 Bulletin
Fall 2011

AHSANULLAH UNIVERSITY OF SCIENCE AND TECHNOLOGY
(Sponsored by the Dhaka Ahsania Mission and Approved by the Government of Bangladesh)
DHAKA, BANGLADESH
Published by

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Disclaimer

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The department of Computer Science and Engineering, abbreviated CSE, is offering an undergraduate engineering degree program since the establishment of the university in the year 1995 to render quality higher education to numerous worthy young fellows as well as to meet the huge demand of highly qualified specialists in the field. The 4-year program is spread over eight semesters with two semesters per academic year. Each semester is of around 20 working weeks containing classes for 15 weeks and preparatory leave with semester final examination for 5 weeks. Apart from the 20 working weeks per semester, the department remains open for clearance/improvement/carryover examinations, result and admission of students in the 1st semester of 1st year and for works related to industrial training etc.

Entry qualification for the program is Higher Secondary Certificate (H.S.C.) with good academic background or A-Level with comparable results or equivalent. Usual intake of students in the department is twice in an academic year. Theory classes are held with approximately 50 students per class and each class is divided into two subsections for practical classes. Students graduated from this department are employed in different prestigious institutions and organizations home and abroad. Some of them have already completed, and some are getting admitted every year to postgraduate studies at well reputed universities all over the world. Also a number of students of the department have taken transfer to foreign universities.

The department has a good number of full-time faculty members with best available exposure to ever-growing horizon of computer science and engineering. Besides, a number of part-time faculties also teach in each semester from other universities, research organizations and industrial establishments for extending experience-rich education.

The program follows an intensive course curriculum containing well-organized courses on basic sciences, computer science, electrical and electronic engineering, computer engineering, management and humanities. Of course, computer science and engineering courses are most emphasized and constitute the bulk of the program (about 70%).

We have seven computer labs and one digital electronics lab equipped with modern personal computers and electronic devices in the department for conducting regular sessional (practical) classes. These labs have been named as Network & Data Communication (NDC) Lab (7B01), Web Application & Multimedia (WAM) Lab (7B03), Data & Knowledge Engineering (DKE) Lab (7B05), Software Engineering (SE) Lab (7B06),
Microprocessor & Interfacing (MI) Lab (7B07), Operating System (OS) Lab (7B08) and Digital Electronics & Design (DED) Lab (7B04) respectively. There is a server center equipped with various PC-server systems for providing network facilities to the labs. The department provides email and internet facilities to teachers and students. It also maintains a web site under the address ‘www.aust.edu’.

The department organizes various co-curricular and extra-curricular activities to develop important social and professional faculties in the students. Most common co-curricular activity is the programming contest, which has become regular by this time. The department also organizes chess, football and cricket tournaments among the students. The most common extra-curricular activities are reception parties for welcoming the newly entered students and also for biding farewell to the outgoing students.

In this booklet semester-wise brief and detailed outlines of the departmental and non-departmental courses have been given. A few other courses may also be offered in addition to the courses shown here. Optional courses described here are offered depending on the availability of teachers and the number of students in the class. Requirements of contact hours and credits have also been summarized. A semester-wise list of suggested text & reference books has been added at the end and, besides, a brief description of the up-to-date rules and regulations regarding examinations, grading system and grade points has been incorporated at the beginning.
(1) The performance of a student in a theoretical course of study will be evaluated on the basis of the following criteria:

(i) Continuous assessment (assessment of class attendance, class performance, quizzes/class tests and/or assignments etc.).

(ii) Semester Final Examination.

(iii) Clearance Examination (for clearance of the courses in which the students fail in the Regular Examination, if any).

(iv) Carry Over Examination (for clearance of back log of the course(s) of previous semester(s), if any).

(v) Improvement Examination (for improvement of the grade(s) obtained in the Regular Examinations, if any).

(2) Continuous assessment and Semester Final Examination will form the Regular Examination while the Clearance Examination, Carry Over Examination and Improvement Examination will provide additional opportunities to the students.

(3) The distribution of marks after continuous assessment and in the Semester Final/Clearance/Carry Over/Improvement Examination will be as follows:

(i) Class participation (i.e. class attendance, class performance etc.)……10%

(ii) Quizzes/class tests and/or assignments........................................... 20%

(iii) Semester Final/Clearance/Carry Over/Improvement Examination…… 70%

Total: ........................................................................................................100%

(4) The number of quizzes/class tests and/or assignments in a theoretical course of study shall ordinarily be (n + 1), where ‘n’ is the number of credit hours of the course. Evaluation of the performance will be on the basis of the best ‘n’ quizzes/class tests and/or assignments.

** These rules are subject to change from semester to semester.
(5) The performance of a student in a sessional/practical course will be evaluated on the basis of class attendance, class performance, quizzes/class tests, assignments, reports, practical examinations, jury viva voce etc. The distribution of marks in the course will be determined by the teachers concerned.

(6) The letter grades and the corresponding grade-points will be awarded for the theoretical courses in the Regular Examination and for the practical/sessional courses in accordance with the provisions shown below:

<table>
<thead>
<tr>
<th>NUMERICAL GRADE</th>
<th>LETTER GRADE</th>
<th>GRADE POINT</th>
</tr>
</thead>
<tbody>
<tr>
<td>80% or above</td>
<td>A+</td>
<td>4.00</td>
</tr>
<tr>
<td>75% to less than 80%</td>
<td>A</td>
<td>3.75</td>
</tr>
<tr>
<td>70% to less than 75%</td>
<td>A-</td>
<td>3.50</td>
</tr>
<tr>
<td>65% to less than 70%</td>
<td>B+</td>
<td>3.25</td>
</tr>
<tr>
<td>60% to less than 65%</td>
<td>B</td>
<td>3.00</td>
</tr>
<tr>
<td>55% to less than 60%</td>
<td>B-</td>
<td>2.75</td>
</tr>
<tr>
<td>50% to less than 55%</td>
<td>C+</td>
<td>2.50</td>
</tr>
<tr>
<td>45% to less than 50%</td>
<td>C</td>
<td>2.25</td>
</tr>
<tr>
<td>40% to less than 45%</td>
<td>D</td>
<td>2.00</td>
</tr>
<tr>
<td>Less than 40%</td>
<td>F</td>
<td>0.00</td>
</tr>
</tbody>
</table>

(7) Apart from the letter grades listed above, the students may be awarded other letter grades for having different status in a course. The letter grade ‘W’ will be given for the withheld result of a student in a course. Subject to the recommendation of the concerned Head of the Department and the approval of the Vice Chancellor of the University, a student may be awarded the letter grade ‘E’ for exemption or waiver of a course. The letter grade ‘P’ will be awarded for course(s) the students have passed in previous semester(s).

<table>
<thead>
<tr>
<th>COURSE STATUS</th>
<th>LETTER GRADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Withheld</td>
<td>W</td>
</tr>
<tr>
<td>Exempted</td>
<td>E</td>
</tr>
<tr>
<td>Passed</td>
<td>P</td>
</tr>
</tbody>
</table>

Grade Point Average (GPA) of a student will be computed without the grades mentioned above.
(8) Every course has a certain number of credit hours which describes its weightage. The credit hours of a theoretical course and the credit hours of a practical/sessional course refer to contact hours per week and half of the contact hours per week of the courses respectively. The number of credit hours a student has completed satisfactorily and the weighted average of the grade points he/she has maintained will help measure the performance of the student. Calculation of Grade Point Average (GPA) can be explained as follows:

\[
GPA = \frac{\sum C_i G_i}{\sum C_t} = \frac{\text{Summation of (Credit hours in a course x Grade points earned in that course)}}{\text{Total number of credit hours completed}}
\]

Where:
- \(C_i\) = Credit hours in a course
- \(G_i\) = Grade points earned in that course
- \(C_t\) = Total number of credit hours completed

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

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hour</th>
<th>Grade</th>
<th>Grade Point</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course 1</td>
<td>3</td>
<td>A+</td>
<td>4.00</td>
</tr>
<tr>
<td>Course 2</td>
<td>3</td>
<td>B</td>
<td>3.00</td>
</tr>
<tr>
<td>Course 3</td>
<td>3</td>
<td>A</td>
<td>3.75</td>
</tr>
<tr>
<td>Course 4</td>
<td>2</td>
<td>B+</td>
<td>3.25</td>
</tr>
<tr>
<td>Course 5</td>
<td>1</td>
<td>A-</td>
<td>3.50</td>
</tr>
</tbody>
</table>

Then his/her Grade Point Average (GPA) for the semester will be computed as follows:

\[
GPA = \frac{3(4.00) + 3(3.00) + 3(3.75) + 2(3.25) + 1(3.50)}{3 + 3 + 3 + 2 + 1} = 3.52
\]
(9) The total marks assigned to a theoretical/practical course of study is 100 and the duration of Semester Final/Improvement/Clearance/Carry Over Examination of a theoretical course is 3 hours. The total marks assigned to continuous assessment (obtained on the basis of class participation, quizzes/class tests and/or assignments etc.) and the Semester Final/Clearance/Improvement Examination are 30 & 70 respectively. **However the full marks (100) of a Carry Over course will be allotted to the Carry Over Examination only and the final performance of a student in the Carry Over course be evaluated only on the basis of the marks obtained in the Carry Over Examination.**

(10) A student who remains absent in the Semester Final/Clearance/Improvement/Carry Over Examination of a course of study will be given the grade ‘F’ for the course. The total marks and the corresponding grade of the students who are absent in the examinations of a course will be entered in the mark sheet of the course considering the mark of the examinations as zero.

(11) The Clearance Examination of a course will be held only for the students obtaining the grade ‘F’ (failed in the course) in the Regular Examination of the course. The Clearance/Carry Over/Improvement Examination of a semester will be held over a period of 1 to 2 weeks at the end of the Semester Final Examination of the semester.

(12) The Clearance Examination of a course will carry 70% of the total marks assigned to the course; the rest of the mark (30%) will be entered from the record of the continuous assessment secured earlier by the student when he/she attended the classes. Whatever is the total mark obtained by the student, the highest attainable grade with the Clearance Examination is ‘C’. So the grading scale for the students appearing in the Clearance Examination will be as follows:

<table>
<thead>
<tr>
<th>NUMERICAL GRADE</th>
<th>LETTER GRADE</th>
<th>GRADE POINT</th>
</tr>
</thead>
<tbody>
<tr>
<td>45% or above</td>
<td>C</td>
<td>2.25</td>
</tr>
<tr>
<td>40% to less than 45%</td>
<td>D</td>
<td>2.00</td>
</tr>
<tr>
<td>Less than 40%</td>
<td>F</td>
<td>0.00</td>
</tr>
</tbody>
</table>
(13) A student obtaining the grade ‘F’ in a maximum of 2 (two) theoretical courses of a semester will be promoted to the next higher class with carry over in the failed theoretical course(s) if the cumulative number of the courses including the number of carry over courses of the previous semester(s) of the student concerned does not exceed the highest allowable limit of 4 (four). The students can clear the backlog of the carryover course(s) in the Carryover Examinations of the relevant semester. Such examinations will be held in the same manner as the clearance examination.

(14) If the number of failed courses of a student in a semester exceeds the highest limit of 2 or if the cumulative number of failed courses including the number of carry over courses of the student exceeds the highest limit of 4, the student will not be promoted to the immediate higher class. In such a case, the student must re-register for the course(s) in which he/she failed in the semester and bring down the number of failed courses including the carry over course(s) within the allowable limits of 4 & 2 to be promoted to the next higher semester.

(15) If the cumulative number of failed courses including the number of carry over courses of a student enrolled in 4th year 2nd semester of 4-year bachelor degree programme or in 5th year 2nd semester of 5-year bachelor degree programme exceeds the highest limit of 4 (four), the student will have to re-register for the courses of the semester in which he/she failed. If the number of failed courses of the final semester of the programs exceeds the highest limit of 2 (two), the student will have to re-register for the courses of the semester in which he/she failed. A student can appear at the Carry Over Examination of the courses in the relevant subsequent semester if the number of failed courses does not exceed the limit of 4 & 2 as specified above.

(16) For appearing in the Carry Over Examinations, the students are required to apply for enrollment within due time in the prescribed application form available in the office of the Controller of Examinations of the University.
(17) The students who have not been promoted to the next higher semester can re-register in the subsequent semester for the course(s) (both theoretical & practical) in which they have failed. The grade(s) secured by the students in the re-registered course(s) will be considered for the result and Grade Point Average (GPA) of the students concerned for that semester. However, the grade(s) obtained by the students in the previous semester will also be recorded in the transcript/grade card and tabulation sheet of semester only for chronological sequence. The students are required to apply in the prescribed application form available in the office of the Registrar of the University for re-registration. The duly filled in application form must be submitted within the notified time.

(18) For the purpose of grade improvement, a student obtaining a passing grade lower than ‘B’ in the Regular Examination of a theoretical course can appear at the relevant Improvement Examination of the semester by canceling the passing grade of the course secured by him/her. The highest attainable grade with the Improvement Examination is ‘B’ and the grade obtained with the Improvement Examination will be considered for the result and GPA of a student. But the grade obtained by the student in the Regular Examination will also be recorded in the tabulation sheet/transcript/grade card only for chronological sequence. The letter grades will be awarded with the Improvement Examinations in accordance with the provision given below:

<table>
<thead>
<tr>
<th>NUMERICAL GRADE</th>
<th>LETTER GRADE</th>
<th>GRADE POINT</th>
</tr>
</thead>
<tbody>
<tr>
<td>60% or above</td>
<td>B</td>
<td>3.00</td>
</tr>
<tr>
<td>55% to less than 60%</td>
<td>B-</td>
<td>2.75</td>
</tr>
<tr>
<td>50% to less than 55%</td>
<td>C+</td>
<td>2.50</td>
</tr>
<tr>
<td>45% to less than 50%</td>
<td>C</td>
<td>2.25</td>
</tr>
<tr>
<td>40% to less than 45%</td>
<td>D</td>
<td>2.00</td>
</tr>
<tr>
<td>Less than 40%</td>
<td>F</td>
<td>0.00</td>
</tr>
</tbody>
</table>

(19) The Improvement Examination of a course will carry 70% of the total mark assigned to the course and like the Semester Final/ Clearance Examinations; the rest of the mark will be entered in the mark sheet of the course from the record of the continuous assessment secured earlier by the student when he/she attended the classes of the semester.
For appearing in the Improvement Examination of a course, the students are required to apply for enrollment in the prescribed application form available in the office of the Controller of Examinations at least four (4) days before the examination date of the course.

(20) A student of a 4-year degree programme can appear in the improvement examination in a maximum of 4 (four) courses while a student of a 5-year degree programme can do the same in a maximum of 5 (five) courses in his/her student career at AUST.

(21) A student failing in any sessional/practical course will have to repeat the semester. But a student failing in the Surveying Practical course may be promoted to the next higher class, if otherwise eligible. A student who remains absent in the classes of the Surveying Practical course due to a reason acceptable to the administration of the University, will get another chance to attend the classes & pass the course along with students of other batches in the next relevant semester.

(22) A student of a semester who fails to submit the report/thesis of the course Project/Thesis during the semester will have to enroll for the course in the subsequent semester of his/her submission of the report/thesis.

(23) Students of all bachelor degree programmes are required to attend at least 60% of the classes held in each course of a semester. The students failing to attend the requisite percentage of classes in any course will not be allowed to appear at the Semester Final/Clearance/Improvement/CARRY Over Examinations of the course in the semester. However, the University may condone the shortage of requisite percentage of class attendance on grounds acceptable to the authority.

(24) All 4-year degree programmes at AUST require completion of all degree requirements within a maximum period of 7 years while a 5-year degree programme requires completion of all degree requirements within a maximum period of 8 years. Failure to complete all degree requirements within the given time frame may disqualify a student from continuation of his/her study at AUST.
(25) GPA Requirements for the Bachelor Degree

(i) The students securing a CGPA (Cumulative Grade Point Average) of 2.20 or above on a scale of 4.00 will be considered to be making normal progress towards a degree and the students failing to attain the CGPA of 2.20 or above on a scale of 4.00 may be placed on academic probation. A minimum Cumulative GPA (CGPA) of 2.20 on a scale of 4.00 will be required for the award of the degree.

(ii) The minimum period of probation is one semester but the usual period is one academic year. The probation may be extended for additional semester(s) until the student achieves an overall GPA of 2.20 or better.

(iii) A student on academic probation failing to maintain at least a CGPA of 2.20 during two consecutive academic years may be suspended from the University. This suspension may be withdrawn by the Head of the Department on receipt of an application from the student and on being satisfied that every effort to improve the grade will be made by him/her. But this can only be done after a full semester of suspension. However, the second suspension will be regarded as final and absolute.

(iv) Graduating students securing a CGPA of 3.75 or above will be included in the Dean’s List of Honor.

(26) GPA requirements for Tuition Fee Waiver

(i) Full Free Tuition Award (FFTA): As per Private University Act, 5% of the students promoted to every class of a semester will be offered the Full Free Tuition Award (FFTA) on the basis of the earned Grade Point Average (GPA) of all courses of the immediate previous semester except the courses Project/Thesis & Surveying Practical. If the grade point averages of more than one student are equal, then the total marks obtained by the students in the courses will be considered for the award. The bonafide students, who are promoted, get admitted and continue their studies at AUST are eligible for FFTA on the basis of merit and other rules and regulations of the University.
(ii) **Half Free Tuition Award (HFTA):** In addition to the FFTA, AUST also offers **Half Free Tuition Award (HFTA)** to a maximum of another 5% of the students promoted to every class of a semester whose results are considered to be brilliant as those for FFTA. The interested students are required to submit application for HFTA in prescribed form available in the office of the Registrar positively by the date notified. No application/candidature/appeal will be considered after the date notified. The selection for HFTA will be, among other rules and regulations, on the basis of the earned grade point average (GPA) of all courses of the immediate previous semester except the courses Project/Thesis & Surveying Practical. If the grade point averages of more than one student are equal, then the total marks obtained by the students in the courses will be considered for the award. In addition to the above following criteria will also be considered in the selection for FFTA and HFTA awards:

a) To be eligible for the award a student needs to continue his/her study at AUST. The award will be cancelled/forfeited for any discontinuation/interruption of study at AUST;

b) If any disciplinary action has been taken against a student, he/she is not eligible for FFTA or HFTA;

c) The students having less than 60% class attendance in the immediate previous semester are not eligible for any award;

d) Student, already selected for FFTA, is not eligible for HFTA; and

e) HFTA will be sanctioned only on the basis of application and rules and regulations and not as a matter of right of the student.

(iii) There are also provisions for financial help to the distressed students from the Fund for Welfare of the Distressed Students.

(iv) If two or more students of the same parents study concurrently as regular students in this University, one of them may get Half Free Tuition Award on application as per the rules of the University.
(v) In addition, 1% of the promoted students are awarded Full Free Tuition Award on the recommendation of the sponsor.

(27) Updates in Course Codes

Previously, a course code, for example CSE303, standing for the course titled Database included 3 digits following an acronym (CSE) for the department offering the course. The first digit (3) stood for year (third) and the next two digits (03) represented the code for the course. In the proposed syllabus, an extra second digit standing for the semester serial number has been introduced. For example, the above 3rd year 1st semester course has the course code CSE3103 where the first digit (3) stands for year (third), the second digit (1) stands for semester (first) and the next digits (03) represent the code for the course, as before.
BRIEF OUTLINE OF THE UNDERGRADUATE PROGRAM IN COMPUTER SCIENCE AND ENGINEERING

YEAR-1, SEMESTER-1

<table>
<thead>
<tr>
<th>Course no.</th>
<th>Course Title</th>
<th>Hours/Week Theory-Lab</th>
<th>Credits</th>
<th>Prerequisite</th>
<th>Contents on page</th>
</tr>
</thead>
<tbody>
<tr>
<td>HUM1107</td>
<td>Critical Thinking &amp; Communication</td>
<td>3-0</td>
<td>3</td>
<td></td>
<td>41</td>
</tr>
<tr>
<td>HUM1108</td>
<td>English Language Sessional</td>
<td>0-3</td>
<td>1.5</td>
<td></td>
<td>41</td>
</tr>
<tr>
<td>MATH1115</td>
<td>Mathematics-I</td>
<td>3-0</td>
<td>3</td>
<td></td>
<td>41</td>
</tr>
<tr>
<td>PHY1115</td>
<td>Physics</td>
<td>3-0</td>
<td>3</td>
<td></td>
<td>42</td>
</tr>
<tr>
<td>PHY1116</td>
<td>Physics Lab</td>
<td>0-3/2</td>
<td>0.75</td>
<td></td>
<td>43</td>
</tr>
<tr>
<td>CHEM1115</td>
<td>Chemistry</td>
<td>3-0</td>
<td>3</td>
<td></td>
<td>43</td>
</tr>
<tr>
<td>CSE1101</td>
<td>Elementary Structured Programming</td>
<td>3-0</td>
<td>3</td>
<td></td>
<td>21</td>
</tr>
<tr>
<td>CSE1102</td>
<td>Elementary Structured Programming Lab</td>
<td>0-3</td>
<td>1.5</td>
<td></td>
<td>21</td>
</tr>
<tr>
<td>CSE1108</td>
<td>Introduction to Computer Systems</td>
<td>0-3</td>
<td>1.5</td>
<td></td>
<td>21</td>
</tr>
</tbody>
</table>

Total: 15-10.5 20.25

Total Contact Hours (nominal): $2(15+10.5) \times 15 = 382.5$

YEAR-1, SEMESTER-2

<table>
<thead>
<tr>
<th>Course no.</th>
<th>Course Title</th>
<th>Hours/Week Theory-Lab</th>
<th>Credits</th>
<th>Prerequisite</th>
<th>Contents on page</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH1219</td>
<td>Mathematics-II</td>
<td>3-0</td>
<td>3</td>
<td>MATH1115</td>
<td>43</td>
</tr>
<tr>
<td>ME1211</td>
<td>Basic Mechanical Engineering</td>
<td>3-0</td>
<td>3</td>
<td></td>
<td>44</td>
</tr>
<tr>
<td>ME1214</td>
<td>Engineering Drawing</td>
<td>0-3/2</td>
<td>0.75</td>
<td></td>
<td>44</td>
</tr>
<tr>
<td>EEE1241</td>
<td>Basic Electrical Engineering</td>
<td>3-0</td>
<td>3</td>
<td></td>
<td>44</td>
</tr>
<tr>
<td>EEE1242</td>
<td>Basic Electrical Engineering Lab</td>
<td>0-3</td>
<td>1.5</td>
<td></td>
<td>44</td>
</tr>
<tr>
<td>CSE1200</td>
<td>Software Development-I</td>
<td>0-3</td>
<td>1.5</td>
<td></td>
<td>22</td>
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Total: 15-10.5 20.25

Total Contact Hours (nominal): 382.5

1 Refers to a course that should be offered in an earlier semester

2 Contact hours per week = 15 + 10.5 = 25.5, nominal semester duration = 15 weeks
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Total: 15-10.5 20.25

Total Contact Hours (nominal): 382.5

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Total: 15-10.5 20.25

Total Contact Hours (nominal): 382.5
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Total Contact Hours (nominal): 337.5

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Total: 15-13.5 21.75

Total Contact Hours (nominal): 427.5

YEAR-4, SEMESTER-2

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Total: 15-12 21

Total Contact Hours (nominal): 405
## OPTIONS AVAILABLE

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<th>Credits</th>
</tr>
</thead>
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<tr>
<td>1</td>
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<td>15</td>
<td>10.5</td>
<td>20.25</td>
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<td>10.5</td>
<td>20.25</td>
</tr>
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<td>Total:</td>
<td>120</td>
<td>82.5</td>
<td>161.25</td>
</tr>
</tbody>
</table>

Total Contact Hours (nominal): \((120 + 82.5) \times 15 = 3037.5\)

Total Credits: 161.25
YEAR-1, SEMESTER-1

CSE1101  3 hours per week, 3 Cr.
Elementary Structured Programming  Prereq.: Nil

Basic programming concepts and notations; Variables, Constants, Data types; Input and Output Statements; Control Structures; Functions and Subroutines; Processing Structured data: Arrays, Strings, Records, Pointers, Structures and Linked lists.

CSE1102  3 hours per week, 1.5 Cr.
Elementary Structured Programming Lab

Laboratory works based on CSE1101.

CSE1108  3 hours per week, 1.5 Cr.
Introduction to Computer Systems


Experiments based on DOS, Windows, Unix, Word processing and Spreadsheet packages.
YEAR-1, SEMESTER-2

CSE1200
Software Development-I
3 hours per week, 1.5 Cr.

Students will develop software in groups or individually using a structured programming language with special emphasis on higher features like strings, files, sound and graphics.

CSE1203
Discrete Mathematics
3 hours per week, 3 Cr.
Prereq.: Nil

Set Theory: Power set, operations on sets, and laws of set operations; Properties and laws of various sets of numbers. Mathematical logic: Propositional and predicate calculus; Methods of proof. Counting and Countability: Counting principles; Basics of recurrence; Countability of sets. Graph Theory: Definitions, classification and computer representation of graphs; Trees; Directed Graphs; Graph traversals. Relations and Functions: Definitions, types and properties of relations and functions; Composition of relations and functions; Discrete numeric functions. Introduction to theory of groups.

CSE1205
Object Oriented Programming
3 hours per week, 3 Cr.
Prereq.: CSE1101

Introduction to Object Oriented Programming (OOP); Concepts and Techniques of OOP: Classes and Objects (General forms, Special keywords and methods, objects as parameters), Polymorphism and Overloading; Class hierarchy and inheritance: Creating class hierarchy, Member access and inheritance, Method overriding; OOP facilities for extensive and robust program design.

CSE1206
Object Oriented Programming Lab
3 hours per week, 1.5 Cr.

Laboratory works based on CSE1205.
YEAR-2, SEMESTER-1

CSE2100  3 hours in alternate week, 0.75 Cr.
Software Development-II

Students will develop software in groups or individually using an object oriented programming language.

CSE2103  3 hours per week, 3 Cr.
Data Structures  Prereq.: CSE1101

Basic concepts: Data structure notation, search and efficiency; Elementary data objects: Logical values, Integers and Packed words; Common data structures: Arrays, Lists (Sublists and recursive lists, Circular lists and Orthogonal lists); Stacks, Queues and Graphs (Binary Tree and Threaded Tree); Applications of data structures: Sorting, Searching, Hashing; Solving Computational problems.

CSE2104  3 hours per week, 1.5 Cr.
Data Structures Lab

Laboratory works based on CSE2103.

CSE2105  3 hours per week, 3 Cr.  Prereq.: Nil
Digital Logic Design

Boolean Algebra: Basic theorems and properties, Boolean functions and their simplification; Digital logic gates; Combinational Logic: Adder, Subtractor, Multiplexer and Demultiplexer, Encoder and Decoder, Comparator; Parity generator and checker; Synchronous Sequential Logic: Flip-flops, Analysis and Design of sequential circuits; Registers; Synchronous and Asynchronous counters; Basic Memory cell.

CSE2106  3 hours per week, 1.5 Cr.
Digital Logic Design Lab

Laboratory works based on CSE2105.
YEAR-2, SEMESTER-2

CSE2200 3 hours in alternate week, 0.75 Cr.
Software Development-III

Students will work in groups or individually to produce software based on current trends and developments in the sector.

CSE2201 3 hours per week, 3 Cr.
Numerical Methods  Prereq.: Nil


CSE2202 3 hours in alternate week, 0.75 Cr.
Numerical Methods Lab

Laboratory works based on CSE2201.

CSE2207 3 hours per week, 3 Cr.  Prereq.: CSE2103
Algorithms

Algorithmic Complexity Analysis; Methods for the design of efficient algorithms: Divide and Conquer, Greedy method, Dynamic programming, Backtracking, Branch and Bound, Polynomial evaluation, Lower bound theory, Intractable problems.

CSE2208 3 hours per week, 1.5 Cr.
Algorithms Lab

Laboratory works based on CSE2207.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Prerequisites</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSE2209</td>
<td>Digital Electronics and Pulse Techniques</td>
<td>3 Cr.</td>
<td>CSE2105, EEE2141</td>
<td>Diode logic; Transistor switches; Logic Families: RTL, DTL, DCTL, TTL, ECL, IIL, MOS, CMOS; Electronic circuits for flip-flops, counters and registers, memory systems, PLAs; A/D and D/A converters with applications; Comparator circuits; Switching circuits; Multi vibrator: monostable, bistable, astable, Schmitt trigger; Voltage and current time-based generators; Timing circuits.</td>
</tr>
<tr>
<td>CSE2210</td>
<td>Digital Electronics and Pulse Techniques Lab</td>
<td>0.75 Cr.</td>
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<td>Laboratory works based on CSE2209.</td>
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<tr>
<td>CSE2213</td>
<td>Computer Architecture</td>
<td>3 Cr.</td>
<td>Nil</td>
<td>Basic structures and concepts of computer systems: Functional units, Basic operational concepts, Bus structures, Software and Performance; Information representation and transfer; Instructions and data access methods: Registers and Addressing, Program flow control, Logic instructions, Program-controlled I/O, Stacks and subroutines; Control Unit: Hardwired control and Microprogrammed control; Memory organization; I/O systems and Interrupts; Introduction to Pipelining, Parallel processing and multiprocessor systems.</td>
</tr>
<tr>
<td>CSE2214</td>
<td>Assembly Language Programming</td>
<td>1.5 Cr.</td>
<td></td>
<td>System Architecture for Assembly language; Assembly programming basics; Assembly instruction types and their formats: Arithmetic, Logical, Transfer control and conditional processing, String processing, Input/Output; Interrupts; Procedures; Interfacing using Assembly language.</td>
</tr>
</tbody>
</table>
YEAR-3, SEMESTER-1

CSE3100 3 hours in alternate week, 0.75 Cr.
Software Development-IV

Students will work in groups or individually to produce software based on current trends and developments in the sector.

CSE3101 3 hours per week, 3 Cr.
Mathematical Analysis for Computer Science
Prereq.: CSE1203, MATH2101

Basic mathematical analysis techniques of algorithms: sums and products, binomial coefficients, harmonic numbers, Fibonacci numbers, recurrence relations; generating functions; Probability Distributions and Expectations: total probability and Bayes’ rule, discrete probability distributions (geometric, modified geometric, Poisson etc.), continuous probability distributions (exponential, Erlang and gamma, Weibull etc.); Stochastic processes: definitions and classifications, discrete-parameter Markov chains (M/G/1 queuing system, birth-death processes), continuous-parameter Markov chains (birth-death processes, M/m/1 and M/M/m queuing systems); Networks of queues: tandem networks, open and closed queuing models.

CSE3103 3 hours per week, 3 Cr.
Database
Prereq.: CSE1203

Basic concepts of data and database systems; Data models; Query languages: Relational algebra and calculus, SQL; Query processing: interpretation, cost estimation, optimization; Functional dependency and normalization; File organization; Data Dictionary and directory systems; Database management: database administration, security & integrity; Introduction to advanced database systems.
CSE3104
Database Lab

3 hours per week, 1.5 Cr.

Laboratory works based on CSE3103.

CSE3107
Microprocessors

3 hours per week, 3 Cr.

Prereq.: CSE2105, CSE2213, CSE2214

Introduction to different types of microprocessors and programmable circuits; Study of a primitive microprocessor: architecture, instruction set, interrupt structure, interfacing I/O devices; Distinguishing features of some advanced microprocessors from Intel, Motorola, IBM etc.

CSE3108
Microprocessors Lab

3 hours in alternate week, 0.75 Cr.

Laboratory works based on CSE3107.

CSE3109
Digital System Design

3 hours per week, 3 Cr.

Prereq.: CSE2105, CSE2213

Design of memory subsystems using SRAM and DRAM; PLA design; Microoperations: Inter-register transfer, arithmetic operations, logic operations, shift operations; Design of various components of a computer: ALU, control unit (hardwired, microprogrammed); Computer bus standards; Design of a computer; Digital Systems in control, communication and instrumentation.

CSE3110
Digital System Design Lab

3 hours in alternate week, 0.75 Cr.

Laboratory works based on CSE3109.
CSE3200  3 hours in alternate week, 0.75 Cr.
Software Development-V

Students will work in groups or individually to produce high quality software using state of the art software development tools. Students will have to prepare proper documentation as well to the software developed.

CSE3211  3 hours per week, 3 Cr.
Data Communication  Prereq.: MATH2203

Data: data representation, signal encoding and signal analysis; Data Transmission Channel: channel capacity, transmission line characteristics, Baseband and Broadband transmission; Guided and unguided transmission media; Transmission networks; Transmission modulation techniques, modems and interfaces; Multiplexing techniques; Introduction to error handling and switching techniques.

CSE3213  3 hours per week, 3 Cr.  Prereq.: Nil
Operating System

Introduction to operating system concepts; Process management: Inter process communication, concurrency and scheduling; Memory management: addressing, virtual memory techniques (paging, segmentation); File systems: implementation, security and protection; Management of I/O; Deadlock handling; Distributed operating systems: Hardware/Software concepts, communication and synchronization.

CSE3214  3 hours per week, 1.5 Cr.
Operating System Lab

Laboratory works based on CSE3213.
CSE3215  Microcontroller Based System Design  3 hours per week, 3 Cr.
Prereq.: CSE3107

Programmable ports and handshaking I/O, Interfacing alphanumeric and power devices, Analog interfacing techniques, Induction and stepper motors, Interfacing with stepper motors, Controlling semiconductor power switches – BJT, MOSFET, SCR and Triac, Bus organization and arbitration, Application of Opto-coupler and relays, Basic differential amplifiers, Logarithmic amplifiers, Frequency and voltage measurement using digital techniques, Data acquisition system and interfacing to microprocessor based systems, Transducers, DMA, Mass storage systems, Serial communication interface; Barcode reader; MIDI interface; Printer interface; ISA, PCI, AGP, PS/2 and USB interfaces, Embedded Processors, Embedded Computing Platform, Real Time Embedded Systems, Embedded Systems Programming, Mapping between languages and hardware, Embedded Communication Systems, Embedded Computer Security.

CSE3216  Microcontroller Based System Design Lab  3 hours in alternate week, 0.75 Cr.

Laboratory works based on CSE3215.

CSE3223  Information System Design and Software Engineering  3 hours per week, 3 Cr.
Prereq.: CSE3103

Information System Design

Information and System; Systems Analysis and Systems Analyst; Information gathering techniques; Structured analysis of systems; Feasibility Study: Concepts (abstraction, refinement, modularity and hierarchy) and classification, Introduction to modeling language (Use case diagram, Sequence diagram and Activity diagram), Cost benefit analysis; Project scheduling; System design techniques; User interface design.
**Software Engineering**

Introduction to system engineering and software engineering; Software requirements analysis, modeling and specification; Software Designing: principles, models, design patterns and specification; Software testing: objectives and principles, testability, testing design and implementation models and documentations, verification, validation and debugging; Quality factors and metrics for different software engineering phases; Software project management issues.

**CSE3224**

3 hours in alternate week, 0.75 Cr.

**Information System Design and Software Engineering Lab**

Laboratory works based on CSE3223.

**YEAR-4, SEMESTER-1**

**CSE4100**

6 hours per week, 3 Cr.

**Project and Thesis-I**

Students are required to engage themselves in groups in research and innovative works with a view to develop computer systems of practical importance.

**CSE4101**

3 hours per week, 3 Cr.

**Computer Networks**

Prereq.: CSE3211

Introduction to computer networks, LAN, MAN and WAN; OSI reference model; TCP/IP Reference Model; Data Link Layer: Sliding window protocol, HDLC, SLIP, PPP, ALOHA, CSMA/CD, GSM, CDMA, IEEE standards for LANs, MANs and Wireless Networks, Bridges; Network Layer: Routing algorithms, Internetworking, IP Protocol, Network layer in ATM network; Transport Layer: Transport services, TCP and UDP, ATM Adaptation layer; Application Layer: Network Security, SNMP, DNS, Electronic mail, WWW.
CSE4102
Computer Networks Lab

3 hours per week, 1.5 Cr.

Laboratory works based on CSE 4101.

CSE4107
Artificial Intelligence

3 hours per week, 3 Cr.

Prereq.: CSE1203, CSE2207, CSE3101

Survey of basic AI concepts and controversies; Knowledge Representation and Reasoning: Propositional and first order predicate logic, inconsistencies and uncertainties, structured representation; Knowledge Organization and Manipulation: search and control strategies, game playing, planning, decision making; Perception and Communication: natural language processing, visual image understanding; Knowledge acquisition (Machine learning); Introduction to knowledge-based systems (Expert systems).

CSE4108
Artificial Intelligence Lab

3 hours in alternate week, 0.75 Cr.

Laboratory works based on CSE4107.

CSE4125
Distributed Database Systems

3 hours per week, 3 Cr.

Prereq.: CSE3103

Distributed databases and systems: Distribution transparency, Data Fragmentation, Distributed query processing and optimization, Transaction management, Concurrency control, Data recovery and Replication; Data warehousing: Multidimensional data models and data cubes, Granularity and partitioning of data, Integration of large bodies of data; Implementation of client-server DBMS and distributed database applications; Security aspects for distributed database systems.

CSE4126
Distributed Database Systems Lab

3 hours in alternate week, 0.75 Cr.

Laboratory works based on CSE4125.
CSE4129 3 hours per week, 3 Cr.
Formal Languages & Compilers
Prereq.: CSE1203

Formal Languages
Basic elements of formal languages, Finite automata, Context-free grammars, Push down automata, Turing machines, Hierarchy of formal languages and grammars.

Compilers
Compiler structure and phases, Lexical analysis, Top down and bottom up parsing, Symbol table, Syntax-directed translation, Type checking, Run time environment, Intermediate code generation, Code optimization.

CSE4130 3 hours in alternate week, 0.75 Cr.
Formal Languages & Compilers Lab
Laboratory works based on CSE4129.

YEAR-4, SEMESTER-2

CSE4203 3 hours per week, 3 Cr.
Computer Graphics
Prereq.: MATH2203

Introduction to Graphical data processing; Scan conversion and its side-effects; Implementation of graphics concepts of 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; Hidden line algorithms; Raster graphics concepts: Architecture, algorithms and other image synthesis methods; Design of interactive graphic conversions.
CSE4204
Computer Graphics Lab

3 hours in alternate week, 0.75 Cr.

Laboratory works based on CSE4203.

CSE4250
Project and Thesis-II

6 hours per week, 3 Cr.

Students are required to engage themselves in groups in research and innovative works with a view to develop computer systems of practical importance.

OPTIONAL COURSES

OPTIONS-I

CSE4211
Simulation of Products, Processes & Services

3 hours per week, 3 Cr.

Prereq.: CSE3101, MATH2101


CSE4212
Simulation of Products, Processes & Services

3 hours in alternate week, 0.75 Cr.

Laboratory works based on CSE4211.
CSE4227  3 hours per week, 3 Cr.  
Digital Image Processing  
Prereq.: CSE4203

Digital image representation and acquisition; Survey of modern techniques for image analysis, processing and enhancement. Two dimensional system and transform theory; Sampling, linear and non-linear filtering, feature extraction, compression and coding, imaging systems.

CSE4228  3 hours in alternate week, 0.75 Cr.  
Digital Image Processing Lab

Laboratory works based on CSE4227.

CSE4283  3 hours per week, 3 Cr.  
Advanced Algorithms  
Prereq.: CSE2103, CSE2207

NP-completeness, Amortized analysis, Approximation algorithms and schemes, Randomized algorithms, Network optimization; Parallel algorithms; Computational geometry; Dynamic trees; Dealing with large data sets: Compression, Streaming algorithms, Compressed sensing; String matching; Pattern matching; Solving homogeneous and non-homogeneous equations.

CSE4284  3 hours in alternate week, 0.75 Cr.  
Advanced Algorithms Lab

Laboratory works based on CSE4283

OPTIONS-II

CSE4225  3 hours per week, 3 Cr.  
Network Programming  
Prereq.: CSE3211, CSE4101

Overview of networking tools; Internetwork-Process Communication (IPC) facilities for distributed applications; IPC user interfaces: pipes, shared memory, message queues, semaphores, sockets, system V Transport Layer Interface (TLI) and Remote Procedure Calls (RPC); Network protocols: TCP/IP, XNS, SNA, and NetBIOS.
CSE4226 3 hours in alternate week, 0.75 Cr.
Network Programming Lab
Laboratory works based on CSE4225.

CSE4231 3 hours per week, 3 Cr.
Multimedia Computing  Prereq.: CSE3103
Introduction to multimedia systems: Coding and compression standards; Architectural issues; Operating systems for multimedia computing. Multimedia databases: indexing and storing multimedia data; Disk placement, scheduling and searching for multimedia data. Networking issues in multimedia computing: Resource reservation, traffic specification, shaping, 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.

CSE4232 3 hours in alternate week, 0.75 Cr.
Multimedia Computing Lab
Laboratory works based on CSE4231.

CSE4237 3 hours per week, 3 Cr.
Soft Computing  Prereq.: CSE3101
Aims and constituents of soft computing. Fuzzy sets and logic: Concepts and properties of fuzzy sets; Mathematical & logical implications of fuzzy sets; Fuzzy relations; Applications of fuzzy sets in information processing, decision making and control systems. Artificial neural networks: Underlying ideas and concepts of artificial neural networks; Feed-Forward, Recurrent and other types of artificial neural networks; Rules and methodologies of training artificial neural networks; Error backpropagation, recurrent backpropagation and other learning algorithms for neural networks. Probabilistic reasoning: Bayesian inference models and Bayesian networks; Dempster – Shafer theory; Probabilistic decision support systems. Genetic algorithms: Underlying principles and fundamental operators of genetic algorithms; Searching based on genetic algorithms; Genetic algorithm based optimization, learning and control. Introduction to various neuro-fuzzy-probabilistic-genetic combined approaches to computing applications.
CSE4238
Soft Computing Lab

3 hours in alternate week, 0.75 Cr.

Laboratory works based on CSE4237.

CSE4281
Web Computing

3 hours per week, 3 Cr.
Prereq.: CSE4101

Introduction to Internet technology: Word Wide Web (WWW), Web pages, Web servers, HTTP, HTTPS, FTP, Electronic mail, Search engines, Global databases, digital libraries, video on demand, streaming audio and video; Web page design: HTML and DHTML concepts, tags, commands, form design, table design, online request, dynamic functions, buttons, animations and multimedia, Script languages, Embedding scripts in HTML; Intranet: Usefulness of intranet, Sharing scarce resources over intranet, Network chatting and newsgroups; E-Commerce: Paying money over the network, Online shopping cart, Mobile payment system; Web Security: Privacy Policy, Encryption techniques, Network security and firewalls.

CSE4282
Web Computing Lab

3 hours in alternate week, 0.75 Cr.

Laboratory works based on CSE4281.

OPTIONS-III

CSE4213
Pattern Recognition

3 hours per week, 3 Cr.
Prereq.: MATH2203, CSE4107

Introduction: Object features, classifications and learning; Statistical, structural and hybrid methods. Bayesian classifier and Bayesian decision theory. Learning algorithms: Perceptron algorithm and its variants, backpropagation algorithm and its variants. Pattern grammars, languages, parsing techniques and clustering. Application of pattern recognition methods to speech recognition, remote sensing, biomedical area and computer aided design.
CSE4214          3 hours in alternate week, 0.75 Cr.
Pattern Recognition Lab

Laboratory works based on CSE4213.

CSE4243          3 hours per week, 3 Cr.
Expert and Decision Support Systems       Prereq.: CSE4107

Decision making and expert decision support fundamentals; The knowledge base; Expert-knowledge acquisition; The inference engine; Modeling of uncertain reasoning; Coherence and validation; ES shells, environments and existing ES.

CSE4244          3 hours in alternate week, 0.75 Cr.
Expert and Decision Support
Systems Lab

Laboratory works based on CSE4243.

CSE4247          3 hours per week, 3 Cr.
Artificial Neural Networks       Prereq.: CSE4107

Elementary neurophysiological principles; Artificial neuron models; Single-layer networks (perceptrons); Multi-layer feed forward networks and backpropagation; Cascade correlation (correlation training); Recurrent networks (Hopfield); Self-organizing maps (Kohonen maps); Bi-directional associative memory; Counter propagation networks; Adaptive resonance theory; Spatiotemporal sequences; Hardware realization of neural networks.

CSE4248          3 hours in alternate week, 0.75 Cr.
Artificial Neural Networks Lab

Laboratory works based on CSE4247.
OPTIONS-IV

CSE4215  
Advanced Computer Architecture  
3 hours per week, 3 Cr.  
Prereq.: CSE2213  


CSE4217  
VLSI Design  
3 hours per week, 3 Cr.  
Prereq.: CSE2209  

VLSI Technology: MOS transistor and inverter characteristics, complex CMOS gates and functional circuits. Design and operation of large fan-out and fan-in circuits; Clocking methodologies; Techniques for data path and data control design. VLSI layout partitioning, placement routine, and writing in VLSI. Reliability aspects and testing of VLSI.

CSE4233  
Advanced Microprocessor Architecture  
3 hours per week, 3 Cr.  
Prereq.: CSE3107  

Intel 80x86 and beyond: Architecture, Addressing modes and Instruction set; Motorola 6800: Programming model, Addressing structure, Addressing modes, Instruction set, Stacks, Pins and Signals, Memory interface, Programmed I/O, Interrupt I/O, DMA, Exception Handling; RISC processors: Key performance features, Registers, Data types and addresses, Instruction set, Pins and signals; SPARC and MIPS.
CSE4255 3 hours per week, 3 Cr.
Telecommunication  Prereq.: CSE3211, CSE4101

Overview of Telecommunication: History, Evolution, Convergence of telecommunication and data networks, Types of telecommunication networks, Generations of wireless telecommunication system; Switching System: Blocking probability and multistage switching, Time division switching and two dimensional switching; Cellular telephony: Frequencies reuse, Frequency management channel alignment, Hand off strategies, GSM, CDMA; Mobile Radio Propagation - Large Scale Path Loss: Free space propagation model; Three basic propagation mechanisms: reflection, diffraction, scattering; Practical link budget design using path loss models; Small scale fading and multipath; Modulation Techniques for Mobile Radio; Modern Telephone Services and Network: Internet Telephony, Facsimile, ISDN, ATM and intelligent networks, Satellite communication, Optical fiber communication.

CSE4241 3 hours per week, 3 Cr.
Digital Signal Processing  Prereq.: MATH2101, MATH2203

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

CSE4219 3 hours per week, 3 Cr.
Computational Geometry  Prereq.: MATH2203

Drawing fundamental geometric objects: Basic concepts, algorithms and their complexity; Point inclusion problems, convexity testing; Polygon triangulations and polygon partitioning; Convex hulls in two-dimensional and three-dimensional spaces; Proximity analysis: Voronoi diagrams and Delaunay triangulations. Drawing Graphs: Styles and applications of graph drawing; Drawing of rooted trees and planar graphs.
Detailed Outline of Undergraduate Departmental Courses for CSE Program

CSE4221 3 hours per week, 3 Cr.
Graph Theory  Prereq.: CSE1203

Introduction: Graphs as abstract connection diagrams; Fundamental concepts and definitions: Simple graphs, digraphs, subgraphs, vertex-degrees, walks, paths and cycles; Varieties of graphs; Trees: Properties, Spanning trees, Isomorphism of trees, Trees and optimization; Planar, Eulerian and Hamiltonian graphs; Cuts and connectivity of graphs; Network flow problem; Graph coloring.

CSE4223 3 hours per week, 3 Cr.
Computational Complexity Theory  Prereq.: CSE3101, CSE4129

Turing Machines and Computational complexity classes: Representation of computational tasks and algorithms using Turing machines, Time and space complexity classes; Computable functions and recursive function theory; Unsolvable/undecidable problems; Intractable problems and NP-completeness: P versus NP question, polynomial-time reductions, NP-complete problems.

CSE4245 3 hours per week, 3 Cr.
Parallel Processing  Prereq.: CSE2213, CSE3213

DETAILED OUTLINE OF UNDERGRADUATE NON-DEPARTMENTAL COURSES FOR CSE PROGRAM

YEAR-1, SEMESTER-1

HUM1107  3 hours per week, 3 Cr.  Critical Thinking & Communication  Prereq.: Nil

Objective: The aim of this foundational course is to help the second language learners acquire fluency in both spoken and written English to communicate messages with clarity, precision and confidence in the workplace. The course will have three components: Language, Speaking and Writing. The skills required in these areas will be imparted through Lectures and Sessionals. While lectures will introduce to basic concepts in communication, sessionals will provide hands-on experience.

Lecture Topics: Introduction to communication, Language and grammar skills, Speaking skills, Writing skills.

HUM1108  3 hours per week, 1.5 Cr.  English Language Sessional  Prereq.: Nil


MATH1115  3 hours per week, 3 Cr.  Mathematics-I  Prereq.: Nil

Differential Calculus

Limit, Continuity and Differentiability, Successive Differentiation, Mean value theorem, Taylor’s theorem, Maclaurine’s series with remainder, Expansion of function, L’ Hospital’s rule, Partial Differentiation, Tangent & Normal, Maxima & Minima, Points of inflection, Asymptotes, Curvature.
Co-ordinate Geometry

2D Geometry: Change of axes, Transformation of Coordinates, Pair of Straight lines, System of circles, Co-axial circles & limiting points, Tangent and Normal, Chord of contact, Chord in terms of middle points, Conjugate Diameter, Director Circles.
3D Geometry: Straight lines, Planes and Equation of solid bodies.

PHY1115 3 hours per week, 3 Cr.  
Physics  
Prereq. : Nil

Electromagnetism

Magnetic field, Lorentz force, Ampere's law, Faraday's Law, Biot-Savart law, Inductance, Calculation of inductance (LR circuit).

States of Matter


Waves and Oscillations

Oscillations: Simple harmonic motion (SHM), Damped harmonic motion, Forced oscillation, Combination and composition of simple harmonic motions, Lissajous figures. Transverse and Longitudinal nature of waves, Travelling and standing waves, Intensity of waves, Energy calculation of travelling and standing waves, Phase velocity and group velocity, Doppler effect.

Physical Optics

PHY1116  
Physics Lab  
3 hours in alternate week, 0.75 Cr.

Laboratory experiments based on PHY1115.

CHEM1115  
Chemistry  
3 hours per week, 3 Cr.  
Prereq. : Nil

Atomic structure and placement of elements in the 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 and phase diagram of mono-component systems; Properties of dilute solutions; Thermo-chemistry, chemical kinetics and chemical equilibrium; Ionization of water and pH concept; Electrical properties of solutions.

YEAR-1, SEMESTER-2

MATH1219  
Mathematics-II  
3 hours per week, 3 Cr.  
Prereq.: MATH1115

Integral Calculus

Definition of integration, Integration by the methods of Substitution, Integration by parts, Standard integrals, Reduction methods, Definite integrals with properties, Walli’s formula, Improper integral, Beta and Gamma Function, Intrinsic equations, Determination of Area; Length, Surface and volume in Cartesian and Polar Coordinate Systems.

Differential Equations

Degree and order of ordinary differential equations, Formation of differential equations, Solution of first order differential equations by various methods, Solution of general linear differential equations of second and higher orders with constant coefficients, Solution of homogeneous linear equations, Solution of differential equations by operator methods; Applications of solution of differential equations of higher order when the dependent and independent variables are absent; Concept of partial differential equations.
ME1211
Basic Mechanical Engineering
3 hours per week, 3 Cr.
Prereq.: Nil

Revision of fundamental principles of kinematics, heat and thermodynamics; Forces and Motion: Forces in trusses and frames, relative motion, transfer of motion and momentum; Introduction to internal combustion engines, refrigerating and air conditioning systems; Elements of robotics: rotational and spatial motion, geometric configurations and structural elements of arms, grippers and other manipulators.

ME1214
Engineering Drawing
3 hours in alternate week, 0.75 Cr.

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

EEE1241
Basic Electrical Engineering
3 hours per week, 3 Cr.
Prereq.: Nil

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

Alternating current: Instantaneous and rms current, voltage and power; average power for various combinations of R, L and C circuits; Phasor representation of sinusoidal quantities, Introduction to three phase circuits.

EEE1242
Basic Electrical Engineering Lab
3 hours per week, 1.5 Cr.

Laboratory Experiments based on EEE1241.
YEAR-2, SEMESTER-1

HUM2109 3 hours per week, 3 Cr.
Society, Ethics and Technology  Prereq.: Nil

Historical Perspectives of Technology, Social Perspectives of Technology, Ethical Perspectives of Technology, Globalization and Human Rights, Information Technology, Biomedical Technology, Population and the Environment.

MATH2101 3 hours per week, 3 Cr.
Mathematics-III  Prereq.: MATH1219

Complex Variable

Complex Number system; General function of Complex variables, Limits and continuity of a function of complex variable, Complex differentiation and the Cauchy–Riemann equation, Mapping and conformal mapping of elementary functions, Cauchy’s Integral theorem, Cauchy's Integral formula; Taylor’s and Laurent’s theorem; Singular points, Residues and evaluation of residues, Cauchy’s Residues theorem, Contour integration.

Laplace Transform

Definition, Laplace transform of some elementary functions, Inverse Laplace transformations, The unit step function, Periodic function, Evaluation of improper integrals. Solution of some differential equations and integral equations by Laplace transform.

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 discrete probability distribution e.g. Uniform, Bernoulli, Binomial; Continuous probability distribution e.g. Uniform, Normal and Poisson; Hypothesis testing and Regression analysis.
EEE2141 3 hours per week, 3 Cr.  
Electronic Devices and Circuits  
Prereq.: EEE1241

Semiconductor Diode: Junction diode characteristics; Operation and small signal models of diodes. Bipolar Transistor: Characteristics; BJT biasing and thermal stabilization; CE, CB, CC configurations; Small signal low frequency h-parameter models and hybrid-π model. Introduction to JFET, MOSFET and CMOS: Biasing and application in switching circuits. Oscillators: Hartley, Colpitts & Wine-Bridge oscillators. Power Electronic Devices: SCR, TRIAC, DIAC, UJT characteristics and application; Introduction to rectifiers, active filters, regulated power supply; Introduction to IC fabrication techniques.

EEE2142 3 hours per week, 1.5 Cr.  
Electronic Devices and Circuits Lab

Laboratory Experiments based on EEE2141.

YEAR-2, SEMESTER-2

MATH2203 3 hours per week, 3 Cr.  
Mathematics-IV  
Prereq.: MATH1115

Matrices

Definition of Matrix, Different types of matrices, Algebra of Matrices, Adjoint and inverse of a matrix, Rank of elementary transformations of matrices; Normal and canonical forms; Solution of linear equations; Matrix polynomials, Eigen values and eigen vectors.

Vector

Scalars and vectors, Equality of vectors, Addition and subtraction of Vectors, Multiplication of vectors by scalars, Scalar and Vector products and their geometrical interpretation, Triple product and multiple product, Linear dependence and independence of vectors, Differentiation and integration of vectors, Definition of Line, Surface and Volume integrals; Gradient, divergence and curl of a point function, Gauss’s theorem, Stoke’s theorem and Green’s theorem.
Fourier Analysis

Fourier series, real and complex form of finite transform, Fourier Integral, Fourier Transforms and their uses in solving boundary value problems.

YEAR-3, SEMESTER-1

HUM3115 3 hours per week, 2+1 Cr. Economics and Accounting
Prereq.: Nil

Economics


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

Accounting


YEAR-3, SEMESTER-2

HUM3207 3 hours per week, 3 Cr. Industrial Law and Safety Management
Prereq.: Nil

Principles of law of contract; Company law: Law regarding formation, incorporation, management and winding up of companies; Labor law: Law in relation to wage hours, health, safety and other work conditions; The trade
union legislation arbitration; The policy of the state in relation to labor; The Factory Act; Law of Compensation.

Safety Management: Evolution of modern safety concepts; Industrial hazard, Safety and risk management; Worker health and safety; Proactive techniques for safety management; Safety standard and regulation for engineering works.

YEAR-4, SEMESTER-1

IPE4111 Industrial Management 3 hours per week, 3 Cr. Prereq.: Nil

Introduction to Management: Organization and the need for management; Organization: Design and Structure, Coordination; Management Theory, Social Responsibility and Ethics, Globalization and Multiculturalism.


Financial Management: Time and Money, Methods of Comparing Alternatives, Concept of Depreciation, Break Even Analysis, Benefit Cost Ratio Analysis.


Technology Management: Management of Innovation and Changes, Technology Life Cycle.
ARCHITECTURE

ARC1130 3 hours per week, 1.5 Cr.
Computer Application I

Word processing and spreadsheet analysis using available software packages.

CIVIL ENGINEERING

CSE2153 3 hours per week, 3 Cr.
Numerical Methods and Computer Programming

Basic components of computer systems; FORTRAN/C language; numerical solution of algebraic and transcendental equations; matrices; solution of systems of linear equations; curve-fitting by least squares; finite differences; divided differences; interpolation; computer applications to Civil Engineering problems, numerical differentiation and integration; numerical solution of differential equations.

CSE2154* 3 hours per week, 1.5 Cr.
Numerical Methods and Computer Programming Lab

Operating system for microcomputers; development of FORTRAN/C programs and solution of problems using a computer, solution of Civil Engineering problems using microcomputers.

* Unified form of the previous course code CSE2163
TEXTILE TECHNOLOGY

CSE2146
Introduction to Computer Science

3 hours per week, 1.5 Cr.

Types of computers, Functional units of a computer, Typical input and output devices, Auxiliary storage devices, Commonly used DOS Commands, GUI, Numerical methods, Programming techniques.

CSE2186
Basic Programming Techniques

3 hours per week, 1.5 Cr.

Writing Algorithms and drawing Flowcharts, Use of different elements of C (variables, operators, input-output statements, branching and looping, library functions, defining functions and sub-routines, arrays and subscripted variables, sequential and random data files, use of graphics and sound.)

MECHANICAL AND PRODUCTION ENGINEERING

CSE1287
Computer Programming

3 hours per week, 3 Cr.

Introduction to the Digital Computer; Introduction to Programming Variables, Assignment; Expressions; Input/Output; Conditionals and Branching; Iteration; Functions; Recursion; Arrays; Introduction to Pointers; Structures; Introduction to Data-Procedure Encapsulation; Dynamic allocation; Linked structures; Introduction to Data Structure, Stacks and Queues; Search Trees; Time and space requirements. (A programming language like C/C++ may be used as a basis language. The same language must be used for the laboratory.)

CSE1288
Computer Programming Sessional

3 hours per week, 1.5 Cr.

Sessional works compatible to CSE1287.
SUGGESTED TEXT AND REFERENCE BOOKS FOR CSE PROGRAM

YEAR-1, SEMESTER-1
12. Maniruzzaman Dr. M., Advanced Reading and Writing Skills, Friends Publ., 2008

YEAR-1, SEMESTER-2
SUGGESTED TEXT AND REFERENCE BOOKS FOR CSE PROGRAM


YEAR-2, SEMESTER-1

2. Lipscutz, Data Structure, Pearson, 2007
YEAR-2, SEMESTER-2


YEAR-3, SEMESTER-1

6. Gaonkar R.S., Microprocessor Architecture, Programming and Application with the 8085, PenRam International (India), 5th Ed., 2006

**YEAR-3, SEMESTER-2**

2. Gupta P.C., *Data Communications*, Prentice Hall, 2004
YEAR-4, SEMESTER-1

YEAR-4, SEMESTER-2


OPTIONAL COURSES (for YEAR-4, SEMESTER-2)
