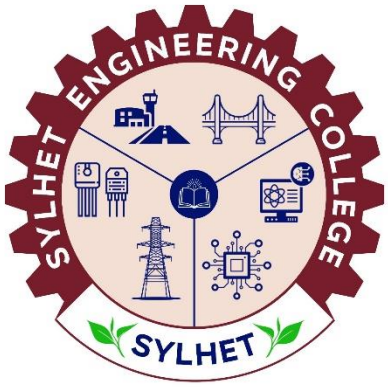
Curriculum

Department of Computer Science and Engineering

Undergraduates
Session: 2023-2024



Sylhet Engineering College
Sylhet, Bangladesh
Website: sec.ac.bd
E-mail: sec.admin@sec.ac.bd

Syllabus Committee:

Chairman:

Md. Abu Naser Mojumder
Assistant Prof. & Head, Dept. of CSE, SEC

Members:

Md Lysuzzaman
Lecturer, Dept. of CSE, SEC

Nayan Kumar Nath
Lecturer, Dept. of CSE, SEC

External Members:

Mohammad Shahidur Rahman, PhD
Professor, Dept of CSE, SUST

Dr Mohammad Reza Selim
Professor, Dept of CSE, SUST

Industry Expert:

Tahlil Ahmed Chowdhury
CEO & Co-Founder
C++, Python, Machine Learning, Computer Vision, NAT Traversal

Alumni:

Md. Jabed Dhali
Software Engineer
Swift, Objective-C, Python

CHAPTER 1
GENERAL INFORMATION

1.1 History

Sylhet Engineering College, abbreviated as SEC, The total development process of a Country can not proceed without development of science and Technology. Today's world is coming foreword to meet the Challenge of the twenty first Century through rapid development of science and technology. In order to meet the Challenge of the 21st Century, it is essential for the Country to produce huge number of engineers and technologies.

There are five Universities of Engineering and Technology and some public and private Universities in the Country for providing engineering education at Degree level which is not sufficient.

In order to meet the present and future job market demand in the country and abroad, it is essential to establish new engineering colleges. It is also essential to expand Engineering/Technological education in order to ensure proper use of technology.

In the Sylhet Engineering College each year 180 Student will be graduated in three degree level Courses, Such as (i) B.Sc in Civil Engineering, (ii) B.Sc in Electrical and Electronics Engineering and (iii) B.Sc in Computer Science & Engineering. After obtaining graduation in Engineering the graduates will be able to get job in different industries and Business organizations in the Country and abroad and also they will be able to make themselves Capable for Self employment.

Sylhet Engineering College is established as a degree level Engineering College in the public Sector. The examination of the courses will be controlled by the Shahjalal University of Science and Engineering and the Students of Sylhet Engineering College will be awarded degree from Shahjalal University of Science and Engineering

1.2 Location

The Sylhet Engineering College campus is located at Tilagarh, Sylhet Sador. It is a nicely located place. There is a female student's dormitory for 80 female students, two male student hostel for 320 students. It is closed to Sylhet Agriculture University. The College Campus accommodates three Academic Buildings one Library Building, one Principle Quarters etc.

1.3 Undergraduate Studies

Undergraduate Courses are Computer Science & Engineering. Civil Engineering, Electrical and Electronic Engineering,

1.4 Postgraduate Studies and Research

At present Post Graduate studies and research are not included but in future college may be upgraded and will offer Master Degree. The expertise of the College teachers and the laboratory facilities of the Engineering College are also utilized to solve problems and to provide up-to-date engineering and technological knowledge to the various organizations of the country. In future government should make effort to improve its research facilities, staff position and coursed and curricula to meet the growing technological challenges confronting the country.

1.5 Faculties, Departments and Teachers

At present, Engineering College has four teaching departments including three Engineering departments offer B.Sc in Engineering Degree. A total of 40 full time and part time teachers are teaching in these Departments.

CHAPTER 2
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

2.1 Historical Background

The Department of Computer Science and Engineering, the first department is going to be started from the academic year 2007-08. At the very beginning, the department will offer only B.Sc Engineering Degree in Computer Science & Engineering. At first, 60 students will be admitted each year for pursuing the B.Sc. Engineering Degree. The department has now active strength of 17 teachers with 2 Professors and 4 Associate Professor.

2.2 Location

The academic building of the Computer Science & Engineering is 4-stored. There are classrooms, different laboratories and the room for the teaching staff. There are also provisions for the departmental library.

2.3 Study Program

The Department of Computer Science and Engineering offers the degrees of B.Sc. Engineering. 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 will meet periodically to review the courses and their contents: necessary changes are made to update the needs and trends from time to time.

2.4 Research Activities

CSE SEC provides the highest quality of research at the international level from Bangladesh. Faculties and Students of CSE SEC have strong research involvement. Government and private sectors prefer faculties of CSE SEC for the solutions to their technical and innovative operations.

2.5 Laboratory Facilities

At present there are five different laboratories in the department premises. A brief description of each of the laboratory facility follows.

2.5.1 Software Engineering Laboratory

This laboratory has a total number of 64 workstations and 2 servers with multimedia support. A multimedia projector belongs to this laboratory to facilitate presentation. All the work station provides windows and Linux platforms and has important software installed.

2.5.2 Microprocessor & Interfacing Laboratory

The digital laboratory is equipped with modem equipment, trainer to demonstrate, design and implement various microprocessor based circuit. This laboratory provides widespread opportunity to gain knowledge about assembler software, complier software and PLC trainer and other devices. This laboratory has 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.

2.5.3 Networking Laboratory

The students will acquire knowledge of network management, establishment and maintenance by using the various networking devices present in this laboratory. The workstations in this laboratory have been loaded with deferent networking software that allows the students to monitor and experiment with different aspects of computer networking.

2.5.4 Communication Laboratory

The communication laboratory is equipped with modem server with network multimedia player and other communication equipment like digital communication trainer, telecommunication trainer, microwave trainer, etc to demonstrate different theories. The communication laboratory provides widespread opportunity to gain knowledge about communication engineering. There is also two servers with 30 work station. All the workstations provide Windows XP and Linux platforms and have important software installed.

2.5.5 Image Processing & Artificial Intelligence Laboratory

This laboratory has 64 high performance workstations with multimedia support. The laboratory has two Flatbed Scanner, two color Digital Video Camera, All the stations are connected with the department LAN. They communicate with an 802.11g/2.4 GHz wireless Access point which is connected to the backbone LAN.

2.6 Library Facilities

There is a provision for small departmental library in the department. The library will be enriched day by day.

2.7 Co-curricular Activities

Students of this department will arrange different co-curricular activities like programming contests, software and hardware project competitions, software fair etc.

2.8 Training

CSE SEC offers professional trainings to students as well as industry personnel for their skill development.

2.9 Consultation Services

For consultation and research the expertise, its teachers and the laboratory facilities are available to other organizations of the country. SEC is not only contributing as the focal point for the development and dissemination of engineering and technological services within the country, but also it is involved to solve complicated practical problems of national importance faced by the planners, engineers and technologists of the country. Highly qualified and diversely experienced consultants of various fields of engineering have been involved in this endeavor. Wide ranges of quality control testing facilities are also available for materials used in various development activities. Expert consultancy services ranging from the analysis, design, evaluation, construction, rehabilitation, etc. are routinely carried out.

2.10 Teaching Staffs

Professors-	**02 Post**
Associate Professors-	**04 Posts**
Assistant Professors-	**05 Posts**
Lecturers-	**06 Posts**

CHAPTER 3
RULES AND RFGULATIONS FOR UNDERGRADUATE PROGRAM

3.1. Student Admission

3.1.1 Undergraduate Admission:
The admission committee of the university will conduct the admission process for Bachelor's degree as per the rules. The student will be admitted in the first semester of an academic year in the individual discipline of different schools. However the admission of foreign students will be subjected to the verification of academic records as per the university rule.

3.1.2 Student Status and Student Level:
Every student has to maintain his/her student status by getting admission paying necessary fees and register for required credits every semester. Unless a student graduate early by taking courses in advance, every student has to get admission in every semester successively. For book keeping purpose a student's level will be expressed by his/her year and semester. A student will be transferred to next level if he/she completes or appears in 80% of his designated courses at his/her present level. Once a student reaches 4th year 2nd (5th year 2nd for Architecture) semester he/she will be kept at this level until he/she graduates.

3.1.3. Re-Admission:
A student has to take re-admission if his/her student status is not maintained or one or more semesters were cancelled because of disciplinary action against him/her. In case of semester cancellation the student has to get re-admission in the same semester. The level (Year and Semester) of re-admission will be determined by his completed/appeared credits. A student will be eligible for re-admission in the first year first semester of the subsequent session if he/she was present in at least 25% of the classes of his/her major courses or appeared at the semester final examination and his/her admission/semester fees was clear in the past semester/session. Re-admitted students will always be assigned the original Registration Number.

3.1.4 Student's Advisor:
After admission every batch of student will be assigned to a student's Advisor from the teacher of his/her discipline to guide him/her through the semester system. Advisors will always be accessible to the students and will be ready to

mentor them in their academic activities, career planning and if necessary, personal issues. There will be a prescribed guideline for the Advisors to follow.

3.2. Academic Calendar

3.2.1 Number of Semesters:
There will be two semesters in an academic year. The first semester will start on 1st January and end on 30th June, the Second semester will start on 1st July and end on 31st December. The routine of the final examination dates along with other academic deadlines will be announced in the academic calendar at the beginning of each semester.

3.2.2 Duration of Semesters:
The duration of each semester will be as follows:

Classes and Preparatory weeks	15 weeks
Final Examination	04 weeks
Total	19 weeks

These 19 weeks may not be contiguous to accommodate various holidays and the Recess before the final examination may coincide with holidays. The final grading will be completed before the beginning of the next semester.

3.3 Course Pattern

The entire Bachelor's degree program is covered through a set of theoretical, practical, project, viva and seminar courses. At the beginning of every academic session a short description of every available course will be published by the syllabus committee of each discipline.

3.3.1 Course Development:

3.3.1.1 Major and Non-Major Courses:
Syllabus committee of every discipline will develop all the courses that will be offered by that particular discipline and has to be approved by the respective school and the Academic Council. These include major courses for the respective discipline as well as non-major courses that will be offered to other disciplines. Non-major courses will be developed with close cooperation of the disciplines concerned keeping into consideration of the need of that discipline.

3.3.1.2 Syllabus:
(a) Major and Non-Major Courses: Syllabus committee will select and approve the courses from major courses of the discipline as well as non-major courses offered by other disciplines to complete the syllabus. The syllabus committee will also select a group of courses as core-courses and without these courses a student will not be allowed to graduate even if he completes the credit requirement. The committee may assign pre-requisite for any course if deemed necessary.
(b) Second Major Courses: The syllabus committee will select a set of courses of 28-36 credits from the major courses for a second major degree.

3.3.1.3 Course Instruction:
At the beginning of every semester the course instructor has to make a detailed plan of the course instruction in the prescribed form and supply it to the head of the discipline to make it available to the students. The course plan should have the information about the suggested text books, number of lectures per topic, number and type of assignments, number and approximate dates of mid-semester examinations and mandatory office hours reserved for the students of the course offered. If not otherwise mentioned the medium of instruction is always English.

3.3.2 Course Identification System:
Each course is designated by a three-letter symbol for discipline abbreviation followed by a three-digit number to characterize the course. To avoid confusion new or modified courses should never be identified by reusing a discontinued course number

3.3.2.1 Discipline Identification:
The three-letter symbol will identify a discipline offering the course as follows. If same course is offered to more than one discipline, if necessary, an extra letter shown in the list may be used after the three digits to specify the department receiving the non-major course.

		School of Applied Sciences and Technology:
1.	CSE	Computer Science and Engineering
2.	EEE	Electrical and Electronic Engineering
3.	CE	Civil Engineering

3.3.2.2 Course Number:
The three-digit number will be used as follows:
(a) First Digit: The first digit of the three digit number will correspond to the year intended for the course recipient.
(b) Second Digit: A discipline should use the number 0 and 1 for the second digit to identify non-major courses. The digits 2-9 are reserved for major courses to identify the different areas within a discipline.
(c) Third Digit: The third digit will be used to identify a course within a particular discipline. This digit can be used sequentially to indicate follow up courses. If possible even numbers will be used to identify laboratory courses.

3.3.2.3 Course Title and Credit:
Every course will have a short representative course title, declaration if it is core course, a number indicating the total credits as well as reference to prerequisite courses if any.

3.3.2.4 Theory and Lab Course:
If a single course has both Theory and Laboratory/Sessional part, then the course must be split into separate Theory and Lab courses and both should have separate course number. A student may not register for a lab course without registering or completing the corresponding theory course.

3.3.3 Assignment of Credits:

3.3.3.1 Theoretical:
One lecture per week (or 13 lectures in total) of 1 hour duration per semester will be considered as one credit. (There will be 10 minutes recess between theory classes). A theory course will have only integer number of credits.

3.3.3.2 Laboratory Classes:
Minimum two contact hours of a laboratory class per week (or 26 contact hours in total) per semester will be considered as one credit. A laboratory course may have half integer credits with a minimum of 1 credit.

3.3.3.3 Seminar, Thesis, Projects, Monographs, Fieldwork, Viva etc.:
Will be assigned by the respective discipline.

3.3.4 Classification of the Courses:
The Bachelor's degree courses will be classified into several groups and the syllabus committee will finalize the curricula selecting courses from the groups shown below.

3.3.4.1 Major Courses:
A student has to take at least 70% courses from his/her own discipline. Out of these courses a section will be identified as core courses and every student of a particular discipline will be required to take those courses.

3.3.4.2 Non-Major Courses:
Every student is required to take at least 20% (including mandatory) courses from related disciplines. If any Non-Major course is declared as Core course a student is required to take that course to graduate. The Non-Major courses will be designed, offered and graded by the offering disciplines.

3.3.4.3 Other Courses:
After completion of the required mandatory, major and non-major courses a student may take few other courses of his/her choice not directly related to his/her discipline to fulfill the total credit requirement.

3.3.4.4 Credit-Only Courses:
The credit of these Credit-Only courses will be added to the total credits if passed but will not affect the CGPA as there will be no grades for these courses.

3.4. Course Registration

3.4.1 Registration:
A student has to register for his/her courses and pay necessary dues within the first two weeks of every semester. Departmental student advisor will advise every student about his/her courses and monitor his/her performances. A student at any level is expected to register the courses at his level provided he/she does not have any incomplete courses from previous levels. A student will not be allowed to appear in the examination if his/her semester and examination fee is not cleared.

3.4.2 Minimum and Maximum Credits:
A student, if s/he is not a clearing graduate, has to register for at least 12 credits minimum and 30 credits maximum every semester.

3.4.3 Incomplete Courses:
(i) If a student has incomplete courses, he/she has to register his/her available incomplete courses from preceding levels before s/he can register courses from current or successive levels. If an incomplete course is not offered in a given semester the student has to take the courses when it is offered next time. A student with incomplete courses will not be eligible for Distinction.
(ii) A student to register his/her incomplete courses, if offered, from proceeding semesters before s/he can register courses from current or successive semester, otherwise s/he takes the courses when the desired course is offered next time. A student will not be allowed to take 100 and 300 level and 200 and 400 level courses simultaneously. 100 level courses mean courses of 1st and 2nd semesters, 200 level courses mean courses of 3rd and 4th semesters and so on.

3.4.4 Course Withdrawal:
A student can withdraw a course by a written application to the Controller of Examinations through the Head of the discipline on or before the last day of instruction. The Controller of Examinations will send the revised registration list to the disciplines before the examination. There will be no record of the course in transcript if the course is withdrawn.

3.4.5 Course Repetition:
If a student has to repeat a failed or incomplete course and that course is not offered any more, the discipline may allow him/her to take an equivalent course from the current syllabus. For clearing graduates if any incomplete course is not offered in the running semester, the discipline may suggest a suitable course to complete the credit requirement.

3.5. Graduation Criteria

3.5.1 Major Degree:

3.5.1.1 Total Credits:
School of Physical Sciences, School of Social Sciences and School of Management and Business Administration have a requirement of 140 credits to graduate from its disciplines. School of Applied Sciences and Technology, School of Life Sciences and School of Agriculture and Mineral Science have requirement of 160 (200 for Architecture) credits for graduation.

3.5.1.2 Total Years:
A regular student is expected to graduate in 8 semesters (4 years) or in 10 semesters (5 years) for the discipline of Architecture. A student may graduate in shorter time period if s/he is willing to take extra courses in a systematic way. A student will be given 4 (2 years) extra semesters in addition to 8/10 semesters to complete his/her degree. The regular examination year will be identified by the session and the end-month (June or December) of the semester the student graduates.

3.5.1.3 Early Graduation:
A student may graduate early by completing courses in advance, in that case he does not need to pay tuition or get admission in subsequent semesters. However a student will not be able to start master's degree one session earlier unless he graduates two semesters early.

3.5.1.4 Minimum Credit for a Clearing Graduate:
For a clearing graduate (8th and subsequent semesters) condition for maximum and minimum credit requirements is relaxed.

3.5.1.5 Break in study:
Those students who have not been able to achieve their degrees by participating in the ascertained 12th (for ARC department 14th) semester final exams will have the opportunity to do so by enrolling into 2 (two) running semesters back to back if after the publications of their results of the 12th (for ARC department 14th) semester final exam, it becomes evident that they have completed at least 80% of their total credits. In case of such students, on the tabulation sheet, result sheet, certificate, transcript, grade sheet, etc., number of total semesters shall be stated instead of the word "Irregular." As for irregular students, studentship shall be annulled after the aforesaid 2 (two) semesters have come to an end.

3.5.2 Second Major Degree:

3.5.2.1 Total Credits:
A student may apply for a second major degree if he/she completes an extra 28-36 credit requirement designated by the offering discipline.

3.5.2.2 Total Semesters:
A student has to complete the credit requirement of second major degree within 8 regular and 4 extra semesters.

3.5.2.3 Requirement of Major Degree:
A student will not be given a second major degree if he/she fails to complete his regular major degree. A student will not be allowed to enroll in Masters program before completion of his/her second major degree even if he/she complete his/her major degree requirement.

3.5.2.4 Registration Criteria:
An offering discipline will decide on the number of seats for second major, enrollment criteria and get it approved from the academic council. Students willing to get a second major have to apply to the offering discipline for enrollment and the discipline will enroll them as per the admission criteria. During registration enrolled students have to get their courses approved from the offering department completing a separate registration form.

3.5.2.5 Class Routine:
After enrollment a regular student may start taking the second major courses starting 3rd semester. The class routine may be arranged to accommodate the student need.

3.5.2.6 Certificate and Mark sheet:
A student completing the requirement will be given an additional certificate and grade sheet for his second major degree.

3.6. Examination System

A student will be evaluated continuously in the courses system, for theoretical classes s/he will be assessed by class participation, assignments, quizzes, mid-semester examinations and final examination. For laboratory work s/he will be assessed by observation of the student at work, viva-voce during laboratory works, from his/her written reports and grades of examinations designed by the respective course teacher and the examination committee.

3.6.1 Distribution of Marks:
The marks of a given course will be as follows:

Class Attendance	10%
Quiz abd Assignments	10%
Mid-Semester Examinations	20%
Final Examination	60%

3.6.1.1 Class Participation:
The marks for class participation will be as follows:

Attendance (Percentage)	Marks	Attendance (Percentage)	Marks	Attendance (Percentage)	Marks
95 and above	10	80 to 84	7	65 to 69	4
90 to 94	9	75 to 79	6	60 to 64	3
85 to 89	8	70 to 74	5	Less than 60	0

A student will not be allowed to appear at the examination of a course if his/her class attendance in that course is less than 50%.

3.6.1.2 Assignments and Mid-Semester Examinations:
There should be at least two mid-semester examinations for every course. The course teacher may decide the relative marks distribution between the assignments, tutorial and mid-semester examinations, however at least 50% contribution should come from the mid-semester examinations. The answer script should be returned to the students as it is valuable to their learning process.

3.6.1.3 Final Examination:
The final examination will be conducted as per the Semester Examination Ordinance.
(a) Duration of the Final Examination: There will be a 3-hour final examination for every course of 3 credits or more after the 13th week from the beginning of the semester. Courses less than 3 credits will have final examination of duration 2 hours.
(b) Evaluation of Answer Script: The students of the School of Applied Science and Technology and the School of Agriculture and Mineral Sciences will have two answer scripts to answer separate questions during final examination. Two separate examiner will grade the two scripts separately and the marks will be added together to get the final mark. For the students of the other schools there will be a single answer script which will be evaluated by two examiners. The two marks will be averaged and if the marks by the two examiners differ by 20% or more the concerned answer scripts will be examined by a third examiner and the two closest marks among the three will be averaged to get the final mark.

3.7. Grading System

3.7.1 Letter Grade and Grade Point:
Letter Grade and corresponding Grade-Point for a course will be awarded from the roundup marks of individual courses as follows:

Numerical Grade	Letter Grade	Grade Point
80% and above	A+	4.00
75% to less than 80%	A	3.75
70% to less than 75%	A-	3.50
65% to less than 70%	B+	3.25
60% to less than 65%	B	3.00
55% to less than 60%	B-	2.75
50% to less than 55%	C+	2.50
45% to less than 50%	C	2.25
40% to less than 45%	C-	2.00
Less than 40%	F	0.00

3.7.2 Calculation of Grades

3.7.2.1 GPA:
Grade Point Average (GPA) is the weighted average of the grade points obtained in all the courses completed by a student in a semester.

3.7.2.2 CGPA:
Cumulative Grade Point Average (CGPA) of only major and both major and second major degree will be calculated by the weighted average of every course of previous semesters

along with the present semester. For clearing graduates if the roundup value of the third digit after decimal is nonzero the second digit will be incremented by one. A student will also receive a separate CGPA for his second major courses.

3.7.2.3 F Grades:
A student is given an 'F' grade if he fails or is absent in the final examination of a course. If a student obtains an 'F' grade his grade will not be counted for GPA and s/he has to repeat the course. An 'F' grade will be in his/her record and s/he will not be eligible for Distinction.

3.8. Distinction

3.8.1 Distinction:
Candidates for four-year Bachelor degree will be awarded the degree with Distinction if his/her overall CGPA is 3.75 or above. However, a student will not be considered for Distinction if (a) s/he is not a regular student (has semester drop, incomplete courses in any semester or break of study) (b) has 'F' grade in one or more courses.

CHAPTER 4
COURSE REQUIREMENTS FOR UNDERGRADUATE COMPUTER SCIENCE AND ENGINEERING STUDENTS

Vision Statement
The Department of Computer Science and Engineering, SEC intends to provide an excellent educational environment in order to develop professionals with strong technical and research backgrounds

Mission
M1. To provide quality education in both theoretical and applied foundations of Computer Science and Engineering.
M2. To create highly skilled computer engineers, capable of doing research and also develop solutions for the betterment of the nation.
M3. To inculcate professional and ethical values among students.

M4. To support society by participating in and encouraging technology transfer
Program Name: B.Sc. (Engg.) in Computer Science and Engineering
Program Educational Objectives (PEO)
Program Educational Objectives (PEOs) are broad statements that describe what graduates are expected to attain within a few years of graduation. Program educational objectives are based on the needs of the program's constituencies.
The entity has set the following PEOs for the B.Sc. (Engg.) program in Computer Science and Engineering major.
PEO1. To provide students with a strong foundation in the mathematical, scientific and engineering fundamentals necessary to formulate, solve and analyze engineering problems and to prepare them for graduate studies, R&D, consultancy and higher learning.
PEO2. To develop an ability to analyze the requirements of the software, understand the technical specifications, design and provide novel engineering solutions and efficient product designs.
PEO3. To provide exposure to emerging cutting edge technologies, adequate training opportunities to work as teams on multidisciplinary projects with effective communication skills and leadership qualities.
PEO4. To prepare the students for a successful career and work with values and social concerns bridging the digital divide and meeting the requirements of local and multinational companies.
PEO5. To promote student awareness on life-long learning and to introduce them to professional ethics and codes of professional practice.
PEO to Mission Statement Mapping

Mission/PEO	PEO1	PEO2	PEO3	PEO4	PEO5
M1	X	X	X		
M2	X	X	X	X	
M3				X	X
M4			X		X

Program Learning Outcome (PLO)
After graduation from this program in CSE, the graduates will be able to:
PLO1. Apply knowledge of science, technology, computing andengineering in different aspects of their lifelong activities.
PLO2. Analyze a problem, identify and define the computing requirements appropriate to its solution.
PLO3. Design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs.
PLO4. Use current techniques, skills, and tools necessary for computing practice.
PLO5. Apply mathematical foundations, algorithmic principles and computer science theory in modeling systems demonstrating tradeoffs and complexities involved in a design choice.
PLO6. Function effectively on teams to accomplish a common goal and communicate effectively with a range of audiences.
PLO7. Understand professional, ethical, legal, security and social issues and responsibilities.
PLO8. Analyze the local and global impact of computing on individuals, organizations and society.
PLO9. Engage in lifelong learning and grow capabilities of critical thinking and research

Program Objectives (PEO/PO) to Program Learning Outcome (PLO) Mapping

PLO/PEO	PEO1	PEO 2	PEO3	PE O4	PEO5
PLO 1	X	X	X		
PLO 2	X	X			
PLO 3	X	X		X	
PLO 4			X	X	X
PLO 5	X	X			
PLO 6			X	X	
PLO 7				X	X
PLO 8				X	
PLO 9	X				X

Graduate Profile:
Graduate profiles are descriptions of attributes, or knowledge, skills and attitudes, which a university community intends its graduates will develop through their study to equip them for their future education or employment. Students graduating from the department of CSE, SUST should have gained the following attributes.
a. Intellectual skills in Science and Engineering
b. Practical and problem solving skills
c. Numeracy and analytical skills
d. Entrepreneurship and innovation skills
e. Communication skills

f. Interpersonal, teamwork and leadership skill
g. Self-management & personal development skills
h. Commitment to community, country and humanity

Semester wise Curriculum Breakdown:
One-semester credit hour represents one class hour or two laboratory hours per week. An academic semester represents 13 weeks of classes exclusive to final exams. Semester wise breakdown of the curriculum structure for 2022-23 session are shown.

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

SEMESTER-I

Course Number	Course Title	Hours/Week		Credit	Pre-requisite
		Theory	Practical /Sessional		
CSE 0613 1133	Structured Programming Language	2.00	---	2.00	
CSE 0613 1134	Structured Programming Language Sessional	--	4.00	2.00	
CSE 0541 1143	Discrete Mathematics	3.00	---	3.00	
EEE 0713 1109	Introduction to Electrical Engineering	3.00	---	3.00	
EEE 0713 1110	Introduction to Electrical Engineering Sessional	---	3.00	1.50	
MAT 054 11101	Co-ordinate Geometry and Linear Algebra	3.00	---	3.00	
PHY 0533 1103	Physics	3.00	---	3.00	
PHY 0533 1104	Physics Sessional	---	3.00	1.50	
SSS 0312 1100	History of the Emergence of Independent Bangladesh	3.00	---	3.00	
	Total	**17.00**	**10.00**	**22.00**	

***N.B.: SSS 0312 1100 Course is mandatory to fulfill the requirement of completing Bachelor's degree.**

SEMESTER-II

Course Number	Course Title	Hours/Week		Credit	Pre-requisite
		Theory	Practical /Sessional		
CSE 0613 1237	Data Structures	3.00		3.00	
CSE 0613 1238	Data Structures Sessional		3.00	1.50	
IPE 0632 1206	Engineering Drawing Sessional	---	3.00	1.50	
CSE 0613 1247	Theory of Computation	2.00	----	2.00	
CHE 0531-1201	Chemistry	2.00	---	2.00	
CHE 0531-1202	Chemistry Sessional		2.00	1.00	
MAT 0541 1203	Calculus	3.00	---	3.00	
ENG 0231 1201	English Language	2.00	---	2.00	
ENG 0231 1202	Communication in English (Practice)	---	2.00	1.00	
SS 0311 1205	Managerial Economics	2.00	---	2.00	
CSE 0610 1250	Project Work I		4.00	2.00	
	Total	**14.00**	**14.00**	**21.00**	

SEMESTER-III

Course Number	Course Title	Hours/Week		Credit	Pre-requisite
		Theory	Practical/Sessional		
CSE 0613 2133	Object Oriented Programming Language	3.00	---	3.00	
CSE 0613 2134	Object Oriented Programming Language Sessional	---	3.00	1.50	
CSE 0541 2157	Numerical Methods	2.00	---	2.00	
CSE 0541 2158	Numerical Methods Sessional with Python	---	2.00	1.00	
CSE 0688 2147	Engineering Ethics and Cyber Law	2.00	---	2.00	
CSE 0613 2134	Introduction to Competitive programming	---	3.00	1.50	
EEE 0714 2111	Electronic Devices and Circuits	3.00	---	3.00	
EEE 0714 2112	Electronic Devices and Circuits Sessional	---	3.00	1.50	
STA 0542 2102	Statistics for Engineers	3.00	---	3.00	
IPE 0632-2105	Management for Engineers	2.00	---	2.00	
	Total	**15.00**	**11.00**	**20.50**	

SEMESTER-IV

Course Number	Course Title	Hours/Week		Credit	Pre-requisite
		Theory	Practical/Sessional		
CSE 0613 2237	Algorithms	3.00	---	3.00	
CSE 0613 2238	Algorithms Sessional	---	3.00	1.50	
CSE 0613 2201	Digital Logic Design	3.00	---	3.00	
CSE 0613 2202	Digital Logic Design Sessional	---	3.00	1.50	
CSE 0714 2279	Computer Architecture	3.00	---	3.00	
BUS 0411 2205	Cost and Management Accounting	2.00	---	2.00	
MAT 0541 2204	Complex Variables, Laplace's Transforms and Fourier Series	3.00	---	3.00	
CSE 0610 2250	Project Work II		4.00	2.00	
CSE 0610 2290	Viva Voce		1.00	1.00	
	Total	**14.00**	**11.00**	**20.00**	

SEMESTER-V

Course Number	Course Title	Hours/Week		Credit	Pre-requisite
		Theory	Practical/Sessional		
CSE 0612 3163	Database Management System	3.00	---	3.00	
CSE 0612 3164	Database Management System Sessional	---	3.00	1.50	
CSE 0619 3193	Artificial Intelligence	3.00		3.00	
CSE 0619 3194	Artificial Intelligence Sessional		3.00	1.50	
CSE 0612 3159	Web Technologies	2.00	---	2.00	
CSE 0612 3160	Web Technologies Sessional	---	3.00	1.50	
CSE 0714 3177	Microprocessors and Microcontrollers	3.00	---	3.00	
CSE 0714 3178	Microprocessors and Microcontrollers Sessional	---	3.00	1.50	
CSE 0714 3171	Data Communication	3.00		3.00	
CSE 0714 3172	Data Communication Sessional	---	3.00	1.50	
	Total	**14.00**	**15.00**	**21.50**	

SEMESTER-VI

Course Number	Course Title	Hours/Week		Credit	Pre-requisite
		Theory	Practical/Sessional		
CSE 0619 3293	Machine Learning	3.00	---	3.00	
CSE 0619 3294	Machine Learning Sessional	---	3.00	1.50	
CSE 0613 3235	Operating System	3.00	---	3.00	
CSE 0613 3236	Operating System Sessional	---	3.00	1.50	
CSE 0714 3275	Digital Signal Processing	3.00	---	3.00	
CSE 0714 3276	Digital Signal Processing Sessional	---	3.00	1.50	
CSE 0613 3241	Software Engineering and Design Patterns	3.00	---	3.00	
CSE 0613 3242	Software Engineering and Design Patterns Sessional	---	3.00	1.50	
CSE 0611 3230	Technical Writing and Presentation	---	3.00	1.50	
CSE 0610 3250	Project Work III	---	4.00	2.00	
CSE 0610 3290	Viva Voce		1.00	1.00	
	Total	**12.00**	**20.00**	**22.50**	

SEMESTER-VII

Course Number	Course Title	Hours/Week		Credit	Pre-requisite
		Theory	Practical/Sessional		
CSE 0610 41**	Thesis I/ Project I	---	4.00	2.00	
CSE 0612 4161	Cryptography and Network Security	3.00	---	3.00	
CSE 0612 4162	Cryptography and Network Security Sessional	---	3.00	1.50	
CSE 0613 4131	Computer Graphics	3.00	---	3.00	
CSE 0613 4132	Computer Graphics Sessional	---	3.00	1.50	
CSE 0612 4165	Computer Networks	3.00		3.00	
CSE 0612 4166	Computer Networks Sessional		3.00	1.50	
Optional					
CSE 0613 4167	Simulation and Modeling	3.00	---	3.00	
CSE 0613 4168	Simulation and Modeling Sessional		3.00	1.50	
Or					
CSE 0619 4193	Deep Learning	3.00	---	3.00	
CSE 0619 4194	Deep Learning Sessional		3.00	1.50	
Or					
CSE 0612 4165	Cloud Computing	3.00	---	3.00	
CSE 0612 4166	Cloud Computing Sessional		3.00	1.50	
Or					
CSE 0613 4171	Introduction to Quantum Computing	3.00	---	3.00	
CSE 0613 4172	Introduction to Quantum Computing Sessional		3.00	1.50	
Or					
CSE 0714 4173	Internet of Things	3.00	---	3.00	
CSE 0714 4174	Internet of Things Sessional		3.00	1.50	
	Total	**12.00**	**16.00**	**20.00**	

SEMESTER-VIII

Course Number	Course Title	Hours/Week		Credit	Pre-requisite
		Theory	Practical/ Sessional		
CSE 0610 42**	Thesis II/ Project II	---	8.00	4.00	
CSE 0613 4247	Compiler Design	3.00	---	3.00	
CSE 0613 4248	Compiler Design Sessional	---	3.00	1.50	
CSE 0610 4290	Viva Voce	---	1.00	1.00	
Optional					
CSE 0613 4231	Digital Image Processing	3.00	---	3.00	
CSE 0613 4232	Digital Image Processing Sessional	---	3.00	1.50	
Or					
CSE 0714 4271	Wireless & Mobile Communication	3.00	---	3.00	
CSE 0714 4272	Wireless & Mobile Communication Sessional	---	3.00	1.50	
Or					
CSE 0613 4237	Advanced Algorithm Engineering	3.00	---	3.00	
CSE 0613 4238	Advanced Algorithm Engineering Sessional	---	3.00	1.50	
Or					
CSE 0688 4297	Bio-informatics	3.00	---	3.00	
CSE0688 4298	Bio-informatics Sessional	---	3.00	1.50	
Or					
CSE 0714 4277	VLSI Design	3.00	---	3.00	
CSE 0714 4278	VLSI Design Sessional	---	3.00	1.50	
Or					
CSE 0613 4243	Natural Language Processing	3.00	---	3.00	
CSE 0613 4244	Natural Language Processing Sessional	---	3.00	1.50	
Or					
CSE 0612 4267	Distributed and Parallel Computing	3.00	---	3.00	
CSE 0612 4268	Distributed and Parallel Computing Sessional	---	3.00	1.50	
	Total	**6.00**	**15.00**	**14.00**	

Summary

Semester	Hours/Week		Credit	Pre-requisite
	Theory	Sessional		
Semester-1	17.00	10.00	22.00	
Semester-2	14.00	14.00	21.00	
Semester-3	15.00	11.00	20.50	
Semester-4	14.00	11.00	20.00	
Semester-5	14.00	15.00	21.50	
Semester-6	12.00	20.00	22.50	
Semester-7	12.00	16.00	20.00	
Semester-8	6.00	15.00	14.00	
Total	**104.00**	**112.00**	**161.50**	

Departmental subjects	:	121.00	credits
Science and other subjects	:	40.50	credits
Total	:	161.50	credits

CHAPTER 5
DETAIL OUTLINE OF UNDERGRADUATE COURSES OFFERED BY THE DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

SEMESTER-I

CSE 0613 1133: Structured Programming Language

3 hours in a week, 3.00 Credit

Rationale:

To familiarize the student with basic concepts of computer programming and developer tools. To present the syntax and semantics of the "C" language as well as data types offered by the language. To allow the students to write their own programs using standard language infrastructure regardless of the hardware or software platform.

Objectives:

- To facilitate students with necessary knowledge about basic understanding of computer hardware and how a computer works.
- To make the students understand the basic terminology used in computer programming
- Helping the students to develop ability in how to write, compile and debug programs in C language
- Helping the students to develop ability in writing programs involving decision structures, loops, functions and pointers
- To make the students understand the basic data structures and their implementation
- To enhancing the skill on implementing different searching and sorting techniques
- To enhancing the skill on building up their own logics and implementing them while solving real-world problems

Course Contents:

Programming Language: Basic concept, Overview of programming languages, Problem Solving Techniques and Data Flow-Diagram. **Language:** Preliminaries, Program constructs, variables and data types in C. Input and output. Character and formatted I/O; Arithmetic Expressions and Assignment statements; Control statement, Loops and Nested loops; break, continue, goto, Decision making; Arrays, Functions; Arguments and local variables, Calling Functions and arrays. Recursion and Recursive functions; Structures within structure. Automatic, external, static variable, Files; File functions for sequential and Random I/O. Pointers; Pointers and structures, union; Pointer and functions; Pointer and arrays; Operation and Pointer; Pointer and memory addresses; Operations on Bits; Bit Operation; Bit field; Advanced features; Preprocessor and Macros, enumeration, Standard library. **Recursion:** Basic idea of recursion (3 laws-base case, call itself, move towards base case by state change), tracing output of a recursive function, applications: factorial, Fibonacci, tower of Hanoi, merge sort, permutation, combination. **Sorting:** Insertion sort, selection sort, bubble sort, merge sort, quick sort, distribution sort (counting sort, radix sort, bucket sort). **Searching:** Linear search, binary Search, application of Binary Search- finding element in a sorted array, finding nth root of a real number, solving equations. **Stack and Queue:** Basic stack operations (push/pop/peek), stack-class implementation using Array and linked list, in-fix to postfix expressions conversion and evaluation, balancing parentheses using stack, basic queue operations (enqueue, dequeue), circular queue/ dequeue, queue-class implementation using array and linked list, application- Josephus problem, palindrome checker using stack and queue.

Course Learning Outcomes: After the successful completion of the course, the student will be able to-

CLO 1 Understand the concepts of computer hardware and how it works.
CLO 2 Recall the basic terminology used in computer programming
CLO 3 Construct, compile and debug programs in C language
CLO 4 Apply control-flow tools such as loop, if-else, etc.
CLO 5 Understand the usage of pointers
CLO 6 Understand basic data structures, their implementation, and application
CLO 7 Apply different searching and sorting techniques
CLO 8 Evaluate real-life problems using programming terminologies

Mapping of Course Learning Outcomes to Program Learning Outcomes

CLO/ PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9
CLO1	X		X			X			
CLO2	X	X	X			X			
CLO3		X	X	X		X			
CLO4		X	X	X		X			
CLO5		X	X	X		X			
CLO6		X	X	X		X			
CLO7		X	X	X		X			
CLO8	X	X				X			

Textbook

1. Schaum's Outline of Programming with C by Byron S. Gottfried
2. C: The Complete Reference by Herbert Schildt

CSE 0613 1134: Structured Programming Language Sessional

3 hours in a week, 1.50 Credit

Laboratory works based on CSE **0613 1133**

Rationale:

To familiarize the student with basic concepts of computer programming and developer tools. To present the syntax and semantics of the "C" language as well as data types offered by the language. To allow students to write their own programs using standard language infrastructure regardless of the hardware or software platform.

Objectives:

- To facilitate students with necessary knowledge about basic understanding of computer hardware and how a computer works.
- To make the students understand the basic terminology used in computer programming
- Helping the students to develop ability in how to write, compile and debug programs in C language

- Helping the students to develop ability in writing programs involving decision structures, loops, functions and pointers
- To make the students understand the basic data structures and their implementation
- To enhancing the skill on implementing different searching and sorting techniques
- To enhancing the skill on building up their own logics and implementing them while solving real-world problems

Course Contents:
Programming Language: Basic concept, Overview of programming languages, Problem Solving Techniques and Data Flow-Diagram. **Language:** Preliminaries, Program constructs, variables and data types in C. Input and output. Character and formatted I/O; Arithmetic Expressions and Assignment statements; Control statement, Loops and Nested loops; break, continue, goto, Decision making; Arrays, Functions; Arguments and local variables, Calling Functions and arrays. Recursion and Recursive functions; Structures within structure. Automatic, external, static variable, Files; File functions for sequential and Random I/O. Pointers; Pointers and structures, union; Pointer and functions; Pointer and arrays; Operation and Pointer; Pointer and memory addresses; Operations on Bits; Bit Operation; Bit field; Advanced features; Preprocessor and Macros, enumeration, Standard library. **Recursion:** Basic idea of recursion (3 laws-base case, call itself, move towards base case by state change), tracing output of a recursive function, applications: factorial, Fibonacci, tower of Hanoi, merge sort, permutation, combination. **Sorting:** Insertion sort, selection sort, bubble sort, merge sort, quick sort, distribution sort (counting sort, radix sort, bucket sort). **Searching:** Linear search, binary Search, application of Binary Search- finding element in a sorted array, finding nth root of a real number, solving equations. **Stack and Queue:** Basic stack operations (push/pop/peek), stack-class implementation using Array and linked list, in-fix to postfix expressions conversion and evaluation, balancing parentheses using stack, basic queue operations (enqueue, dequeue), circular queue/ dequeue, queue-class implementation using array and linked list, application- Josephus problem, palindrome checker using stack and queue.

Course Learning Outcomes: After the successful completion of the course, the student will be able to-

CLO 1	Understand the concepts of computer hardware and how it works.
CLO 2	Recall the basic terminology used in computer programming
CLO 3	Construct, compile and debug programs in C language
CLO 4	Apply control-flow tools such as loop, if-else, etc.
CLO 5	Understand the usage of pointers
CLO 6	Understand basic data structures, their implementation, and application
CLO 7	Apply different searching and sorting techniques
CLO 8	Evaluate real-life problems using programming terminologies

Mapping of Course Learning Outcomes to Program Learning Outcomes

CLO/ PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9
CLO1	X		X			X			
CLO2	X	X	X			X			
CLO3		X	X	X		X			
CLO4		X	X	X		X			
CLO5		X	X	X		X			
CLO6		X	X	X		X			
CLO7		X	X	X		X			
CLO8	X	X				X			

Textbook
1.Schaum's Outline of Programming with C by Byron S. Gottfried
2.C: The Complete Reference by Herbert Schildt

CSE 0541 1143 Discrete Mathematics
3 hours in a week, 3.00 Credit

Rationale:
CSE students need to have a very strong logical and mathematical background and a course of discrete math is essential for that. This course also works as the mathematical foundation for future courses like data structure, algorithm, digital electronics and theory of computation.
Objectives:
- Help them conceptualize basic theories in mathematical reasoning and appreciate the precision of language and rigor required for mathematics.
- Help them conceptualize basic theories in combinatorial analysis to be able to solve counting problems.
- To facilitate necessary knowledge about how to work with discrete data structures like graphs and trees.
- To facilitate necessary knowledge about algorithmic techniques and to be able to implement in computer programs.
- Apply the knowledge of discrete mathematics in real life problems using modeling.

Course Contents:
Set, Relations, Functions: Set, Function, Representing Relations, Equivalence Relations.
Propositional Calculus: Propositions, Predicate and Quantifier.
Algorithms: Complexity, Divisions, Algorithm, Application of Number Theory.
Recursion: Sequences and summations, Recursive Definition and algorithm.
Combinatorial Analysis: Permutation and Combination, Divide and Conquer Algorithms, Generating Functions.
Graphs: Representation, Isomorphism, Connectivity, Euler and Hamilton path, Shortest path, Planer, Coloring.
Trees: Spanning trees, Rooted Trees, Binary Trees, Huffman Trees.
Boolean Algebra: Number System, Boolean Function, representing Boolean Function, Logic gate, Minimization of Circuits.

Course Learning Outcomes: After the successful completion of the course, the student will be able to-

CLO 1	Memorize the basic concepts of sets, permutations, relations, graphs, trees
CLO 2	Represent discrete objects and relationships using abstract mathematical structures

CLO 3	Apply basic concepts of mathematical logic and proof
CLO 4	Employ mathematical reasoning in order to read, comprehend, and construct mathematical arguments
CLO 5	Evaluate whether an algorithm works well and perform analysis in terms of memory and time
CLO 6	Formulate and model problems with the concepts and techniques of discrete mathematics

Mapping of Course Learning Outcomes to Program Learning Outcomes

CLO/ PLO	PLO 1	PL02	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9
CLO1	X	X			X				
CLO2	X	X			X				
CLO3	X	X			X				
CLO4	X	X			X				
CLO5	X	X			X				
CLO6	X	X			X				

Textbook

1. Discrete Mathematics and Its Applications by Kenneth H. Rosen

EEE 0713 1109: Introduction to Electrical Engineering

3 hours in a week, 3.00 Credit

Rationale

This course endeavors to build on this knowledge and further expand students' skill in analyzing and designing analogue circuits involving transistors and diodes. The course covers: the basic principles of operation and device characteristics of diodes, Bipolar Junction Transistors (BJT), Junction Filed Effect Transistors (JFET) and Metal Oxide Semiconductor Field Effect Transistors (MOSFET) that underpin the analysis, design and implementation of analogue circuits. Multi-stage amplifiers using BJT and FETs further enhanced the course. Upon completion, students should be able to construct, analyze, verify, and troubleshoot analog circuits using appropriate techniques and test equipment.

Course Objectives:

- To introduce the basic principle operations, device and circuit characteristics of diodes, BJT, JFET, MOSFET and Op-Amp.
- To further develop skill and knowledge in analysis and design of analogue circuits such as amplifiers.
- To introduce the idea about DC and AC analysis of different amplifier circuits.
- To make the students interpret semiconductor theory.

Course Contents:

P-N junction as a circuit element: Intrinsic and extrinsic semiconductors, operational principle of p-n junction diode, contact potential, current-voltage characteristics of a diode, Diode circuits: Half wave and full wave rectifiers, rectifiers with filter capacitor, characteristics of a Zener diode, clamping and clipping circuits. **Bipolar Junction Transistor (BJT) as a circuit element:** current components, BJT characteristics and regions of operation, BJT as an amplifier, biasing the BJT for discrete circuits, small signal equivalent circuit models, BJT as a switch. **Metal Oxide Semiconductor Field Effect Transistor (MOSFET) as circuit element:** structure and physical operation of an enhancement MOSFET, threshold voltage, Body effect, current-voltage characteristics of an enhancement MOSFET, and biasing discrete and integrated MOS amplifier circuits, single-stage MOS amplifiers, MOSFET as a switch, CMOS inverter. **Operational amplifiers (Op-Amp):** Properties of ideal Op-Amps, non-inverting and inverting amplifiers, inverting integrators, differentiator, weighted summer and other applications of Op-Amp circuits. Introduction to photodiode, Laser, Solar cell, Photo detector, LED.

.**Course Learning Outcomes:**

After the successful completion of the course, the student will be able to-

CLO 1	Interpret the basic semiconductor theory
CLO 2	Explain the basis operation of diode, and diode circuits
CLO 3	Design BJT amplifier circuits and perform DC and AC analysis.
CLO 4	Design JFET amplifier circuits and perform DC and AC analysis.
CLO 5	Identify different MOSFET circuits
CLO 6	Formulate an understanding for special purpose MOSFET
CLO 7	Differentiate between switching network of BJT and MOSFETs

Mapping of Course Learning Outcomes to Program Learning Outcomes

CLO/ PLO	PLO 1	PL02	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9
CLO1	X	X	X	X					
CLO2	X	X	X	X					
CLO3	X	X	X				X		
CLO4	X	X	X				X		
CLO5	X	X							
CLO6	X			X			X	X	
CLO7	X	X		X			X	X	

Recommended Books

1. Electronic Devices and Circuit Theory by Robert L. Boylestad and Louis Nashlesky
2. Microelectronic Circuits- Sedra/Smith
3. Digital logic and Computer Design – M. Morris Mano

EEE 0713 1110: Introduction to Electrical Engineering Sessional

3 hours in a week, 1.50 Credit

In this course students will perform experiments to verify practically the theories and concepts learned in EEE-106. Theoretical knowledge is incomplete without hands on experiments using the basic components and measuring devices. This is an introductory experimental laboratory that explores the design, construction, and debugging of analog electronic circuits. Lectures and two laboratory projects

investigate the performance characteristics of diodes, transistors, JFETs, and MOSFETS, including the construction of a small audio amplifier and preamplifier. The course provides opportunity to simulate real-world problems (as given as assignment) and solutions that involve tradeoffs and the use of engineering judgment.

Course objectives:

- Acquaint students with the basic idea about implementing different types diode circuits and investigates the voltage, current relationships.
- To help them develop skills for calculating voltage gain, current gain, overall gain in a multistage BJT, JFET and MOSFET amplifiers.
- To provide the students with capability of implementing different real life analog electronic circuits.

Course Contents:

- To familiarize students with electronics devices and Laboratory Equipment.
- To study of V-l Characteristics curve of P-N junction diode.
- To study of Half-Wave Rectification circuit.
- To study of Full-Wave Rectification circuit (Bridge &Center- tap).
- To study of Clipping and clamping circuit.
- To study MOSFET and BJT characteristics.
- Speech/ Audio amplification using NPN/PNP Transistor.
- MOSFET as an amplifier and switch.
- Different operational amplifier circuits.

Course Learning Outcomes:

After the successful completion of the course, the student will be able to-

CLO 1	Explain operation of diodes.
CLO 2	Design types of diode circuits.
CLO 3	Distinguish and interpret operation of BJT, JFET and MOSFET
CLO 4	Calculating operating point and perform DC analysis.
CLO 5	Differentiate between BJT, JFET and MOSFET amplifier circuits
CLO 6	Differentiate between BJT and MOSFET switching circuits
CLO 7	Demonstrate team-based communication skills, magnify their moral standards and apply these in practical life

Mapping of Course Learning Outcomes to Program Learning Outcomes

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9
CLO 1	X	X	X						
CLO 2	X	X	X	X			X		
CLO 3	X	X					X	X	
CLO 4	X	X	X						
CLO 5	X	X							
CLO 6	X	X		X					
CLO 7						X	X		

Recommended Books

1. Fundamental of Electric Circuits – Charles K. Alexander and Matthew N.O. Sadiku
2. Introductory Circuit Analysis by Robert L.Boylestad
3. Electronic Devices and Circuit Theory by Robert L. Boylestad and Louis Nashlesky
4. Microelectronic Circuits- Sedra/Smith

MAT 0541 1101 Co-ordinate Geometry & Linear Algebra

3 hours in a week, 3.00 Credit

In an increasingly complex world, mathematical thinking, understanding, and skill are more important than ever. **MAT 0541 1101 will** show students how to simplify many types of complex problems using matrix algebra and vector geometry. Students who major in the sciences or engineering are often required to study linear algebra. This course provides a solid foundation for further study in mathematics, the sciences, and engineering.

Course Objectives:

- Engage students in sound mathematical thinking and reasoning
- Provide a setting that prepares students to read and learn mathematics on their own
- Enhance and reinforce the student's understanding of concepts through the use of technology when appropriate

Course Contents:

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

Linear Algebra: Introduction to systems of linear equations ;homogeneous systems; Gaussian elimination; Matrix: Matrix and matrix operations; different types of matrices; algebraic operations on matrices; cofactors and minors; determinant of a square matrix; adjoint and inverse of a matrix; elementary transformation of matrices; normal and canonical form of a matrix; rank of a matrix; the row-reduced form of a matrix and rank ; Real vector spaces and subspaces; linear dependence and independence; spanning set and basis; coordinates and dimension, Change of basis, Rank and Nullity; Inner product spaces; Eigen values and eigen vectors; diagonalization of matrices; Cayley-Hamilton theorem; Euclidean n-space; Linear transformations: Linear transformations; composition of transformations Linear transformations from IRn to IRm; Properties of linear transformations from IRn to IRm ; Cauchy-Schwartz inequality; orthogonality; orthonormal basis and Gram-Schmidt process.

Course Learning Outcomes (CLO):

After completing the course the students will be able to

CLO 1	Learn how to transform an equation from one axis to another axis .
CLO 2	Understand properties of circle and explain the geometric condition

that determine the relation between two or more circle .

CLO 3 Learn properties of Pair of straight line ,Parabola ,Hyperbola and Ellipse.

CLO 4 Solve system of linear equation and determine the size, transpose, inverse, rank, and LU-factorization of a matrix

CLO 5 Understand element and operation of Real vector space and determine span ,basis ,dimension of those element.

CLO 6 Explain the mathematical foundation of eigen value and eigen vector and Understand matrix diagonalization .

Mapping of Course Learning Outcomes to Program Learning Outcomes

CLO/PLO	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9
CLO1	X				X				
CLO2	X				X				
CLO3	X				X				
CLO4	X				X				
CLO5	X				X				
CLO6	X				X				

Books Recommended:

1. Thomas Finney: Calculus and Analytic Geometry.
2. Howard Anton and Chris Rorres: Elementary linear algebra applications
3. Steven J. Leon: Linear algebra with applications, Prentice Hall, 1998
4. Rahman and Vattacharjee :A Text book on Coordinate Geometry with Vector Analysis

PHY 0533 1103 Physics

3 hours in a week, 3.00 Credit

Rationale:

In this course, Students will be able to gather knowledge of thermal properties of materials and apply
The knowledge in different thermal situations. This course will also provide basic knowledge in structure
Of matter, wave and oscillations. Physical optics will covered by this course through which students will
be familiar with interference, Bi-prism and diffraction.

Objectives

- To learn about thermometer and its construction.
- To learn basic principles of thermodynamics.
- To know wave behavior and Lissajous figure.
- To learn physical optics and problem solving technique.

Course Content:

Heat and Thermodynamics: Principle of temperature measurements: platinum resistance thermometer, thermo-electric thermometer, pyrometer; Kinetic theory of gases: Maxwell's distribution of molecular
Speeds, mean free path, equipartition of energy, Brownian motion, Van der Waal's Equation of state,
Review of the First Law of thermodynamics and its application, reversible and irreversible processes, Second Law of thermodynamics, Carnot cycle; Efficiency of heat engines, Carnot's Theorem, entropy of reversible and irreversible process.

Structure of Matter: Crystalline and non-crystalline solids, single crystal and polycrystalline solids, unit
Cell, crystal systems, co-ordinations number, crystal planes and directions, NaCl and CsCl Structure, packing factor, Miller indices, relation between inter-planar spacing and Miller indices, Bragg's Law.

Waves and Oscillations: Differential equation of a simple harmonic oscillator, total energy and average
energy, combination of simple harmonic oscillations, Lissajous figures, spring-mass system, calculation
of time period of torsional pendulum, damped oscillation, determination of damping co-efficient, forced
oscillation.

Physical Optics : Theories of light; Interference of light, Young's law, 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.

Course Learning outcomes

After the successful completion of the course, students will be able to:

CLO1: Explain thermometer, kinetic theory of gases, mean free path, Brownian motion, van der walls equation and related problems.

CLO2: Learn basic law of thermodynamics and solve related problems.

CLO3: Understand structure of matter.

CLO4: Learn wave behaviour and calculate wave properties for different situations.

CLO5: Know physical optics and related problems.

Mapping of the CLOs with PLOs

CLO/ PLO	PLO 1	PL02	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9
CLO1	X	X	X		X		X		X
CLO2	X	X	X		X		X		X
CLO3	X		X				X		X
CLO4	X	X					X		X
CLO5	X	X	X				X	X	X

Recommended Books

1. Physics for Engineers .Dr.Giasuddin Ahmed
2. Halliday, D. and Resnick, R: physics (Vol.I and Vol II)

PHY 0533 1104 Physics Sessional

3 hours in a week, 1.50 Credit

Laboratory works based on PHY **0533 1104**.

Rationale:

In this course students will perform some laboratory experiments that will help to visualize some fundamental concepts of physics.

Course objectives:

- To enable the students to carry out some fundamental experiments for finding out the numerical values of some physical parameters based on various laws, principles and theorems of physics.

Course contents:

1. Determination of the value of 'g' gravity by using compound pendulum.
2. Determination of the spring constant and effective mass of a spiral spring.
3. Determination of the focal length of a convex lens.
4. Determination of the mechanical equivalent of heat by electrical method.
5. Determination of the velocity of sound by water tube and tuning fork.
6. Calculation of the Planck's constant using LED.
7. Determination of angle of rotation of a sugar solution using half-shade Polarimeter.
8. Determination of the radius of curvature of a plano-convex lens by Newtons ring method.
9. Determination of specific heat of a liquid by the method of cooling.
10. Comparison of e.m.f of two cells by potentiometer.
11. Determination of Frequency of tuning fork by Melde's apparatus.
12. Determination of refractive index of a prism.

Course learning outcomes

After successfully completion of the course, the student will be able to-

CLO1: Determine the value of 'g' gravity by using compound pendulum.
CLO2: Determine the spring constant and effective mass of a spiral spring.
CLO3: Determine the focal length of a convex lens.
CLO3: Determine the focal length of a convex lens.
CLO4: Determine the mechanical equivalent of heat by electrical method.
CLO5: Determine the velocity of sound by water tube and tuning fork.
CLO6: Calculate the Planck's constant using LED.
CLO7: Determine angle of rotation of a sugar solution using half-shade polarimeter.
CLO8: Determine the radius of curvature of a Plano-convex lens by Newton's ring method.
CLO9: Determine specific heat of a liquid by the method of cooling.
CLO10: Compare e.m.f of two cells by potentiometer.
CLO11: Determine Frequency of tuning fork by Melde's apparatus.
CLO12: Determine refractive index of a prism.

Mapping of the CLOs with PLOs

CLO/ PLO	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9
CLO 1	X	X	X	X	X	X	X	X	X
CLO 2	X		X	X	X	X		X	
CLO 3	X	X	X	X	X	X	X	X	X
CLO 4		X		X	X		X		X
CLO 5	X		X		X	X		X	
CLO 6	X	X	X	X		X	X	X	X
CLO 7		X	X	X	X	X		X	X
CLO 8	X		X	X	X		X		
CLO 9	X	X				X		X	X
CLO 10	X	X		X	X	X	X	X	
CLO 11		X	X	X	X	X	X	X	X
CLO 12		X	X		X	X		X	X

Recommended Books

1. Practical Physics: Dr.Giasuddinahmed & Md.Shahabuddin

SSS 0312 1100 History of the Emergence of Independent Bangladesh

3 hours in a week, 3.00 Credit

Rationale:

This is a special compulsory course for all students of Bachelor program of Shahjalal University of Science and Technology, Sylhet. This course deals with the interrelated themes and topics that are essential to understand the emergence of Bangladesh.

Objectives:

- To give an outline about the concept of liberation war and freedom fighter
- To clarify the role of different people in the liberation war.
- To explain the role of Bangabandhu in liberation war
- To develop an insight about the value of the sacrifice of martyrs for motherland.

Course Contents:

This course deals with the following interrelated themes and topics that are essential to understand the emergence of Bangladesh. These themes include land and people, politics, economy, governance, society, religion and culture, global connections as well as the basic topics on the freedom struggle and War of Liberation. Issues under each of the broad themes will be discussed from the perspective of historical evolution and contemporary significance.

Description of the country and its people: Impact of Geographical features, Ethnic composition of Bangladesh, Development of Bengali Language and its impact, Cultural syncretism and religious tolerance, Distinctive identity of Bangladesh in the context of undivided Bangladesh. **Proposal for undivided sovereign Bengal, the partition of the Subcontinent, 1947 and Foreshadowing Bangladesh:**

Rise of communalism under the colonial rule, Lahore Resolution 1940, The proposal of Suhrawardi and Sarat Bose for undivided Bengal: consequences, The creation of Pakistan 1947, Foundation of Awami Muslim League and Foreshadowing Bangladesh. **Pakistan: Structure of the state and disparity;** Central and provincial structure, Influence of Military and Civil bureaucracy, Economic, social and cultural disparity. **Language Movement and quest for Bengali identity:** Misrule by Muslim League and Struggle for democratic politics, The Language Movement: context, phases and International Recognition of Bengali Language, United front of Haque – Vasani – Suhrawardi: election of 1954, consequences. **Military rule: the regimes of Ayub Khan and Yahia Khan (1958-1971):** Definition of military rules and its characteristics, Ayub Khan's rise to power and characteristics of his rule (Political repression, Basic democracy, slamisation), Fall of Ayub Khan and Yahia Khan's rule. **Rise of nationalism and the Movement for self-determination:** Resistance against cultural aggression and resurgence of Bengali culture, Sheikh Mujibur Rahman and the 6 points movement, Reactions: Importance and significance, The Agortola Case 1968. **The mass- upsurge of 1969 and 11 point movement:** Background, Program, Significance. **Election of 1970 and its Impact:** Legal Framework Order (LFO), Programs of different political parties, Election result and centers refusal to comply **Non-cooperation Movement and 7th March Speech, 1971:** The non-cooperation movement, Speech of 7th March: Background of the speech, major characteristics of the speech, impact of this speech, International recognition of 7th March Speech as part of world heritage. **Declaration of Independence of Bangladesh:** Operation Searchlight, Declaration of Independence of Bangladesh by Bangobondhu, Beginning of the Liberation War of Bangladesh. **The war of Liberation 1971:** Genocide, repression of women, refugees, Formation of Bangladesh government and proclamation of Independence, The spontaneous early resistance and subsequent organized resistance (Mukti Fouz, Mukti Bahini, guerillas and the frontal warfare), Publicity Campaign in the war of Liberation (Shadhin Bangla Betar Kendra, the Campaigns abroad and formation of public opinion), Contribution of students, women and the masses (Peoples war) and different political parties, The role of Great powers and the United Nations in the Liberation war, The contribution of India in the Liberation War, The Anti-liberation activities of the occupation army, the Peace Committee, Al-Badar, Al-Shams, Rajakars, pro Pakistan political parties and Pakistani Collaborators , killing of the intellectuals, Trial of Bangabandhu and reaction of the World Community, Formation of joint command and the Victory, The overall contribution of Bangabandhu in the Independence struggle. **The Bangabandhu Regime 1972-1975:** Homecoming; Speech of 10 January, Making of the constitution, Reconstruction of the war-ravaged country, Foreign Policy of Bangabandhu; Bangabandhu's First Speech in the United Nations, The murder of Bangabandhu and his family and the ideological turn-around.

Mapping of Course Learning Outcomes to Program Learning Outcomes

CLO /PLO	PL O1	PL O2	PL O3	PL O4	PL O5	PL O6	PL O7	PL O8	PL O9
CLO 1							X		X
CLO 2							X		X
CLO 3							X		X
CLO 4							X		X
CLO 5							X		X

Recommended texts:

1. Ahmed, Salahuddin and Bazlul Mobin Chowdhury (eds.), *Bangladesh: National Culture and Heritage: An Introductory Reader* (Dhaka: Independent University Bangladesh, 2004)
2. Harun-or-Roshid, *The Foreshadowing of Bangladesh: Bengal Muslim League and Muslim Politics, 1906-1947* (Dhaka : The University Press Limited, 2012)
3. Jahan Rounaq, *Pakistan: Failure in National Integration,(Dhaka :* The University Press Limited, 1977)
4. Maniruzzaman Talukder, *Radical Politics and the Emergence of Bangladesh, (Dhaka :* Mowla,Brothers, 2003)
5. Muhith, A M A, *History of Bangladesh: A Subcontinental Civilization*, (Dhaka: UPL, 2016)
6. Samad Abdus, *History of Liberation War of Bangladesh*, (Dhaka : Aparajeyo Bangla Prakashani, 2019)
7. Milton Kumar Dev, Md. Abdus Samad, *History of Bangladesh* (Dhaka : Biswabidyalya Prokasoni, 2014)
8. Schendel, Willem van : *A History of Bangladesh* (Cambridge: Cambridge University Press, 2009)

৯. শেখ মুজিবুর রহমান : *অসমাপ্ত আত্মজীবনী , (*ঢাকা : দি ইউনিভার্সিটি প্রেসলিমিটেড, ২০১২)

১০. নীহাররঞ্জনরায় : *বাঙালীর ইতিহাস , (*কলকাতা : দে' জ পাবলিশিং, ১৪০২ সাল)

১১. সালাহ্ উদ্দিন আহমেদ ও অন্যান্য (সম্পাদিত), *বাংলাদেশের মুক্তি সংগ্রামের ইতিহাস* ১৯৪৭-১৯৭১, (ঢাকা : আগামী প্রকাশনী, ২০০২)

১২. আবুল মাল আবদুল মুহিত : *বাংলাদেশ: জাতিরাষ্ট্রের উদ্ভব, (ঢাকা :* সাহিত্য প্রকাশ, ২০০০)

১৩. সিরাজুল ইসলাম (সম্পাদিত), *বাংলাদেশের ইতিহাস ১৭০৪-১৯৭১*, ৩ খন্ড, (ঢাকা : এশিয়াটিক সোসাইটি অব বাংলাদেশ, ১৯৯২)

১৪. হারুন-অর-রশিদ : *বঙ্গীয় মুসলিম লীগ পাকিস্তান আন্দোলন বাঙালির রাষ্ট্রভাবনা ও বঙ্গবন্ধু*, (ঢাকা : অন্য প্রকাশন, ২০১৮)

১৫. হাসান হাফিজুর রহমান :বাংলাদেশের স্বাধীনতাযুদ্ধ দলিলপত্র, (সম্পাদিত), (ঢাকা:গণপ্রজাতন্ত্রী বাংলাদেশ সরকার, ১৯৮৫)

Course Learning Outcomes**:** After the successful completion of the course, the student will be able to-

CLO 1	Know liberation war of Bangladesh and role of freedom fighters
CLO 2	Know the causes of developing movement and nationalism
CLO 3	Know different disparities and deprivation of Bangladesh by Pakistan
CLO 4	Know the declaration and continuing breathtaking moments of liberation war.
CLO 5	Know the lifelong contributions of Bangabandhu Sheikh Mujibor Rahman in the creation of independent Bangladesh.