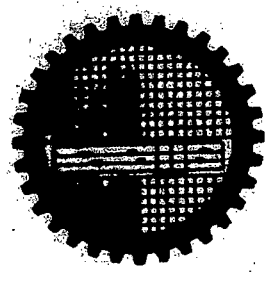
Department of Computer Science and Engineering

CALENDAR

July,1994



Bangladesh University of Engineering and Technology

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Published by:

Department of Computer Science & Engineering
Bangladesh University of Engineering & Technology
Dhaka-1000, Bangladesh

Editorial Committee :

Printed by:

World University Services Press,
University Press Building, Dhaka University, Dhaka-1000.

PREFACE

The department of Computer Science & Engineering founded in 1985 and housed in EME building of BUET, offers B.Sc. Engg., M.Sc. Engg./M. Engg. degree in CSE and is also prepared to offer Ph.D. program. Our objective is to provide our students with the highest quality education, one that will provide the technical foundation and leadership skills that will carry them through a lifetime career in Computer Science & Computer Engineering. Our faculty members and the courses they teach provide a broadly based education that covers fundamentals and advanced subjects in the discipline. In addition, our program offers exposure to fundamentals of electrical engg., mathematics, physical sciences and the humanities.

We believe that, in the future, all science and engineering students will have to be computationally proficient, not just computer literate. Similarly, our own students will need a better understanding of the challenges of science and engineering and the effective use of computers in providing solutions.

Teaching is a responsibility taken seriously by our faculty, both at the graduate and undergraduate levels. Research is also important, both for its impact on teaching and for its importance to the country. With the introduction of the new course system at the undergraduate level, students will have the opportunity to work closely with the faculty members, both in the laboratories and classroom, and go on to become outstanding contributors in their own right after graduation.

The departmental as well as non-departmental courses together with details of courses offered to undergraduate and postgraduate students are presented here. The up-to-date rules and regulations of the course system have been incorporated in full in this calendar for information of students, teachers and advisers.

Dhaka
July 1994

Dr. A. B. M. Siddique Hossain
Professor and Head

CONTENTS

THE CAMPUS

CENTRAL LIBRARY

The four storied central library building with a floor space of 19,775 sft is close to the academic building. The library with built-in-facilities provides various services to students, teachers and researchers and performs administrative and technical functions. It is primarily a reference and research library for the use of staff and students of the university and visiting scholars. The administration of the library system is centralized under the University Librarian.

All acquisitions and cataloguing activities are carried out in the library which maintains an accession register, a catalogue of holdings and a shelf list. The holdings of the library as of June, 1988 is : books 95,354, current periodicals 1181 and back volumes 12,307.

COMPUTER CENTER

The Computer Center plays an important role in teaching and research of different faculties. It also provides useful services in data processing as required in various sectors of national development. The Computer Center has two main frame computers IBM 370 Model 115 H02 system and an IBM 4331 K02 system. In addition microcomputers with hard disk and plotting facilities are also available. The on-line peripherals are eight 3340 DASD devices each having a capacity of seventy megabytes, three magnetic tape units, one diskette 1/0 unit and two line printers. Interactive facilities are available through four VDU terminal in addition to a matrix printer connected to the 370/115 and ten VDU terminal connected to the 4331.

WORKSHOP FACILITIES

To provide engineering and workshop services as backup facilities to research (instrumentation, equipment maintenance, construction of rigs for experimentation) the University is well equipped with quite a few workshops. These workshops are administered and managed under a separate Directorate of Advisory, Extension and Research Services.

The workshops also function as teaching workshops to impart practical knowledge in workshop technology, metal cutting technology and on job training to the first Level students in

general and to the second, third and fourth Level students of Mechanical Engineering who undertake sessional work on Machine Tools and Production Engineering. Machine Shop, Foundry and Pattern Shop, Sheet Metal and Welding Shop, Carpentry Shop and Automobile Shop are teaching cum-service workshops. The Central Instrument Workshop provides services in repair and maintenance of equipments of engineering and science departments. This workshop also provides photocopying services and other reproduction facilities for academic and official purposes.

DIRECTORATE OF STUDENTS WELFARE

The Directorate of Students Welfare is responsible for the various activities related to the physical, psychological, social and general welfare of the students. These include arrangement of supervision for halls of residence, programs for physical education, games and sport, supervision of programs for extra-curricular activities of students through the Central Students Union and the students unions of the various halls of residence. It is also responsible for providing health services through the guidance programs, to assist in employment of students and to organize and maintain contact with the alumni of the University. The Central Students Union, which is elected by the students, oversees the socio-cultural activities of the students. It assists incoming students and protects the interests of all students.

HALLS OF RESIDENCE

The University has eight halls of residence, one of which is for female students. The total capacity of these halls is around 2,800 including 390 female students. The halls are named after the national heroes, educationists, poets and eminent personalities of the country.

The existing capacity accommodates around 80% of the total number of students of the University. Non-residential students are to be attached to a hall of residence, so that the administrative control of students are hall-based.

All of the eight halls are set in gardens and lush green lawns and are within easy walking distances of the University, shopping centers and on bus routes to the city and suburbs. Rooms depending on sizes are shared by 3 to 4 students. Every hall has common-room/television lounge, library, dining hall and

prayer room. Other facilities such as room laundry service and barber shop are also available.

HEALTH SERVICE

A students health center provides primary and basic health care facilities to students, both residential and non-residential, free of charge. A hospital and an out-patient dispensary are maintained for the students. The center is staffed with six full-time general practitioners who also attend residential student-patients on call. For specialized consulted diseases, the center refers the patients to specialist-consultants. The University bears all hospital expenses, in case a student needs hospitalization.

ATHLETIC CLUB

The athletic club of the University provides excellent facilities to students for physical fitness indispensable for a healthy mind and body. The University maintains a beautiful playground, a squash court, tennis lawns, cricket-pitch volley ball and basketball courts. A well-equipped modern gymnasium provides ample facilities for all types of physical activities to a large number of students at a time. The athletic club arranges a colorful athletic competition every year in the form of annual sports meet.

For improvement of the standard of games and sports, regular coaching by experts are arranged. The University arranges inter-hall football, hockey, basketball, tennis, swimming competitions and inter-faculty cricket competitions. It also participates in inter-University and national competitions in which the University Teams and participants have won medals on different occasions. Inter-hall indoor game competitions are held and sometimes teachers-student friendly games are also arranged.

AUDITORIUM COMPLEX

The University has its own Auditorium Complex with modern facilities which houses one auditorium with a seating capacity of 1000. Within this complex, a canteen caters to students and teachers. There is also a seminar hall, with a seating capacity of 250 capable of accommodating conferences and seminars. Besides this auditorium complex, a 200 capacity seminar room is located on the first floor of the Civil Engineering Building.

STUDENT UNION

The members of the Central Student Union, known as the EUCSU, are elected by the students of the University. EUCSU arranges all central extra-curricular activities. There are other student union in the halls of residence. These unions are responsible for arranging various activities of halls.

COMPUTER SCIENCE & ENGINEERING DEPARTMENT

The department of Computer Science & Engineering offers a program under the faculty of Electrical & Electronic Engineering leading to the degree of B.Sc Engg., M.Sc Engg. and PhD in Computer Science & Engineering. The program is designed to satisfy the growing demand of computer professionals throughout the country. It gives the student the opportunity to obtain a broad knowledge of Computer Science & Computer Engineering and some freedom to tailor the program according to the student's individual needs. Moreover, there are sufficient number of Mathematics, Electrical Engineering, and other basic Science & Liberal Arts courses.

LIST OF TEACHING STAFF AND THEIR RESEARCH INTERESTS

Professors :

Dr. A.B.M. Siddique Hossain (Head of the department)
Electronics, Data communication

Dr. Md. Shamsul Alam
Computer Networks, Computer System Performance Analysis

Assistant Professors :

Dr. M. Kaykobad
Theoretical Computer Science, Theory of Computational Complexity, Design & Analysis of Algorithms

Md. Abdus Sattar
Expert Systems, Algorithms

Nazmul Haque
Systems Programming, Compiler Construction

Abu Syed Md. Latiful Haque
System Analysis & Design, Database Design, Computer Networks

Lecturers :

Md. Enamul Hamid
Computer Architecture, Artificial Neural Networks, Digital System Design, Design for Testability

Sanaul Haque
Logic Design, Computer Arithmetic

A.S.M Moinul Ahsan
VLSI Design, Parallel Processing

N.S.M. Jamil Sarwar
Data Communication, Computer Networks, VLSI Design

Ahmad Fuad Rezaur Rahman
Computer Vision, Image Processing, Pattern Recognition

Tanjima Rahman
Operating System, Digital Electronics

Sandeepan Sanyal
Artificial Intelligence, Fuzzy Logic, Computer Communication

Mohammad Ohiuddin Mahbub
Computer Communication, Operatng System

Latifur Rahman Khan
Algorithms, Computer Networks, Compiler Theory

Tuhin Mahmud
Computer Communication, VLSI Design

Mohammad Manzur Murshed
AI & Expert System, 3-dimensional Computer Graphics

Kazi Iffat Hoque
VLSI Design, Parallel Processing

Md. Badrul Munir Sarwar
Operating System, Computer Architecture

Faisal Ahmed
Data Structure & Algorithms, Computer Graphics

TRAINING, RESEARCH & CONSULTANCY ACTIVITIES

Training:

The department has conducted a number of computer training programs for different organizations and individuals. The courses covered so far are DOS, Wordperfect, Lotus 123, dBase IV, Harvard Graphics, Turbo C and Assembly language. With the mushroom like growth of computer training centers in Dhaka, where the quality of teaching is questionable, the computer science & engineering department is eager to play a vital role in producing quality computer professionals who can make positive contribution in the development of this country.

Research :

The research work taken by the teachers and students of this department in the last few years is diversified in nature. It includes the research on image processing and pattern recognition, database management system and information management system, expert system design, networking, computer aided teaching etc. The research works are not of academic interest only rather a special attention is given to improve the socio-economic condition of Bangladesh by implementing the results. For example, in the image processing and pattern recognition field signature analysis to be used in bank, a system for recognition of printed Bangla characters has been developed. Research on developing a technique for economic coding and transmitting of Bangla text, development of Bangla Spell Checker is under progress. In the area of database management system for library operation, hospital information system, system for resource planning and production control of industry, relation database for loan accounting for financial organization has been developed. Further research has been carried out on relational database for hospital and office management. In the arena of expert system, an expert system for assisting the decision of load-shedding in the national power grid and another expert system to forecast weather has been developed. In the networking field, performance study and implementation of different networking protocols have been completed. A study of setting of fiber optic network in Dhaka city has also been completed. In the computer aided teaching (CAT) a system for teaching mathematics to students has been developed. In the microprocessor based system design field design of time division switching of voice channel and electronic switching system for small exchange is under progress. A number of other microprocessor based control system have been developed.

Consultancy :

The department offers several consultancy services to different government and private organizations for their computerization. The consultancy services include feasibility study (both technical and financial), machine & peripheral specification preparation and supervision of their proper installation, system analysis, software development, course-curriculum development etc.

THE LABORATORY FACILITIES

(a) PC Lab : The PC Lab is equipped with three networks running under Novell Netware v3.11, SCO-XENIX, and Apple-network. The LAN system has currently 25 workstations connected to it which can be expanded to 50 workstations. The SCO-XENIX network has in total 8 terminals. The Apple network has in total 17 Mac-plus and Mac-SE II computers with two printers connected to it.

Moreover, there are around 30 stand-alone PCs running under MS-DOS operating system. The Teacher's PC lab has additional 6 486/DX machines to do their necessary research works. The PC lab also includes the peripherals like two flat-bed handscanners, one 48" 8-pen plotter, one heavy duty printer, one high resolution digital camera.

(b) Digital Hardware Lab : There is a rich digital hardware lab equipped with modern tools to design digital circuits. It has a vast number of ICs in stock, starting from simple 74 series chips upto different types of microprocessors and their peripheral chips. The lab has an excellent facility to work with 8085 based microprocessors. 8086 & 68000 microprocessor based training kit is under procurement.

THE LIBRARY FACILITIES

A small rich library has been established in the department. It has currently 700 books and lot of journals in the library. The library is being enriched day by day. Computer books can also be found at the central library, computer center library and Electrical Engineering Faculty library.

In addition to that there is a small computer software library. It consists of original software and manuals.

THE COURSE SYSTEM

Introduction

The Undergraduate curricula at Bangladesh University of Engineering & Technology is based on the course system from the academic session 1990-91. The rules and regulations of the new system was duly published by the Registrar's Office in a booklet entitled "Report of the committee for framing recommendations for implementation and administration of course system" which is revised and approved in the meeting of the Academic Council. This information booklet depicts only the relevant sections of the aforesaid report to give the students a vivid understanding about the course system.

Basics of the Course System

The salient features of the course system are :

1) Reduction of the number of theoretical courses and examination papers around five in each term,

2) The absence of a pass or fail on an annual basis,

3) Continuous evaluation of student's performance,

4) Introduction of Letter Grades and Grade Points instead of numerical grades,

5) Introduction of some additional optional courses and thus enable students to select courses according to his interest as far as possible,

6) Opportunity for students to choose fewer or more courses than the normal course load depending on his/her capabilities and needs,

7) The flexibility to allow the student to progress at his own pace depending on his ability or convenience, subject to the regulations on credit and minimum grade point average (GPA) requirements, and

8) Promotion of teacher-student contact.

In the curriculum for the undergraduate programs, besides the professional courses pertaining to each discipline, there is a

strong emphasis on acquiring a thorough knowledge in the basic sciences of Mathematics, Physics and Chemistry. Due importance is also given for the study of several subjects in Humanities and Social Sciences, which is expected to help the student to interact more positively with the society in which he/she lives. Thus the course contents of the undergraduate programs provide a harmonious blend of both basic sciences and their applications as well as their social relevance.

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

The newly introduced course system is expected to reduce the work load which now accumulates at the end of the semesters demanding extended/long preparatory leave due to the presence of decisive final examination. The proposed system will create a continuous, even and consistent work load throughout the term for the students.

Student Admission

Students will be admitted in undergraduate curricula in the Departments of Architecture, Chemical Engineering, Civil Engineering, Computer Science & Engineering, Electrical & Electronic Engineering, Mechanical Engineering, Metallurgical Engineering, and Naval Architecture & Marine Engineering as per existing rules of the university. The Registrar's office will continue to serve as Admissions Office and will deal with course registration in addition to student admission.

Number of Terms in a Year

There will be two terms (Term I and Term II) in an academic year. In addition to these two regular Terms there may be a short Term in the intervening period between end of Term II and commencement of Term I. During this short term students, those who need, may take additional courses either to make up deficiencies in Credit and GPA requirements or to fulfill the credit requirements for bachelor's degree spending less time than the normal duration; and other students may take vacation.

Duration of Terms

The Duration of each Term I and Term II will be 18 weeks which will be used as follows :

Classes	14 weeks
Recess before Term Final Examination	2 weeks
Term Final Examination	2 weeks
	Total = 18 weeks

The duration of a Short Term will be around 8 weeks of which about 7 weeks will be spent for class lectures and one week for Term Final Examination.

Course Pattern and Credit Structure

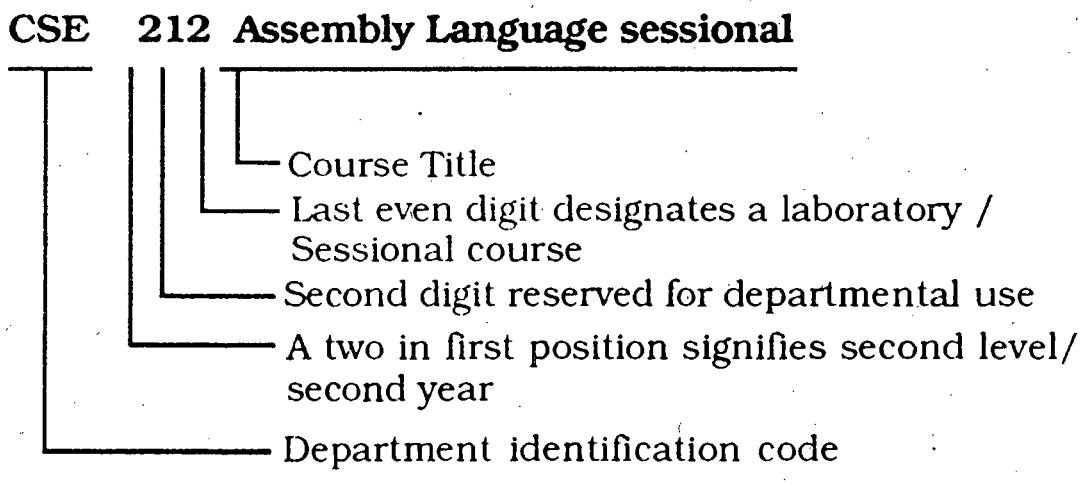
The entire undergraduate program is covered through a set of theoretical and laboratory/sessional/Studio courses.

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) 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.

The course designation system is illustrated by an example.



Assignment of Credits

(i) Theoretical Courses:
One lecture per week per term will be equivalent to one credit

(ii) Laboratory/Sessional Courses:
Credits for laboratory/sessional courses will be half of the class hours per week per term.

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.

Types of Courses

The courses included in the undergraduate curricula are divided into several groups as follows:

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 program. A student has to complete all of the designated core courses for his/her discipline.

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 terms.

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.

Course Offering and Instruction

The courses to be offered in a particular term will be announced and published in the Course Catalog along with a tentative Term Schedule(Annexure 2) before the end of the previous term. Whether a course is to be offered in any term will be decided by

the respective Board of Undergraduate studies (BUGS). Respective departments may arrange to offer one or more pre-requisite or core courses in any term depending on the number of students who dropped or failed the course in the previous term.

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 adviser all academic matters, especially those related to courses taken and classes being attended by him. Students are also encouraged to meet with other teacher any time for help and guidance in academic matters.

Student Adviser

One adviser will normally be appointed for a group of student by the BUGS of the concerned department who will advise each student about the courses to be taken by a student. In each term the adviser will discuss with the student his academic program and help him number and the nature of courses for which he can register. However, it is the student's responsibility to keep contacts with his/her adviser who will review and eventually approve the students specific plan of study and check on subsequent progress. The adviser should be in the rank of an Assistant Professor or above from the concerned department(s).

For a student of second and subsequent terms, the number and nature of courses for which he can register will be decided on the basis of his academic performance during the previous term(s). The adviser will advise the student to register for the courses during the next term within the framework of the guidelines in respect of minimum/ maximum credit hour limits, etc. which are discussed late. He may also permit a student to drop one or more courses based on his academic performanc and the corresponding categorization. Special provision exist for academically weak students with regard to make-up courses.

Registration Requirements

Any student who makes use of class room or laboratory facilities or faculty time is required to register formally. Being admitted to the university, each student is assigned to student adviser. The student can register for courses he intends to take during a given term only on the basis of the advise and consent of his/her adviser.

Course Registration Procedure

Students must register for each class in which they will participate. Each student will have to fill up a course Registration Form in consultation with and under the guidance of his adviser. The original copy of the course registration form will be submitted to the Registrar's Office for distribution to the concerned Adviser, Head, Dean and Controller of Examination and the student. The date , time and venue of registration will be announced in advance by the registrar's office. Much counselling and advising are accomplished at the registration time. It is absolutely necessary that all students be present for registration at the specified time.

Late registration is permitted during the first week on payment of a late registration fee. Students having outstanding dues to the university or a hall of residence shall not be permitted to register. All students must clear their dues and obtain a clearance or no dues certificate, on the production of which, they will be given necessary course registration forms. These registration forms will normally be available in the registrar's office.

However, for the first year students prior department-wise enrollment/admission is mandatory. An orientation program will be conducted for them at the beginning of the first term when they will be handed over the registration package after producing enrollment slip/proof of admission.

Limits on the Credit Hours to be Taken

A student must be enrolled for at least 15 credits hours. He/she may be allowed to enroll in up to maximum of 24 credit hours if recommended by his/her adviser. A student must enroll for the prescribed laboratory/sessional courses in the respective term within the allowed credit-hour limits.

Pre-condition for Registration

A student will be allowed to register in those courses subject to the class capacity constraints and satisfaction of pre-requisite courses. If a student fails in pre-requisite course in any term, the concern BUGS may allow him to register for a course which builds on the pre-requisite course provided his attendance and grades in continuous assessment in the said pre-requisite course is found to be satisfactory.

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 term. He/She may add courses only within the first two weeks of a regular term and only during the first week of Short Term. In case of dropping a course, a student will be allowed to do so within four weeks after the commencement of a regular term and two weeks after commencement of a short term. Adjustment of initially registered courses in any term can be done by duly completing the **Course Adjustment Form** (Annexure 4). 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 time of orientation. Any student willing to add or drop courses will have to fill up a Course Adjustment Form in consultation with and under the guidance of his adviser. The original copy of the Course Adjustment 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 to the Concerned Adviser, Head, Dean, Controller of Examination and the student.

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 and signed by the concerned persons. To **add/drop** a course respective teacher's consent will be required.

Withdrawal from a Term

If student is unable to sit for a Term 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 Term within a week after the end of the Term Final Examination. The application must be supported by a medical certificate from the Chief Medical Officer of the university. The Academic Council will take the final decision about such applications.

The 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 term 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 sessionals would be done through evaluation of a number of projects assigned throughout the term. As discussed earlier, each course has a certain number of credits which describe its weightage. 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 measured by the number of credits that he/she has completed satisfactorily and the weighted average of the grade points that he/she has maintained. A minimum grade point average is required to be maintained for satisfactory progress. Also a minimum number of earned credits should be acquired in order to qualify for the degree, as prescribed under article 22.

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)	4.0
75% to less than 80%	A	(A regular)	3.75
70% to less than 75%	A-	(A minus)	3.5
65% to less than 70%	B+	(B plus)	3.25
60% to less than 65%	B	(B regular)	3.0
55% to less than 60%	B-	(B minus)	2.75
50% to less than 55%	C+	(C plus)	2.5
45% to less than 50%	C	(C regular)	2.25
40% to less than 45%	D		2.0
less than 40%	F		0.0
Continuation (for project & thesis/design courses)	X		

Note: All C grades awarded to students of First Year classes during the last academic year (1990-91) will be considered and recorded as C grades with a grade point of 2.25 and D grades will be considered and recorded to have a grade point of 2.00.

Distribution of Marks

Thirty percent (30%) of marks shall be alloted for continuous assessment i.e., quizzes and homework assignments, in-class evaluation and class participation. The remainder of the marks will be alloted to TERM FINAL examination which will be conducted centrally by the University. There will be internal and

external examiners for each course in the Term Final Examination of 3 hour 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

For 2 credit courses 3 best out of 5, for 3 credit courses 4 best out of 6, and for 4 credit courses 5 best out of 7 quizzes may be considered for awarding grade. These may be considered as the minimum recommended number of quizzes for any course. If the number of quizzes administered in a course exceeds these suggested minimum numbers, then two-thirds best of all quizzes may be considered. The scheme of continuous assessment that a teacher proposes to follow for a course will be announced on the first day of classes.

Earned Credits

The course in which a student has obtained 'D' or higher grade will be counted as credit 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 a 'F' grade in any Core Course in any term he/she will have to repeat the course.

If a student obtains a '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 calculations but will stay permanently on the Grade Sheet and Transcript. When a student will repeat a course in which he/she previously obtained a 'F' grade, he/she will not be eligible to get a grade better than 'D' in such course.

If a student obtains a grade other than 'F' in a course, he/she will not be allowed to repeat the course for the purpose of grade improvement.

Honors

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

Dean's List

As a recognition of excellent performance, the names of students obtaining an average GPA of 3.75 or above in two regular terms in each academic year may be published in Dean's list in each faculty. Students receiving a 'F' grade in any of the courses will not be considered for Dean's list for that year.

Student's Classification

To definitely classify the undergraduate students a system is to be devised. At BUET regular students are classified according to the number of credit hours earned towards a degree. The following classification applies to the student :

Year/Level	Earned Credit Hours
First (Freshman)	0 to 36
Second (Sophomore)	37 to 72
Third (Junior)	73 to 108
Fourth (Senior)	109 and above

Registration for the second and Subsequent Terms

A student is normally required to earn at least 15 credits in a term. At the end of each term, the students will be classified into the following three categories :

Category 1 — consisting of students who have passed all the courses prescribed for the term and have no backlog of courses. A student belonging to category 1 will be eligible to register for all courses prescribed for the next term.

Category 2 — consisting of students who have earned at least 15 credits in the term but do not belong to category 1. A student belonging to category 2 is advised to take at least one course less in the next term subject to the condition that he has to register for such backlog courses as may be prescribed by the adviser.

Category 3 — Consisting of students who have failed to earn 15 credits in the term. A student belonging to this category is advised to take at least two courses less subject to registration for a minimum of 15 credits. However he will be required to register for such backlog courses as may be prescribed by the adviser.

Performance Evaluation

The performance of a student will be evaluated in terms of two indices, viz. term grade point average, and cumulative grade point average, which is the grade point average of all terms. The term grade point average is computed dividing the total grade points earned in a term by the number of term hours taken in that term. 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 has earned 275 grade points in attempting 100 credit hours of courses would have an overall grade point average of 2.75.

Students will be considered to be making normal progress towards a degree if their cumulative GPA for all work attempted is 2.20 or more. Students who regularly maintain term GPA of 2.20 or better are considered to be making good progress towards their degree 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 exists :

i) Term GPA falls below 2.20 or
ii) Cumulative GPA fall below 2.20
iii) Earned credits fall below 15 times the Number of Terms attended/studied

All such students can make up deficiencies in GPA and credit requirements by completing courses in next term(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.

SUMMARY OF UNDERGRADUATE COURSES

LEVEL-I TERM-I

Course No.	Subject	Hours/Week Theory-Sessional	Prerequisite
ME 165	Basic Mechanical Engg.	3-0	
ME 166	Basic Mechanical Engg. sessional	0-3	
CHEM 101	Chemistry	3-0	
CHEM 114	Inorganic quantitative analysis	0-3	
MATH 141	Mathematics-I (Differenti-calculus & Co-ordinate geometry)	3-0al	
HUM 101	English	3-0	
CSE 101	Programming Language-I	3-0	
CSE 102	Programming Language-I Sessional	0-3	
	Total:	15-9	Cr. 19.5
	Total contact hour=24		

LEVEL-I TERM-II

EEE 163	Basic Electrical Engg.	4-0	
EEE 164	Basic Electrical Engg. Sessional	0-3	
MATH 143	Mathematics-II (Integral calculus & Ordinary Differential equations)	3-0	MATH 141
PHY 109	Physics (Heat & thermodynamics, Structure of matter, Waves & Oscillations and Physical optics)	4-0	
PHY 102	Physics Sessional	0-3	
CSE 103	Discrete Mathematics	3-0	
CSE 105	Programming Language-II	3-0	CSE 101
CSE 106	Programming Language-II Sessional	0-3	
	Total:	17-9	Cr. 21.5

Total contact hour=26

LEVEL-I I TERM-I

EEE 263	Electronic Devices and Circuits	3-0	EEE 163
EEE 264	Electronic Devices and Circuits Sessional	0-3	
MATH 241	Mathematics-III (Complex variable, Laplace transforms and Statistics)	4-0	MATH 143
ME 160	Mechanical Engg. Drawing-I	0-3	
CSE 201	Numerical Methods	3-0	
CSE 203	Data Structures	3-0	CSE 101
CSE 204	Data Structures Sessional	0-3/2	
CSE 205	Digital Logic Design	3-0	
CSE 206	Digital Logic Design Sessional	0-3	
	Total:	16-10.5	Cr. 21.25

Total contact hour=26.5

LEVEL-I I TERM-II

HUM 103	Economics	3-0	
EEE 269	Electrical drives and Instrumentation	3-0	EEE 163
EEE 270	Electrical drives and Instrumentation Sessional	0-3	
MATH 243	Mathematics-IV (Matrices, Vectors and Fourier analy-sis)	3-0	MATH 143
CSE 207	Algorithms	3-0	CSE 105 CSE 203
CSE 208	Algorithms Sessional	0-3/2	
CSE 209	Digital Electronics and Pulse Techniques	3-0	EEE 263
CSE 210	Digital Electronics and Pulse Techniques Sessional	0-3	
CSE 212	Assembly Language Programming	0-3	

Total: 15-10.5 Cr. 20.25
Total contact hour=25.5

LEVEL-III TERM-I

CSE 301	Mathematical Analysis for Computer Science	3-0	MATH 241
CSE 303	Database	3-0	CSE 203 CSE 207
CSE 304	Database Sessional	0-3	
CSE 305	Computer Architecture-I	3-0	CSE 205
CSE 307	Microprocessors	3-0	CSE 205
CSE 308	Microprocessors Sessional	0-3	
CSE 309	Digital System Design	4-0	CSE 205
CSE 310	Digital System Design Sessional	0-3	

Total: 16-9 Cr. 20.5
Total contact hour=25

LEVEL-III TERM-II

CSE 311	Data communication	3-0	EEE 263
CSE 313	Operating System	3-0	CSE 305
CSE 314	Operating System Sessional	0-3/2	
CSE 315	Computer Interfacing	3-0	CSE 205 CSE 307 CSE 305
CSE 316	Computer Interfacing Sessional	0-3	
CSE 318	Software Development	0-3	CSE 203 CSE 207
CSE 319	Information System Design	3-0	CSE 303
CSE 320	Information System Design Sessional	0-3/2	
CSE....	Option-I	3-0	
CSE....	Option-I Sessional	0-3/2	

Total: 15-10.5 Cr. 20.25
Total contact hours=25.5

LEVEL-I V TERM-I

IPE 493	Industrial Management	3-0	
CSE 400	Project & Thesis	0-6	
CSE 401	Computer Networks	3-0	CSE 311
CSE 402	Computer Networks Sessional	0-3/2	
CSE 403	Computer Graphics	3-0	MATH 243
CSE 404	Computer Graphics Sessional	0-3/2	
CSE 405	Software Engineering	3-0	CSE 303
CSE....	Option-II	3-0	
CSE....	Option-II Sessional	0-3/2	

Total: 15-10.5 Cr. 20.25
Total contact hours=25.5

LEVEL-I V TERM-II

HUM 313	Accounting	2-0	
CSE 400	Project and Thesis	0-6	
CSE 407	Artificial Intelligence	3-0	CSE 103 CSE 207
CSE 408	Artificial Intelligence Sessional	0-3	
CSE 409	Professionalism in computing	3-0	
CSE....	Option-III	3-0	
HUM....	Option-IV	2-0	
	Total:	13-9	Cr. 17.5

Total contact hours=22

OPTIONS AVAILABLE

		Hours/Week Theory-Sessional
	OPTION-I	
CSE 321	Fault Tolerant Systems	3-0
CSE 322	Fault Tolerant Systems Sessional	0-3/2
CSE 323	Compiler	3-0
CSE 324	Compiler Sessional	0-3/2
	OPTION-II	
CSE 411	Simulation and Modelling	3-0
CSE 412	Simulation and Modelling Sessional	0-3/2
CSE 413	Pattern Recognition	3-0
CSE 414	Pattern Recognition Sessional	0-3/2
	OPTION-III	
CSE 415	Computer Architecture-II	3-0
CSE 417	VLSI Design	3-0
CSE 419	Computer System Performance Evaluation	3-0

OPTION-IV

HUM 211	Sociology	2-0
HUM 213	Government	2-0
hum 411	Business Law	2-0

Total contact hours :

Theory:122
Sessional:78
Total :200

Total credits requirement for B.Sc. Engg. degree in CSE : 161

DETAILED UNDERGRADUATE COURSES

LEVEL-I TERM-I

CSE 101 PROGRAMMING LANGUAGES I
3 hours per week, 3 Cr.

Introduction to digital computers and programming algorithms and flow chart construction. Information representation in digital computers. Writing, debugging and running programs (including file handling) on various digital computer using PASCAL.

CSE 102 PROGRAMMING LANGUAGES I SESSIONAL
3 hours in each week, 1.5 Cr.

Laboratory works based on CSE 101

LEVEL-I TERM-II

CSE 103 DISCRETE MATHEMATICS
3 hours per week, 3 Cr.

Set theory, Elementary number theory, Graph theory, Paths and trees, Generating functions, Algebraic structures, Semigraph, Permutation groups, Binary relations, functions, Mathematical logics, Propositional calculus and predicate calculus.

CSE 105 PROGRAMMING LANGUAGES II
3 hours per week, 3 Cr.

Introduction to data structures. Formal specification of syntax. Elements of language theory : mathematical preliminaries. Formal languages. Structured programming concepts. Survey of features of existing major high level languages. Appropriate application using C, C++, BASIC, FORTRAN.
pre req. CSE 101)

CSE 106 PROGRAMMING LANGUAGES II SESSIONAL
3 hours in each week, 1.5 Cr.

Laboratory works based on CSE 105

LEVEL-I I TERM-I

CSE 201 NUMERICAL METHODS
3 hours per week, 3 Cr.

Computational methods for solving problems in linear algebra, linear programming, nonlinear equations, approximations, iterations, methods of least squares, interpolation, integration and ordinary differential equations.

CSE 203 DATA STRUCTURES
3 hours per week, 3 Cr.

Concepts and examples, elementary data objects, elementary data structures, arrays, lists, stacks, queues, graphs, trees. Memory management. Sorting and searching, hash techniques.
(pre req. CSE 101)

CSE 204 DATA STRUCTURES SESSIONAL
3 hours in alternate week, 0.75 Cr.

Laboratory works based on CSE 203

CSE 205 DIGITAL LOGIC DESIGN
3 hours per week, 3 Cr.

Number systems and codes. Digital logic : Boolean algebra, De-Morgan's law, 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. TTL, MOS, CMOS, IIL logic gates and their circuits. PLA design. Synchronous and asynchronous logic design: state diagram, Mealy and Moore machines. State minimizations and assignments. Pulse mode logic. Fundamental mode design.

CSE 206 DIGITAL LOGIC DESIGN SESSIONAL
3 hours in each week, 1.5 Cr.

Laboratory works based on CSE 205

LEVEL-I I TERM-II

CSE 207 ALGORITHMS
3 hours per week, 3 Cr.

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, graph algorithms, Algebraic simplification and transformations, lower bound theory, NP-hard and NP-complete problems.

(pre req. CSE 105, CSE 203)

CSE 208 ALGORITHMS SESSIONAL
3 hours in alternate week, 0.75 Cr.

Laboratory work based on CSE 207

CSE 209 DIGITAL ELECTRONICS AND PULSE TECHNIQUES
3 hours per week, 3 Cr.

Diode logic gates, transistor switches, transistor transistor gates, MOS gates, Logic Families: TTL, ECL, IIL 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, PLA's. A/D, D/A converters with applications. S/H circuits, LED, LCD and optically coupled oscillators. Non-linear applications of OP AMPs. Analogue 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 astable multivibrators; Schmitt trigger; blocking oscillators and time-base circuit. Timing circuits. Simple voltage sweeps, linear current sweeps.
(Pre req. EEE 263)

CSE 210 DIGITAL ELECTRONICS AND PULSE TECHNIQUES SESSIONAL
3 hours in each week, 1.5 Cr

Laboratory works based on CSE 209

CSE 212 ASSEMBLY LANGUAGE PROGRAMMING
3 hours in each week, 1.5 Cr.

Machine and Assembly instruction types and their formats. Character representation instructions. Instruction execution. Machine language programming . Instruction sets and their implementations. The Assembly process. Addressing methods. Subroutines, macros and files. I/O programming, interrupts and concurrent processes.

LEVEL-III TERM-I

CSE 301 MATHEMATICAL ANALYSIS FOR COMPUTER SCIENCE
3 hours per week, 3 Cr.

Probability distribution and expectations, Stochastic processes, Discrete time Markov chain and continuous time Markov chain. Birth-death process in queuing. Queuing models: M/M/1, M/M/C, M/G/1, M/D/1,G/M/1 solution of network of queues - closed queuing models and approximate models. Applications of queuing models in Computer Science and Engineering.
(Pre req. MATH 241)

CSE 303 DATABASE
3 hours per week, 3 Cr.

Concepts and methods in data base system. File organization and retrieval. Data manipulation. Query formulation and language.Database models.Data description languages, database integrity and security. Data dictionary/directory systems, database administration. Database design. Survey of some existing database management systems. Some applications using COBOL program.
(pre req. CSE 203, CSE 207)

CSE 304 DATABASE SESSIONAL
3 hours in each week, 1.5 Cr.

Laboratory works based on CSE 303

CSE 305 COMPUTER ARCHITECTURE - I
3 hours per week, 3 Cr.

Information representation and transfer; instruction and data access methods; the control unit: hardwired and microprogrammed;memory organization, I/O systems, channels, interrupts, DMA. Von Neumann SISD organization. RISC and CISC machines.

(pre req. CSE 205)

CSE 307 MICROPROCESSORS
3 hours per week, 3 Cr.

Introduction to different types of microprocessors. Microprocessor architecture, instruction set, interfacing, I/O operation, interrupt structure, DMA. Microprocessor interface ICs. Advanced microprocessor concept of microprocessor based system design.

(pre req. CSE 205)

CSE 308 MICROPROCESSORS SESSIONAL
3 hours in each week, 1.5 Cr.

Laboratory works based on CSE 307

CSE 309 DIGITAL SYSTEM DESIGN
4 hours per week, 4 Cr.

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 microprogrammed. Microprocessor based designs. Computer bus standards. Design usingspecial purpose controllers, floppy disk controller. Digitalcontrol system. Computers in telecommunica-tion and control.

(pre req. CSE 205)

CSE 310 DIGITAL SYSTEM DESIGN SESSIONAL
3 hours in each week, 1.5 Cr.

Laboratory works based on CSE 309

LEVEL-III TERM-II

CSE 311 DATA COMMUNICATION
3 hours per week, 3 Cr.

Introduction to modulation techniques : Pulse modulation; pulse amplitude modulation, pulse width modulation and pulse position modulation. Pulse code modulation; quantization, Delta modulation. TDM, FDM, OOK, FSK, PSK, QPSK; Representation of noise; threshold effects in PCM and FM. Probability of error for pulse systems, concept of channel coding and capacity. Asynchronous and synchronous communications. Hardware interfaces, multiplexers, concentrators and buffers. Communica-tion medium, Fiber optics.

(Pre req. EEE 263)

CSE 313 OPERATING SYSTEMS
3 hours per week, 3 Cr.

Principles of operating systems; design objectives; sequential processes; concurrent processes, concurrency, functional mutual exclusion, processor cooperation and deadlocks, processor management. Control and scheduling of large information processing systems. Resource allocation, dispatching, processor access methods, job control languages. Memory management, memory addressing, paging and store multiplexing. Multiprocessing and time sharing, batch processing. Scheduling algorithms, file systems, protection and security; design and implementation methodology, performance evaluation and case studies.

(pre req. CSE 305)

CSE 314 OPERATING SYSTEMS SESSIONAL
3 hours in alternate week, 0.75 Cr.

Laboratory works based on CSE 313

CSE 315 COMPUTER INTERFACING
3 hours per week, 3 Cr.

Interface components and their characteristics, microprocessor I/O. Disk, Drums and Printers. Optical displays and sensors. High power interface devices, transducers, stepper motors and peripheral devices.

(pre req. CSE 205, CSE 305, CSE 307)

CSE 316 COMPUTER INTERFACING SESSIONAL
3 hours in each week, 1.5 Cr.

Laboratory works based on CSE 315

CSE 318 SOFTWARE DEVELOPMENT
3 hours in each week, 1.5 Cr.

Students will work in groups or individually to produce high quality software in different languages. Students will write structured programs and use proper documentation. Advanced programming techniques in Assembly language.
(pre req. CSE 203, CSE 207)

CSE 319 INFORMATION SYSTEM DESIGN
3 hours per week, 3 Cr.

Information, general concepts of formal information systems, analysis of information requirements for modern organizations, modern data processing technology and its application, information systems structures, designing information outputs, classifying and coding data, physical storage media considerations, logical data organization, systems analysis, general systems design, detail systems design. Project management and documentation. Group development of an information system project. Includes all phases of software life cycles from requirement analysis to the completion of a fully implemented system.
(Pre req. CSE 303)

CSE 320 INFORMATION SYSTEM DESIGN SESSIONAL
3 hours in alternate week, 0.75 Cr

Laboratory works based on CSE 319

LEVEL-I V TERM-I

CSE 400 PROJECT AND THESIS
6 hours in each week, 3 Cr.

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

CSE 401 COMPUTER NETWORKS
3 hours per week, 3 Cr.

Network architectures - layered architectures and ISO reference model: data link protocols, error control, HDLC, X.25, flow and congestion control, virtual terminal protocol, data security. Local area networks, satellite networks, packet radio networks. Introduction to ARPANET, SNA and DECNET. Topological design and queuing models for network and distributed computing systems.

(pre req. CSE 311)

CSE 402 COMPUTER NETWORKS SESSIONAL
3 hours in alternate week, 0.75 Cr

Laboratory works based on CSE 401

CSE 403 COMPUTER GRAPHICS
3 hours per week, 3 Cr.

Introduction to Graphical data processing. Fundamentals of interactive graphics programming. Architecture of display devices and connectivity to a computer. Implementation of graphics concepts of two-dimensional and three-dimensional viewing, clipping and transformations. Hidden line algorithms. Raster graphics concepts : Architecture, algorithms and other image synthesis methods. Design of interactive graphic conversations.

(Pre req. MATH 243)

CSE 404 COMPUTER GRAPHICS SESSIONAL
3 hours in alternate week, 0.75 Cr.

Laboratory works based on CSE 403

CSE 405 SOFTWARE ENGINEERING
3 hours per week, 3 Cr.

Concepts of software engineering : requirements definition, modularity, structured design, data specifications, functional specifications, verification, documentation, software maintenance. Software support tools. Software project organization, quality assurance, management and communication skills.

(pre req. CSE 303)

LEVEL-I V TERM-II

CSE 400 PROJECT AND THESIS
6 hours in each week, 3 Cr.

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

CSE 407 ARTIFICIAL INTELLIGENCE
3 hours per week, 3 Cr.

Survey of concepts in artificial intelligence. Knowledge representation, search and control techniques. AI machines and features of LISP and PROLOG languages. Problem representation; search, inference and learning in intelligent systems; systems for general problems solving, game playing, expert consultation, concept formation and natural languages processing: recognition, understanding, and translation. Some expert systems.

(Pre req. CSE 103, CSE 207)

CSE 408 ARTIFICIAL INTELLIGENCE SESSIONAL
3 hours in each week, 1.5 Cr.

Laboratory works based on CSE 407

CSE 409 PROFESSIONALISM IN COMPUTING
3 hours per week, 3 Cr.

Application of the digital computer to the analysis and synthesis of physical, social, cultural, economic, and environmental processes and systems. History of computing and effects of computers on society. Study of practical problems emphasizing research and investigation.

OPTIONS AVAILABLE

CSE 321 FAULT TOLERANT SYSTEMS
3 hours per week, 3 Cr.

Introduction to 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.
(Pre req. CSE 309)

CSE 322 FAULT TOLERANT SYSTEMS SESSIONAL
3 hours in alternate week, 0.75 Cr.

Laboratory works based on CSE 321

CSE 323 COMPILER
3 hours per week, 3 Cr.

The grammar of programming languages; lexical analyzers, parsers, code emitters and interpretations; code optimization; run time support; error management; translator writing systems. A small project.
(Pre req. CSE 103, CSE 203, CSE 212)

CSE 324 COMPILER SESSIONAL
3 hours in alternate week, 0.75 Cr

Laboratory works based on CSE 323

CSE 411 SIMULATION AND MODELING
3 hours per week, 3 Cr.

Simulation methods, model building, random number generator, statistical analysis of results, validation and verification techniques. Digital simulation of continuous systems. Simulation and analytical methods for analysis of computer systems and practical problems in business and practice. Introduction to the simulation packages.
(Pre req. CSE 301)

CSE 412 SIMULATION AND MODELING SESSIONAL
3 hours in alternate week, 0.75 Cr

Laboratory works based on CSE 411

CSE 413 PATTERN RECOGNITION
3 hours per week, 3 Cr.

Introduction to pattern recognition : features, classifications, learning. Statistical methods, structural methods and hybrid method. Applications to speech recognition, remote sensing and biomedical area. Learning algorithms. Syntactic approach :

Introduction to pattern grammars and languages. Parsing techniques. Pattern recognition in computer aided design.
(pre req. MATH 243)

CSE 414 PATTERN RECOGNITION SESSIONAL
3 hours in alternate week, 0.75 Cr.

Laboratory works based on CSE 413

CSE 415 COMPUTER ARCHITECTURE II
3 hours per week, 3 Cr.

Pipelined machines, interleaved memory system, caches. Hardware and architectural issues of parallel machines. Array processors, associative processors, multiprocessors, systolic processors, dataflow computers and interconnection networks. High level language concept of computer architecture.
(Pre req. CSE 305)

CSE 417 VLSI DESIGN
3 hours per week, 3 Cr.

Design and analysis techniques for VLSI circuits. Design of reliable VLSI circuits, noise considerations, design and operation of large fan out and fan in circuits, clocking methodologies, techniques for data path and data control design. Simulation techniques. Parallel processing, special purpose architectures in VLSI. VLSI layouts partitioning and placement routing and wiring in VLSI. Reliability aspects of VLSI design.
(Pre req. CSE 209)

CSE 419 COMPUTER SYSTEM PERFORMANCE EVALUATION
3 hours per week, 3 Cr.

Review of system analysis, approaches to system development, feasibility assessment, hardware and software acquisition. Procurement, workload characterization, the representation of measurement data, instrumentation: software monitors, hardware monitors, capacity planning, bottleneck detection, system and program tuning, simulation and analytical models and their application, case studies.
(Pre req. CSE 301, CSE 313)

UNDERGRADUATE COURSES FOR NON-DEPARTMENTAL STUDENTS

CSE 325 DIGITAL TECHNIQUES
3 hours per week, 3 Cr.

Number System and Codes: Number system-binary, decimal, Octal and Hexadecimal number systems and their representation, conversions, complementation, addition, subtraction, multiplication and division. BCD, alphanumeric, gray and excess-3 and parity codes.

Digital logic: Boolean algebra, De Morgan's laws, logic gates and their truth tables. Canonical forms, combinational logic circuits, Karnaugh Map. Logic Families: TTL, ECL, I^2L and CMOS; logic, brief description and principle of operation. Propagation delay, speed delay; product and noise-immunity. Arithmetic and data-handling logic circuits : Half adder, full adder, half subtractor, full subtractor, BCD to decimal decoders, BCD to seven segment decoder/drivers, encoders, multiplexers/ demultiplexers. Study and use of TTL Data Handbooks.

Combinational Circuit design. Flip-Flops. R-S Flip-Flop, clocked R-S Flip-Flop, simple D-type Flip-Flop, race problems. T Flip-Flops, J-K master-slave Flip-Flop, direct set and reset facilities. Counters-Asynchronous counters and applications. Registers-different types, shift registers, serial to parallel and parallel to serial, left shift, right shift and circular registers and their applications, D to A and A to D converters with applications. Different types of digital storage media.

CSE 326 DIGITAL TECHNIQUES SESSIONAL
3 hours in each week, 1.5 Cr.

Laboratory works based on CSE 325

CSE 421 MICROPROCESSORS AND DIGITAL COMPUTERS
3 hours per week, 3 Cr.

Introduction to different types of microprocessors (8 bits, 16 bits) Instruction sets. Hardware organization. Microprocessor interfacing. Introduction to available microprocessor peripheral IC's. Microprocessor applications.

Design of digital computer subsystems, flow of information and logical flow diagram in timing and control signals. System organization. Hardware structures. Design of the control unit of a digital computer. Introduction to microprogramming. Multi-programming, time-sharing and real time computer systems. Data and instructions. Data systems, addressing of operative memory. Machine instructions. Channel programs. Assembler program. Program execution. Interrupt systems. I/O systems. Interconnection of computers. Operating systems. Control program. File handler. Program structure Virtual memory.

CSE 422 MICROPROCESSORS AND DIGITAL COMPUTERS SESSIONAL
3 hours in each week, 1.5 Cr.

Laboratory works based on CSE 421

NON-DEPARTMENTAL UNDERGRADUATE COURSES FOR CSE STUDENTS

LEVEL-I TERM-I

ME 165 BASIC MECHANICAL ENGINEERING
3 hours per week, 3 Cr.

Source of energy: conventional and renewable. Study of steam generation units, introduction to steam turbine, internal combustion engines, gas turbine and automobile. Introduction to pumps blowers and compressors. Introduction to basic modes of heat transfer: steady state one dimensional conduction and convection. Introduction to refrigeration and air conditioning systems.

ME 166 BASIC MECHANICAL ENGINEERING SESSIONAL
3 hours in each week, 1.5 Cr.

Laboratory works based on ME 165

CHEM 101 CHEMISTRY
3 hours per week, 3 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

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

CHEM 114 INORGANIC QUANTITATIVE ANALYSIS (SESSIONAL)
3 hours in each week, 1.5 Cr.

Volummetric analysis: acid-base titration, oxidation-reduction titrations, determination of Fe, Cu, Ca volummetrically.

MATH 141 MATHEMATICS-I (DIFFERENTIAL CALCULUS & CO-ORDINATE GEOMETRY)
3 hours per week, 3 Cr.

Differential Calculus:
Limit, Continuity and differentiability, Successive differentiation of various types of function, Liebnitz's theorem. Rolle's theorem, Mean value theorem. Taylor's theorem in finite and infinite forms. Maclaurine's theorem in finite and infinite forms. Lagrange's form of remainders. Cauchy's form of remainder's. Expansion of functions. Evaluation of indeterminate forms by L'Hospitals rule. Partial differentiation. Euler's theorem. Tangent & Normal. Subtangent and subnormal in cartesian and polar co-ordinates. Determination of maximum and minimum values of functions and points of inflexion. Applications. Curvature. Radius of curvature. Center of curvature.

Co-ordinate Geometry:
Change of axes: Transformation of co-ordinates. Simplification of equations of curves.

Pair of straight lines: Conditions under which general equations of the second degree may represent a pair of straight lines. Homogeneous equations of second degree. Angle between the pair of lines. Pair of lines joining the origin to the point of intersection of two given curves.

System of circles: orthogonal circles. Radical axes. Radical center. properties of radical axes. coaxial circles and limiting points. equation of ellipse and hyperbola in cartesian and polar co-ordinates. Tangent and normal. Pair of tangent. Chord of contact. Chord in terms of its middle points, parametric co-ordinates. Diameters. Conjugate diameters and their properties. Director circles and asymptotes.

HUM 101 ENGLISH
3 hours per week, 3 Cr.

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

LEVEL-I TERM-II

EEE 163 BASIC ELECTRICAL ENGINEERING
4 hours per week, 4 Cr.

Fundamental electrical concepts and measuring units, D.C voltage, current, resistance and power. Laws of electrical circuits and methods of network analysis. Principles of D.C measuring apparatus, Law s of magnetic fields and methods of solving simple magnetic circuits.

Alternating current- instantaneous and r.m.s current, voltage and power, average power for various combinations of R,L and C circuits, Phasor representation of sinusoidal quantities.

EEE 164 BASIC ELECTRICAL ENGINEERING SESSIONAL
3 hours in each week, 1.5 Cr.

Laboratory works based on EEE 163

MATH 143 MATHEMATICS-II (INTEGRAL CALCULUS & ORDINARY DIFFERENTIAL EQUATIONS)
3 hours per week, 3 Cr.

Integral Calculus:
Definitions of integration. Integration by the method of substitution. Integration by parts. Standard integrals. Integration by the method of successive reduction. Definite integrals, 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, parametric and pedal equations. Intrinsic equation. Volumes of solids of revolution. Volume of hollow solids of revolutions by shell method. Area of surface of revolution.

Ordinary Differential Equations:
Degree and order of ordinary differential equation. Formation of differential equations. Solutions of first order differential equations by various methods. Solutions of general linear equations of second and higher order with constant co-efficients. Solution of homogeneous linear equations. Applications.

Solution of differential equations of the higher order when the dependent and independent variables are absent. Solution of differential equation by the method based on the factorization of the operators.

(Pre req. MATH 141)

PHY 109 PHYSICS (HEAT & THERMODYNAMICS, STRUCTURE OF MATTER, WAVES & OSCILLATIONS AND PHYSICAL OPTICS)
4 hours per week, 4 Cr.

Heat & Thermodynamics: Temperature and zeroth law of thermodynamics. Thermometers: constant volume, platinum resistance, thermocouple. First law of thermodynamics and its application, molar specific heats of gases, isothermal and adiabatic relations, work done by a gas. Kinetic theory of gases: explanation of gas laws, kinetic interpretation of temperature, equipartition of energy and calculation of ratio of specific heats, mean free path, Vander Waals equation of state, second law of thermodynamics: reversible and irreversible processes, Carnot cycle, efficiency, Carnot's theorem, entropy.

Structure of Matter: States of matter: solid, liquid and gas. Classification of solids: amorphous, crystalline, ceramics & polymers. Atomic arrangement in solids. Different types of bonds in solid: metallic, Vander Waals, covalent and ionic bond, packing in solids, interatomic distances and forces of equilibrium, x-ray diffraction, Bragg's law. Plasticity and elasticity. Distinction between metal, insulator and semi-conductor.

Waves & Oscillations: Oscillations: Simple harmonic motion, damped simple harmonic oscillations, forced oscillations, resonance vibrations of membranes & columns. Combination & composition of simple harmonic motions, Lissajous' figures. Transverse and longitudinal nature of waves, travelling & standing waves, intensity of wave, energy calculation of progressive & stationary waves, phase velocity, group velocity.

Sound waves: velocity of longitudinal wave in a gaseous medium. Doppler effect. Architectural acoustics: Sabine's formula, requisites of a good auditorium.

Physical Optics: Theories of light: Huygen's principle and construction. Interference of light: Young's double slit experiment, Fresnel bi-prism, Newton's ring, interferometers. Diffraction of light: Fresnel and Fraunhoffer diffraction, diffraction by single slit, diffraction by double slit, diffraction gratings, polarization, production and analysis of polarized light, optical activity, optics of crystals.

PHY 102 PHYSICS SESSIONAL
3 hours in each week, 1.5 Cr.

Laboratory works based on PHY 109

LEVEL-I I TERM-I

EEE 263 ELECTRONIC DEVICES AND CIRCUITS
3 hours per week, 3 Cr.

Semiconductors, junction diode characteristics. Bipolar transistor: characteristics, small signal low frequency h-parameter model, hybrid - pi model. Amplifiers :voltage and current Amplifiers. Oscillators, Differential Amplifiers, Operational Amplifiers(OPAMs). Linear applications of OPAMs,gain, input and output impedances, off-set null adjustments,frequency response and noise. Introduction to JFET, MOSFET, PMOS, NMOS and CMOS : biasing and application in switching circuits. Silicon controlled rectifier(SCR), TRIAC, DIAC, UJT: characteristics and application. Introduction to rectifiers, active filters, regulated power supply. Introduction to IC fabrication techniques.

(Pre req. EEE 163)

EEE 264 ELECTRONIC DEVICES AND CIRCUITS SESSIONAL
3 hours in each week, 1.5 Cr.

Laboratory works based on EEE 263

MATH 241 MATHEMATICS-III (COMPLEX VARIABLE, LAPLACE TRANSFORMS AND STATISTICS)
4 hours per week, 4 Cr.

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 and Laurent's theorem. Singular points. Residue. Cauchy's residue theorem. Evaluation of residues. Contour integration. Conformal mapping.

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.

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, e.g. binomial, poison and negative binomial. Continuous probability distributions, e.g. normal and exponential. Characteristics of distributions. Hypothesis testing and regression analysis.

(Pre req. MATH 143)

ME 160 MECHANICAL ENGINEERING DRAWING-I
3 hours in each week, 1.5 Cr.

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

LEVEL-I I TERM-II

HUM 103 ECONOMICS
3 hours per week, 3 Cr.

Definition of Economics. Economics and Engineering.

Principles of Economics:
Micro-economics: The theory of demand and supply and their elasticities. Price determination. Nature of an economic theory, applicability of economic theories to the problems of developing countries. Indifference curve technique. Marginal analysis. Production, production function, types of productivity. Rational region of production of an engineering firm. Concepts of market and market structure. Cost analysis and cost function. Small scale production and large scale production. Optimization. Theory of distribution.

Macro-economics: Savings , investment, employment. National income analysis. Inflation. Monetary policy, Fiscal policy and trade policy with reference to Bangladesh.
Economics of development and planning.

EEE 269 ELECTRICAL DRIVES AND INSTRUMENTATION
3 hours per week, 3 Cr.

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: terminology, types, principles and application of photovoltaic, piezoelectric, thermoelectric, variable reactance and opto-electronic transducers. Noise reduction in instrumentation.

(Pre req. EEE 163)

EEE 270 ELECTRICAL DRIVES AND INSTRUMENTATION SESSIONAL
3 hours in each week, 1.5 Cr.

Laboratory works based on EEE 269

MATH 243 MATHEMATICS-IV (MATRICES, VECTORS AND FOURIER ANALYSIS)
3 hours per week, 3 Cr.

Matrices:
Definition of matrix. Different types of matrices. Algebra of matrices. Adjoint and inverse of a matrix. Rank and elementary transformations of matrices. Normal and canonical forms. Solution of linear equations. Matrix polynomials. Eigenvalues and eigenvectors.

Vectors:
Scalars and vectors, equality of vectors. Addition and subtraction of vectors. Multification 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, Stroke's theorem, Green's theorem.

Fourier Analysis:
Real and complex form. Finite transform. Fourier integral. Fourier transforms and their uses in solving boundary value problems.

(Pre req. MATH 143)

LEVEL-I V TERM-I

IPE 493 INDUSTRIAL MANAGEMENT
3 hours per week, 3 Cr.

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 & incentives, informal groups, organizational change and conflict.

Cost & financial management: Elements of costs of products depreciation, break-even analysis, investment analysis, benefit cost analysis.

Management accounting: Cost planning and control, budget & 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.

LEVEL-I V TERM-II

HUM 313 PRINCIPLES OF ACCOUNTING
2 hours per week, 2 Cr.

Principles of accounting: accounts, transactions, the accounting procedures and financial statements. Cost in general: objectives and classifications. Overhead costing. Cost sheet under job costing, operating costing and process costing. Marginal costing: tools and techniques, cost-volume-profit analysis. Relevant costing: analyzing the profitability within the firm, guidelines for decision making. Long-run planning and control: capital budgeting.

OPTIONS AVAILABLE

HUM 211 SOCIOLOGY
2 hours per week, 2 Cr.

Scope. Some basic concepts. Social evolution and techniques of production, culture and civilization. Social structure of Bangladesh. Population and world resources. Oriental and Occidental societies, Industrial revolution. Family-urbanization and industrialization, Urban ecology. Co-operative and Socialist movements. Rural Sociology.

HUM 213 GOVERNMENT
2 hours per week, 2 Cr.

Some basic concepts of government and politics. Functions, organs and forms of modern state and government; socialism, Fascism, Marxism, U.N.O.

Government and politics of Bangladesh. Some major administrative systems of developed countries. Local self-government.

HUM 411 BUSINESS LAW
2 hours per week, 2 Cr.

Principles of law of contract. 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). Law of compensation(1965).

UNDERGRADUATE THESIS TITLES

1989-90 and 1990-91 SESSION

1. An expert system for weather forecasting.
2. Query processing in relational database management system.
3. Design of an Assembler.
4. A study of some computer arithmetic algorithms.
5. Performance analysis of external searching.
6. Recognition of handwritten Bangla numerals.
7. Microprocessor controlled telephone call recorder.
8. Software development for performing Fast Fourier Transformation on audio frequency signals.
9. Microprocessor controlled variable frequency square wave inverter.
10. Performance study of Sorting Algorithms.
11. Study of media access protocols for high speed fiber optics local area network by simulation.
12. Study of different explicit token passing schemes in multiple bus local area network by simulation.

13. An expert system for carrier selection services for HSC students.

14. Design and implementation of extended data dictionary system.

15. Development of mini GIS system which can display optimal route.

16. Implementation of a video graphics processor supporting HPGL.

17. Study and implementation of a set of DP primitives to support Bangla data processing.

18. Emulation of VM/SP command environment in PCs under DOS.

19. A study on search techniques used in AI programs.

20. A study on computer arithmetic algorithms.

21. Algorithms for hidden surface problem.

22. Personnel Information Systems for BUET.

23. A study on line clipping algorithms.

24. Design a database for tabulation of results and transcripts/ marksheet generation for all departments of BUET.

25. Simulations of protocols for local computer networks.

26. Design a Bangla word processor.

27. Developing a small scale simulation package.

28. Design of arbitration logic for shared memory multiprocessor using multi-bus.

29. Evaluation of performance of different join strategies.

30. Database design through E-R modelling: a case study for banking system.

1991-92 SESSION

1. Development of Expert Systems : Theorem prover and symbolic integrator.

2. A study of logic synthesis and optimization.
3. A study on algorithms of computational geometry.
4. Study of computer arithmetic algorithms.
5. Design and construction of single board microcomputer.
6. Analysis of multiuser multiprocessing systems.
7. Machine recognition of hand-printed Bangla character.
8. Performance analysis of different variations of heapsort.
9. Construction and interfacing of a light-pen.
10. Computerization of a library information system.
11. Development of GIS system.
12. Development of CASE tools.
13. A study of neural networks and their learning algorithms.
14. Fault detection techniques for digital circuits - an overview.
15. A study of different LAN operating system.
16. An integer computer arithmetic teaching tool.
17. A floating point computer arithmetic teaching tool.
18. Analysis and modeling of digital systems.

POSTGRADUATE STUDIES

The department of Computer Science & Engineering offers a program of study leading to a Master of Science in Computer Science & Engineering (M.Sc. Engg. in CSE) degree. The program emphasizes the theory and applications of both hardware and software and permits concentrations of study in specific areas of computer engineering. Particular strengths lie with the unique faculty expertise and with the extensive computer engineering laboratories. The program is offered in the late afternoon and evening to serve the educational needs of practicing computer professionals.

(i) FOR MASTERS AND M.PHIL DEGREES

Admission :

A student having a B.Sc. Engg. degree in Computer Science & Engineering or Electrical & Electronic Engineering or accredited bachelor's degree in Computer Science/Computer Engineering may be admitted to the Master of Science in Computer Engineering program with the satisfaction of the admission requirements as set forth by the Board of Postgraduate Studies (BPGS). A student must have a first class in all public examinations or an overall minimum grade point average (GPA) of 3.0 (4.0 scale).

Conduct of Examination:

For all postgraduate degrees in Engineering, Architecture, Urban & Regional Planning and Physics and Chemistry, in addition to test, assignments and/or examinations during the semester as may be given by the teacher (s) concerned, there shall be a written examination and/or other test for each of the subjects offered in a semester at the end of that semester. The dates of which shall be announced by the Dean of the respective faculties at least two weeks before the commencement of the examination. The final grade in a subject shall be based on the performance in all tests, assignments and/or examinations.

Grading System:

Final grades for courses shall be recorded as follows:

Grade	Merit description	Grade Points	Numerical Markings
A+	Excellent	4.0	90% and above
A	Very good	3.5	80% to below 90%
B+	Good	3.0	70% to below 80%
B	Average	2.5	60% to below 70%
C	Pass	2.0	50% to below 60%
F*	Failure	-	below 50%
I**	Incomplete	-	
S or U	Satisfactory or Unsatisfactory (for non-credit course)		
W	Withdrawn from course		

* Subject in which the student gets F grades shall not be counted towards credit hour requirements and for the calculation of Grade Point Average (GPA).

** Given only a student is unable to complete the course because of circumstances beyond his control, it must be made up by the close of next two semesters or the incomplete grade becomes a failure. He may, however, be allowed to register without further payment of tuition fees for that course.

Qualifying Requirements :

The qualifying requirements for graduation is that a student must earn the minimum grade point of 2.65 based on the weighted averaged in his course work.

The C grades, upto a maximum of two subjects may be ignored for calculation of grade point average (GPA) at the written request of the student, provided the student has completed the total credit hour requirement with a minimum weighted GPA of 2.65 in the remaining subjects. No subject shall be repeated unless it is a compulsory requirement for the degree as determined by the Board of Postgraduate Studies. Performance in all the subjects shall be reflected in the transcript.

If the cumulative number of F grades obtained by the student is three or more he shall not be allowed to continue in the program. If at the end of the second of any subsequent semesters, the cumulative GPA falls below 2.5 (considering all grades including F grades), he shall not be allowed to continue in the program.

Thesis/Project :

In addition to successful completion of course works every student shall submit a thesis/project on his research work, fulfilling the requirements as detailed below.

Every candidate submitting a thesis/project in partial fulfillment of the requirements of a degree, shall be required to appear at an oral examination, on a date or dates fixed by the Head of the department and must satisfy the examiners that he is capable of intelligently applying the results of this research to the solution of problems, of undertaking independent work, and also afford evidence of satisfactory knowledge related to the theory and technique used in his research work.

(ii) FOR PH.D. DEGREE :

Conduct of Examination for Ph.D.

Rules are same as in Masters and M. Phil degrees.

Qualifying requirements or Ph.D.

To qualify for the degree a student must earn a minimum grade of 2.65 based on the weighted average in his course work.

Comprehensive Examination for Ph.D.

The date and time of the comprehensive examination shall be fixed by the Doctoral committee on the request of the supervisor. Comprehensive Examination shall ordinarily be held after the completion of the course work by the student.

The comprehensive examination shall comprise a written examination and/or an oral examination to test the knowledge of the student in his field of study. The Doctoral Committee shall conduct the comprehensive examination. If a student fails to qualify in a comprehensive examination he shall be given one more chance to appear in the examination as scheduled by the Doctoral Committee.

Research work for a thesis shall be carried out in this university or at a place(s) approved by the Doctoral Committee in consultation with the supervisor.

Thesis for Ph.D.

At the end of the student's research work the student shall submit a thesis which must be an original contribution to engineering/sciences and worthy of publication. At least five type written copies of the thesis in the final form must be submitted to the Head of the department through the supervisor in the approved format.

In case a student fails to satisfy the Board of Examiners in thesis and/or oral examination, the student shall be given one more chance to resubmit the thesis and/or appear in oral examination as recommended by the board.

A student who has been transferred to the Ph.D. program from the M.Sc. Engg./M. Phil. program may be awarded an M.Sc. Engg./M. Phil. degree on recommendation of the supervisor, if the student fails to qualify for the award of the Ph.D. degree.

POSTGRADUATE COURSES

CSE 6101 Microcomputers and Microprocessors (3 Credits)

Review of the hardware and software of microcomputers, programming in microcomputers. Hardware-software interfacing in microcomputer system design. I/O structure and auxiliary electronics. Interrupt structure, direct memory access. Priority interrupt structure. the design of digital systems based around microcomputers-timing considerations. Input/output design and total system design. Case studies including CPU and peripheral IC's of Intel, Motorola, Zilog etc.

CSE 6201 Digital Computer Theory and Design (3 Credits)

Introduction to stored program computers. Overall computer organization with specific examples as IBM 360/370 and IBM 4331/4341. System organization of digital systems including minicomputer and microprocessor architecture and comparison. control unit design, hardwired control and microprogram control. Control unit organization to include serial-parallel modes of operation.

Design of the control unit of a small digital computer for laboratory use. Characteristics of computer system hardware and software to provide for multiprocessing, multiprogramming and time shared operation. Interrupt system. Concurrent process in multiprocessors.

CSE 6202 Computer Organization (3 Credits)

Stored program computers: Data representation; algorithmic treatment; Instruction formats, Computer units, System structures, special features of Intel 80880, 8085, 8086, Motorola 6800/68000, PDP-8 and PDP-11, IBM-370, IBM-4300, CDC 7600, Elliac and latest microprocessors. Hardware description, methodologies, considerations in simulation and testing of designs.

CSE 6203 Advanced Topics in Microcomputers (3 Credits)

Latest developments in microprocessor field including 32 bit microprocessors-hardware structure and software capabilities, memory development with examples, bubble memories. Microcomputer development systems. Bitslice Microprocessors and Microprogramming, design of and instruction set using micro-control. software for microcomputers, assemblers, high level microprogramming languages.

CSE 6204 Data Communication and Computer Networks (3 Credits)

Principles and practice of modern data communication techniques. Transmission-Codes, modes for data transmission, multiplexers, concentrators, terminals. Modems and interfaces. Digital network interface. Error control, cryption, security. Network protocols and line control procedures. Protocols for buffer Management, reassembly, queue control. Communication/carrier systems planning. Distributed intelligence. Message and packet switching. Hardware and software interfacing. International data communication, analytical results on network topology, alternatives, resource sharing and file allocation.

CSE 6301 Computer Science (3 Credits)

Relaxation methods, successive over relaxation, convergence criteria; Optimization techniques, simulation; Hybrid computation. Time-sharing. Computer aided design(CAD) application to engineering problems.

CSE 6302 Machine and Assembly Language Programming (3 Credits)

Machine instruction types, number representation and addressing schemes, programming of microprocessors and microcomputers and mainframe computers in machine and assembly language. use and design of macroassemblers; Conditional assembly, control of I/O via access methods. Program status and control, Interrupt handling, job control languages and file structures. File and storage managements. Linkers, loaders and Load modules. introduction to operating systems. assembly language program testing in mainframe computer IBM-370/115. Applications using BUET Computer.

CSE 6303 Operating System I (3 Credits)

Introduction to operating systems for batch oriented multiprogrammed computer system. Memory management in fixed and variable partitions; device and storage management. Input-output programming, interrupt structure and processing. Information managements. file systems; systems programming. Access control verifications. performance modelling and evaluation.

CSE 6304 Operating System II (3 Credits)

Operating system for time-shared and multiprocessor computer systems, processor management-state modelling, job scheduling, process scheduling, process synchronization, time slicing and time-sharing operation systems and subsystems. Memory Management in a paged and segmented virtual memory systems. Performance evaluation of computer network software, introduction to computer as a utility. Introduction to security and large database system.

CSE 6305 Database Management (3 credits)

Relational network and hierarchical data models; sequential, indexed sequential, inverted, multilist, computer access and clustered files; External sorting algorithms, secondary indices optimization, security decomposition of query; Differential fields; evaluation of the organization, current literature.

CSE 6306 Compiler Construction (3 Credits)

Theory and practice of constructing translators for high level programming languages. scanning and parsing of formal languages, introductory theory of context free languages and syntactic analysis. Object code generation and economization. Automatic generations of syntax analyzers, translator writing systems, extensible translations.

CSE 6307 System Analysis and Design (3 Credits)

The system cycle. Structured systems analysis. Detailed analysis and feasibility study. Tools for the system designer. System design-input and output design; organizing and designing files-designing a database; Process design and acquisition of hardware and software; design review and Program Definition Module Design; programming and coding and testing, documentation and maintenance; management of the systems process.

CSE 6900 Special Topics related to Computer Science & Engineering (3 credits)

Course contents to be decided by the course teacher with the approval of the BPGS.

The following EEE courses may be taken by the students with the approval of the BPGS :

EEE 6106 Artificial Neural Systems (3 Credits)

Biological Nervous System : the brain and the neurons. Artificial Neural Networks, historical backgrounds, Hebbian Associator, Perceptrons : learning rule, illustration, proof, failing, Adaptive Linear (ADALINE) and multiple Adaptive Linear (MADALINE) networks. Multilayer Perceptrons : generating internal representation, Backpropagation, cascade correlation and counter-propagation networks. Higher order and bidirectional associated memory, Hopfield networks : Lyapunov energy function, attraction basin. Probabilistic updates: simulated annealing, Boltzman machine. Adaptive Resonance Theory (ART) network. ART1, ART2, Fuzzy ART mapping (ARTMAP) networks. Kohonen's feature map, Learning Vector Quantization (LVQ) networks. Applications of neural nets.

EEE 6205 Digital Signal Processing (3 credits)

Main features and applications of digital signal processing. Introduction to speech, image and data processing. Discrete time signals, sequences. Linear systems, Linear constant coefficient difference equations. Sampling of continuous time signals. Two dimensional sequences and systems. Z-transform, inverse Z-transform, Z-transforms theorems and properties, system function, two dimensional Z-transform. H-transform. Frequency domain representation, discrete time systems and signals, discrete Fourier series and Fourier transform, properties of discrete Fourier transform (DFT), Parseval's theorem, equivalent noise definition of bandwidth. Convolution, Correlation and the method of numerical integration, computation of the DFT : Goertzel FFT, Chirp Z transform algorithms.

Signal flow graph representation of digital networks, Tellegen's theorem. Introduction to digital filters, IIR and FIR digital filter design techniques. Programming the TMS320C30 and TMS320C40 digital signal processor cards. Probability and Stochastic processes, discrete time random process, spectrum representation of infinite energy signals, response of linear systems to random signals, adaptation algorithms, all-zero, pole-zero and lattice adaptive filters, applications of adaptive filtering. Introduction to parametric and model based signal processing.

EEE 6206 Optical Fibre Communication (3 Credits)

Introduction to optical fibre communication : Optical fibres: structure, step-index and graded-index fibres, modes of propagation, modal theory for circular waveguide, modal equations, waveguide equations, power flow in optical fibres. Signal degradation in optical fibres: fibre attenuation, distortion of optical waveguides, dispersions in fibres, mode coupling. Optical sources : Light Emitting Diodes(LED) and Semiconductor Laser Diodes (SLD) - structures, internal quantum efficiencies, modulation capability, transient response, power bandwidth product, modal noise, temperature effects and reliability considerations. Digital transmitter design with lasers. Photodetectors : p-i-n and avalanche Photodetectors(APDs) principles of operations, structures, photodetector noise sources, detector response time, detector reponsivity and photodiode materials.

Optical modulation and detection schemes: direct detection, coherent detection, direct detection receiver : configuration, receiver operation, receiver noises, receiver sensitivity calculation, performance curves and design of receiver preamplifier. Effect of laser phase noise on receiver performance. Introduction to heterodyne optical receiver. Transmission link analysis: point-to-point links- system configuration, link power budget, rise time budget. Data buses : star and T-coupler data buses. Local area networks applied to single-mode fibre-optic communication. Line coding: NRZ, RZ, manchester code (MC) and block codes. Introduction to wavelength division multiplexing (WDM) and optical Frequency division multiplexing (OFDM) transmission schemes.

EEE 6405 VLSI Design (3 Credits)

Overview of the design methodology: top-down design approach, technology trends and design styles. Brief review of MOS transistor theory: nMOS and pMOS transistors, threshold voltage, body effect, design equations and V-I characteristics, latch-up problem. MOS transistor as a switch: pass transistors and transmission gates. nMOS inverter characteristics, CMOS inverter characteristics: influence of n/p ratio on transfer characteristics and noise margin. CMOS processing technologies: design-fabrication interface, layers of abstraction, CMOS design rules, CMOS circuit characteristics and performance estimation: resistance and capacitance, rise and fall times, delay, gate resistor sizing, power consumption. CMOS

logic design: logic structures, electrical and physical design of logic gates, clocking of logic gates, clocking strategies, I/O structures.

Structured design methods: design styles, automated synthesis, circuit extraction, simulation and design rule checking (DRC). Design examples: CMOS subsystem design: adders and related functions, multipliers, memory systems, data paths, programmable logic arrays (PLAs), field programming gate arrays (FPGAs). VLSI testing: fault models, design for testability(DFT)- ad hoc testing, structured DFT, self-test and built-in test.

POSTGRADUATE (M.Sc Engg.) THESIS TITLES HITHERTO COMPLETED

1. Design of a star type local area network (LAN) interface utilizing the existing telecommunications system in BUET campus.
2. Design & analysis of computer based argumentation from categenical propositions.
3. Computer technique utilization for spectral signature identification.
4. Algorithms and program modules for processing interrelated information cells.
5. Online microcomputer control multivariable system for chemical process.
6. Recognition of printed Bengali characters by decision matrix method of pattern recognition.
7. Design and development of information management system.
8. Design of a information base for diabetic patients with expert diagnostic aid.
9. Development of token ring local area network.
10. Design of a relational database for wide variety of micro computer chips.

11. Study of computer network topolgies in a aground Dhaka city.

12. Image encoding and representation technique with application to an online banking system.

13. Performance analysis of sorting algorithms.

14. Performance analysis of multiprocessor sharing memory modules connected by multibus network.

15. Performance study of multiple channel carrier sense multiple access with collision detection [CSMA/CD] protocol by simulation.

16. Study of token passing protocols for multiple bus local area network by simulation.

17. Recognition of printed Bangla characters by syntactic method of pattern recognition.

18. Performance analysis of searching algorithms.

19. Peformance analysis of external sorting algorithms.

FUTURE DEVELOPMENT PLAN

Due to the heavy demand from local students, the department is planning to admit students in PhD program in near future. To materialize this lofty goal, the department has already started seeking experienced senior teachers to fill up the vacant positions. It has schemes like inviting expatriates to the department to deliver lectures on some courses and guide some research works.

In the next 1-2 years, the department is planning to establish Computer Communications lab and Robotics lab. Installation of a GIS lab is also under consideration.

The department has some plans to expand its physical facilities so that it can accomodate different labs, faculty rooms, and other facilities.