Head of the degree awarding department for total withdrawal from the Semesterwithin a week after the end of the Semester Final Examination. However, he/she may choose not to withdraw any laboratory/sessional/design course if the grade obtained in such a course is 'D' or better. The application must be supported by a medical certificate from the Medical Officer of the College. The Academic Council will take the final decision about such application.

1.11 Grading System

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/in class evaluation, class participation, homework assignments, and a semester final examination. The assessment in laboratory/sessional courses is made through observation of the student at work in class, viva-voce during laboratory hours, and quizzes. For architecture students, assessments in design sessional would be done through evaluation of a number of projects assigned throughout the semester. As discussed earlier, each course has a certain number of credits, which describe its weight age. A letter grade with a specified number of grade points is awarded in each course for which a student is registered. A student's performance is satisfactorily and weighted average of the grade points that he/she has maintained. A minimum grade point average is required to be maintained for satisfactory progress.

Letter grades and corresponding grade points will be awarded in accordance with provisions shown below:

Numerical Grade	**Letter Grade**	**Grade Point**
80% or above	A+ (A plus)	4.00
75% to less than 80%	A (A regular)	3.75
70% to less than 75%	A- (A minus)	3.50
65% to less than 70%	B+ (B plus)	3.25
60% to less than 65%	B (B regular)	3.00
55% to less than 60%	B- (B minus)	2.75
50% to less than 55%	C+ (C plus)	2.50
45% to less than 50%	C (C regular)	2.25
40% to less than 45%	D	2.00
Less than 40%	F	0.00
Continuation (For project & thesis/design course)	×	-

1.11.1 Distribution or Marks

Thirty percent (30%) of marks shall be allotted for continuous assessment i.e., quizzes and homework assignments, in class evaluation and class participation. The remainder of the marks will be allotted to Semester Final examination which will be conducted centrally by the University. There will be internal and external examiners for each course in the Semester Final examination of 3 hours duration. The distribution of marks for a given course will be as follows:

i.	Class participation	10%
ii.	Homework Assignment and Quizzes	20%
iii.	Final Examination (3 hours)	70%
	Total	=100%

Basis for awarding marks for class participation and attendance will be as follows:

Attendance	Marks
90% and above	10
85% to less than 90%	9

80% to less than 85%	8
75% to less than 80%	7
70% to less than 75%	6
65% to less than 70%	5
60% to less than 65%	4
Less than 60%	0

The number of quizzes of a course shall be at least n+1, where n is the number of credits of the course. Evaluation of the performance in quizzes will be on the basis of the best n quizzes. The scheme of continuous assessment that a teacher proposes to follow for a course will be announced on the first day of classes.

1.12 Earned Credits:

The courses in which a student has obtained 'D' or a higher Grade will be counted as credits earned by him/her. Any course in which a student has obtained 'F' grade will not be counted towards his/her earned credits.

A student who obtains 'F' grade in a Core Course in any semester will have to repeat the course.
If a student obtains 'F' grade in an Optional Course he/she may choose to repeat the Course or take a Substitute Course if available.

'F' grades will not be counted for GPA calculation but will stay permanently on the Grade Sheet and Transcript. When a student repeats a course in which he/she previously obtained 'F' grade, he/she will not be eligible to get a grade better than 'B' in such a course.

If a student obtains a grade lower than 'B' in a course, he/she will be allowed to repeat the course only once for the purpose of grade improvement by forgoing his/her earlier grade, but he/she will not be eligible to get a grade better than 'B' in such a course. A student will be permitted to repeat for grade improvement purposes a maximum of four courses in B.Sc. Engineering programme.

If a student obtains 'B' or a better grade in any course, he/she will not be allowed to repeat the course for the purpose of grade improvement.

1.13 Honours

Candidates for Bachelor's degree in engineering and architecture will be awarded the degree with honours if their over all GPA is 3.75 or better.

1.14 Calculation of GPA

Grade Point Average (GPA) is the weighted average of the grade points obtained in all the courses passed/completed by a student. For example, if a student passes/completes five courses in a semester having credits of C_1, C_2, C_3, C_4 and C_5 and his/her grade points in these courses are G_1, G_2, G_3, G_4 and G_5, respectively then.

$$\text{GPA} = \frac{\sum \text{CiGi}}{\sum Ci}$$

1.14.1 A Numerical Example

Suppose a student has completed five courses in a Semester and obtained the following grades:

Course	Credits	Grade	Grade points
EEE 203	3	A +	4.00
EEE 205	3	B	3.00
EEE 207	3	A	3.75
Math 205	2	B +	3.25
Hum	1	A -	3.50

Then his/her GPA for the semester will be computed as follows:

$$GPA=\frac{3\times4.0+3\times3.0+3\times3.75+2\times3.25+1\times3.5}{3+3+3+2+1}=3.52$$

1.15 Performance Evaluation

The performance of a student will be evaluated in Semester of two indices, viz. Semester grade point average, and cumulative grade point average, which is the grade average for all the Semester. The semester grade point average, which is the grade average for all the Semester. The semester grade point average is computed dividing the total grade points earned in a semester by the number of semester hours taken in that semester. The overall or cumulative grade point average (CGPA) is computed by dividing the total grade points accumulated up to date by the total credit hours earned. Thus, a student who was earned 275 grade points in attempting 100 credit hours of courses would have a cumulative grade point average of 2.75.

Students will be considered to be making normal progress toward a degree if their cumulative or overall GPA for all work attempted is 2.20 or more. Students who regularly maintain Semester GPA of 2.20 or better are making good progress toward their degrees and are in good standing with the university. Students who fail to maintain this minimum rate of progress will not be in good standing. This can happen when one or more of the following conditions exist:
This can happen when one or more of the following conditions exist:

i) Semester GPA falls below 2.20,
ii) Cumulative GPA falls below 2.20,
iii) Earned credits fall below 15 times the number of Semester attended/studied.

All such students can make up deficiencies in GPA and credit requirements by completing courses in next Semester (s) and backlog courses, if there be any, with better grades. When GPA and credit requirements are achieved, the student is returned to good standing.

1.16 Academic Progress, Probation and Suspension

Academic Progress: Undergraduate students will be considered to be making normal progress toward a degree if their cumulative or overall GPA for all work attempted is not less than 2.20.

Probation and Suspension: Undergraduate students who regularly maintain Semester GPA of 2.20 or better are making good progress toward their degrees and are in good standing with the university. Students who fail to maintain this minimum rate of progress may be placed on academic probation.

The status of academic probation is reminder/warning to the student that satisfactory progress towards graduation is not being made. A student may be placed on academic probation when either of the following conditions exists:

i) The Semester GPA falls below 2.20, or
ii) The cumulative GPA falls below 2.20.

Students on probation are subject to such restrictions with respect to courses and extracurricular activates as may be imposed by the respective Dean of faculty.

The minimum period of probation is one Semester, but the usual period is for one academic year. This allows the student an opportunity to improve the GPA through the completion of additional course work during the period that the student is on probation. The probation is extended for additional Semester until the student achieves an overall GPA of 2.20 or better. When that condition is achieved, the student is returned to good standing.

Academic probation is not to be taken lightly-it is very serious matter. A student on academic probation who fails to maintain a GPA of at least 2.20 during two consecutive academic years may be suspended from this university. A student who has been suspended may make a petition to the Dean of faculty, but this petition will not be considered until the student has been suspended at least one full Semester.

Petitions for reinstatement must set forth clearly the reasons for the previous unsatisfactory academic record and it must delineate the new conditions that have been created to prevent the recurrence of such work. Each such petition is considered individually on its own merits.

After consideration of the petition, and perhaps after consultation with the student, the Dean in some cases, reinstate the student if this is the first suspension. However, a second suspension will be regarded as final and absolute.

1.17 Measures for Helping Academically Weak Students

The following provisions will be made as far as possible to help academically weak students to enable them to complete their studies within the maximum period of seven years in engineering and eight years in architecture student, respectively:

i) All such students whose cumulative grade point average (CGPA) is less than 2.20 at the end of semester may be given a load of not exceeding four courses, in the next semester.

ii) For other academic deficiencies, some basic and core courses may be offered during the Short Semester in order to enable the student to partially make-up for the deduced load during Regular Semester.

Following criteria will be followed for desemestering academically weak students:

i) CGPA falling below 2.20.

ii) Semester grade point average (SGPA) falling below 2.20 points below that of previous semester.

iii) Earned credit falling below 15 times the number of Semester attended.

1.18 Minimum Earned Credit and GPA Requirements for Obtaining Graduation

The minimum GPA requirement for obtaining a bachelor's degree in engineering is 2.20. Completion of fulltime Studentship: Students who have completed minimum credit requirement for graduation for a Bachelor's degree shall not be considered and registered as fulltime students.

A student may take additional courses with the consent of his/her adviser in order to raise GPA, but he/she may take a maximum of 15 such additional credits in engineering beyond respective credit-hour requirements for bachelor's degree during his/her entire period of study.

1.18.1 Application for Graduation and Award of Degree

A student who has fulfilled all the academic requirements for Bachelor's degree will have to apply to the Controller of Examinations through his/her Adviser for graduation. Provisional degree will be awarded on completion of credit and GPA requirements. Such provisional degrees will be confirmed by the Academic Council.

1.19 Industrial/Professional Training Requirements

Depending on each department's own requirement a student may have to complete a prescribed number of days of industrial/professional training in addition to minimum credit and other requirements, to the satisfaction of the concerned department.

1.20 Time Limits for completion of Bachelor's Degree

A student must complete his studies within a maximum period of seven years for engineering.

1.21 Inclusion of Repeaters from Annual System in Course System

Repeater students including Private students of Annual system will be included in the Course System of curricula as and when such situation will arise.

1.21.1 Exemption of Courses Repeater students including private students may be granted exemption in theoretical course(s) in which he/she secured 45% or more marks and in sessional/laboratory course(s) in which he/she secured 41% or more marks.

1.21.2 Time Limit for Completion of Bachelor's Degree
Time allowed for a student included in Course System from Annual System to complete studies leading to a bachelor's degree will be proportional to the remaining credits to be completed by him/her.

A student in engineering, for example, having earned 40 credit hours through equivalence and exemption (of previously completed courses) out of a total requirement of 161.50 credits for bachelor's degree will get (7yrs×120/161.50=5.20) = 5.5 years (rounded to next higher half-a-year) or 11 (eleven) Regular Semester to fulfill all requirements for bachelor's degree. For a student in architecture, time allowed will be calculated in a similar way.

1.21.3 Relaxation of Course Registration for Students

Transferred to Course System from Annual System
The requirement of registration of a minimum 15 credit hours in a semester shall be waived for only the Semester of the level where he/she has been transferred in course system provided that he/she has been granted exemption in some of the courses offered in those Semester.

1.22 Attendance, Conduct, Discipline, etc.

1.22.1 Attendance
All students are expected to attend classes regularly. The college 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 60% of all classes held in every course.

1.22.2 Conduct and Discipline
A student shall conform to a high standard of discipline, and shall conduct himself/herself, within and outside the precincts of the college in a manner befitting the students of a college of national importance. He/She shall show due courtesy and consideration to the employees of the college and Halls of Residence, good neighborliness to his/her fellow students and the teachers of the college and pay due attention and courtesy to visitors.
T safeguard its ideals of scholarship, character and personal behavior, the college reserves the right to require the withdrawal of any student at any time for any reason deemed sufficient.

1.23 Absence During Semester
A student should not be absent from quizzes, tests, etc. during the Semester. Such absence will naturally lead to reduction in points/marks which count towards the final grade. Absence in Semester Final Examination will result in 'F' grades.

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 on returning to the classes. Such request should be supported by medical certificate from a Medical officer. The medical certificate issued by registered medical practitioners (with the Registration Number shown explicitly on the certificates) will also be acceptable only in those cases where the student has valid reasons for his absence from the college).

CHAPTER 2
COURSE REQUIREMENTS FOR UNDERGRADUATE COMPUTER SCIENCE AND ENGINEERING STUDENTS

Undergraduate students of the Department of Computer science and Engineering have to follow a particular course schedule which is given in this chapter according to semester-wise distribution of the courses:

SEMESTER-I

Course Number	Course Title	Hours/Week		Credit	Pre-requisite
		Theory	Practical/ Sessional		
CSE 101	Introduction to Computer Systems	1.00	---	1.00	
CSE 102	Introduction to Computer Systems (Sessional)	------	3.00	1.50	
EEE 105	Introduction to Electrical Engineering	2.00	---	2.00	
EEE 106	Introduction to Electrical Engineering (Sessional)	---	3.00	1.50	
ME 100	Mechanical Engineering Drawing-I	---	3.00	1.50	
ME 101	Mechanical Engineering	2.00	---	2.00	
ME 102	Mechanical Engineering (Sessional)	--	3.00	1.50	
MATH 101	Differential Calculus and Co-ordinate Geometry	3.00	---	3.00	
PHY 101	Physics (Heat and Thermodynamics, Structure of Matter, Waves and Oscillations, and Physical Optics)	3.00	---	3.00	
PHY 102	Physics (Sessional)	---	3.00	1.50	
SS 101	Social Studies	2.00	---	2.00	
	Total	**13.00**	**15.00**	**20.50**	

SEMESTER-II

Course Number	Course Title	Hours/Week		Credit	Pre-requisite
		Theory	Practical/ Sessional		
CSE 201	Structured Programming Language	3.00	---	3.00	
CSE 202	Structured Programming Language (Sessional)	---	3.00	1.50	
CSE 203	Discrete Mathematics	3.00	---	3.00	
MATH 201	Integral Calculus, Differential Equations and Series	3.00	----	3.00	
CHEM 201	Chemistry	3.00	---	3.00	
CHEM 202	Chemistry (Sessional)	---	3.00	1.50	
ENG 201	English Language	2.00	---	2.00	
ENG 202	Communication in English (Practice)	---	2.00	1.00	
SS 201	Government and Public Administration	2.00	---	2.00	
	Total	**16.00**	**8.00**	**20.00**	

SEMESTER-III

Course Number	Course Title	Hours/Week		Credit	Pre-requisite
		Theory	Practical/ Sessional		
CSE 301	Object Oriented Programming Language	3.00	---	3.00	
CSE 302	Object Oriented Programming Language (Sessional)	---	3.00	1.50	
CSE 303	Data Structures	3.00	---	3.00	
CSE 304	Data Structures (Sessional)	---	3.00	1.50	
CSE 305	Digital Logic Design	3.00	---	3.00	
CSE 306	Digital Logic Design (Sessional)	---	3.00	1.50	
EEE 309	Electronic Devices and Circuits	3.00	---	3.00	
EEE 310	Electronic Devices and Circuits (Sessional)	---	3.00	1.50	
MATH 301	Complex Variable and Statistics	3.00	---	3.00	
	Total	**15.00**	**12.00**	**21.00**	

SEMESTER-IV

Course Number	Course Title	Hours/Week		Credit	Pre-requisite
		Theory	Practical/ Sessional		
CSE 401	Algorithms	3.00	---	3.00	
CSE 402	Algorithms (Sessional)	---	3.00	1.50	
CSE 403	Digital Electronics and Pulse Techniques	3.00	---	3.00	
CSE 404	Digital Electronics and pulse Techniques (Sessional)	---	3.00	1.50	
CSE 405	Theory of Computation	2.00	---	2.00	
EEE 407	Electrical Drives and Instrumentation	3.00	---	3.00	
EEE 408	Electrical Drives and Instrumentation (Sessional)	---	3.00	1.50	
MATH 401	Matrices, Vectors, Fourier Analysis, Laplace's Transforms	3.00	---	3.00	
SS 401	Managerial Economics	2.00	--	2.00	
	Total	**16.00**	**9.00**	**20.50**	

SEMESTER-V

Course Number	Course Title	Hours/Week		Credit	Pre-requisite
		Theory	Practical/ Sessional		
CSE 501	Database Management System	3.00	---	3.00	
CSE 502	Database Management System (Sessional)	---	3.00	1.50	
CSE 503	Computer Architecture	3.00	---	3.00	
CSE 505	Microprocessors and Microcontrollers	3.00	---	3.00	
CSE 506	Microprocessors and Microcontrollers (Sessional)	---	3.00	1.50	
CSE 507	Operating System	3.00	---	3.00	
CSE 508	Operating System (Sessional)	---	3.00	1.50	
CSE 509	Communication-I	3.00	---	3.00	
SS 501	Project Planning and Management	2.00	---	2.00	
	Total	**17.00**	**9.00**	**21.50**	

SEMESTER-VI

Course Number	Course Title	Hours/Week		Credit	Pre-requisite
		Theory	Practical/ Sessional		
CSE 601	Mathematical Analysis for Computer Science	3.00	---	3.00	
CSE 603	Compiler	3.00	---	3.00	
CSE 604	Compiler (Sessional)	---	3.00	1.50	
CSE 605	Software Engineering and Information System Design	3.00	---	3.00	
CSE 607	Numerical Methods	3.00	---	3.00	
CSE 608	Numerical Methods (Sessional)	---	3.00	1.50	
CSE 609	Computer Networks	3.00	---	3.00	
CSE 610	Computer Networks (Sessional)	---	3.00	1.50	
CSE 612	Software Development	---	3.00	1.50	
	Total	**15.00**	**12.00**	**21.00**	

SEMESTER-VII

Course Number	Course Title	Hours/Week		Credit	Pre-requisite
		Theory	Practical/ Sessional		
CSE 700	Project and Thesis	---	6.00	3.00	
CSE 701	Artificial Intelligence	3.00	---	3.00	
CSE 702	Artificial Intelligence (Sessional)	---	3.00	1.50	
CSE 703	Peripheral and Interfacing	3.00	---	3.00	
CSE 704	Peripheral and Interfacing (Sessional)	---	3.00	1.50	
IPE 701	Industrial Management	2.00	---	2.00	
SS 703	Sociology and Industrial Law	2.00	---	2.00	
SS 705	Financial Management & Accounting	3.00	---	3.00	
CSE 705	Simulation and Modeling	3.00	---	3.00	
	Or				
CSE 707	Basic Graph Theory	3.00	---	3.00	
	Or				
CSE 709	Fault Tolerant Systems	3.00	---	3.00	
	Or				
CSE 711	Digital Image Processing	3.00	---	3.00	
	Or				
CSE 713	Basic Multimedia Theory	3.00	---	3.00	
	Total	**16.00**	**12.00**	**22.00**	

SEMESTER-VIII

Course Number	Course Title	Hours/Week		Credit	Pre-requisite
		Theory	Practical/ Sessional		
CSE 800	Project and Thesis	---	6.00	3.00	
CSE 801	Computer Graphics	3.00	---	3.00	
CSE 802	Computer Graphics (Sessional)	---	3.00	1.50	
CSE 803	Introduction to Distributed Computing	3.00	---	3.00	
Network and Communications group One subject from the following groups (depending on availability of Resources) :					
CSE 807	Communication-II	3.00		3.00	
CSE 808	Communication-II (Seasonal)		3.00	1.50	
Or					
CSE 809	Wireless & Mobile Communication	3.00		3.00	
CSE 810	Wireless & Mobile Communication (Sessional)		3.00	1.50	
Theoretical Computer Science group One subject from the following groups (depending on availability of Resources) :					
CSE 811	Advanced Algorithm Engineering	3.00		3.00	
CSE 812	Advanced Algorithm Engineering (Sessional)		3.00	1.50	
Or					
CSE 813	Computational Geometry	3.00		3.00	
CSE 814	Computational Geometry (Sessional)		3.00	1.50	
Or					
CSE 819	VLSI Design	3.00		3.00	
CSE 820	VLSI Design (Sessional)		3.00	1.50	
Artificial Intelligence group One subject from the following groups (depending on availability of Resources):					
CSE 815	Machine Learning	3.00		3.00	
CSE 816	Machine Learning (Sessional)		3.00	1.50	
Or					
CSE 817	Pattern Recognition	3.00		3.00	
CSE 818	Pattern Recognition (Sessional)		3.00	1.50	
	Total	**9.00**	**12.00**	**15.00**	

Summary

Semester	Hours/Week		Credit	Pre-requisite
	Theory	Sessional		
Semester-1	13.00	15.00	20.50	
Semester-2	16.00	8.00	20.00	
Semester-3	15.00	12.00	21.00	
Semester-4	16.00	9.00	20.50	
Semester-5	17.00	9.00	21.50	
Semester-6	15.00	12.00	21.00	
Semester-7	16.00	12.00	22.00	
Semester-8	9.00	12.00	15.00	
Total	**117.00**	**89.00**	**161.50**	

Departmental subjects	:	105.00	credits
Science and other subjects	:	56.50	credits
Total	:	161.50	credits

CHAPTER 3
DETAIL OUTLINE OF UNDERGRADUATE COURSES OFFERED BY THE DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

SEMESTER-I

CSE 101 Introduction to Computer Systems
1 hour in a week, 1.00 Credit

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; Basic architecture of a computer; Basic Information Technology; The Internet; Number system: binary, octal, hexadecimal, binary arithmetic; Basic programming concepts; Program development stages: flow charts; Programming constructs: data types, operators, expressions, statements, control statements, functions, array.

CSE 102 Introduction to Computer systems (Sessional)
3 hours in a week, 1.50 Credit

Laboratory works based on CSE 101

EEE 105 Introduction to Electrical Engineering
2 hours in a week, 2.00 Credit

Fundamental electrical concepts and measuring units. Direct current: voltage, current, resistance and power. Laws of electrical circuits and methods of network analysis; Introduction to magnetic circuits. Alternating current: instantaneous and r.m.s. current, voltage and power, average power for various combinations of R,L and C circuits, phasor representation of sinusoidal quantities.

EEE 106 Introduction to Electrical Engineering (Sessional)
3 hours in a week, 1.50 Credit

Laboratory works based on EEE 105.

ME 100 Mechanical Engineering Drawing- 1
3 hours in a week, 1.50 Credit

Introduction; Instruments and their uses; First and third angle projections; Orthographic drawings; Isometric views; Missing lines and views; Sectional views and conventional practices; Auxiliary views.

ME 101 Basic Mechanical Engineering
2 hours in a week, 2.00 Credit

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.

ME 102 Basic Mechanical Engineering (Sessional)
3 hours in a week, 1.50 Credit

Study of workshop hand tools; Safety tools equipment used in a workshop; Different parts of a Lathe, Bench Drilling Machine, Milling Machine, Surface Grinding Machine.

MATH 101 Differential Calculus and Co-ordinateGeometry
3 hours in a week, 3.00 Credit

Differential Calculus: Limits, continuity and differentiability; Successive differentiation of various types of functions; Leibniz's Theorem; Rolle's Theorem; Mean value Theorem in finite and infinite forms; Lagrange's form of remainders; Cauchy's form of remainder; Expansion of functions; Evaluation of indesemesterinate forms by L' Hospital's : ule; Partial differentiation; Euler's Theorem; Tangent and Normal, Sub tangent and subnormal in Cartesian and polar co-ordinates; Maximum and minimum values of functions of single variable; Points of inflexion; Curvature, radius of curvature, center of curvature; Asymptotes, curve tracing.

Co-ordinate Geometry : Transformation of co-ordinates axes and its uses: Equation of conics and its reduction to standard forms; Pair of straight lines; Homogeneous equations of second degree: Angle between a pair of straight lines; Pair of lines joining the origin to the point of intersection of two given curves, circles; System of circles; Orthogonal circles; Radical axis, radical center, properties of radical axes; Coaxial circles and limiting points; Equations of parabola; ellipse and hyperbola in Cartesian and polar co-ordinates; Tangents and normals, pair of tangents; Chord of contact; Chord in Semester of its middle points; Pole and polar parametric co-ordinates; Diameters; conjugate diameters and their properties; Director circles and asymptotes.

PHY 101 Physics
(Heat and Thermodynamics, Structure of Matter, Waves and Oscillations, and Physical Optics)
3 hours in a week, 3.00 Credit

Heat and Thermodynamics : Principle of temperature measurements: platinum resistance thermometer, thermo-electric thermometer, pyrometer; Kinetic theory of gases: Maxwell's distribution of molecular speeds, mean free path, equipartition of energy, Brownian motion, Van der Waal's Equation of state, review of the First Law of thermodynamics and its application, reversible and irreversible processes, Second Law of thermodynamics, Carnot cycle; Efficiency of heat engines, Carnot's Theorem, entropy and disorder, thermodynamic functions, Maxwell relations, Clausius-Clapeyron Equation, Gibbs Phase Rule, Third Law of thermodynamics.

Structure of Matter : Crystalline and non-crystalline solids, single crystal and polycrystalline solids, unit cell, crystal systems, co-ordinations number, crystal planes and directions, sodium chloride and CsCl structure, packing factor, Miller indices, relation between inter-planar spacing and Miller indices, Bragg's Law, methods of desemesterination of inter-planar spacing from diffraction patterns; Defects in solids: point defects, line defects; Bonds in solids, inter-atomic distances, calculation of cohesive and bonding energy; Introduction to band theory: distinction between metal, semiconductor and insulator.

Waves and Oscillations : Differential equation of a simple harmonic oscillator, total energy and average energy, combination of simple harmonic oscillations, Lissajous figures, spring-mass system, calculation of time period of torsional pendulum, damped oscillation, desemesterination of damping co-efficient, forced oscillation, resonance, two-body oscillations, Reduced mass, differential equation of a progressive wave, power and intensity of wave motion, stationary wave, group velocity and phase velocity, architectural acoustics, reverberation and Sabine's formula.

Physical Optics : Theories of light; Interference of light, Young's double slit experiment; Displacements of fringes and its uses; Fresnel Bi-prism, interference at wedge shaped films, Newton's rings, interferometers; Diffraction of light: Fresnel and Fraunhoffer diffraction, diffraction by single slit, diffraction from a circular aperture, resolving power of optical instruments, diffraction at double slit & N-slits-diffraction grating; Polarization: production and analysis of polarized light, Brewster's law, Malus law, Polarization by double refraction, retardation plates, Nicol prism, optical activity, polarimeters, Polaroid.

PHY 102 Physics (Sessional)
3 hours in a week, 1.50 Credit

Laboratory works based on PHY 101.

SS -101
Social Studies
2 hours in a week, 2.00 Credit

Anthropological background of Bangladesh& evolution of Bangla literature, archaeological heritage of Bangladesh, history & culture of Bangladesh, social structure of Bangladesh, Bangladesh profile.

SEMESTER-II

CSE 201 Structured Programming Language
3 hours in a week, 3.00 Credit

Structured programming language: data types, operators, expressions, control structures; Functions and program structure: 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 language: C

CSE 202 Structured Programming Language (Sessional)
3 hours in a week. 1.50 Credit

Laboratory works based on CSE 201.

CSE 203 Discrete Mathematics
3 hours in a week, 3.00 Credit

Set theory; Relations; Functions; Graph theory; Propositional calculus and predicate calculus; Mathematical reasoning: induction, contradiction and recursion; counting; Principles of inclusion and exclusion; Recurrence relations; Algebraic structures: rings and groups.

MATH 201 Integral Calculus, Ordinary and Partial Differential Equations, and Series Solutions
3 hours in a week, 3.00 Credit

Integral Calculus: Definitions of integration; Integration by the method of substitutions; Integration by parts; Standard integrals; Integration by the method of successive reduction; Definite integrals and its properties and use in summing series; Walli's formula, Improper integrals, Beta function and Gamma function; Area under a plane curve in Cartesian and polar co-ordinates; Area of the region enclosed by two curves in Cartesian and polar co-ordinates; Trapezoidal rule, Simpson's rule. Arc lengths of curves in Cartesian and polar co-ordinates, parametic and pedal equations; Intrinsic equation; Volume of solids of revolution; Volume of hollow solids of revolution by shell method. Area of surface of revolution; Jacobian, multiple integrals and their application.

Ordinary Differential Equation (ODE): Degree and order of ordinary differential equations; Formation of differential equations; Solution of first order differential equations by various methods; Solution of first order but higher degree ordinary differential equations; Solution of General linear equations of second and higher orders with constant coefficients; Solution of homogeneous linear - equations and its applications; Solution of differential equations of higher order when dependent and independent variables are absent; Solution of differential equation by the method based on factorization of operators.

Partial DifferentialEquations (PDE): Four rules for solving simultaneous equations of the form $\frac{dx}{P} = \frac{dy}{Q} = \frac{dz}{R}$
Lagrange's method of solving PDE of order one; Integral surfaces passing through a given curve; Nonlinear PDE of order one (complete, particular, singular and general integrals): standard forms $f(p,q) = 0$, $z = px + qy + f(p,q)$, $f(p,q.z)$

= 0, $f_1(x,p) = f_2(v,$ q); Charpit's method; Second order PDE: its nomenclature and classifications to canonical (standard)- parabolic, elliptic, hyperbolic; Solution by separation of variables. Linear PDE with constant coefficients.

Series Solution: Solution of differential equations in series by the method of Frobenius; Bessel's functions, Legendre's polynomials and their properties.

CHEM 201 Chemistry
3 hours in a week, 3.00 Credit

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 monocomponent system; Properties of dilute solutions; Thermochemistry, chemical kinetics, chemical equilibria; Ionization of water and pH concept; Electrical properties of Solution.

CHEM 202 Chemistry(Sessional)
3 hours in a week, 1.50 Credit

Laboratory works based on CHEM 201.

ENG 201 English Language
2 hours in a week, 2.00 Credit

English phonetics: the places and manners of articulation of the English sounds; Vocabulary; English grammar: construction of sentences, some grammatical problems; Comprehension; Paragraph writing; Precis writing; Amplification; Report writing; Business communication and tenders; Short stories written by some well-known classic writers.

ENG 202 Communication in English (Practice)
2 hours in a week, 1.00 Credit

Grammar: Tense, article, preposition, subject-verb agreement, clause, conditional and sentence structure.

Vocabulary building: Correct and precise diction, affixes,. level of appropriateness. Colloquial and standard. informal and formal.

Developing reading skill: Strategies of reading - skimming. scanning, predicting. inferring; analyzing and interpreting variety of texts; practicing comprehension from literary and nonliterary texts.

Developing writing skill: Sentences, sentence variety, generating sentences; clarity and correctness of sentences, linking sentences to form paragraphs, writing paragraphs, essays, reports, formal and informal letters.

Listening skill and note taking: Listening to recorded texts and class lectures and learning to take useful notes based on listening,

Developing speaking skill.: Oral skills including communicative expressions for personal identification, life at home, giving advice and opinion, instruction and directions, requests, complaints, apologies, describing people and places, narrating events.

SS 201 Government and Public Administration
2 hours in a week, 2 Credit

Constitution of Bangladesh, fundamental rights as enunciated in Bangladesh constitution, forms of government of Bangladesh, organs of government : a) legislative assembly: composition, powers and functions, b) judiciary-composition, powers and functions, c) executive public administration, role of government, good governance, accountability and transparency of the public servant, local government, human resource management and planning.

SEMESTER -III

CSE 301 Object Oriented Programming Language
3 hours in a week, 3.00 Credit

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; Inheritance: single and multiple inheritance; Polymorphism: overloading, abstract classes, virtual functions and overriding; Exceptions: Object Oriented I/O; Template functions and classes; Multi-threaded Programming. Reference languages: C++ and Java.

CSE 302 Object Oriented Programming Language (Sessional)
3 hours in a week, 1.50 Credit

Laboratory works based on CSE 301.

CSE 303 Data Structures
3 hours in a week, 3.00 Credit

Internal data representation; Abstract data types; Elementary data structures: arrays, lists, stacks, queues, trees, graphs; Advanced data Structures: heaps, Fibonacci heaps, B-trees; Recursion, sorting, searching, hashing, storage management.

CSE 304 Data Structures (Sessional)
3 hours in a week, 1.50 Credit

Laboratory works based on CSE 303.

CSE 305 Digital Logic Design
3 hours in a week, 3 Credit

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 demultiplexers; Combinational circuit design; Flip-flops, race around problems; Counters: asynchronous counters, synchronous counters and their applications; PLA design; Synchronous and asynchronous logic design; State diagram, Mealy and Moore machines; State minimizations and assignments; Pulse mode logic; Fundamental mode design.

CSE 306 Digital Logic Design (Sessional)
3 hours in a week, 1.50 Credit

Laboratory works based on CSE 305.

EEE 309 Electronic Devices and Circuits
3 hours in a week, 3.00 Credit

Introduction to semiconductors, p-type and n-type semiconductors; p-n junction diode characteristics; Diode applications: half and full wave rectifiers, clipping and clamping circuits, regulated power supply using zener diode.
Bipolar Junction Transistor (BJT): principle of operation, I-V characteristics; Transistor circuit configurations (CE, CB, CC), BJT biasing, load lines; BJTs at low frequencies; Hybrid model, -h parameters, simplified hybrid model; 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 NMOS and PMOS; biasing of FETs; Low and high frequency models of FETs, Switching circuits using FETs; Introduction to CMOS.
Operational Amplifiers (OPAMP): linear applications of OPAMPs, gain, input and output impedances, active filters, frequency response and noise.
Introduction to feedback, Oscillators, Silicon Controlled Rectifiers (SCR), TRIAC, DIAC and UJT: characteristics and applications; Introduction to IC fabrication processes.

EEE 310 Electronic Devices and Circuits (Sessional)
3 hours in a week, 1.50 Credit

Laboratory works based on EEE 309.

MATH 301 Complex Variable and Statistics
3 hours in a week, 3.00 Credit

Complex Variable: Complex number system; General functions of a complex variable; Limits and continuity of a function of complex variable and related theorems; Complex differentiation and the Cauchy-Riemann Equations; Mapping by elementary functions; Line integral of a complex function; Cauchy's Integral Theorem; Cauchy's Integral Formula; Liouville's Theorem; Taylor's Theorem and Laurent's Theorem. Singular points; Residue; Cauchy's Residue Theorem. Evaluation of residues; Contour integration; Conformal mapping.

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, Poisson and negative binomial); Characteristics of distributions; Elementary sampling theory; Estimation; Hypothesis testing and regression analysis.

SEMESTER -IV

CSE 401 Algorithms
3 hours in a week, 3 Credit

Techniques for analysis of algorithms; Methods for the design of efficient algorithms: divide and conquer. greedy method, 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: Algebraic simplification and transformations; Lower bound theory; NP-completeness, NP-hard and NP-complete problems.

CSE 402 Algorithms (Sessional)
3 hours in a week, 1.50 Credit

Laboratory work based on CSE 401.

CSE 403 Digital Electronics and Pulse Techniques
3 hours in a week, 3 Credit

Diode logic gates, transistor switches, transistor gates, MOS gates; Logic Families: TTL, ECL, IlL and CMOS logic with operation details Propagation delay, product and noise immunity; Open collector and high impedance gates; Electronic circuits for flip-flops, counters and register, memory systems, PLAs; A/D and D/A converters with applications; S/H circuits, LED, LCD and optically coupled oscillators; Non-linear applications of OP AMPs; Analog switches. Linear wave shaping: diode wave shaping techniques, clipping and clamping circuits. comparator circuits, switching circuits; Pulse transformers, pulse transmission, pulse generation; monostable, bistable and astabletnultivibrators, Schmitt trigger, blocking oscillators and time-base circuit; Timing circuits; Simple voltage sweeps, linear current sweeps.

CSE, 404 Digital Electronics and Pulse Techniques(Sessiona)
3 hours in a week, 1.50 Credit

Laboratory works based on CSE 403.

CSE: 405 Theory of Computation
2 hours in a week, 2 Credit

Language theory; Finite automata: desemesterinistic finite automata, nondesemesterinistic (finite automata, equivalence and conversion of desemesterinistic and nondesemesterinistic. finite automata, pushdown automata; Context free languages; Context free grammars; Turing Machines: basic machines, configuration, computing with Turing machines, combining Turing machines; Undesirability.

EEE 407 Electrical Drives and Instrumentation
3 hours in a week, 3.00 Credit

Introduction to three phase circuits, alternators and transformers; Principles of operation of DC, synchronous, induction, universal, and 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 to microprocessor based systems: Transducers: semesterinology, types, principles and application of photovoltaic, piezoelectric, thermoelectric, variablereactance and opto-electronic transducers; Noise reduction in instrumentation.

FEE 408 Electrical Drives and Instrumentation(Sessional)
3 hours in a week, 1.50 Credit

Laboratory works based on EEE 407.

MATH 401 Matrices, Vectors, Fourier Analysis, and Laplace Transforms
3 hours in a week, 3.00 Credit

Matrices: Definition of matrix; Different types of matrices; Algebra of matrices; Adjoint and inverse of a matrix; Elementary transformations of matrices; Matrix polynomials; Calay-Hamilton theory with uses of rank and nullity; Normal and canonical forms; Solution of linear equations; Eigenvalues and eigenvectors.

Vector Spaces: Definition and properties, subspaces, basis and dimension, change of basis; Linear Transformation (LT): definition and properties, linear operator matrix, geometry of LT, standard plane LT.

Vector Algebra: 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.

Vector Calculus: 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.

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.

Laplace Transforms: Definition; Laplace transforms of some elementary functions; Sufficient conditions for existence of Laplace transforms; Inverse Laplace transforms; Laplace transforms of derivatives. The unit step function; Periodic function; Some special theorems on Laplace transforms; Partial fraction; Solutions of differential equations by Laplace transforms; Evaluation of improper integrals.

SS 401 Managerial Economics
2 hours in a week, 2.00 Credit

Micro and macro economics, market economy, GDP, GNP, NNP with reference to Bangladesh, globalization, world trade organization and Bangladesh economy, sustainable development, disaster management in Bangladesh, gender: concept and issues.

SEMESTER-V

CSE 501 Database Management System
3 hours in a week, 3.00 Credit

Concepts of database systems; Models: Entity-Relationship model, Relational model; Relational algebra; SQL; Integrity constraint; Relational database design; File organization and retrieval, file indexing; Transaction. manager; Concurrency controller; Recovery manager; Security system; Database administration; Advanced database management systems: distributed, multimedia, objectoriented, object-relational; Some applications using SQL.

CSE 502 Database Management System(Sessional)
3 hours in a week, 1.50 Credit

Laboratory works based on CSE 501.

CSE 503 Computer Architecture

3 hours in a week, 3.00 Credit

Information representation; Measuring performance; Instructions and data access methods: operations and operands of computer hardware, representing. instruction, addressing styles; Arithmetic Logic Unit (ALU) operations, floating point operations, designing ALU; Processor design: datapaths - single cycle and multicycle implementations; Control Unit design - hardwared and microprogrammed; Hazards; Exceptions; Pipeline: pipelined datapath and control, superscalar and dynamic pipelining; Memory organization: cache, virtual memory,channels; DMA and Interrupts: Buses; Multiprocessors: types of multiprocessors, performance, single bus multiprocessors, multiprocessors connected by network, clusters.

CSE 505 Microprocessors and Microcontrollers
3 hours in a week, 3.00 Credit

Introduction to 8-bit, 16-bit, and 32-bit microprocessors: architecture, addressing modes, instruction set, interrupts, multi-tasking and virtual memory; Memory interface; Bus interface; Arithmetic co-processor; Microcontrollers; Integrating microprocessor with interfacing chips.

CSE 506 Microprocessors mid Microcontrollers (Sessional)
3 hours in a week, 1.50 Credit

Laboratory works based on CSE 505.

CSE 507 Operating System
3 hours in a week, 3.00 Credit

Operating System: its role in computer systems; Operating system concepts; Operating system structure; Process: process model and implementation, Inter-Process Communication (1PC), classical IPC problems, process scheduling, multiprocessing and time-sharing; Memory management: swapping, paging, segmentation, virtual memory; Input/Output: hardware, software, disk, semesterinals, clocks; Deadlock: resource allocation and deadlock, deadlock detection, prevention and recovery; File Systems: files, directories, security, protection; Case study of some operating systems.

CSE 508 Operating System (Sessional)
3 hours in a week, 1.50 Credit

Laboratory works based on CSE 507.

CSE 509 Communication-I
3 hours in a week, 3.00 Credit

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

SS 501 Project Planning and Management
2 hours in a week, 2.00 Credit

Definition of project, program, project objectives, why project management, Function of project management; Importance & objectives of project planning; Project organization structure, Matrix organizational design, project conflict resolution and project negotiation; benefit of project planning; project life cycle; project identification, project evaluation (social, technical and financial);
Project Implementation: Pricing and cost estimation, project scheduling, CPM, PERT, project management inforation system, project monitoring, evaluation and control; project semesterination: semesterinating the project, project audit, project final report; Case study.

SEMESTER -VI

CSE 601 Mathematical Analysis for Computer Science

3 hours in a week, 3.00 Credit

Recurrent problems; Manipulation of sums; Number theory; Special numbers; Generating functions.Random variables; Stochastic process; Markov chains: discrete parameter, continuous parameter, birth-death process; Queuing models: birth-death model, Markovian model, open and closed queuing network; Application of queuing models.

CSE 603 Compiler
3 hours in a week, 3.00 Credit

Introduction to compiling; Basic issues; Lexical analysis; Syntax analysis; Syntax-directed translation; Semantic analysis: type-checking; Run-time environments; Insemesterediate code generation; Code generation; Code optimization.

CSE 604 Compiler (Sessional)
3 hours in a week, 1.50 Credit

Laboratory works based on CSE 603 and project works using some lexical analyzer and parser designing tools.

CSE 605 Software Engineering and Information System Design
3 hours in a week, 3.00 Credit

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

Analysis Concepts and principles: requirement analysis, Analysis modeling, data modeling.
Design concepts and principles, Architectural design, User Interface design, Object Oriented software development and design: Iterative Development and the Unified Process. Sequential waterfall life cycles, Inception. Use case model for requirement writing, Elaboration using System Sequence Diagram, Domain Model. Visualizing concept classes. UML diagrams, Interaction and Collaboration Diagram for designing Software. Designing Objects with responsibilities. GRASP patterns with General Principles in assigning responsibilities: Information expert, Creator, Low Coupling and High Cohesion, Creating design class diagrams and mapping design to codes. Advanced GRASP patterns: Polymorphism, Pure Fabrication, Indirection, Project Variation. GoF Design Patterns: Adapter, Factory, Singleton, Strategy, Composite, Facade, and Observer. Software Testing: White Box and Black Box testing. Basis Path Testing. Testing for specialized environment. Software testing strategies: Unit Testing, Integration Testing, Validation Testing, System Testing, Art of debugging. Analysis of System Maintenance and upgrading: Software repair, downtime, error and faults, specification and correction, Maintenance cost models, documentation. Software Quality Assurance, Quality factors. Software quality measures. Cost Impact of Software defects. Concepts of Software reliability, availability and safety. Function based metrics and bang metrics. Metrics for analysis and design model. Metrics for sourer code, testing and maintenance.

CSE 607 Numerical Methods
3 hours in a week, 3 Credit

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: Numerical differentiation and integration; 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 trigonornetric functions.

CSE 608 Numerical Methods (Sessional)
3 hours in a week, 1.50 Credit

Laboratory works based on CSE 607

CSE 609 Computer Networks
3 hours in a week, 3.00 Credit

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; Congestion control; 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; Network security: Cryptography, DES, IDEA, public key algorithm; Authentication; Digital signatures; Gigabit Ethernet; Domain Name System: Name servers; Email and its privacy; SNMP; HTTP; World Wide Web.

CSE 610 Computer Networks (Sessional)
3 hours in a week, 1.50 Credit

Laboratory works based on CSE 609.

CSE 612 Software Developments
3 hours in a week, 1.50 Credit

Semester project of making software on some practical problems with sound software engineering practices.

SEMESTER -VII

CSE 700 Project and Thesis
6 hours in a week, 3.00 Credit

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

CSE 701 Artificial Intelligence
3 hours in a week, 3.00 Credit

Introduction to old and new Al techniques; Knowledge representation; Propositional and first order logic, inference in first order logic; Frame problem; Search techniques in Al; Game playing; Planning; Probabilistic reasoning; Learning in symbolic and non-symbolic representation; Natural language processing. Introduction to expert system.

CSE 702 Artificial Intelligence (Sessional)
3 hours in alternate week, 1.50 Credit

Laboratory works based on CSE 701.

CSE 703 Peripheral and Interfacing
3 hours in a week, 3.00 Credit

Designing I/O system; I/O devices; Designing Microprocessor based system with interfacing chips; Programmable peripheral interface (interface to AID and D/A converter); Keyboard/display interface; Programmable timer; Programmable interrupt controller, DMA controller;Design using MSI and LSI components; 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 special purpose controllers.

CSE 704 Peripheral and Interfacing (Sessional)
3 hours in a week, 1.50 Credit

Laboratory works based on CSE 703.

IPE 701 Industrial Management
2 hours in a week, 2.00 Credit

Introduction, evolution, management function, organization and environment.

Organization: Theory and structure; Coordination; Span of control; Authority delegation; Groups; Committee and task

force; Manpower planning.

Personnel Management: Scope; Importance; Need hierarchy; Motivation; Job redesign; Leadership; Participative management; Training; Performance appraisal; Wages and incentives; Informal groups; Organizational change and conflict.

Cost and Financial Management: Elements of costs of products depreciation; Break-even analysis; Investment analysis; Benefit cost analysis.

Management Accounting: Cost planning and control; Budget and budgetary control; Development planning process.

Marketing Management: Concepts; Strategy; Sales promotion; Patent laws.

Technology Management: Management of innovation and changes; Technology life cycle: Case studies.

SS 703 Sociology and Industrial Law
2 hours in a week, 2.00 Credit

Sociological perspective: definition, nature, scope and importance of sociology; Sociology and scientific approach: methods of social research, stages of social research; Primary concepts of sociology: society, community, association, institution, group; Social evolution: stages in the evolution of human civilization; Culture: definition, characteristics, culture contents (material and non-material), cultural lag, culture and civilization: Industrial revolution: the growth of capitalism, features and social consequences, socialism; Social organization: family, forms and functions of family, functions of family in modern industrial society, marriage, forms of marriage, functions of marriage; Social stratification: main types of social stratification - slavery-caste and social class and status, social stratification and social mobility; Social control: religion and morality, custom and public opinion, taboo-law, state and education; Social change: changeevolution-progress-development, factors in social change; Society and population: human migration, population and resources; Some current social problems: crime, deviance, juvenile delinquency, youth unrest; Technology and society: effects of technological factors on social life.
Principles of law of contracts; Company law: law regarding formation, incorporation, management and winding up of companies; Labor law: law in relation to wages hours, health, safety and other condition to work; The trade union legislation arbitration, the policy of the state in relation to labor; The Factory Act (1965); The Law of compensation (1965).

SS 705 Financial Management & Accounting
3 hours in a week, 3.00 Credit

Budgetary system (Revenue), Budgetary System (ADP), Drawing and disbursing activities, financial powers, public procurement rules/act, store management, accounting, auditing system : a) audit procedure, objection, reply and settlement, b) performance and accounts audit.

CSE 705 Simulation and Modeling
3 hours in a week, 3.00 Credit

Simulation modeling basics: systems, models and simulation; Classification *of* simulation models; Steps in a simulation study; Concepts in discrete-event simulation: event-scheduling vs. process interaction approaches, time-advance mechanism, organization of a discrete-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 for comparing real-world observations and simulated outputs, input modeling; Generating random numbers and random variates; Output analysis.
Simulation languages; Analysis and modeling *of* some practical systems.

OR

CSE 707 Basic Graph Theory
3 hours in a week, 3.00 Credit

Graphs: simple graphs, digraphs, subgraphs, vertex-degrees, walks, paths and cycles; Trees, spanning trees in graphs,

distance in graphs; Complementary graphs, cut-vertices, bridges and blocks, k-connected graphs; Euler tours, Hamiltonian cycles, Chinese Postman Problem, Traveling Salesman Problem; Chromatic number, chromatic polynomials, chromatic index, Vizing's theorem, planar graphs, perfect graphs.

OR

CSE 709 Fault Tolerant Systems
3 hours in a week, 3.00 Credit

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

OR

CSE 711 Digital Image Processing
3 hours in a week, 3.00 Credit

Introduction; Digitization of images and its properties; Data structures for image analysis; Image processing; Segmentation: detection of discontinuities, edge linking and boundary detection, thresholding, region oriented segmentation, use of motion in segmentation; Image transforms: Z-transform, 2D Fourier transform, discrete cosine transform, Hadamard transform, Walsh transform, Slant transform; Image compression: run-length coding, transform coding, standards.

OR

CSE 713 Basic Multimedia Theory
3 hours in a week, 3.00 Credit

Multimedia systems - introduction; Coding and compression standards; Architecture issues in 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 a multimedia document; Networking issues in multimedia - Quality-of-service guarantees, resource reservation, traffic specification, shaping; and monitoring, admission control; Multicasting issues; Session directories; Protocols for controlling sessions: Security issues in multimedia - digital wasemesterarking, partial encryption schemes for video streams; Multimedia applications - audio and video conferencing, video on demand, voice over IP.

SEMESTER -VII1

CSE 800 Project and Thesis
6 hours in a week, 3.00 Credit

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

CSE 801 Computer Graphics
3 hours in a week, 3.00 Credit

Graphics hardware: display devices, input devices etc; Basic raster graphics algorithms for drawing 2D primitives; Two-dimensional and three-dimensional viewing, clipping and transformations; Threedimensional object representations: polygon surface, B-Splinc curves and surfaces, BSP trees, Octrees, Fractal-Geometry methods; Visible surface detection methods: Z-buffer method, BSP tree method, Ray casting method; Illumination models; Surface rendering methods: polygon rendering, ray tracing, terrain visualization with height mapping, modeling surface details with texture mapping; Color models; Computer animation.

CSE 802 Computer Graphics (Sessional)
3 hours in alternate week, 1.50 Credit

Laboratory works based on CSE 801.

CSE 803Introduction to Distributed Computing
3 hours in aweek, 3.00 Credit

Introduction to Parallel and Distributed Systems: Architecture, Challenges, principle and paradigm, Middleware: Introduction to Erlang, Communication: Synchronous and asynchronous communication abstraction and model, message passing and shared memory. Replication & Consistency: Control replication, data replication, consistency model and protocols. Distributed Shared Memory: Design issue, Implementation issue, consistency issue, Shared Memory model, MPI, LINDA, ORCA, case study: Trademark, JACKAL, Distributed Objects: Introduction, remote objects, CORBA, Distributed Shared object, Globe. Synchronization & Coordination: Distributed algorithms, time and clocks, Local state, Global State, consistency protocols, coordination elections, distributed transactions management. Fault Tolerance: Failure model, Faults, Process Resilience, reliable communication, Recovery, Checkpoints and checkpoint algorithms, Rollback recovery algorithms, Security: Threats and attacks, policy and mechanism, Design issue, design of cryptographic algorithms, cryptographic protocols, Key distribution, authentication, secure communication, auditing. Naming: Basic concept, Naming Services, DNS, Attribute based naming, X.500 and LDAP, Distributed File Systems: Client perspective, Server perspective, NFS, Coda, Google File System (GFS), Parallel Programming: parallel computing, parallel programming structure, Planet Lab, Grid: Grid model, Grid Middleware, Globus toolkit, Planet Lab Overview.

CSE 807 Communication II
3 hours in a week, 3.00 Credit

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

CSE 808Communication II(Sessional)
3 hours in alternate week, 1.50Credit

Laboratory works based on CSE 807.

CSE 809 Wireless& Mobile Communication
3 hours in a week, 3.00 Credit

Cellular concepts: frequency reuse, handoff strategies, interference and system capacity, grade of service, improving capacity and coverage, call blocking probability; Propagation effects: outdoor propagation models, indoor propagation models, power control, Doppler's effect, small and large scale fades; Wireless LAN Technology; IEEE 802.11: standard, protocol architecture, physical layer and media access control; Mobile IP; Wireless Application Protocol; IEEE 802.16 Broadband Wireless Access; Brief review of 2^{d} and $3^{`d}$ generation wireless: GSM, GPRS, CDMA; Cordless system; Wireless local loop; Bluetooth: overview and base band specifications.

CSE 810 Wireless & Mobile Communication(Sessional)
3 hours in aweek, 1.50 Credit

Laboratory works based on CSE 809.

CSE 811 Advanced Algorithm Engineering
3 hours in a week, 3.00 Credit

Computational complexity, Parameterized complexity, Algorithms for combinatorial optimization, practical computing and heuristics, Approximation algorithms, LP based approximation algorithms, randomized algorithms, Experimental algorithmic, Algorithms in state of-the-art fields like Bioinformatics, Grid Computing, VLSI design etc.

CS1; 812Advanced Algorithm Engineering (Sessional)
3 hours in a week, 1.50 Credit

Laboratory works based on CSE 811.

CSE 813 Computational Geometry

3 hours in a week, 3.00 Credit

Algorithm and complexity of fundamental geometric objects: polygon triangulations and art gallery theorem, polygon partitioning, convex hulls in 2-dimension.
Proximity: Voronoi diagrams and Delaunary triangulations. .
Graph Drawing: drawing styles and applications, drawing of rooted trees, straight line drawing of planar graphs.

CSE 814 Computational Geometry (Sessional)
3 hours in a week, 1.50 Credit

Laboratory works based on CSE 813.

CSE 815 Machine Learning
3 hours in a week, 3.00 Credit

Introduction to machine learning; Learning algorithms: supervised, unsupervised, reinforcement, attribute based, neural network based, relational supervised and negative correlation; Genetic algorithm,
genetic programming and evolutionary programming; Practical application of machine learning.

CSE 816 Machine Learning (Sessional)
3 hours in a week, 1.50 Credit

Laboratory works based on CSE 815.

CSE 817 Pattern Recognition
3 hours in a week, 3.00 Credit

Pattern Recognition: introduction, importance; Statistical and Neural Pattern Recognition: Bayesian classifier, Bayes decision theory, discriminant functions and decision surfaces; Bayesian classifier for normal distributions: Linear classifiers: discriminant functions and decision hyperplanes, Perceptron algorithm and its variants, Kessler's
construction; Nonlinear classifiers: two and. three layer perceptions, backpropagation algorithm and its variants; Template matching: optimal path searching techniques, dynamic programming methods, correlation based matching and 2D log search algorithm for image matching; Context dependent classification: Viterbi algorithm, channel equalization, observable and hidden Markov models, three problems of HMM and their application in speech recognition; Syntactic Pattern Recognition: introduction to Syntactic Pattern Recognition, grammar based approach, parsing, graph-based approach; Unsupervised classification: basic concepts of clustering, proximity measures, categories of clustering algorithms, sequential clustering algorithms.

CSE 818 Pattern Recognition (Sessional)
3 hours in a week, 1.50 Credit

Introduction to MATLAB; Laboratory works based on CSE 817 and using MATLAB: Bayesian classifier, linear classifier, nonlinear classifier, image matching, speech recognition, context dependent classification.

CSE 819 VLSI Design
3 hours in a week, 3.00 Credit

VLSI design methodology: top-down design approach, technology trends and design automation algorithms; Introduction to CMOS inverters and basic gates; Brief overview of CMOS fabrication process: layout and design rules; Basic CMOS circuit characteristics and performance estimation; Buffer circuit design; Complex CMOS gates, CMOS building blocks: adder, multiplier; data path and memory structures.
Hardware modeling: hardware modeling languages, logic networks, state diagrams, data-flow and sequencing graphs, behavioral . optimization.
Architectural Synthesis: circuit specification, strategies for architectural optimization, data-path synthesis, control unit synthesis and synthesis of pipelined circuits.
ASIC design using FPGA and PLDs.

CSE 820 VLSI Design (Sessional)
3 hours in a week, 1.50 Credit

Laboratory works based on CSE 819.