CALENDAR

APRIL, 2002

Department of Computer Science and Engineering
Bangladesh University of Engineering and Technology

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PREFACE

Bangladesh University of Engineering and Technology (BUET) offers both undergraduate and graduate programmes. This calendar is for undergraduate students of the Department of Computer Science and Engineering of BUET. Although this calendar has been written mainly for the students, student advisers and teachers would find it valuable as a reference document.

This calendar provides general information about this university, its historical background, university administration, faculties and departments. Different aspects of the course system, such as rules and regulations relating to admission, grading system, performance evaluation, requirement for degrees etc. are mentioned. It describes the course requirements, detail course outline and courses offered in different terms for the undergraduates of Computer Science and Engineering (CSE) department.

Computer Science and Computer Engineering themselves are changing rapidly. So the departmental as well as the non-departmental courses for CSE students have been revised thoroughly to cater to recent advancements in the field of Computer Science and Computer Engineering. The revised curriculum as incorporated in this calendar has been approved by the academic council, BUET for the CSE undergraduate students commencing their Level-I Term-I classes in the 2000-2001 session.

Some of the information recorded in this calendar is likely to be modified from time to time. The undergraduate students are strongly advised to be in touch with their advisers regarding modifications that are introduced later by the university.

It is hoped that this information booklet will be of much use to the undergraduate students as well as the teachers of CSE department.

Dhaka, Bangladesh
April, 2002

Dr. Md. Abul Kashem Mia
Head, CSE Dept.

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1 General Information

1.1 History

Bangladesh University of Engineering and Technology, abbreviated as BUET, is the oldest institution for the study of Engineering and Architecture in Bangladesh. The history of this institution dates back in 1876 when BUET originated as the Survey School at Nalgola to train Surveyors for the then Government of Bengal of British India. As the years passed, the Survey School became the Ahsanullah School of Engineering offering three-year diploma courses in Civil, Electrical and Technical Engineering. In 1948, the School was upgraded to Ahsanullah Engineering College (at its present premise) as a Faculty of Engineering under the University of Dhaka, offering four year Bachelor's courses in Civil, Electrical, Mechanical, Chemical and Metallurgical Engineering. This action was taken with a view to meet the increasing demand for engineers in the country and to expand the facilities for quicker advancement of engineering education. In order to facilitate postgraduate studies and research, in particular, Ahsanullah Engineering College was upgraded to the status of a university giving a new name of East Pakistan University of Engineering and Technology in the year 1962. After the independence of Bangladesh in 1971, it was renamed as the Bangladesh University of Engineering and Technology (BUET).

Till today, the Bangladesh University of Engineering and Technology has produced around 20,000 graduates in different branches of engineering and has established a good reputation throughout the world for the quality of its graduates, many of whom have excelled in their respective fields in different parts of the globe. It was able to attract students from countries like Nepal, India, Sri Lanka, Jordan, Iran, Malaysia, Pakistan and Palestine.

1.2 Location

The BUET campus is in the heart of the capital of Dhaka. It has a compact campus with halls of residences within walking distances of the academic buildings. At present the campus occupies 76.85 acres (31.1 hectares) of land. The academic area is confined in and around the old campus occupying 30.24 acres (12.24 hectares) of land defined by Shahid Sharani, Bakshi Bazar Road and Asian Highway. This area accommodates five faculties, two instates, the Club and eight two units of residential accommodation of teachers, staff and employees and the vice-chancellor's bungalow.

1.3 Undergraduate Studies

Undergraduate courses in the faculties of Engineering, Civil Engineering, Electrical and Electronic Engineering, Mechanical Engineering extend over a time span of four academic years and lead to B.Sc. Engineering degrees in Civil Engineering, Water Resources Engineering, Electrical and Electronic Engineering, Computer Science and Engineering, Mechanical Engineering, Industrial and Production Engineering, Chemical Engineering, Metallurgical Engineering, Naval Architecture and Marine Engineering. In the faculty of Architecture and Planning, the degree of Bachelor of Architecture is obtained in five years.

1.4 Postgraduate Studies and Research

Post Graduate studies and research are now among the primary functions of the university. Most of the departments under the different faculties offer Masters degrees and some of the departments have Ph.D. programs. In addition to its own research programs, the university undertakes research programs sponsored by outside organizations like UNO, Commonwealth, UGC, etc. The expertise of the university teachers and the laboratory facilities of the University are also utilized to solve problems and to provide up-to-date engineering and technological knowledge to the various organizations of the country. The University is persistent in its effort to improve its research facilities, staff position and courses and curricula to meet the growing technological challenges confronting the country.

1.5 Administration

The University has the following Statutory Authorities:

- Syndicate
- Academic Council
- Finance Committee
- Faculties
- Selection Boards
- Boards of Postgraduate Studies
- Committee for Advanced Studies and Research (CASR)
- Planning and Development Committee
- Boards of Undergraduate Studies (BUGS)

The Syndicate is the supreme authority in major policy-making matter and in approving recommendations. The finance committee, The Planning and Development Committee and other committees assist the Syndicate in matters important for proper functioning of the University. The Academic Council is the supreme body in formulating academic rules and regulations to which the CASR, Boards of Undergraduate and Postgraduate Studies and the Faculties recommend.

Vice Chancellor	:	**Prof. Nooruddin Ahmed**
Dean of Faculties		
Civil Engineering	:	**Prof. Md. Abdul Halim**
Architecture and Planning	:	**Prof. Nizamuddin Ahmed**
Electrical and Electronic Engineering	:	**Prof. Shahidul Islam Khan**
Mechanical Engineering	:	**Prof. Md. Quamrul Islam**
Engineering	:	**Prof. Md. Mohar Ali**
Administrative Officers		
Registrar	:	**Md. Shahjahan**
Controller of Examinations	:	**Md. Asadullah Khan**
Comptroller	:	**K. M. Anisur Rahman Khan**
Director of Students' Welfare	:	**Prof. Md. Zoynul Abedin**
Director, Planning & Development	:	**Prof. M. Mazharul Hoque**
Director, Advisory, Extension and Research Services	:	**Prof. Md. Maksud Helali**

Director, Bureau of Research, Testing and Consultation	:	**Prof. Md. Sabder Ali**
Librarian	:	**Mohammad Zahirul Islam**

Provost of Residential Halls

Ahsanullah Hall	:	**Prof. Abdul Muqtadir**
Chatter Hall	:	**Prof. Mir Shahidul Islam**
Nazrul Islam Hall	:	**Prof. Nazrul Islam**
Shahid Smriti Hall	:	**Prof. Ahsanul Kabir**
Sher-e-Bangla Hall	:	**Prof. Pran Kanai Saha**
M. A. Rashid Hall	:	**Prof. Abu Siddique**
Sohrawardy Hall	:	**Prof. M. A. Matin**
Titumir Hall	:	**Prof. Md. Monwarul Islam**

1.6 Faculties, Departments and Teachers

At present, the University has sixteen teaching departments under five faculties. A total of 475 teachers are teaching in these faculties. There are additional teaching posts of Dr. Rashid Professor, Professor Emeritus and Supernumerary Professors.

2 Department of Computer Science and Engineering

2.1 Historical Background

The Department of Computer Science and Engineering, the first department of its kind, was established in 1982 under the faculty of Electrical & Electronics Engineering. From the very initial days of its establishment, it has been able to attract the very best students of the country. Students securing topmost merit positions in the legendary admission test of BUET opt for studies in this department. At the very beginning, the department offered only M. Sc. Engg. and M Engg. degrees in Computer Science and Engineering. The Undergraduate program started in 1986. At first, 30 students were admitted each year for pursuing the B.Sc. Engineering degree. Starting from the academic session 1994-1995, the number was increased to 45 and from the session 1997-1998 the number was further increased to 60. Considering the growing need of computer science graduates, the department decided to enroll 120 students per session and started to do so from the academic session 2000-20001. So far in nine batches 271 students have been awarded B.Sc. Engineering, 60 M.Sc Engineering and 1 Ph.D. degree from this department. The department has now faculty strength of 29 with 6 having Ph.D. Degree in different branches of Computer Science and Engineering.

Over the years, this ever-flourishing department has been providing the technical foundation, scholarly guidance and leadership skills that have resulted in a number of highly qualified and skilled computer graduates, proving their potentiality home and abroad. With an educated, sincere and enthusiastic faculty, a continuous enrollment of brilliant students and an amicable teacher-student interaction – the department has become a unique one in its field.

2.2 Location

The Department of Computer Science and Engineering is located on the west wing of the third, fourth and fifth floors of the Electrical and Mechanical Engineering (EME) building. The classrooms occupy the fourth floor, whereas the labs are located on the third and fourth floors.

The departmental library and the room for the teaching staff are located on the fifth floor.

2.3 Research Activities

The Department has already achieved reputation through its research activities. The research work undertaken by the teachers and students of this department in the last few years is diversified in nature. Undergraduate students of the department have already achieved extraordinary success in their research works through the publication of a number of papers in journals of international repute. Since 1997 the number of publications in international conferences and journals of the department exceeds over 100. It includes research on graph theory, parallel processing, 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 only of academic interest, but also aim at improving the socioeconomic condition of Bangladesh by implementing the results.

In December 1997 the National Conference of Computer and Information Systems, NCCIS '97 was held in Dhaka University and Atomic Energy Commission premises. The department was the single largest participant by contributing about 50% of the total accepted papers.

In December 1998, the International Conference on Computer and Information Technology (ICCIT '98) was held in BUET and this department contributed 24 papers out of 63. In ICCIT '99 the figure was 21 out of 57. In ICCIT 2000 and 2001, the department's contribution was 19 out of 63 and 19 out of 64 papers, respectively.

2.4 Consultation Services

The department offers several consultation services to different government and private organizations for their computerization. These 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.

2.5 Training

The department has conducted a number of training programs for different organizations and individuals. With the mushroom like growth of computer centers in the country, 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. Recently the department is conducting a two-year training program on computer networking.

2.6 Programming Contests

Students of this department have achieved remarkable success in co-curricular activities like programming contests. The team of Suman Kumar Nath, Rezaul Alam Chowdhury and Tareque Mesbaul Islam became champion in 1997 Asia Region Dhaka site of the Association for Computing Machinery International Collegiate Programming Contest (ACM-ICPC) and qualified for the prestigious World Championship to be held at Atlanta, USA. In a contest of 54 best teams from all over the world our students occupied 24th position in the very first appearance. Since then our students became champion in regional contests showing overwhelming superiority over other universities of the region and qualified for the World Championship every year. In the 23rd ACM-ICPC World finals they participated in the Netherlands.

Next year, a team comprised of the members Mustaq Ahmed, Munirul Abedin and Mohammad Rubaiyat Ferdous Jewel advanced to the 24th world finals by becoming the champion among the 59 participating teams in the regional selection for the ACM International Collegiate Programming Contest, held in IIT Kanpur, India on December 7, 1999. On March 18, 2000, the 24th ACM-ICPC world finals were held in Orlando, Florida, USA and the aforementioned team brought unprecedented glory to the university and the entire country by outperforming almost all the US universities and occupying the 11th position among 60 participating teams selected from 1,968 teams representing 1,041 universities in 69 countries on 6 continents competing at 82 sites from all around the world.

In December 2001 Mustaq Ahmed, Munirul Abedin and Abdullah-Al-Mahmood became the regional champions from IIT Kanpur site. They

were among the Sixty-four teams of students advancing from 2,700 teams to compete at the 25th ACM-ICPC World Finals that was held on March 10, 2001, in Vancouver, Canada. They secured the 29th position among these 64 teams.

In recognition of the extraordinary achievements of Bangladeshi students, the Honorable Prime Minister gave an award of Tk. One lac to each of the 9 students of which 8 were from the Department of Computer Science and Engineering. On the 6th convocation of graduated BUET students, the Honorable Prime Minister, Sheikh Hasina gave an award of Tk. One lac each to Mustaq Ahmed, Munirul Abedin and Mohammad Rubaiyat Ferdous Jewel for their extraordinary performance in the 24th world finals of the ACM-ICPC.

Shahriar Manzoor and Rezaul Alam Chowdhury, graduates of the Department have been playing a leading role in hosting international programming contests. BUET hosted one of the Asia regional ACMICPC in November 2001. BUET team comprising of Abdullah-Al-Mahmood, Md. Kamruzzaman and Mushfiqur Rouf became the regional champion and qualified for the ACMICPC World Finals, to be held at Hawaii, USA in March 2002. In recognition of the extraordinary achievement of BUET students, BUET has been declared as one of the Asia Region Sites of the regional ACMICPC to be held in 2002.

2.7 Laboratory Facilities

The laboratory facilities of the department have been increased significantly over the last few years. At present there are seven different laboratories in the department premises. A brief description of each of the laboratory facility follows.

Microcomputer Laboratory

This laboratory was established in 1986. The PCs and servers of these laboratories have been upgraded continuously. At present these labs have about 40 Pentium IV workstations and three severs of following configuration:

1. DELL P2 Dual Processor NT Server
2. IBM RS6000 Quad Processor Server
3. Pentium-II Linux Gateway

All the workstations provide Windows NT/2000 and Linux platforms and have important software installed.

Software Engineering Laboratory

This laboratory facility has come into existence from 2001. This lab has 36 Pentium-III high performance workstations with multimedia support. There is a HP Net P3 Dual Processor Servers with 72GB SCSI HDD.

Networking Laboratory

The networking laboratory has also been established in 2001. The students can acquire knowledge of network management, establishment and maintenance by using the various networking devices present in this lab. There are Cisco routers (model no. 2514 and 2501), Cisco Switches (model no. 1600 and 1900) and 32 Pentium-III workstations. The workstations and servers in this lab have been loaded with different networking software that allow the students to monitor and experiment with different aspects of computer networking.

Digital Laboratory, and Interfacing Laboratory

The Digital Laboratory was established in 1986 while the Interfacing Laboratory has been established in 2001. The digital lab is equipped with modern tools to design and implement digital circuits. On the other hand, the interfacing lab provides opportunity to gain knowledge about interfacing peripheral devices with microprocessors. These labs have a vast number of ICs in stock, starting from simple 74 series chips up to different types of microprocessors and their peripheral chips. There are various Microprocessor Trainer Kits such as 8088 based MTS 88.C µkit and 8086 based µkit.

There are trainer boards of different models, logic probe (GLP-1GW), logic pulser (GPG-2GW), Digital IC tester (GUT 6600), Oscilloscope (GOS626G, GOS620FG, GOS653G, Kenwood CS4125, Trio CS1040), multimeters (GDM354A, GDM352A). These labs also have a number of PCs, Eprom eraser (AT402), Basic Communication Trainer (KL900A), PC bus interface card (CIT7000).

Multimedia Laboratory

This laboratory facility is a new addition to the department. This lab has 40 Pentium-IV high performance workstations with multimedia support. There is a Pentium III 1GHz Dual Processor 2000 Server with 72GB SCSI HDD. The laboratory has Flatbed Scanner, HP Color Laser printer, HP Heavy Duty Laser Printer, Digital Video Camera, Multimedia Projector with Document Camera, Video Capture Card, PC-based Video Conferencing Kit, Graphics Tablet, Bar Code Scanner, Intel Pentium III 1 GHz Notebook Computer.

Computing Laboratory

This laboratory facility is a new addition to the department. This lab has 40 Pentium-IV high performance workstations with multimedia support. There is a Pentium III 1GHz Dual Processor 2000 Server with 72GB SCSI HDD. All the workstations provide Windows 2000 and Linux platforms and have important software installed.

2.8 Library Facilities

A small but rich library has been established in the department. It has currently 1200 books and a lot of journals. The library is being enriched day by day. Books related to the field of study 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 which consists of original software, user's guide, programmer's guide and manuals.

2.9 Study Programs

The Department of Computer Science and Engineering offers the degrees of B. Sc. Engg., M. Engg., M. Sc. Engg. and Ph.D. the courses and syllabus followed by this department for the above degrees are the most modern ones like that of advanced countries as well as appropriate to the local needs. The syllabus is so designed as to contain all the necessary study materials so that a graduate can face the engineering problems readily after graduation. The teachers of the department meet periodically to review the courses and their contents; necessary changes are made to update the needs and trends from time to time.

3 Rules and Regulations for Undergraduate Program under Course System

3.1 Introduction

From the academic session 1990-91, the University has introduced a course system for undergraduate studies. The rules and regulations for administering undergraduate curricula through the Course System have been applicable to students henceforth. This new system has been introduced with an aim to create a continuous, even and consistent workload throughout the term for the students. This new curriculum does not demand the same rate of academic progress from all students for obtaining the degree but only lays down the pace expected of a normal student. A student whose background or capacity for assimilation is lower is permitted to complete the program at a slower pace by studying a fewer number of courses during a given term, subject to a minimum course load.

Given below is an extract from the report of the Committee for Framing Recommendations for Implementation and Administration of Course System of instruction at undergraduate level as approved in the meetings of the Academic Council held in 1992. Only relevant sections of the report and the amendments that were subsequently made to it are included for clarity.

The Course System

The salient features of the Course System are as follows:

- Introduction of Letter Grade and Grade Points instead of numerical grades.
- Limiting the number of theoretical courses and examination papers to around five in each term.
- Introduction of more optional courses to enable the students to select courses according to their individual needs and preferences.
- Continuous evaluation of student's performance.

- Abolition of a pass or a fail on an annual basis.
- Providing opportunity to a student to take fewer or more courses than the normal course load depending on own capability and needs.
- Providing flexibility to allow a student to progress at desired pace depending on own ability or convenience, subject to some regulations on minimum earned credits and minimum Grade Point Average (GPA) requirements.
- Promotion of student-teacher interaction and contact.

Besides the professional courses pertaining to each discipline, the undergraduate curriculum gives a strong emphasis on acquiring thorough knowledge in the basic sciences of Mathematics, Physics and Chemistry. Due importance is also given on the study of several subjects in Humanities and Social Sciences.

The first two terms of Bachelor's degree programs generally consist of courses in basic engineering and architecture subjects, while the third and subsequent terms go on to develop competence in specific disciplines.

3.2 Student Admission

Students are admitted in undergraduate curricula in the Department of Architecture, Urban and Regional Planning, Chemical Engineering, Civil Engineering, Water Resources Engineering, Computer Science and Engineering, Electrical and Electronic Engineering, Mechanical Engineering, Industrial and Production Engineering, Materials and Metallurgical Engineering and Naval Architecture and Marine Engineering as per existing rules of the university. The Registrar's Office serves as the Admissions Office and deals with course registration in addition to student admission.

3.3 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 the end of Term II and the commencement

of Term I of the following academic session. During the short term, students may take additional courses to make up deficiencies in credit and GPA requirements for Bachelor's degree spending less time than the normal duration.

Respective departments will take the decisions about courses to be offered during each short term depending upon the availability of course teachers and number of students willing to take a particular course.

Duration of Terms

The duration of each of Term I and Term II will be 18 weeks that will be used as follows:

Classes	14 weeks
Recess before Term Final Examination	2 weeks
Term Final Examination (approximately)	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.

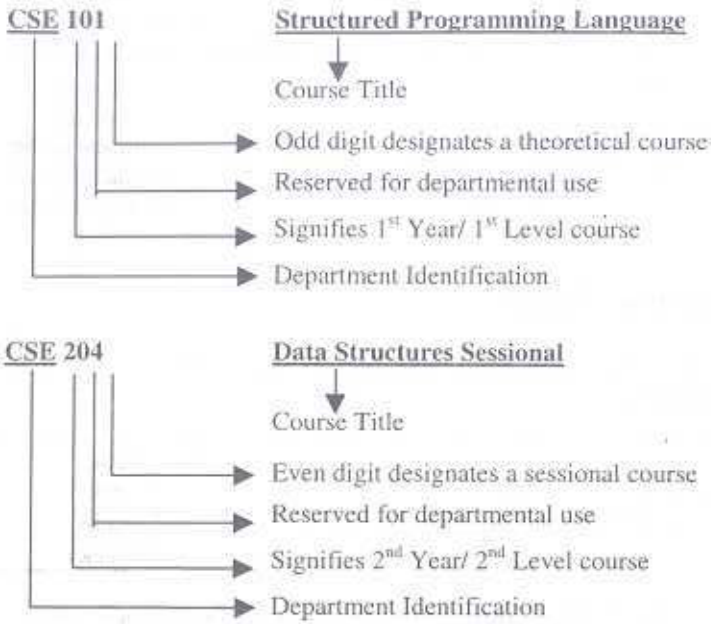
3.4 Course Pattern and Credit Structure

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

Course Designation System

Each course is designated by a two to four letter code identifying the department offering the code followed by a three-digit number having the following interpretation:

- The first digit corresponds to the year/level in which the course is normally taken by the students.
- The second digit is reserved for departmental use. It usually identifies a specific area of study within the department.
- The last digit is an odd number for theoretical courses and an even number for sessional courses.



Assignment of Credits

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

- Theoretical Courses: One lecture per week per term is equivalent to one credit.
- Sessional Courses: Credits for sessional courses is half of the class hours per week per term.

Credits are also assigned to project and thesis work taken by the students. The amount of credits assigned to such work varies from one discipline to another.

Types of Courses

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

- Core Courses: In each discipline, a number of courses are identified as core courses, which form the nucleus of the respective bachelor's degree program. A student has to complete all of the designated core courses of his/her discipline.
- Prerequisite Courses: Some of the core courses are identified as prerequisite courses for a specific subject. A prerequisite course is the one that is required to be completed before some other course(s) can be taken.
- Optional Courses: Apart from the core courses, the students can choose from a set of optional courses. A required number of optional courses from a specified group have to be chosen.

3.5 Course Offering and Instruction

The courses to be offered in a particular term are announced and published in the Course Catalog along with the tentative Term Schedule before the end of the previous term. The courses 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 prerequisite or core courses in any term depending upon the number of students who dropped or failed the course in the previous term.

Each course is conducted by a course teacher who is responsible for maintaining the expected standard of the course and for the assessment of student performance. Depending on the strength of registered students (i.e. on the number of students) enrolled for the course, the teacher concerned might have course associates and teaching assistants (TA) to aid in teaching and assessment.

3.6 Departmental Monitoring Committee

Consistent with its resilient policy to keep pace with new developments in the field of science and technology, the university updates its course curriculum at frequent intervals (at least every three years). Such updating aims not only to include the expanding frontiers of knowledge in the various fields but also to accommodate the changing social, industrial and professional needs of the country. This can be done

through the deletion and modification of some of the courses and also through the introduction of new ones.

The Board of Undergraduate Studies (BUGS) of each department forms a Departmental Monitoring Committee with three teachers of the department. This committee is in charge of monitoring and evaluating the performance of the course system within the department. In addition to other teachers of the department, the committee also may propose from time to time to the Board of Undergraduate Studies (BUGS) any changes or modifications required for upgrading the Undergraduate Curriculum and the Course System.

3.7 Teacher Student Interaction

The new system encourages students to come in close contact with the teachers. For promotion of a high level of teacher-student interaction, each student is assigned to an Adviser and the student is free to discuss with his adviser all academic matters. Students are also encouraged to meet with other teachers any time for help and guidance in academic matters.

3.8 Student Adviser

One adviser is normally appointed for a group of students by the Board of Undergraduate Studies (BUGS) of the concerned department. The adviser advises each student about the courses to be taken in each term by discussing the academic program of that particular term with the student. However, it is also the student's responsibility to keep regular contact with his/her adviser who will review and eventually approve the student's specific plan of study and monitor subsequent progress of the student. The adviser is usually in the rank of an Assistant Professor or above of the concerned department.

For a student of second and subsequent terms, the number and nature of courses for which he/she can register is decided on the basis of academic performance during the previous term. The adviser may permit the student to drop one or more courses based on previous academic performance.

3.9 Course Registration

Any student who uses classroom or laboratory facilities or faculty time is required to register formally. Upon admission to the university each student is assigned to a student adviser with whose consent and advice the student can register for courses he intends to take during a given term.

Registration Procedure

At the commencement of each term, each student has to fill up a course registration form in consultation with and under the guidance of his/her advisor. The date, time and venue of registration are announced in advance by the Registrar's Office. Much counseling and advising are accomplished at this time. It is absolutely essential that all the students be present for registration at the specified time. Late registration is, however, permitted during the first week on payment of a late registration fee.

Pre-conditions for Registration

For first year students, department-wise enrollment/admission is mandatory prior to registration. At the beginning of the first term, an orientation program is conducted for them where they are handed over with the registration package on production of the enrollment slip/proof of admission.

Any student other than freshmen having outstanding dues to the university or a hall of residence is not permitted to register. Each student must clear their dues and obtain a clearance certificate, on the production of which, he/she will be given necessary Course Registration Forms to perform course registration.

A student is allowed to register in a particular course subject to the class capacity constraints and satisfaction of pre-requisite courses. However, even if a student fails in a pre-requisite course in any term, the concerned BUGS may allow him/her to register for course which depends upon the pre-requisite course provided that his/her attendance and performance in the continuous assessment of the mentioned pre-requisite course is found to be satisfactory.

Limits on the Credit Hours to be taken

A student must be enrolled for at least 15 credit hours and is allowed to take a maximum of 24 credit hours. A student must enroll for the sessional courses prescribed in a particular term within the allowable credit hour limits.

In special cases where it is not possible to allot the minimum required 15 credit hours to a student, the concerned BUGS may approve a lesser number of credit hours to suit individual requirements. Such cases are only applicable to students leading less than 15 credit hours for graduation.

Registration Deadline

Each student must register for the courses to be taken before the commencement of each term. Late registration is permitted only during the first week of classes. Late registration after this date will not be accepted unless the student submits a written appeal to the registrar through the concerned Head of the department and can document extenuating circumstances such as medical problems from the Chief Medical Officer of the university or some other academic commitments which prohibits enrollment prior to the last date of registration.

Penalty for Late Registration

Students who fail to register during the designated dates for registration are charged a late registration fee of Tk. 100.00 (one hundred only). This is not waived whatever the reason behind the delay in registration.

Course Add/Drop

A student has some limited options to add or delete courses from the registration list. Addition of courses is allowed only within the first two weeks of a regular term and only during the first week of a short term. Dropping a course is permitted within the first four weeks of a regular term and two weeks of a short term.

Any student willing to add or drop courses has to fill up a Course Adjustment Form that is available in the Registrar's Office. This also has to be done in consultation with and under the guidance of the student's respective adviser. The original copy of the Course

Adjustment Form has to be submitted to the Registrar's Office, where the required number of photocopies are made for distribution to the concerned adviser, Head, Dean, Controller of Examinations and the student.

All changes must be approved by the adviser and the Head of the concerned department. The Course Adjustment Form has to be submitted after being signed by the concerned persons. The respective course teacher's consent is also required.

Withdrawal from a Term

If a student is unable to complete the 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. However, he/she may choose not to withdraw any laboratory/sessional/design course if the grade obtained in such a course is 'D' or better. The application must be supported by a medical certificate from the Chief Medical Officer of the university. The Academic Council will take the final decision about such applications.

3.10 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, class evaluation, class participation, homework assignment and a term final examination. The assessment in laboratory/sessional courses is made through observation of the student at work during the class, viva-voce during laboratory hours and quizzes.

Each course has a certain number of credits, which describes its corresponding weights. A letter grade with a specified number of grade points is awarded to each course for which a student is registered. A student's performance is measured both by the number of credits completed satisfactorily and by the weighted average of the grade point earned. A minimum grade point average (GPA) is essential for satisfactory progress. A minimum number of earned credits also have to be acquired in order to qualify for the degree.

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

Grade	Grade Points	Numerical Markings
A+	4.0	80% and above
A	3.75	75% to below 80%
A-	3.50	70% to below 75%
B+	3.25	65% to below 70%
B	3.00	60% to below 65%
B-	2.75	55% to below 60%
C+	2.50	50% to below 55%
C	2.25	45% to below 50%
D	2.00	40% to below 45%
F*	0.00	below 40%
I**	-	Incomplete
X	-	Continuation (For project and thesis/design courses)
S	-	Satisfactory (non credit courses)
U	-	Unsatisfactory (non credit courses)
W***	-	Withdrawal

* Subject in which the student gets F grades shall not be counted towards credit hours 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.

***A student must withdraw officially from a course within two working weeks of the commencement of the semester or else his grade in that course shall be recorded as failure unless he is eligible to get a grade of I (incomplete). A student may be permitted to withdraw and change his course within the specified period with the approval of his adviser, Head of the department and the respective teacher(s) concerned.

3.11 Distribution of Marks

Thirty percent (30%) of marks of a theoretical course shall be allotted for continuous assessment, i.e. quizzes, home assignments, class evaluation and class performance. The rest of the marks will be allotted

to the Term Final Examination that is conducted centrally by the university. There are internal and external examiners for each course in the Term Final Examination of three hours duration. Distribution of marks for a given course is as follows.

Class Participation	10%
Homework assignment and quizzes	20%
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
Below 60%	0

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

3.12 Calculation of GPA

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

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

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

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

A numerical example

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

Course	Credits, C_i	Grade	Grade Points, G_i	C_i*G_i
ME 160	1.50	A-	3.50	5.250
ME 165	3.00	A+	4.00	12.000
CHEM 101	3.00	A	3.75	11.250
CHEM 114	1.50	A-	3.50	5.250
MATH 141	3.00	B	3.00	9.000
HUM 175	3.00	B-	2.75	8.250
HUM 275	2.00	B	3.00	6.000
CSE 101	3.00	A+	4.00	12.000
CSE 102	1.50	A	3.75	5.625
Total	**21.50**			**74.625**

GPA = 74.625/21.50 = 3.47

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

Level	Term	Credit Hours Earned, TC_i	GPA Earned, GPA_i	GPA_i*TC_i
1	1	21.00	3.73	78.330
1	2	20.50	3.93	80.565
2	1	19.75	3.96	78.210
2	2	20.25	4.00	81.000
Total		**81.50**		**318.105**

CGPA = 318.105/81.50 = 3.90

3.13 Impacts of Grade earned

The courses in which a student has earned a 'D' or a higher grade will be counted as credits earned by him/her. Any course in which a student has obtained an 'F' grade will not be counted towards his/her earned credits or GPA calculation. However, the 'F' grade will remain permanently on the Grade Sheet and the Transcript.

A student who obtains an 'F' grade in a core course will have to repeat that particular course. However, if a student gets an 'F' in an optional course, he/she may choose to repeat that course or take a substitute course if available. When a student will repeat a course in which he/she has previously obtained an 'F', he/she will not be eligible to get a grade better than 'B' in that repeated course.

If a student obtains a grade lower than 'B' in a particular course he/she will be allowed to repeat the course only once for the purpose of grade improvement by forgoing his/her earlier grade. However, he/she will not be eligible to get a grade better than 'B' for an improvement course. A student will be permitted to repeat for grade improvement purposes a maximum of four courses in B. Sc. Engineering and BURP programs and a maximum of five courses in B. Arch. program.

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

3.14 Classification of Students

At the Bangladesh University of Engineering and Technology (BUET), regular students are classified according to the number of credit hours completed/earned towards a degree. The following classification applies to all the students:

Level	Credit Hours Earned	
	Engineering	Architecture
Level 1	0 to 36	0 to 35
Level 2	37 to 72	36 to 70
Level 3	73 to 108	71 to 113
Level 4	109 and above	114 to 154
Level 5		155 and above

However, before the commencement of each term all students other than freshmen are classified into three categories:

Category 1: This category consists of students who have passed all the courses described for the term. A student belonging to this category will be eligible to register for all courses prescribed for the upcoming term.

Category 2: This category consists of students who have earned a minimum of 15 credits but do not belong to category 1. A student belonging to this category is advised to take at least one course less since he might have to register for one or more backlog courses as prescribed by his/her adviser.

Category 3: This category consists students who have failed to earn the minimum required 15 credits in the previous term. A student belonging to this category is advised to take at least two courses less than a category 1 student subject to the constraint of registering at least 15 credits. However, he will also be required registering for backlog courses as prescribed by the adviser.

3.15 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 average for all the terms completed.

Students will be considered to be making normal progress toward a degree if their Cumulative Grade Point Average (CGPA) for all work attempted is 2.20 or higher. Students who regularly maintain a term GPA of 2.20 or better are making good progress toward the degrees and are in good standing with the university. Students who fail to maintain this minimum rate of progress will not be in good standing. This can happen when any one of the following conditions exists.

1. The term GPA falls below 2.20.
2. The Cumulative Grade Point Average (CGPA) falls below 2.20.

3. The earned number of credits falls below 15 times the number of terms attended.

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

3.16 Probation and Suspension

Undergraduate students who fail to maintain the minimum rate of progress as mentioned before may be placed on academic probation. The objective of the academic probation is to remind or warn the student that satisfactory progress towards graduation is not being made. A student may be placed on academic probation when either of the following conditions exists.

1. The term GPA falls below 2.20.
2. The Cumulative Grade Point Average (CGPA) falls below 2.20.

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

The minimum period of probation is one term, but the usual period is for one academic year. This gives the student an opportunity to improve the GPA through the completion of additional course work during the period the student is on probation. The probation may be extended for additional terms until the students achieve an overall GPA of 2.20 or better.

An academic probation is not to be taken lightly. A student on academic probation who fails to maintain a GPA of at least 2.20 during two consecutive academic years may be suspended from the university. A student who has been suspended may petition to the Dean of Faculty, but this petition will not be considered until the student has been suspended for at least one full term.

Petitions for reinstatement must set forth clearly the reasons for the previous unsatisfactory academic records and it must delineate the new

conditions that have been created to prevent the recurrence of such work. Each such petition is considered individually on its own merits.

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

3.17 Measures for Helping Academically Weak Students

First, academically weak students will be identified according to the following criteria:

1. The term GPA falls below 2.20.
2. The Cumulative Grade Point Average (CGPA) falls below 2.20.
3. The earned number of credits falls below 15 times the number of terms attended.

The following provisions will be made as far as possible to help such academically weak students to enable them to complete their studies within the maximum allowable period of 7 years in Engineering and 8 years in Architecture.

1. All such students may be given a load of not more than four courses in the term following the term in which the student's GPA was below 2.20
2. Some basic and core courses maybe offered during the Short Term in order to enable academically weak students to partially make up for the reduced work load during the regular terms.

3.18 Rules for Special Courses

A special course is a self-study course, but is amongst the regular courses listed in the course catalog. This type of course is offered only in exceptional cases. The following rules are applicable to all special courses:

- Whether a course is to be floated as a special course will be decided by the Head of the concerned department in consultation with the teacher/course coordinator concerned.

Such a decision also has to be reported to the Academic Council.

- A special course may be offered in a particular term only if the course is not running in that term as a regular course.
- The special course is offered to a student in his/her last term if it helps him/her to graduate in that term.
- A student is allowed to register for a maximum of two courses on a self-study basis.
- A special course cannot be utilized for grade improvement purposes.
- Normally no lecture will be delivered for a special course but laboratory/design classes may be held if they form part of a course.
- The course coordinator/course teacher will assign homework, administer quizzes, and final examination for giving assessments at the end of the term.

3.19 Rules for Courses offered in Short Term

- The courses to be run during the Short Term shall be decided on the recommendations of departments on the basis of essential deficiencies to be made up by a group of students. Once floated, other students could be allowed to register in those courses subject to the capacity constraints and satisfaction of prerequisites.
- Student will be allowed to register in a maximum of two courses during the Short Term.
- A course may be given a weight of up to 6 credits in any Short Term following a graduation/final term if he/she is short by a maximum of 6 earned credits only, on a self-study basis with no formal instruction. In a self-study course, there will be a final examination, beside the continuous assessment.
- A certain fee for each credit hour to be registered to be borne by the students who enroll during Short Term.

3.20 Minimum Earned Credit and GPA Requirement for Obtaining Degree

Minimum credit hour requirements for the award of bachelor's degree in engineering (B.Sc. Engg.) and architecture (B.Arch.) will be decided

by the respective BUGS. However, at least 157 credit hours for engineering and 190 credit hours for architecture must be earned to be eligible for graduation, and this must include the specified core courses.

The minimum GPA requirement for obtaining a Bachelor's degree in engineering and architecture is 2.20.

A student may take additional courses with the consent of his/her Adviser in order to raise GPA, but he/she may take a maximum of 15 such additional credits in engineering and 18 such additional credits in architecture beyond respective credit-hour requirements for Bachelor's degree during his/her entire period of study.

Application for Graduation and Award of Degree

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

3.21 Time Limits for Completion of Bachelor's Degree

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

3.22 Attendance, Conduct and Discipline

The university has strict rules regarding the issues of attendance in class and regarding the disciplinary issues.

Attendance

All students are expected to attend classes regularly. The university believes that attendance is necessary for effective learning. The first responsibility of a student is to attend classes regularly, and one is required to attend at least 60% of all classes held in any course.

Conduct and Discipline

A student is expected conform to a high standard of discipline and conduct himself/herself, within and outside the precincts of the

university in a manner befitting the students of a university of national importance. He is expected to show due courtesy and consideration to the employees of the university and Halls of Residence, good neighborliness to his fellow students and the teachers of the university and pay due attention and courtesy to visitors.

To safeguard its ideal of scholarship, character and personal behavior, the university reserves the right to withdraw any student at any time for any reason deemed sufficient.

3.23 Absence during a Term

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

A student who has been absent for short periods, up to a maximum of three weeks due to illness, should approach the course teacher(s) or the course coordinator(s) for make-up quizzes or assignments immediately upon return to classes. Such request has to be supported by medical certificate from a University Medical Officer. The medical certificate issued by a registered medical practitioner (with the registration number shown explicitly on the certificates) will also be acceptable only on those cases where the student has valid reasons for his absence from the university.

3.24 Honors

Candidates for Bachelor's degree in Engineering and Architecture will be awarded the degree with honors if their Cumulative Grade Point Average (CGPA) is 3.75 or better.

Dean's List

As a recognition of excellent academic performance, the names of students obtaining an average GPA of 3.75 or above in two consecutive regular terms of an academic year may be published in the Dean's List in each Faculty. Students who have received an 'F' grade in any course during any of the two regular terms will not be considered for the Dean's List that year.

Gold Medal

Gold medal for outstanding Computer Science and Engineering graduates was introduced and the medal is presented to the student who secures the first position in the entire class and whose CGPA is above 3.75. The student must have completed his/her undergraduate coursework within four consecutive academic years and have a satisfactory attendance to his credit.

4 Course Requirements for Undergraduate Computer Science and Engineering Students

Undergraduate students of the Department of Computer Science and Engineering have to follow a particular course schedule which is given below according to term-wise distribution of the courses:

Level-I Term-I

Course Number	Course Title	Hours/Week		Credit	Pre-requisite
		Theory	Sessional		
ME 160	Mechanical Engineering Drawing-I	0.00	3.00	1.50	
ME 165	Basic Mechanical Engineering	3.00	0.00	3.00	
CHEM 101	Chemistry	3.00	0.00	3.00	
CHEM 114	Inorganic Quantitative Analysis	0.00	3.00	1.50	
MATH 141	Mathematics-I (Differential Calculus and Coordinate Geometry)	3.00	0.00	3.00	
HUM 175	English	3.00	0.00	3.00	
HUM 275	Economics	2.00	0.00	2.00	
CSE 101N	Structured Programming Language	3.00	0.00	3.00	
CSE 102N	Structured Programming Language Sessional	0.00	3.00	1.50	
	Total	**17.00**	**9.00**	**21.50**	

LEVEL-I TERM-II

Course Number	Course Title	Hours/Week		Credit	Pre-requisite
		Theory	Sessional		
EEE 163	Introduction to Electrical Engineering	3.00	0.00	3.00	
EEE 164	Introduction to Electrical Engineering Sessional	0.00	3.00	1.50	
MATH 143	Mathematics-II (Integral Calculus, and Ordinary and Partial Differential Equations)	4.00	0.00	4.00	MATH 141
PHY 109	Physics (Heat and Thermodynamics, Structure of Matter, Waves and Oscillations, and Physical Optics)	4.00	0.00	4.00	
PHY 102	Physics Sessional	0.00	3.00	1.50	
CSE 103N	Discrete Mathematics	3.00	0.00	3.00	
CSE 105N	Object Oriented Programming Language	2.00	0.00	2.00	CSE 101N
CSE 106N	Object Oriented Programming Language Sessional	0.00	3.00	1.50	
	Total	**16.00**	**9.00**	**20.50**	

LEVEL-II TERM-I

Course Number	Course Title	Hours/Week		Credit	Pre-requisite
		Theory	Sessional		
EEE 263	Electronic Devices and Circuits	4.00	0.00	4.00	EEE 163
EEE 264	Electronic Devices and Circuits Sessional	0.00	3.00	1.50	
MATH 243	Mathematics-IV (Matrices, Vectors, and Fourier Analysis)	3.00	0.00	3.00	MATH 143
CSE 201N	Numerical Methods	3.00	0.00	3.00	
CSE 203N	Data Structures	3.00	0.00	3.00	CSE 101N
CSE 204N	Data Structures Sessional	0.00	1.50	0.75	
CSE 205N	Digital Logic Design	3.00	0.00	3.00	
CSE 206N	Digital Logic Design Sessional	0.00	3.00	1.50	
	Total	**16.00**	**7.50**	**19.75**	

LEVEL-II TERM-II

Course Number	Course Title	Hours/Week		Credit	Pre-requisite
		Theory	Sessional		
EEE 269	Electrical Drives and Instrumentation	3.00	0.00	3.00	EEE 163
EEE 270	Electrical Drives and Instrumentation Sessiona	0.00	3.00	1.50	
MATH 241	Mathematics-III (Complex Variable, Laplace Transforms, and Statistics)	4.00	0.00	4.00	MATH 143
CSE 207N	Algorithms	3.00	0.00	3.00	CSE 103N CSE 203N
CSE 208N	Algorithms Sessional	0.00	1.50	0.75	
CSE 209N	Digital Electronics and Pulse Techniques	3.00	0.00	3.00	EEE 263
CSE 210N	Digital Electronics and Pulse Techniques Sessional	0.00	3.00	1.50	
CSE 211N	Theory of Computation	2.00	0.00	2.00	CSE 103N
CSE 214N	Assembly Language Programming	0.00	3.00	1.50	
	Total	**15.00**	**10.50**	**20.25**	

LEVEL-III TERM-I

Course Number	Course Title	Hours/Week		Credit	Pre-requisite
		Theory	Sessional		
CSE 301N	Mathematical Analysis for Computer Science	3.00	0.00	3.00	MATH 243
CSE 303N	Database	3.00	0.00	3.00	
CSE 304N	Database Sessional	0.00	3.00	1.50	
CSE 305N	Computer Architecture	3.00	0.00	3.00	CSE 205N
CSE 307N	Software Engineering	3.00	0.00	3.00	
CSE 309N	Compiler	3.00	0.00	3.00	CSE 211N
CSE 310N	Compiler Sessional	0.00	1.50	0.75	
CSE 311N	Data Communication	3.00	0.00	3.00	MATH 241
	Total	**18.00**	**4.50**	**20.25**	

LEVEL-III TERM-II

Course Number	Course Title	Hours/Week		Credit	Pre-requisite
		Theory	Sessional		
HUM 371	Financial and Managerial Accounting	2.00	0.00	2.00	
CSE 313N	Operating System	3.00	0.00	3.00	CSE 207N CSE 305N
CSE 314N	Operating System Sessional	0.00	1.50	0.75	
CSE 315N	Microprocessors and Microcontrollers	3.00	0.00	3.00	CSE 205N
CSE 316N	Microprocessors and Microcontrollers Sessional	0.00	1.50	0.75	
CSE 317N	Artificial Intelligence	3.00	0.00	3.00	CSE 207N
CSE 318N	Artificial Intelligence Sessional	0.00	1.50	0.75	
CSE 319N	Pattern Recognition	3.00	0.00	3.00	CSE 211N
CSE 320N	Pattern Recognition Sessional	0.00	1.50	0.75	
CSE 321N	Communication Engineering	3.00	0.00	3.00	CSE 311N
	Total	**17.00**	**6.00**	**20.00**	

LEVEL-IV TERM-I

Course Number	Course Title	Hours/Week		Credit	Pre-requisite
		Theory	Sessional		
CSE 400N	Project and Thesis	0.00	3.00	1.50	
CSE 401N	Computer Networks	3.00	0.00	3.00	
CSE 402N	Computer Networks Sessional	0.00	1.50	0.75	
CSE 403N	Digital System Design	3.00	0.00	3.00	CSE 315N
CSE 404N	Digital System Design Sessional	0.00	3.00	1.50	
CSE 405N	System Analysis and Design	3.00	0.00	3.00	CSE 303N
CSE 406N	System Analysis, Design and Development Sessional	0.00	3.00	1.50	
CSE 407N	Computer Interfacing	3.00	0.00	3.00	CSE 305N CSE 315N
CSE 408N	Computer Interfacing Sessional	0.00	1.50	0.75	
CSE nnnN	Option-I	3.00	0.00	3.00	
	Total	**15.00**	**12.00**	**21.00**	

Option-I

Course Number	Course Title	Hours/Week		Credit	Pre-requisite
		Theory	Sessional		
CSE 421N	Basic Graph Theory				CSE 207N
CSE 423N	Fault Tolerant Systems				CSE 305N
CSE 425N	Machine Learning				CSE 317N

LEVEL-IV TERM-II

Course Number	Course Title	Hours/Week		Credit	Pre-requisite
		Theory	Sessional		
IPE 493	Industrial Management	3.00	0.00	3.00	
CSE 400N	Project and Thesis	0.00	6.00	3.00	
CSE 409N	Computer Graphics	3.00	0.00	3.00	MATH 243 CSE 207N
CSE 410N	Computer Graphics Sessional	0.00	1.50	0.75	
CSE 411N	VLSI Design	3.00	0.00	3.00	CSE 209N
CSE 412N	VLSI Design Sessional	0.00	1.50	0.75	
CSE nnnN	Option-II	3.00	0.00	3.00	
HUM nnn	Option-III	2.00	0.00	2.00	
	Total	**14.00**	**9.00**	**18.50**	

Option-II

Course Number	Course Title	Hours/Week		Credit	Pre-requisite
		Theory	Sessional		
CSE 431N	Simulation and Modeling				CSE 301N
CSE 433N	Image Processing				MATH 241
CSE 435N	Basic Multimedia Theory				

Option-III

Course Number	Course Title	Hours/Week		Credit	Pre-requisite
		Theory	Sessional		
HUM 471	Sociology				
HUM 473	Government				
HUM 411	Business Law				

SUMMARY

Level Term	Theory	Sessional	Credits
Level 1 Term 1	17.00	9.00	21.50
Level 1 Term 2	16.00	9.00	20.50
Level 2 Term 1	16.00	7.50	19.75
Level 2 Term 2	15.00	10.50	20.25
Level 3 Term 1	18.00	4.50	20.25
Level 3 Term 2	17.00	6.00	20.00
Level 4 Term 1	15.00	12.00	21.00
Level 4 Term 2	14.00	9.00	18.50
Total	128.00	67.50	161.75

5 Detail Outline of Undergraduate Courses Offered by the Department of Computer Science and Engineering

Level-I Term-I

ME 160 Mechanical Engineering Drawing-I
3 hours in a week, 1.50 Cr.

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

ME 165 Basic Mechanical Engineering
3 hours in a week, 3.00 Cr.

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

CHEM 101 Chemistry
3 hours in a week, 3.00 Cr.

Atomic structure, quantum numbers, electronic configuration, periodic table; Properties and uses of noble gases; Different types of chemical bonds and their properties; Molecular structure of compounds; Selective organic reactions; Different types of solutions and their compositions; Phase rule, phase diagram of 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 a week, 1.50 Cr.

Volumetric analysis: acid-base titration, oxidation-reduction titration, determination of Fe, Cu, Ca volumetrically.

HUM 275 Economics
2 hours in a week, 2.00 Cr.

Definition of Economics; Economics and engineering; Principles of economics.

Micro-Economics: Introduction to various economic systems – capitalist, command and mixed economy; Fundamental economic problems and the mechanism through which these problems are solved; Theory of demand and supply and their elasticities; Theory of consumer behavior; Cardinal and ordinal approaches of utility analysis; Price determination; Nature of an economic theory; Applicability of economic theories to the problems of developing countries; Indifference curve techniques; Theory of 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; Use of derivative in economics: maximization and minimization of economic functions, relationship among total, marginal and average concepts.

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.

MATH 141 Mathematics-I (Differential Calculus and Co-ordinate Geometry)
3 hours in a week, 3.00 Cr.

Differential Calculus: Limits, continuity and differentiability; Successive differentiation of various types of functions; Leibnitz's Theorem; Rolle's Theorem; Mean value Theorem in finite and infinite forms; Lagrange's form of remainders; Cauchy's form of remainder;

Expansion of functions; Evaluation of indeterminate forms by L'Hospitals rule; Partial differentiation; Euler's Theorem; Tangent and Normal, Subtangent and subnormal in cartesian and polar co-ordinates; Maximum and minimum values of functions of single variable; Points of inflexion; Curvature, radius of curvature, center of curvature; Asymptotes, curve tracing.

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

HUM 101 English

3 hours in a week, 3.00 Cr.

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

CSE 101N Structured Programming Language

3 hours in a week, 3.00 Cr.

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

Reference language: C

CSE 102N Structured Programming Language Sessional

3 hours in a week, 1.50 Cr.

Laboratory works based on CSE 101N.

LEVEL-I TERM-II

EEE 163 Introduction to Electrical Engineering

3 hours in a week, 3.00 Cr.

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

EEE 164 Introduction to Electrical Engineering Sessional

3 hours in a week, 1.50 Cr.

Laboratory works based on EEE 163.

MATH 143 Mathematics-II (Integral Calculus, and Ordinary and Partial Differential Equations)

4 hours in a week, 4.00 Cr.

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

Area of surface of revolution; Jacobian, multiple integrals and its application.

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

Partial Differential Equations (PDE): Four rules for solving simultaneous equations of the form $\frac{dx}{P}=\frac{dy}{Q}=\frac{dz}{R}$; Lagrange's method of solving PDE of order one; Integral surfaces passing through a given curve; Nonlinear PDE of order one (complete, particular, singular and general integrals): standard forms $f(p,q) = 0$, $z = px + qy + f(p,q)$, $f(p,q,z) = 0$, $f_1(x,p) = f_2(y, q)$; Charpit's method; Second order PDE: its nomenclature and classifications to canonical (standard)-parabolic, elliptic, hyperbolic; Solution by separation of variables. Linear PDE with constant coefficients.

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

PHY 109 Physics (Heat and Thermodynamics, Structure of Matter, Waves and Oscillations, and Physical Optics)

4 hours in a week, 4.00 Cr.

Heat & Thermodynamics: Principle of temperature measurements: platinum resistance thermometer, thermo-electric thermometer, pyrometer; Kinetic theory of gases: Maxwell's distribution of molecular speeds, mean free path, equipartition of energy, Brownian motion, Van der Waal's equation of state, review of the First Law of thermodynamics and its application, reversible and irreversible processes, Second Law of thermodynamics, Carnot cycle; Efficiency of

heat engines, Carnots Theorem, entropy and disorder, thermodynamic functions, Maxwell relations, Clausius-Clapeyron Equation, Gibbs Phase Rule, Third Law of thermodynamics.

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

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

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

PHY 102 Physics Sessional

3 hours in a week, 1.50 Cr.

Laboratory works based on PHY 109

CSE 103N Discrete Mathematics
3 hours in a week, 3.00 Cr.

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

CSE 105N Object Oriented Programming Language
2 hours in a week, 2.00 Cr.

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

Reference languages: C++ and Java.

CSE 106N Object Oriented Programming Language Sessional
3 hours in a week, 1.50 Cr.

Laboratory works based on CSE 105N.

LEVEL-II TERM-I

EEE 263 Electronic Devices and Circuits
4 hours in a week, 4.00 Cr.

Introduction to semiconductors, p-type and n-type semiconductors; p-n junction diode characteristics; Diode applications: half and full wave rectifiers, clipping and clamping circuits, regulated power supply using zener diode.

Bipolar Junction Transistor (BJT): principle of operation, I-V characteristics; Transistor circuit configurations (CE, CB, CC), BJT biasing, load lines; BJTs at low frequencies; Hybrid model, *h* parameters, simplified hybrid model; Small-signal analysis of single and multi-stage amplifiers, frequency response of BJT amplifier.

Field Effect Transistors (FET): principle of operation of JFET and MOSFET; Depletion and enhancement type NMOS and PMOS; biasing of FETs; Low and high frequency models of FETs, Switching circuits using FETs; Introduction to CMOS.

Operational Amplifiers (OPAMP): linear applications of OPAMPs, gain, input and output impedances, active filters, frequency response and noise.

Introduction to feedback, Oscillators, Silicon Controlled Rectifiers (SCR), TRIAC, DIAC and UJT: characteristics and applications; Introduction to IC fabrication processes.

EEE 264 Electronic Devices and Circuits Sessional
3 hours in a week, 1.50 Cr.

Laboratory works based on EEE 263.

CSE 201N Numerical Methods
3 hours in a week, 3 Cr.

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

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

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

CSE 204N Data Structures Sessional
3 hours in alternate week, 0.75 Cr.

Laboratory works based on CSE 203N

CSE 205N Digital Logic Design
3 hours in a week, 3 Cr.

Number systems and codes; Digital logic: Boolean algebra, De Morgan's Theorems, logic gates and their truth tables, canonical forms, combinational logic circuits, minimization techniques; Arithmetic and data handling logic circuits, decoders and encoders, multiplexers and demultiplexers; Combinational circuit design; Flip-flops, race around problems; Counters: asynchronous counters, synchronous counters and their applications; PLA design; Synchronous and asynchronous logic design; State diagram, Mealy and Moore machines; State minimizations and assignments; Pulse mode logic; Fundamental mode design.

CSE 206N Digital Logic Design Sessional
3 hours in a week, 1.50 Cr.

Laboratory works based on CSE 205N

MATH 243 Mathematics-IV (Matrices, Vectors, and Fourier Analysis)
3 hours in a week, 3.00 Cr.

Matrices: Definition of matrix; Different types of matrices; Algebra of matrices; Adjoint and inverse of a matrix; Elementary transformations of matrices; Matrix polynomials; Calay-Hamiltoi theory with uses of

rank and nullity; Normal and canonical forms; Solution of linear equations; Eigenvalues and eigenvectors.

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

Vector Algebra: Scalars and vectors, equality of vectors; Addition and subtraction of vectors; Multiplication of vectors by scalars; Scalar and vector product of two vectors and their geometrical interpretation; Triple products and multiple products; Linear dependence and independence of vectors.

Vector Calculus: Differentiation and integration of vectors together with elementary applications; Defirition of line, surface and volume integrals; Gradient, divergence and curl of point functions, various formulae, Gauss's theorem, Stoke's theorem, Green's theorem.

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

LEVEL-II TERM-II

EEE 269 Electrical Drives and Instrumentation
3 hours in a week, 3.00 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.

EEE 270 Electrical Drives and Instrumentation Sessional

3 hours in a week, 1.50 Cr.

Laboratory works based on EEE 269.

CSE 207N Algorithms

3 hours in a 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; Topological sorting; Connected components, spanning trees, shortest paths; Flow algorithms; Approximation algorithms; Parallel algorithms; Algebraic simplification and transformations; Lower bound theory; NP-completeness, NP-hard and NP-complete problems.

CSE 208N Algorithms Sessional

3 hours in alternate week, 0.75 Cr.

Laboratory work based on CSE 207N

CSE 209N Digital Electronics and Pulse Techniques

3 hours in a week, 3 Cr.

Diode logic gates, transistor switches, 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 and D/A converters with applications; S/H circuits, LED, LCD and optically coupled oscillators; Non-linear applications of OP AMPs; Analog switches.

Linear wave shaping: diode wave shaping techniques, clipping and clamping circuits, comparator circuits, switching circuits; Pulse transformers, pulse transmission, pulse generation; monostable, bistable and astable multivibrators, Schmitt trigger, blocking oscillators and time-base circuit; Timing circuits; Simple voltage sweeps, linear current sweeps.

CSE 210N Digital Electronics and Pulse Techniques Sessional

3 hours in a week, 1.50 Cr.

Laboratory works based on CSE 209N

CSE 211N Theory of Computation

2 hours in a week, 2 Cr.

Language theory; Finite automata: deterministic finite automata, nondeterministic finite automata, equivalence and conversion of deterministic and nondeterministic finite automata, pushdown automata. Context free languages; Context free grammars; Turing Machines: basic machines, configuration, computing with Turing machines, combining Turing machines; Undecidability.

CSE 214N Assembly Language Programming

3 hours in a week, 1.50 Cr.

Hardware architecture and software architecture; Instruction types and their formats; Assembly program format; Assembly process; Interrupts and system services; Addressing methods; High level control structure formation; Use of subroutines and macros; Numeric processing and string processing; Concurrent processes and high level linking; Disk geometry, file system and file I/O handling.

MATH 241 Mathematics-III (Complex Variable, Laplace Transforms, and Statistics)

4 hours in a week, 4.00 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 Theorem 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, (binomial, Poisson and negative binomial); Characteristics of distributions; Elementary sampling theory; Estimation; Hypothesis testing and regression analysis.

CSE 207 Algorithms

3 hours in a 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; Topological sorting; Connected components, spanning trees, shortest paths; Flow algorithms; Approximation algorithms; Parallel algorithms; Algebraic simplification and transformations; Lower bound theory; NP-completeness, NP-hard and NP-complete problems.

CSE 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 in a week, 3 Cr.

Diode logic gates, transistor switches, 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 and D/A converters with applications; S/H circuits, LED, LCD and optically coupled oscillators; Non-linear applications of OP AMPs; Analog switches.

Linear wave shaping: diode wave shaping techniques, clipping and clamping circuits, comparator circuits, switching circuits; Pulse transformers, pulse transmission, pulse generation; monostable, bistable and astable multivibrators, Schmitt trigger, blocking oscillators and time-base circuit; Timing circuits; Simple voltage sweeps, linear current sweeps.

CSE 210 Digital Electronics and Pulse Techniques Sessional

3 hours in a week, 1.50 Cr.

Laboratory works based on CSE 209

CSE 211 Theory of Computation

2 hours in a week, 2 Cr.

Language theory; Finite automata: deterministic finite automata, nondeterministic finite automata, equivalence and conversion of deterministic and nondeterministic finite automata, pushdown automata. Context free languages; Context free grammars; Turing Machines: basic machines, configuration, computing with turing machines, combining turing machines.

CSE 214 Assembly Language Programming

3 hours in a week, 1.50 Cr.

Hardware architecture and software architecture; Instruction types and their formats; Assembly program format; Assembly process; Interrupts and system services; Addressing methods; High level control structure formation; Use of subroutines and macros; Numeric processing and string processing; Concurrent processes and high level linking; Disk geometry, file system and file I/O handling.

LEVEL-III TERM-I

CSE 301N Mathematical Analysis for Computer Science

3 hours in a week, 3.00 Cr.

Recurrent problems; Manipulation of sums; Number theory; Special numbers; Generating functions.

Random variables; Stochastic process; Markov chains (discrete parameter, continuous parameter, birth-death process); Queuing models (birth-death model, Markovian model), open and closed queuing network; Application of queuing models.

CSE 303N Database

3 hours in a week, 3.00 Cr.

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

CSE 304N Database Sessional

3 hours in a week, 1.50 Cr.

Laboratory works based on CSE 303N

CSE 305N Computer Architecture

3 hours in a week, 3.00 Cr.

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

CSE 307N Software Engineering

3 hours in a week, 3.00 Cr.

Concepts of software engineering; Software engineering paradigms; Different phases of software; Synthesis vs. iterative design; Top-down

and bottom-up design; Different design tools; Structured and non-Structured programming; Data-directed design techniques; Modular design; Design of automatic, redundant and defensive programs; Influences of languages in design process; Concepts of complexity measures; COCOMO model; Tree model; PNR curve; Statistical model; Zipf's laws and their application in computer languages; Halstead program length formula; Graphical analysis for complexity measures; Memory requirements analysis; Processing time analysis; Testing philosophy; Test methods; Debugging; Verification, validation and certification; Choice of tes: data; Simulator; Arthur Laemmel's scheme; Concepts of software reliability and availability; Software repair, downtime, error and faults, specification and correction; New error generation hypothesis; Estimating number of bugs in a computer program; Reliability models; Availability models; Quality assurance; Quality measures; Different cost estimation models and their comparisons; Software maintenance; Maintenance-cost models; Growth dynamic models; Documentation; Software project organization; Management and communication skills.

CSE 309N Compiler

3 hours in a week, 3.00 Cr.

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

CSE 310N Compiler Sessional

3 hours in alternate week, 0.75 Cr.

Laboratory works based on CSE 309N and project works using some lexical analyzer and parser designing tools.

CSE 311N Data Communication

3 hours in a week, 3.00 Cr.

Fourier transforms; Modulation techniques: AM, FM, PM, OOK, FSK, PSK, QPSK, QAM; Pulse modulation- PCM, PPM, PAM, Delta modulation; Companding; Equalizers; Echo cancellation; Intersymbol interference; TDM, FDM; Error due to noise; Concept of channel coding and capacity; Voice Digitization, Speech redundancies, DPCM; Layered concept of computer network architecture.

LEVEL-III TERM-II

HUM 313 Financial and Managerial Accounting
2 hours in a week, 2.00 Cr.

Financial Accounting: Objectives and importance of accounting; Accounting as an information system; Computerized system and applications in accounting. Recording system: double entry mechanism; accounts and their classification; Accounting equation; Accounting cycle: journal, ledger, trial balance; Preparation of financial statements considering adjusting and closing entries; Accounting concepts (principles) and conventions.

Financial statement analysis and interpretation: ratio analysis.

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

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

CSE 313N Operating System
3 hours in a week, 3.00 Cr.

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

CSE 314N Operating System Sessional
3 hours in alternate week, 0.75 Cr.

Laboratory works based on CSE 313N.

CSE 315N Microprocessors and Microcontrollers
3 hours in a week, 3.00 Cr.

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

CSE 316N Microprocessors and Microcontrollers Sessional
1.50 hours in a week, 0.75 Cr.

Laboratory works based on CSE 315N.

CSE 317N Artificial Intelligence
3 hours in a week, 3.00 Cr.

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

CSE 318N Artificial Intelligence Sessional
3 hours in alternate week, 0.75 Cr.

Laboratory works based on CSE 317N

CSE 319N Pattern Recognition
3 hours in a week, 3.00 Cr.

Pattern Recognition: introduction, importance.
Statistical and Neural Pattern Recognition: Bayesian classifier, Bayes decision theory, discriminant functions and decision surfaces, Bayesian

classifier for normal distributions; Linear classifiers: discriminant functions and decision hyperplanes, perceptron algorithm, least squares methods; Nonlinear classifiers: two and three layer perceptrons, backpropagation algorithm; Template matching: optimal path searching techniques, dynamic programming methods, correlation methods; Context dependent classification: observable and hidden Markov models, Viterbi algorithm.

CSE 320N Pattern Recognition Sessional

3 hours in alternate week, 0.75 Cr.

Laboratory works based on CSE 319N

CSE 321N Communication Engineering

3 hours in a week, 3.00 Cr.

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

Level-IV Term-I

CSE 400N Project and Thesis

3 hours in a week, 1.50 Cr.

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

CSE 401N Computer Networks

3 hours in a week, 3.00 Cr.

Protocol hierarchies; Data link control: HLDC; DLL in Internet; DLL of ATM; LAN Protocols: Standards IEEE 802.*; Switches and Hubs; Bridges, FDDI, Fast Ethernet; Routing algorithm; Congestion control;

Internetworking, WAN; Fragmentation; Firewalls; IPV4, IPV6, ARP, RARP, Mobile IP, Network layer of ATM; Transport protocols; Transmission control protocol: connection management, transmission policy, congestion control, timer management; UDP; AAL of ATM; Network security: Cryptography, DES, IDEA, public key algorithm; Authentication; Digital signatures; Gigabit Ethernet; Domain Name System: Name servers; Email and its privacy; SNMP; HTTP; World Wide Web.

CSE 402N Computer Networks Sessional

3 hours in alternate week, 0.75 Cr.

Laboratory works based on CSE 401N

CSE 403N Digital System Design

3 hours in a week, 3.00 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 using special purpose controllers.

CSE 404N Digital System Design Sessional

3 hours in a week, 1.50 Cr.

Laboratory works based on CSE 403N

CSE 405N System Analysis and Design

3 hours in a week, 3.00 Cr.

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

Telecommunications requirements analysis; Project team organization; Database and files design; Project management and documentation; Analysis of system maintenance and upgrading; Ethics and privacy; Control and security.

CSE 406N System Analysis, Design and Development Sessional

3 hours in a week, 1.50 Cr.

Laboratory works based on CSE 405N and CSE 307N.

CSE 407N Computer Interfacing

3 hours in a week, 3.00 Cr.

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

CSE 408N Computer Interfacing Sessional

1.50 hours in a week, 0.75 Cr.

Laboratory works based on CSE 407N

CSE 421N Basic Graph Theory

3 hours in a week, 3.00 Cr.

Graphs and simple graphs, digraphs, subgraphs, vertex-degrees, walks, paths and cycles; trees, spanning trees in graphs, distance in graphs; Complementary graphs, cut-vertices, bridges and blocks, k-connected graphs; Euler tours, Hamiltonian cycles, Chinese Postman Problem, Traveling Salesman Problem; Chromatic number, Chromatic polynomials, chromatic index, Vizing's theorem, planar graphs, perfect graphs.

CSE 425N Machine Learning

3 hours in a week, 3.00 Cr.

Introduction to machine learning; Supervised, unsupervised and reinforcement learning; Unsupervised learning algorithms; Attribute based and relational supervised learning algorithms; Neural network based learning algorithms; Genetic algorithm and genetic programming; Reinforcement learning algorithms; Computational learning theory.

CSE 423N Fault Tolerant Systems

3 hours in a week, 3.00 Cr.

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

LEVEL-IV TERM-II

IPE 493 Industrial Management

3 hours in a week, 3.00 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 and incentives; Informal groups; Organizational change and conflict.

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

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

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

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

HUM 211 Sociology
2 hours in a week, 2.00 Cr.

Sociological perspective: definition, nature, scope and importance of sociology; Sociology and scientific approach: methods of social research, stages of social research; Primary concepts of sociology: society, community, association, institution, group; Social evolution: stages in the evolution of human civilization; Culture: definition, characteristics, culture contents (material and non-material), cultural lag, culture and civilization; Industrial revolution: the growth of capitalism, features and social consequences, socialism; Social organization: family, forms and functions of family, functions of family in modern industrial society, marriage, forms of marriage, functions of marriage; Social stratification: main types of social stratification – slavery-caste and social class and status, social stratification and social mobility; Social control: religion and morality, custom and public opinion, taboo-law, state and education; Social change: change-evolution-progress-development, factors in social change; Society and population: human migration, population and resources; Some current social problems: crime, deviance, juvenile delinquency, youth unrest; Technology and society: effects of technological factors on social life.

HUM 213 Government
2 hours in a week, 2.00 Cr.

Some basic concepts of government and politics; Functions, organs and forms of modern state and government; Socialism, Fascism, Marxism.

Government and politics of Bangladesh; Some major administrative systems of developed countries; Local self government; Some major aspects of international politics.

HUM 411 Business Law
2 hours in a week, 2.00 Cr.

Principles of law of contracts; Company law: law regarding formation, incorporation, management and winding up of companies; Labor law: law in relation to wages hours, health, safety and other condition to work; The trade union legislation arbitration, the policy of the state in relation to labor; The Factory Act (1965); The Law of compensation (1965).

CSE 400N Project and Thesis
6 hours in a week, 3.00 Cr.

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

CSE 409N Computer Graphics
3 hours in a week, 3.00 Cr.

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

CSE 410N Computer Graphics Sessional
3 hours in alternate week, 0.75 Cr.

Laboratory works based on CSE 409N.

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

VLSI design methodology: top-down design approach, technology trends. NMOS, CMOS inverters, pass transistor and pass gates: DC and transient characteristics. Brief overview of fabrication process: NMOS, CMOS, Bi-CMOS process. NMOS and CMOS layout, stick diagram

and design rules. CMOS circuit characteristics and performance estimation: resistance and capacitance, rise and fall time, power estimation. Buffer circuit design. Introduction to Bi-CMOS circuits.
Complex CMOS gates. CMOS building block: multiplexer, barrel shifter, adder, counter, multipliers. Data Path and memory structures. Design style: FPGA and PLDs.

Introduction to HDL: basic digital design using VHDL.

CSE 412N VLSI Design Sessional

3 hours in alternate week, 0.75 Cr.

Laboratory works based on CSE 411N.

CSE 431N Simulation and Modeling

3 hours in a week, 3.00 Cr.

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

CSE 433N Image Processing

3 hours in a week, 3.00 Cr.

Digital image fundamentals, perception, representation; image transforms: Fast Fourier Transform (FFT), Discrete Cosine Transform (DCT), Karhunen and Loeve Transform (KLT), Wavelet transform and sub-band decomposition; image enhancement and restoration

techniques, image compression techniques, image compression standards: JPEG, MPEG, H.261, and H.263.

Students investigate image processing algorithms in Matlab or C.

CSE 435N Basic Multimedia Theory

3 hours in a week, 3.00 Cr.

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

EQUIVALENCE TABLE

Old Course			New Equivalence Course		
Course No	Course Title	Cr.	Course No	Course Title	Cr.
CSE 101	Programming Language-I	3.00	CSE 101N	Structured Programming Language	3.00
CSE 102	Programming Language-I Sessional	1.50	CSE 102N	Structured Programming Language Sessional	1.50
CSE 103	Discrete Mathematics	3.00	CSE 103N	Discrete Mathematics	3.00
CSE 105	Programming Language-II	3.00	CSE 105N	Object Oriented Programming Language	2.00
CSE 106	Programming Language-II Sessional	1.50	CSE 106N	Object Oriented Programming Language Sessional	1.50
CSE 201	Numerical Methods	3.00	CSE 201N	Numerical Methods	3.00
CSE 203	Data Structures	3.00	CSE 203N	Data Structures	3.00
CSE 204	Data Structures Sessional	0.75	CSE 204N	Data Structures Sessional	0.75
CSE 205	Digital Logic Design	3.00	CSE 205N	Digital Logic Design	3.00
CSE 206	Digital Logic Design Sessional	1.50	CSE 206N	Digital Logic Design Sessional	1.50
CSE 207	Algorithms	3.00	CSE 207N	Algorithms	3.00
CSE 208	Algorithms Sessional	0.75	CSE 208N	Algorithms Sessional	0.75
CSE 209	Digital Electronics and Pulse Techniques	3.00	CSE 209N	Digital Electronics and Pulse Techniques	3.00
CSE 210	Digital Electronics and Pulse Techniques Sessional	1.50	CSE 210N	Digital Electronics and Pulse Techniques Sessional	1.50
CSE 212	Assembly Language Programming	1.50	CSE 214N	Assembly Language Programming	1.50
CSE 301	Mathematical Analysis for Computer Science	3.00	CSE 301N	Mathematical Analysis for Computer Science	3.00
CSE 303	Database	3.00	CSE 303N	Database	3.00
CSE 304	Database Sessional	1.50	CSE 304N	Database Sessional	1.50
CSE 305	Computer Architecture-I	3.00	CSE 305N	Computer Architecture	3.00
CSE 307	Microprocessors	3.00	CSE 315N	Microprocessors and Microcontrollers	3.00

Old Course			New Equivalence Course		
Course No	Course Title	Cr.	Course No	Course Title	Cr.
CSE 308	Microprocessors Sessional	0.75	CSE 316N	Microprocessors and Microcontrollers Sessional	0.75
CSE 309	Digital System Design	4.00	CSE 403N	Digital System Design	3.00
CSE 310	Digital System Design Sessional	1.50	CSE 404N	Digital System Design Sessional	1.50
CSE 311	Data communication	3.00	CSE 311N	Data communication	3.00
CSE 313	Operating System	3.00	CSE 313N	Operating System	3.00
CSE 314	Operating System Sessional	0.75	CSE 314N	Operating System Sessional	0.75
CSE 315	Computer Interfacing	3.00	CSE 407N	Computer Interfacing	3.00
CSE 316	Computer Interfacing Sessional	1.50	CSE 408N	Computer Interfacing Sessional	0.75
CSE 318	Software Development	1.50	CSE 211N	Theory of Computation	2.00
CSE 319	Information System Design	3.00	CSE 405N	System Analysis and Design	3.00
CSE 320	Information System Design Sessional + Option-II Sessional	0.75 + 0.75	CSE 406N	System Analysis, Design and Development Sessional	1.50
CSE 321	Fault Tolerant Systems (Option-I)	3.00	CSE 423N	Fault Tolerant Systems (Option-I)	3.00
CSE 322	Fault Tolerant Systems Sessional	0.75			
CSE 323	Compiler (Option-I)	3.00	CSE 309N	Compiler	3.00
CSE 324	Compiler Sessional	0.75	CSE 310N	Compiler Sessional	0.75
CSE 400	Project & Thesis	6.00	CSE 400N	Project & Thesis	4.50
CSE 401	Computer Networks	3.00	CSE 401N	Computer Networks	3.00
CSE 402	Computer Networks Sessional	0.75	CSE 402N	Computer Networks Sessional	0.75
CSE 403	Computer Graphics	3.00	CSE 409N	Computer Graphics	3.00
CSE 404	Computer Graphics Sessional	0.75	CSE 410N	Computer Graphics Sessional	0.75
CSE 405	Software Engineering	3.00	CSE 307N	Software Engineering	3.00
CSE 407	Artificial Intelligence	3.00	CSE 317N	Artificial Intelligence	3.00
CSE 408	Artificial Intelligence Sessional	0.75	CSE 318N	Artificial Intelligence Sessional	0.75
CSE 409	Professionalism in Computing	3.00	CSE 321N	Communication Engineering	3.00
CSE 411	Simulation and Modeling (Option-II)	3.00	CSE 431N	Simulation and Modeling (Option-II)	3.00

Old Course			New Equivalence Course		
Course No	Course Title	Cr.	Course No	Course Title	Cr.
CSE 412	Simulation and Modeling Sessional	0.75		Nil	
CSE 413	Pattern Recognition (Option-II)	3.00	CSE 319N	Pattern Recognition	3.00
CSE 414	Pattern Recognition Sessional	0.75	CSE 320N	Pattern Recognition Sessional	0.75
CSE 415	Computer Architecture-II (Option-III)	3.00		Option-II	3.00
CSE 417	VLSI Design (Option-III)	3.00	CSE 411N	VLSI Design	3.00
CSE 419	Computer System Performance Evaluation (Option-III)	3.00		Option-II	3.00
			CSE 412N	VLSI Design Sessional	0.75
			CSE 421N	Basic Graph Theory (Option-I)	3.00
			CSE 425N	Machine Learning (Option-I)	3.00
			CSE 433N	Image Processing (Option-II)	3.00
			CSE 435N	Basic Multimedia Theory (Option-II)	3.00

Total Credits Requirement: 161.00

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