### PROPOSED

### UPDATED COURSE CURRICULUM

### (To be effective from Spring semester, 2013)

**FACULTY OF MODERN SCIENCE**

**DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING (CSE)**

**UNDERGRADUATE PROGRAM**

Bachelor of Science in Computer Science & Engineering (B.Sc. in CSE)

### LEADING UNIVERSITY

### S Y L H E T

###

### Submitted To:

### University Grants Commission (UGC)

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### UPDATED COURSE CURRICULUM (Syllabus)

## FACULTY OF MODERN SCIENCE

**Department: Computer Science & Engineering (CSE)**

### Program: Bachelor of Science in Computer Science & Engineering (B.Sc. in CSE)

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**Undergraduate Programs**

**Leading University, Bangladesh** offers degree in all branches of academic programs such as Business, Engineering, Economics, and Science & Technology and if any desired field needed for the society. Degrees will be granted at the undergraduate, graduate level including doctoral degrees. Initially the university will limit itself to offer in a limited number of subjects. As the university grows and as institutional capacity is build up, the degrees will be awarded in a larger number of disciplines.

Undergraduate Programs are designed to graduate business and technology professionals directed toward employment in business, industry or related areas. A maximum of 198 semester hours and a minimum of 120 semester hours are required depending upon the academic background in English and Math of the student. All degrees have unique requirements; students should know all regulations and the particular requirements for each of the degrees.

**Department of Computer Science and Engineering**

**Objective and Goal**

The Department of Computer Science and Engineering offers Bachelor of Science in Computer Science and Engineering.  Computer plays a crucial and in fact, obligatory role in all fields of modern sciences. Computer Science and Engineering has established itself as one of the most important branches of engineering. All the students of Computer Science and Engineering are requested to have a balanced knowledge of digital electronics, computers, micro‑processors and programming. The new generation of computer engineers is encouraged to undertake research and development activities in the above areas and this department is committed to the study and analysis of fundamental as well as applied problems. Throughout the study programs, considerable emphasis is placed on the development of methodical procedure for analysis and design, and on the responsible use of technology.

**Degree offering Department**

Our degree-offering department is the Department of Computer Science and Engineering, which is under Faculty of Modern Science.

**Duration of a semester**

Proposed University’s academic programs operate on tri-mister system (14 weeks per academic semester including exams). For 1 credit theory course will be equal to minimum 12-13 hours of actual lecture time per semester of a tri-mister system. For 1 credit Sessional course minimum of 24-hours of actual Sessional works per semester of a tri-mister system will be required. That means **theory classes will have a minimum duration of 1 hour for 1 credit hour and each Sessional class will have a minimum duration of 2-hours for 1 credit hour and 3 hours for 1.5 credit hour**. Course credit is assigned according to the number of in-class contact hours associated with the course.

**CSE Undergraduate Admission**

For CSE program, students without mathematics, Physics and Chemistry in HSC/A level are not eligible for the admission.

**Requirements for admission into the CSE program**

At least a second division or minimum **CGPA 2.5 out of 5.0** GPA in the S.S.C and H.S.C. examination, or five subjects **O-level** and three major subjects (Math, Physics and Chemistry) in **A-level** education are required for admission into CSE program of the Leading university. Students obtaining diploma in engineering from Bangladesh Technical Education Board (BTEB) or equivalent with a GPA of 2.5 or above, or at least second division are eligible for admission. Students having GED are not eligible to get admission in CSE program.

**Admission test**

All incoming freshmen are required to take evaluation test. For students intending to get admitted in CSE program will have to pass the admission test of English, Mathematics, Physics, Chemistry and General Knowledge.

### Grading System

All course work is graded according to a unified grading system as shown in the following chart.

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

**\*\*Uniform grading system is provided by UGC**

**Degree requirement and graduation time**

At least 152 academic credits are required for CSE degree. Proposed University’s academic programs operate on semester system (14 weeks per academic semester including exams). For 1 credit theory course will be equal to minimum 12-hours of actual lecture time per semester of a tri-mister system. If students continue to take 13 to 15 credit hours regularly in every semester, student will complete our proposed CSE program in four (4) years. Students who need to raise their Computer, English and Math skills to the required level may be required to earn more than 152 credits. Minimums of 12 credit hours are considered a full undergraduate load in one academic semester. A student is considered to be a full time student if s/he continuously enrolled for at least two semesters per academic year. The maximum time to complete CSE degree program is 1.5 times the normal length of the program unless mitigating circumstances, such as illness, exist.

According to UGC,

The minimum CGPA for remaining in University degree programs:

**Undergraduate: 2.5 (a C average); Graduate Programs: 3.0 (B average)**

**We follow the exact instructions of UGC in each sector in our Institution.**

**Grade Points**

A student’s semester grade point average is determined by dividing the total number of grade points by the total number of hours attempted. Grade point totals are calculated by multiplying the number of credit hours of a course by the number of points for the corresponding grade received. A student’s grade point average will be determined by dividing the total number of grade points by the total number of hours attempted with the exception of courses in which marks of “CR”, “W”, “WA”, “R”, “AU”, “S”, “U”, “I”, are received.

**Course Evaluation:**

There will be **one midterm worth 30% and final examination worth 40%. 5% for class attendance, 10% for tutorials, 5% for viva, 10% for quizzes, assignments, and presentations.** Any missed exam/test will earn zero (0). Academic dishonesty, such as Misbehaver in class, copying exam/test or letting another student copy may result “F” grade in the course.

# Policy

* Each course will consist no less than 100 marks or points. There are no fixed criteria in terms of test scores. The allocation of 100% marks/ points will be taken according to the marks distribution mentioned above.
* The nature of questions should be of varied nature such as MCQ, short type, Broad type, Case Study; Specific problems etc. or in any other form as the tutors deem it necessary to judge the comprehensive study as well as the merit of the students.
* Questions for semester final will be submitted in two sets in different form at least two weeks ahead of Exam dates as these questions will be sent to Moderation Board.
* Duration of the Mid-Term Tests from 1 to 1½ hour and Final Examinations may be 2 to 3 hours respectively depending on the nature of questions.
* According to the schedule of examinations final examinations are held in all courses upon the completion of each semester’s work. No one is to be excused from the final examinations.
* Course Instructor/Tutor shall conduct their respective tests and Exams. Question papers are to be taken back from the students at the end of each exam.

Course Numbering System

**Course numbers in the University system indicate course level:**

0xxx ................. No credit

1xxx...............Introductory level—first year---primarily for freshmen and sophomores

2xxx………….. Second year---for sophomores.

3xxx ................. Intermediate level—primarily for juniors and seniors, but open to sophomores with a C average overall and in prerequisites.

4xxx ..................Advanced level—open to juniors, seniors, and graduate students.

8xxx ................. Graduate level—open only to students registered in the Graduate School.

xxx0 ................. May be repeated for credit, if a CLA course (course numbers in other University divisions do not always follow this system).

3970 or 5970.... Directed studies courses.

3980 or 5980.... Directed instruction courses.

3990 or 5990.... Directed research courses.

\*\* The second digit stands for the usual semester the student should be advised, third and fourth digit stands for subject code, odd numbers are for theory courses and even numbers are for sessionals.

# Symbols and Abbreviations

Prefixes ..............Two-, three-, or four-letter department designator (e.g., ENG for English).

**Category of courses**

**• English: Three courses (6 credit hours)**

English Reading, English Composition, Spoken English.

**• General Education (GED): Five Courses (15 credit hours)**

Students will have to complete five GED Courses in the following academic areas: History, Anthropology, Geography, Sociology, Political Science, Psychology, International Relations, Art, Literature, Music, and Philosophy. **There is a list of our GED courses from which students can choose five courses.**

**• Basic Sciences: Two Courses (7 credit hours)**

Courses in the following academic areas qualify as science credits: Chemistry and Physics. Total basic science courses are 7 credit hours. Each theory course is of 3 credit hours and each 1-hour Sessional credit is equal to 2 contact hours.

**• Interdisciplinary Engineering Courses: 7 courses (25 credit hours)**

Students will have to complete seven interdisciplinary Engineering Courses in the following academic areas: Electrical Engineering, Mechanical Engineering and Civil Engineering. **There is a list** **of courses from where students will choose seven courses.**

**• Program Core courses: 39 courses (84 credit hours including Sessional)**

Students will have to complete 39 Courses including Sessional courses as Computer Science and s core courses.

**• Mathematics: 5 Courses (15 credit hours)**

Courses in the following academic areas qualify as mathematics credits: Differential and Integral Calculus, Coordinate Geometry and Vector Analysis, Ordinary and Partial Differential Equations, Linear Algebra, Probability and Statistics.

**Leading University, Sylhet**

Department of Computer Science and Engineering

**Computer Science & Engineering Program**

**Curriculum for B. Sc. in Computer Science & Engineering (Proposed)**

**Summary of Courses**

(To be effective from Spring semester, 2013)

|  |  |  |
| --- | --- | --- |
| **Types of Courses** | **No. Of Courses** | **Credit Hours** |
| English Courses | 02 | 06 |
| GED courses | 05 | 15 |
| Basic Science Courses | 02 | 07 |
| Mathematics Courses | 05 | 15 |
| Inter-disciplinary Engineering Courses | 07 | 25 |
| Program core courses | 21 | 74 |
| Option I (Specialized courses) | 01 | 03 |
| Option II (Specialized courses) | 01 | 03 |
| Project / Thesis | 02 | 04 |
| **Total** | **46** | **152** |

**List of Courses**

|  |
| --- |
| **Interdisciplinary Courses**  |
| **Course Code** | **Course Title** | **Credit Hours** | **Contact Hours / Week** | **Prerequisite Courses** |
| **English Courses (Two courses - 6 credit hours)** |
| ENG-1111 | English Reading and Speaking | 3 | 3 | N/A |
| ENG-1311 | English Writing and Listening | 3 | 3 | ENG-1111 |
| **Total** | **6** | **6** |  |
| **General Education Courses (Any five courses - 15 credit hours)** |
| ART-1111 | Bangladesh Studies | 3 | 3 | N/A |
| ECON-2211 | Principals of Economics | 3 | 3 | N/A |
| ART- 2213 | Professional Ethics | 3 | 3 | N/A |
| ART-2311 | Introduction to Sociology | 3 | 3 | N/A |
| MGT-2315 | Introduction to Business | 3 | 3 | N/A |
| ACC-2111 | Principles of Accounting | 3 | 3 | N/A |
| MGT-3211 | Industrial Management | 3 | 3 | N/A |
| ART-1215 | Public Administration | 3 | 3 | N/A |
| ART-1217 | Political Science | 3 | 3 | N/A |
| **Basic Science Courses (Two courses - 7 credit hours)** |
| PHY-2211 | General Physics | 3 | 3 | N/A |
| PHY-2212 | General Physics Sessional | 1 | 2 | N/A |
| CHEM-2311 | Chemistry | 2 | 2 | N/A |
| CHEM-2312 | Chemistry: Sessional | 1 | 2 | N/A |
| **Total** | **07** | **09** |  |
| **Mathematics Courses (5 courses - 15 credit hours)** |
| MATH-1111 | Differential and Integral Calculus | 3 | 3 | N/A |
| MATH-1213 | Linear Algebra & Complex Analysis | 3 | 3 | N/A |
| MATH-1315 | Differential Equations and Fourier Analysis | 3 | 3 | MATH-1111 |
| MATH-2111 | Co-Ordinate Geometry and Vector Analysis | 3 | 3 | N/A |
| MATH-2213 | Probability and Statistics | 3 | 3 | N/A |
| **Total** | **15** | **15** |  |
| **Other Engineering Discipline Courses (25 credit hours)** |
| **Course Code** | **Course Title** | **Credit Hours** | **Contact Hours / Week** | **Prerequisite Courses** |
| EEE-1111 | Electrical Circuits I | 3 | 3 | N/A |
| EEE-1112 | Electrical Circuits I Sessional | 1 | 2 | N/A |
| EEE-1213 | Electrical Circuits II | 3 | 3 | N/A |
| EEE-1214 | Electrical Circuit Simulation Laboratory | 1 | 2 | N/A |
| EEE-1315 | Electronics I | 3 | 3 | EEE-1213 |
| EEE-1316 | Electronics I Sessional | 1 | 2 | EEE-1214 |
| CE-2110 | Engineering Drawing | 1.5 | 3 | N/A |
| EEE-2317 | Digital Electronics | 3 | 3 | N/A |
| EEE-2318 | Digital Electronics Sessional | 1.5 | 3 | N/A |
| EEE-3211 | Microprocessor, Assembly Language and Computer Interfacing | 3 | 3 | N/A |
| EEE-3212 | Microprocessor, Assembly Language and Computer Interfacing Sessional | 1 | 2 | N/A |
| EEE-4127 | VLSI I | 2 | 2 | EEE-2317 |
| EEE-4128 | VLSI I Sessional | 1 | 2 | EEE-2318 |
| **Total** | **25** | **33** |  |

List of Core Courses

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course Code** | **Course Title** | **Credit Hours** | **Contact Hours / Week** | **Prerequisite Courses** |
| CSE-1111 | Introduction to Computers | 2 | 2 | N/A |
| CSE-1112 | Introduction to Computers Sessional | 1 | 2 | N/A |
| CSE-1213 | Computer Programming | 3 | 3 | N/A |
| CSE-1214 | Computer Programming Sessional | 1 | 2 | N/A |
| CSE-1215 | Discrete Mathematics | 3 | 3 | N/A |
| CSE-1315 | Data Structures | 3 | 3 | CSE-1213 |
| CSE-1316 | Data Structures Sessional | 1 | 2 | CSE-1214 |
| CSE-2117 | Computer Algorithms and Complexity | 3 | 3 | CSE-1315 |
| CSE-2118 | Computer Algorithms and Complexity Sessional | 1 | 2 | CSE-1316 |
| CSE-2213 | Object Oriented Programming | 3 | 3 | CSE-1213 |
| CSE-2214 | Object Oriented Programming Sessional | 1 | 2 | CSE-1214 |
| CSE-2319 | Database Management System | 3 | 3 | N/A |
| CSE-2320 | Database Management System Sessional | 1 | 2 | N/A |
| CSE-3111 | Numerical Methods | 3 | 3 | N/A |
| CSE-3112 | Numerical Methods Sessional | 1 | 2 | N/A |
| CSE-3113 | Operating System | 2 | 2 | N/A |
| CSE-3114 | Operating System Sessional | 1 | 2 | N/A |
| CSE-3115 | Computer Networks | 3 | 3 | N/A |
| CSE-3116 | Computer Networks Sessional | 1 | 2 | N/A |
| CSE-3117 | Computer Architecture and Design | 3 | 3 | N/A |
| CSE-3213 | Data Communication | 3 | 3 | N/A |
| CSE-3227 | Theory of Computation | 3 | 3 | N/A |
| CSE-3311 | System Analysis, Design and Development | 3 | 3 | N/A |
| CSE-3312 | System Analysis, Design and Development Sessional | 1 | 2 | N/A |
| CSE-3315 | Compiler Design and Construction | 3 | 3 | CSE-3227 |
| CSE-3316 | Compiler Design and Construction Sessional | 1 | 2 | N/A |
| CSE-3317 | Java Programming | 3 | 3 | CSE-2213 |
| CSE-3318 | Java Programming Sessional | 1 | 2 | CSE-2214 |
| CSE-3321 | Software Engineering | 2 | 2 | N/A |
| CSE-4111 | Management Information System | 3 | 3 | N/A |
| CSE-4113 | Computer Graphics | 3 | 3 | CSE-1213 |
| CSE-4114 | Computer Graphics Sessional | 1 | 2 | CSE-1214 |
| CSE-4119 | Artificial Intelligence | 3 | 3 | N/A |
| CSE-4211 | Web Technologies | 3 | 3 | CSE-2319 |
| CSE-4212 | Web Technologies Sessional | 1 | 2 | CSE-2320 |
| CSE-4800 | Project/Thesis (Part-I) | 1 | 2 |  |
| CSE-4801 | Project/Thesis (Part-II) | 3 | 6 |  |
| **Total** | **78** | **96** |  |

**List of Specialized Elective Courses**

**Option-I for Eleventh Semester** (Any one course and Sessional (if any), to be taken)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course Code** | **Course Title** | **Credit Hours** | **Contact Hours / Week** | **Prerequisite Courses** |
| CSE-4213 | Optical Fiber Communication | 3 | 3 | CSE-3213 |
| CSE-4215 | Distributed Systems | 2 | 2 |  |
| CSE-4216 | Distributed Systems: Sessional | 1 | 2 |  |
| CSE-4217 | Open Source Tools & Techniques | 2 | 2 |  |
| CSE-4218 | Open Source Tools & Techniques: Sessional | 1 | 2 |  |
| CSE-4219 | Object Oriented Software Development Using UML | 2 | 2 |  |
| CSE-4220 | Object Oriented Software Development Using UML: Sessional | 1 | 2 |  |
| CSE-4221 | Simulation & Modeling  | 2 | 2 |  |
| CSE-4222 | Simulation & Modeling: Sessional | 1 | 2 |  |
| CSE-4223 | Neural Network & Fuzzy Logic | 3 | 3 |  |
| CSE-4225 | Advanced Algorithms | 3 | 3 |  |
| CSE-4227 | Graph Theory & Applications | 2 | 2 |  |
| CSE-4228 | Graph Theory & Applications: Sessional | 1 | 2 |  |
| CSE-4229 | Computer Aided Design & Manufacturing | 2 | 2 |  |
| CSE-4230 | Computer Aided Design & Manufacturing | 1 | 2 |  |
| CSE-4231 | Data Warehousing & Data Mining | 2 | 2 |  |

**Option-II for Twelfth Semester** (Any one course and Sessional (if any), to be taken)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course No.** | **Course Title** | **Credit Hours** | **Contact Hours / Week** | **Prerequisite Courses** |
| CSE-4311 | Cellular Mobile & Satellite Communication  | 3 | 3 |  |
| CSE-4313 | Image Processing and Computer Vision | 2 | 2 |  |
| CSE-4314 | Image Processing and Computer Vision Sessional | 1 | 2 |  |
| CSE-4315 | Computer Security & Cryptography | 3 | 3 |  |
| CSE-4317 | Human Computer Interaction | 3 | 3 |  |
| CSE-4319 | Advanced Operating Systems | 2 | 2 |  |
| CSE-4320 | Advanced Operating Systems: Sessional | 1 | 2 |  |
| CSE-4321 | Decision Support Systems  | 2 | 2 |  |
| CSE-4322 | Decision Support Systems: Sessional  | 1 | 2 |  |
| CSE-4323 | Introduction to Robotics | 2 | 2 |  |
| CSE-4324 | Introduction to Robotics: Sessional | 1 | 2 |  |
| CSE-4325 | Multimedia Communications  | 3 | 3 |  |

Prepared by

Academic Committee

Department of Computer Science and Engineering

Leading University

Semester-wise Course Distribution

First Semester (1st Year 1st Semester)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course No.** | **Course Title** | **Credit Hours**  | **Contact Hour/ Week** | **Prerequisite Courses** |
| ENG-1111 | English Reading and Speaking | 3 | 3 | N/A |
| ART-1111 | Bangladesh Studies | 3 | 3 | N/A |
| MATH-1111 | Differential and Integral Calculus | 3 | 3 | N/A |
| CSE-1111 | Introduction to Computers | 2 | 2 | N/A |
| CSE-1112 | Introduction to Computers: Sessional | 1 | 2 | N/A |
| EEE-1111 | Electrical Circuits I | 3 | 3 | N/A |
| EEE-1112 | Electrical Circuits I Sessional | 1 | 2 | N/A |
| **Total** | 16 | 17 |  |

Second Semester (1st Year 2nd Semester)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course No.** | **Course Title** | **Credit Hours**  | **Contact Hour/ Week** | **Prerequisite Courses** |
| MATH-1213 | Linear Algebra and Complex Analysis | 3 | 3 | N/A |
| CSE-1213 | Computer Programming | 3 | 3 | N/A |
| CSE-1214 | Computer Programming: Laboratory | 1 | 2 | N/A |
| CSE-1215 | Discrete Mathematics | 3 | 3 | N/A |
| EEE-1213 | Electrical Circuits II | 3 | 3 | EEE-1111 |
| EEE-1214 | Electrical Circuit Simulation Laboratory | 1 | 2 | EEE-1112 |
| **Total** | 14 | 16 |  |

**Third Semester** (1st Year 3rd Semester)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course No.** | **Course Title** | **Credit Hours**  | **Contact Hour/ Week** | **Prerequisite Courses** |
| ENG-1311 | English Writing & Listening | 3 | 3 | N/A |
| MATH-1315 | Differential Equations and Fourier Analysis | 3 | 3 | MATH-1111 |
| EEE-1315 | Electronics I | 3 | 3 | EEE-1213 |
| EEE-1316 | Electronics Circuit Simulation Laboratory | 1 | 2 | EEE-1214 |
| CSE-1315 | Data Structures  | 3 | 3 | CSE-1213 |
| CSE-1316 | Data Structures: Sessional | 1 | 2 | CSE-1214 |
| **Total** | 14 | 16 |  |

**Fourth Semester** (2nd Year 1st Semester)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course No.** | **Course Title** | **Credit Hours**  | **Contact Hour/ Week** | **Prerequisite Courses** |
| ACC-2111 | Principles of Accounting | 3 | 3 | N/A |
| MATH-2111 | Co-Ordinate Geometry and Vector Analysis  | 3 | 3 | N/A |
| CE-2110 | Engineering Drawing | 1.5 | 3 | N/A |
| CSE-2117 | Computer Algorithms & Complexity | 3 | 3 | CSE-1315 |
| CSE-2118 | Computer Algorithms & Complexity Sessional | 1 | 2 | CSE-1316 |
| **Total** | 11.5 | 14 |  |

**Fifth Semester** (2nd Year 2nd Semester)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course No.** | **Course Title** | **Credit Hours**  | **Contact Hour/ Week** | **Prerequisite Courses** |
| ECON-2211 | Principles of Economics | 3 | 3 | N/A |
| MATH-2213 | Probability and Statistics | 3 | 3 | N/A |
| PHY-2211 | General Physics | 3 | 3 | N/A |
| PHY-2212 | General Physics Laboratory | 1 | 2 | N/A |
| CSE-2213 | Object Oriented Programming | 3 | 3 | CSE-1213 |
| CSE-2214 | Object Oriented Programming: Sessional | 1 | 2 | CSE-1214 |
| **Total** | 14 | 16 |  |

**Sixth Semester** (2nd Year 3rd Semester)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course No.** | **Course Title** | **Credit Hours**  | **Contact Hour/ Week** | **Prerequisite Courses** |
| ART-2311 | Introduction to Sociology | 3 | 3 | N/A |
| CHEM-2311 | Chemistry | 2 | 2 | N/A |
| CHEM-2312 | Chemistry Laboratory  | 1 | 2 | N/A |
| EEE-2317 | Digital Electronics | 3 | 3 | EEE-1315 |
| EEE-2318 | Digital Electronics Laboratory | 1.5 | 3 | EEE-1316 |
| CSE-2319 | Database Management System  | 3 | 3 | N/A |
| CSE-2320 | Database Management System: Sessional  | 1 | 2 | N/A |
| **Total** | 14.5 | 18 |  |

**Seventh Semester** (3rd Year 1st Semester)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course No.** | **Course Title** | **Credit Hours**  | **Contact Hour/ Week** | **Prerequisite Courses** |
| CSE-3111 | Numerical Methods | 3 | 3 | N/A |
| CSE-3112 | Numerical Methods: Sessional | 1 | 2 | N/A |
| CSE-3113 | Operating System | 2 | 2 | N/A |
| CSE-3114 | Operating System: Sessional | 1 | 2 | N/A |
| CSE-3115 | Computer Networks | 3 | 3 | N/A |
| CSE-3116 | Computer Networks Laboratory  | 1 | 2 | N/A |
| CSE-3117 | Computer Architecture & Design | 3 | 3 | N/A |
| **Total** | 14 | 17 |  |

**Eighth Semester** (3rd Year 2nd Semester)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course No.** | **Course Title** | **Credit Hours**  | **Contact Hour/ Week** | **Prerequisite Courses** |
| MGT-3211 | Industrial Management | 3 | 3 | N/A |
| EEE-3211 | Microprocessor, Assembly Language & Computer Interfacing | 3 | 3 | EEE-2317 |
| EEE-3212 | Microprocessor, Assembly Language & Computer Interfacing Laboratory | 1 | 2 | EEE-2318 |
| CSE-3213 | Data Communication | 3 | 3 |  |
| CSE-3227 | Theory of Computation | 3 | 3 | N/A |
| **Total** | 13 | 14 |  |

**Ninth Semester** (3rd Year 3rd Semester)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course No.** | **Course Title** | **Credit Hours**  | **Contact Hour/ Week** | **Prerequisite Courses** |
| CSE-3311 | System Analysis, Design and Development | 3 | 3 | N/A |
| CSE-3312 | System Analysis, Design and Development: Sessional | 1 | 2 | N/A |
| CSE-3315 | Compiler Design & Construction | 3 | 3 | CSE-3227 |
| CSE-3316 | Compiler Design & Construction: Sessional | 1 | 2 | N/A |
| CSE-3317 | Java Programming | 3 | 3 | CSE-2213 |
| CSE-3318 | Java Programming: Sessional | 1 | 2 | CSE-2214 |
| CSE-3321 | Software Engineering | 2 | 2 | N/A |
| **Total** | 14 | 17 |  |

**Tenth Semester** (4th Year 1st Semester)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course No.** | **Course Title** | **Credit Hours**  | **Contact Hour/ Week** | **Prerequisite Courses** |
| EEE-4127 | VLSI I | 2 | 2 | N/A |
| EEE-4128 | VLSI I Laboratory  | 1 | 2 | N/A |
| CSE-4111 | Management Information System | 3 | 3 | N/A |
| CSE-4113 | Computer Graphics | 3 | 3 | CSE-1213 |
| CSE-4114 | Computer Graphics Sessional | 1 | 2 | CSE-1214 |
| CSE-4119 | Artificial Intelligence | 3 | 3 | N/A |
| **Total** | 13 | 15 |  |

**Eleventh Semester** (4th Year 2nd Semester)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course No.** | **Course Title** | **Credit Hours**  | **Contact Hour/ Week** | **Prerequisite Courses** |
| CSE-4211 | Web Technologies | 3 | 3 | CSE-3219 |
| CSE-4212 | Web Technologies Sessional | 1 | 2 | CSE-3220 |
| Specialized course | **One course from Option I** | 3 | 3 |  |
| CSE-4800 | Project / Thesis (Proposal) | 1 | 2 |  |
| **Total** | 8 | 10 |  |

**Twelfth Semester** (4th Year 3rd Semester)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course No.** | **Course Title** | **Credit Hours**  | **Contact Hour/ Week** | **Prerequisite Courses** |
| Specialized course | **One course from Option II** | 3 | 3 |  |
| EEE-4801 | Project / Thesis (Finalize & Submission) | 3 | 6 |  |
| **Total** | 6 | 12 |  |

**Course Description of CSE Program**

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| --- | --- |
| **ENG-1111** | **English Reading and Speaking** |
|  | The course aims at building the ability of the students in correct reading fiction texts, non-fiction texts, speaking with a good pronunciation and the course is designed so that students will have a good idea about making requests, giving commands, inviting people, giving advice, suggestions, asking questions, making comments and presentation building. |
|  |  |
| **ENG-1311** | **English Writing and Listening** |
|  | The course aims at building the ability of the students in correct writing, composition and presentation of English. The emphasis of the course is on correct and independent writing and correct listening to individual phoneme and word pronunciation, listening to monologue, listening to dialogue and conversation. |
|  |  |
| ART-1111 | Bangladesh Studies |
|  | Bangladesh: History Society, Culture, Geo-politics & Economics.Pakistan: East West Relationship, Development of internal colonialism, The constitution of 1956, 1962, Centre-province relationship, Martial Law Regimes, Nation Building, State Building, Basic Democracy and its impact in Politics.Movement: Language Movement of 1952, Constitutional movement of 1962, War 1965, Six point Formula and Movement of 1966, Mass Movement of 1968-69 (Non cooperation movement and struggle for constitutional autonomy), Election of 1970.Emergence of Bangladesh: Army crackdown and genocide, liberation war: causes and various dimensions.Political Process of Bangladesh: Democratic Practice and constitutional experimentations in Bangladesh, Military Rule, Civilization Process, power and functions of the organs of government (executive, legislature and judiciary).Administration of Bangladesh: Bureaucracy and its characteristics and functions, structure and organization of Bangladesh secretariat and attached departments, planning commission and Bangladesh public service, local government. Independence movement, Constitutional land mark, Emergence of Bangladesh, Political economy of Bangladesh, Bangladesh agriculture, Unemployment in Bangladesh, Bangladesh industry, Economic planning, Social security in Bangladesh. |
|  |  |
| ACC-2111 | Principles of Accounting |
|  | Introduction: Financial Accounting-definition and Scope, objectives of Financial Accounting, Keeping Terms used in accounting, users of accounting information and limitations of Financial Accounting. Conceptual Framework: Accounting Concepts, Principles and Conventions, Accounting Policies, Accounting as a measurement discipline, valuation Principles, accounting estimates. Recording of transactions: Voucher system; Accounting Process, Journals, Subsidiary Books, Ledger, Cash Book, Bank Reconciliation Statement, Trial Balance. Depreciation: Meaning, need & importance of depreciation, methods of charging depreciation. Preparation of final accounts: Preparation of Trading and Profit & Loss Account and Balance Sheet of sole proprietary business. Computerized Accounting: Computers and Financial application, Accounting Software packages. An overview of computerized accounting system - Salient features and significance, Concept of grouping of accounts, Codification of accounts, maintaining the hierarchy of ledger, Generating Accounting Reports. |
|  |  |
| **ART-1215** | **Public Administration** |
|  | Public Personnel Administration: Meaning Scope and Importance of Personnel Administration, Approaches & Challenges, Historical Development of Personnel Administration. Pioneers of Personnel Administration: Fredrick w. Taylor, Henry Fayol and George Elton Mayo. Human Resource Planning Definition, Elements, Importance, Human Resource Planning Process, Approaches. Personnel Agency: Types, functions and Importance. Procurement: Recruitment, selection and placement Transfer, Promotion. Development: Training, Importance, Employee training process, types and methods of training, career management. Appraisal: job analysis, job evolution, performance appraisal, objective and methods of performance appraisal, MBO. Compensation: wage and salary, compensation plan. Integration: Motivation: Definition, importance, theories of motivation. Maintenance: grievances procedure, disciplinary action. Separation: retirement employee benefit. Industrial relation & communication: industrial relation, industrial disputes, means of settlement of industrial disputes, trade union, collective bargaining. Public personnel research.  |
|  |  |
| ART-1217 | Political Science |
|  | Making of Bangladeshi Constitution. Constituent Assembly: Composition and Working. Preamble and Salient Features of Indian Constitution. Fundamental Rights and Fundamental Duties, Directive Principles of State Policy. President and Prime Minister. Parliament. Supreme Court, Judicial Review and Judicial Activism. Governor, Chief Minister and State Legislatures. Panchayati Raj and Municipal Governments. Nature of Federal System and Centre-State Relations. Election Commission and Electoral Reforms, National Commission for Scheduled Castes, National Commission for Scheduled Tribes. |
|  |  |
| ART-2213 | Professional Ethics |
|  | Human values: morals, values and ethics, integrity, work ethic, service learning, civic virtue, respect for others, living peacefully, character, spirituality. Engineering ethics: senses of ‘engineering ethics’, variety of moral issue, types of inquiry, moral dilemmas, moral autonomy, Kohlberg’s theory, Gilligan’s theory, consensus and controversy, models of professional roles, theories about right action, self-interest, customs and religion, uses of ethical theories. Engineering as social experimentation: engineering as experimentation, engineers as responsible experimenters, codes of ethics, a balanced outlook on law, the challenger case study. Safety, responsibilities and rights: safety and risk, assessment of safety and risk, risk benefit analysis and reducing risk, the three-mile-island and Chernobyl case studies. Collegiality and loyalty, respect for authority, collective bargaining, confidentiality, conflicts of interest, occupational crime, professional rights, employee rights, intellectual property rights, discrimination. Global issues: multinational corporations, environmental ethics, computer ethics, weapons development, engineers as managers, consulting engineers, engineers as expert witnesses and advisors, moral leadership, sample code of ethics like asme, asce, ieee.  |
|  |  |
| ECON-2211 | **Principles of Economics** |
|  | Introduction: Definition of economics, scope and utility of studying economics. Microeconomics: The theory of demand and supply and their elasticity, price determination, nature of an economic theory, applicability of economic theories to the problems of developing countries. Indifference curves technique, Marginal utility analysis. Production: Production function, types of productivity, the nature of Isoquants and Isocosts, rational region of production of an engineering firm, Euler’s theorem. Market: Concepts of market and market structure, cost analysis and cost function, small-scale production and large-scale production, optimization, theory of distribution. Macroeconomics: Savings, investment, employment, national income analysis, inflation, monetary policy, fiscal policy and trade policy with reference to Bangladesh. Economics of development: Dimensions of development, relevance of theory, the employment problem, human resource development. Economics of planning: Planning and market, policy models, planning experience. |
|  |  |
| ART-2311 | **Introduction to Sociology** |
|  | The Sociological Perspective, Development of Sociology, Sociological Research, Culture and Society, Socialization, Social Structure, Social Institutions: The Family, Social Stratification, Social Inequality, Social Institutions: Government, Economy, and the Environment. |
|  |  |
| **MGT-2315** | **Introduction to Business** |
|  | The course outlines the philosophy, objectives, activities and responsibility of business enterprises and familiarizes with business enterprises, business terminology and business environment. Included in the course are forms and procedure of business organization, procedure for business start up, sources of finance, agencies involved in business start up, major business decisions, associations in business world, major business functions and careers in business. Functional areas of business such as marketing, production, finance, accounting, personnel, etc. are discussed, includes a project work on how to set up a business. |
|  |  |
| **MGT-3211** | **Industrial Management** |
|  | UNIT I: Concepts of Management and Organisation – Functions of Management – Evolution of Management Thought : Taylor’s Scientific Management, Fayol’s Principles of Management, Douglas Mc-Gregor’s Theory X and Theory Y, Mayo’s Hawthorne Experiments, Hertzberg’s Two Factor Theory of Motivation, Maslow’s Hierarchy of Human Needs – Systems Approach to Management.UNIT II: Designing Organisational Structures : Basic concepts related to Organisation - Departmentation and Decentralisation, Types of mechanistic and organic structures of organisation (Line organization, Line and staff organization, functional organization, Committee organization, matrix organization, Virtual Organisation, Cellular Organisation, team structure, boundaryless organization, inverted pyramid structure, lean and flat organization structure) and their merits, demerits and suitability.UNIT III: Plant location, definition, factors affecting the plant location, comparison of rural and urban sites-methods for selection of plant- Matrix approach. Plant Layout – definition, objectives, types of production, types of plant layout – various data analyzing forms-travel chart.UNIT IV: Work study - Definition, objectives, method study - definition, objectives, steps involved- various types of associated charts-difference between micromotion and memomotion studies. Work measurement- definition, time study, steps involved-equipment, different methods of performance rating- allowances, standard timecalculation. Work Sampling – definition, steps involved, standard time calculations, differences with time study.UNIT V: Materials Management-Objectives, Inventory – functions, types, associated costs, inventory classification techniques-ABC and VED analysis. Inventory Control Systems-Continuous review system-periodical review system. Stores Management and Stores Records. Purchase management, duties of purchase of manager, associated forms.UNIT VI: Introduction to PERT / CPM : Project management, network modeling-probabilistic model, various types of activity times estimation-programme evaluation review techniques- Critical Path-probability of completing the project, deterministic model, critical path method (CPM)-critical path calculation-crashing of simple of networks.UNIT VII: Inspection and quality control, types of inspections - Statistical Quality Control-techniques-variables and attributes-assignable and non assignable causes- variable control charts, and R charts, attributes control charts, p charts and c charts. Acceptance sampling plan- single sampling and double sampling plans-OC curves. Introduction to TQM-Quality Circles, ISO 9000 series procedures.UNIT VIII: Introduction to Human Resource Management, Functions of HRM, Job Evaluation, different types of evaluation methods. Job description, Merit Rating.- difference with job evaluation, different methods of merit ratings, wage incentives, different types of wage incentive schemes. Marketing, marketing vs selling, marketing mix, product life cycle.TEXT BOOKS:1. Amrine, Manufacturing Organization and Management, Pearson, 2nd Edition, 2004.2. Industrial Engineering and Management O.P. Khanna Dhanpat Rai. |
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| **PHY-2211** | **General Physics** |
|  | Heat and Thermodynamics: Principle of temperature measurements: platinum resistance thermometer, thermo-electric thermometer, pyrometer; Kinetic theory of gases: Maxwell’s distribution of molecular speeds, mean free path, equipartition of energy, Brownian motion, Van der Waal’s equation of state, review of the First Law of thermodynamics and its application, reversible and irreversible processes, Second Law of thermodynamics, Carnot cycle; Efficiency of heat engines, Carnot’s Theorem, entropy and disorder, thermodynamic functions, Maxwell relations, Clausius-Clapeyron Equation, Gibbs Phase Rule, Third Law of thermodynamics. Structure of Matter: Crystalline and non-crystalline solids, single crystal and polycrystal solids, unit cell, crystal systems, co-ordinations number, crystal planes and directions, sodium chloride and CsCl structure, packing factor, Miller indices, relation between interplanar spacing and Miller indices, Bragg’s Law, methods of determination of interplanar spacing from diffraction patterns; Defects in solids: point defects, line defects; Bonds in solids, inter-atomic distances, calculation of cohesive and bonding energy; Introduction to band theory: distinction between metal, semiconductor and insulator. Waves and Oscillations: Differential equation of a simple harmonic oscillator, total energy and average energy, combination of simple harmonic oscillations, Lissajous’ figures, spring-mass system, calculation of time period of torsional pendulum, damped oscillation, determination of damping co-efficient, forced oscillation, resonance, twobody oscillations, Reduced mass, differential equation of a progressive wave, power and intensity of wave motion, stationary wave, group velocity and phase velocity, architectural acoustics, reverberation and Sabine’s formula. Physical Optics: Theories of light; Interference of light, Young’s double slit experiment; Displacements of fringes and its uses; Fresnel Bi-prism, interference at wedge shaped films, Newton’s rings, interferometers; Diffraction of light: Fresnel and Fraunhoffer diffraction, diffraction by single slit, diffraction from a circular aperture, resolving power of optical instruments, diffraction at double slit & N-slits-diffraction grating; Polarization: production and analysis of polarized light, Brewster’s law, Malus law, Polarization by double refraction, retardation plates, Nicol prism, optical activity, polarimeters, polaroid. |
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| PHY-2212 | General Physics Sessional |
|  | LIST OF EXPERIMENTS 1. Experiment with spring: a. To verify Hooke’s law for a spring. b. To determine the modulus of rigidity of the material of the spring. c. To observe the harmonic motion of the spring for different loads attached to it. 2. To determine the acceleration due to gravity ‘g’ by means of a compound pendulum. 3. To determine the surface tension of water by capillary rise method. 4. To determine rigidity modulus of the material of a wire by dynamic method. 5. To determine the coefficient of viscosity of water at room temperature. 6. To determine Young’s modulus of the material of a wire by Searle’s apparatus.7. To verify Ohm’s law by using a tangent galvanometer. 8. To determine the resistance of a Voltmeter. 9. To determine the horizontal component of the earth’s magnetic field and the magnetic moment of a bar magnet by magnetometer. 10. To determine the end-corrections of a meter bridge and hence to determine the specific resistance of wire.  |
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| **CHEM-2311** | **Chemistry** |
|  | Atomic structure, quantum numbers, electronic configuration, periodic table; Properties and uses of noble gases; Different types of chemical bonds and their properties; Molecular structure of compounds; Selective organic reactions; Different types of solutions and their compositions; Phase rule, phase diagram of monocomponent system; Properties of dilute solutions; Thermo-chemistry, chemical kinetics, chemical equilibria; Ionization of water and pH concept; Electrical properties of Solution. |
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| **CHEM-2312** | **Chemistry Sessional** |
|  | Volumetric analysis: acid-base titration, oxidation-reduction titration, determination of Fe, Cu, Ca volumetrically. |
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| **MATH-1111** | **Differential and Integral Calculus** |
|  | **Differential Calculus:** Functions of one variable & their plots, Limit, Continuity, Differentiability, Successive differentiation, Leibnitz’s theorem, Rolle’s, Mean-value, Taylors, Maclurin’s Theorem, Langrange’s & Cauchy’s forms of Reaminder, Expansion of functions in Taylor’s & Maclaurin’s series, Evaluation of Indeterminate form by L’Hospital’ rule, Maxima and Minima of a function, Points of inflexion, Tangent, Normal, Curvature & radius of curvature, Functions of several variables, Partial derivatives, Euler’s theorem, Jacobians, Directional derivatives. **Integral Calculus:** Physical meaning of a integration of function, different techniques of integrations, Integration by parts, Definite integration, Integration by summation of series, Fundamental theorem of integral calculus.  |
|  |  |
| **MATH-1213** | **Linear Algebra & Complex Analysis** |
|  | **Matrix**: Definition, Types of Matrices, Rank of the Matrix, Equivalence Matrix, System of linear equations**Linear Algebra :** Different types of matrices, Algebraic operations on matrices, Adjoint & inverse of a matrix, Orthogonal & Unitary matrices, System of linear equations, Vector space, Linear transformations, Characteristic roots & vectors, Diagonalization of matrices.**Complex Variable:** De-Moiver’s theorem & its application, Functions of a complex variable, Limit, Continuity & Differentiability of a function of complex variable, Analytic functions, Cauchy-Riemann equations, Cauchy’s theorem, Singularity & poles, Residues, Simple contour integration. |
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| **MATH-1315** | **Differential Equations and Fourier Analysis** |
|  | **Differential equation:** Ordinary differential equation, Formation of DE(=Differential equation), Degree & order of DE, Solutions of 1st & 2nd order ordinary DE, Separable equations, Linear equations, Homogeneous linear equations with constant coefficients, Solution by variation of parameters, Undermined coefficients & operator method, Solution by series.**Laplace Transformation:** Definition of LT(=Laplace transform), LT of different functions, First Shift theorem, Inverse transform, Linearity, Use of first shift theorem & Partial functions, Transform of derivative, Transform of an integral, Heaviside unit function, The 2nd shift theorem, Periodic functions, Convolutions, Solution of ordinary differential equation by Laplace transform.**Fourier Analysis:** Real & Complex form, Finite transform, Fourier integral, Fourier series & convergence of Fourier series, Fourier transform & uses in solving boundary value problem. |
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| **MATH-2111** | **Co-ordinate Geometry and Vector Analysis** |
|  | **Two dimensional geometry:** Transformation of co-ordinates, translation and rotation of axes, invariants, polar co-ordinates, pairs of straight lines, homogeneous second degree equation, general second degree equation, angle between pairs of straight lines, bisectors of angles, general equation of second degree. **Three dimensional geometry:** Co-ordinates in three dimensions, direction cosines and direction ratios, planes, straight lines, spheres.**Vector Analysis**: Vector components, Vector components in spherical & cylindrical system, Derivative of vector, Vector operators, Del, Gradient, Divergence and Curl. Their physical significance, Vector integration, Line, Surface & Volume integration, Green’s & Stoke’s theorem and their applications. |
|  |  |
| **MATH-2213** | **Probability and Statistics** |
|  | Frequency distribution of data, Population and sample, Collection and representation of statistical data, tabulation of data, class interval, Discrete, continuous and cumulative distribution, histograms, frequency polygon, graphical representation of data, Statistical measures, Sampling, correlation theory, Probability, Stochastic processes. |
|  |  |
| **EEE-1111** | **Electrical Circuits I** |
|  | Electrostatics, Magnetism, Resistance and capacitance, resistors and capacitors in series and parallel connections, Ohm’s law, Kirchoff’s laws, charging and discharging of a capacitor in RC circuit, Faraday’s law, Inductance and inductor, LR circuit, alternating current: RMS and peak values of A.C. quantities, A.C. circuits with R,L & C, R-L-C series and parallel circuits, resonance in ac circuits, transformer, multiphase circuits, star-delta conversion, Network theorem: superposition theorem, Thevenin’s theorem, Norton’s theorem, maximum power transfer theorem. |
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| **EEE-1112** | **Electrical Circuits I Sessional** |
|  | Verification of Ohm’s law, Kirchoff’s voltage law, Kirchoff’s current law, Thevenin’s theorem, R-L-C circuits, star-delta conversion. |
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| **EEE-1213** | **Electrical Circuits II** |
|  | Transient Analysis of AC circuits: RL, RC and RLC Circuits, First Order and Second Order Transient Response, AC Circuit Analysis and the Phasor Concept, The Impedance and Admittance of the R, L and C Components, Average and rms values of Voltages and Current, Sinusoidal Steady State Analysis. |
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| **EEE-1214** | **Electrical Circuit Simulation Laboratory** |
|  | Power Supply design, half wave, full wave rectification with diode applications. |
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| **EEE-1315** | **Electronics I** |
|  | Introduction to semiconductors: P and N type semiconductors, P-N junctions under forward and reverse biases. Diode: Load lines, graphical analysis of diode circuits, equivalent circuits and frequency response, diode applications, half and full-wave rectifiers, bridge rectifiers, clippers, clampers, voltage multipliers, voltage regulators, characteristics of different types of diodes, transistors. |
|  |  |
| **EEE-1316** | **Electronics I Sessional** |
|  | **Instruments:** Measuring Instruments and how to use them, **Ohm’s law and network theorems:** Circuits using resistors, capacitors, inductors and diodes, **Transistor amplifier:** Using Transistor in a circuit as an amplifier, **Transistor as a switch:** Using transistor in circuit as an amplifier. **Use of op-amp:** Familiarizing with Operational Amplifier and building as audio amplifier using op-amp, **Digital Circuits**: Using Logic gates in digital circuits to make flip flops, counters, registers, adders and other components, **Power supply construction:** Making a 5 Volt power supply. |
|  |  |
| **EEE-2317** | **Digital Electronics** |
|  | Number system and Codes: General way of representing numbers, decimal, binary, octal and hexadecimal number systems and their representation conversion of number from one system to another, compliment in number system, different Codes: BCD, alphanumeric, Gray, Excess-3, ASCII and error detection codes. Digital Logic: Boolean algebra, De-Morgans Theorem logic gates and their truth tables, Canonical form of logic expression, simplification of logic expression: algebraic method, K-Map, realization by using NAND/NOR gates, adders, subtractors, code converters, magnitude comparator encoder, decoder, multiplexer, de-multiplexer, ROM, RAM, Programmable Logic Array (PLA), D/A & A/D converters with applications.  |
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| **EEE-2318** | **Digital Electronics Sessional** |
|  | Logic gates, flip-flops, full adder, counters, registers, decoders, encoders, multiplexers. |
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| **EEE-3211** | **Microprocessor, Assembly Language and Computer Interfacing** |
|  | This course introduces the basics of computer organization and assembly language programming. Topics covered include: basic building blocks of a computer, bus system, microprocessor architecture, memory organization, programming model of a microprocessor, instructions set, and assembly language programming concepts. Mnemonics and opcodes, instruction sets for 8085 and 8086, assembly language programming, arithmetic instructions, logical instructions, loops and arrays, procedures, macros, interrupts, use of assembly language for simple system development. Fundamental units of a microcomputer: Input unit, CPU, Microprocessor, Memory unit, Output unit, Bus structures, and Processor clock. Memory devices: ROM, RAM, EPROM, Microcomputer programming concepts and timing. Architecture of a general purpose microprocessor, INTEL 8086 microprocessor, Internal architecture, Register structure, Addressing modes, Pin diagram and pin descriptions, Timing diagram, Instruction sets, Memory interface, I/O interface, Bus interface, DMA, Interrupts, Analog interfacing and industrial control, An overview of Intel 80186 through Pentium models. |
|  |  |
| **EEE-4127** | **VLSI I** |
|  | P-MOS, N-MOS and C-MOS transistors structures, characteristics and operations, MOS inverter, Fabrication process, Stick diagram, Design rules and layout, Logic circuit design, Dynamic MOS circuits, Memory, Register, Counter, Architecture and implementation of PLDS and PLA, Reliability aspects, Ultra-fast VLSI circuits. P-M0S, N-MOS and C-MOS transistors structures, characteristics and operations, MOS inverter, Fabrication process, Stick diagram, Design rules and layout, Logic circuit design, Dynamic MOS circuits, Memory, Register, Counter, Architecture and implementation of PLDS and PLA, Reliability aspects, Ultra-fast VLSI circuits. |
|  |  |
| **CSE-1111** | **Introduction to Computers** |
|  | Introduction: History and development of computer Science, fundamental concepts, types of computers, a variety of computer applications (Word, Excel, Access, LAN). Hardware: CPU, motherboards, storage media, I/O devices. Software: Basic concepts, types of software. Operating system: Types, Importance, components, and basic functions. Application software: Programming languages, Applications Packages. Maintenance: Power supply, UPS, Virus protections. |
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| **CSE-1112** | **Introduction to Computers Sessional** |
|  | Students should be given a good practical idea about MS Word, Excel, Access and PowerPoint. |
|  |  |
| **CSE-1213** | **Computer Programming** |
|  | Introduction to Programming Languages: Machine language, assembly language, mid-level language, high-level language, language translation, interpreter, assembler and compiler. Programming Concepts: Algorithm and logic, flow-chart, keywords, syntax, data object, data types, declaration, operator, identifier, expressions and statements, structure, functions, built-in-functions, I/O functions, control statements, branching, looping, subprogram, storage management. The objective of this course is to enable the students to know the keywords and basic programming techniques in different structured languages. |
|  |  |
| **CSE-1214** | **Computer Programming Sessional** |
|  | Input and output operations, operators and expressions decision making and branching, use of one, two and multi dimensional arrays, decision making and looping, character strings, functions, pointers and dynamic memory allocations, file management, the preprocessor statements. |
|  |  |
| **CSE-1215** | **Discrete Mathematics** |
|  | Set theory, relations, functions, vectors, and matrices, graph theory, planar graphs, and trees, directed graphs and binary trees, combinational analysis, algebric systems,Number theory, languages, grammars and automata, ordered sets lattices, propositional calculus, Boolean algebra, logic gates, lattice and group theory, cyclic group, permutation groups, symmetry groups, quetients, homomorphism, basic structure theory, set and combinatories, prepositional and predicate logic, mathematical reasoning and proof techniques, theories with induction, counting and countability, graphs and trees, morphisms of algebric structures, modeling computation, program correctness and verification. |
|  |  |
| **CSE-1315** | **Data Structures** |
|  | Introduction, data structures, data structure operations, mathematical notations and functions, algorithmic notations, control structures, linear data structures, arrays, records, pointers, linked lists, stacks, recursions, queues and their applications, non-linear data structures- trees, graphs and their applications; Sorting and searching- insertion sort, selection sort, merging, merge-sort, radix sort, searching and hashing. |
|  |  |
| CSE-1316 | **Data Structures Sessional** |
|  | Laboratory works based on Data Structure. |
|  |  |
| **CSE-2213** | **Object Oriented Programming** |
|  | Introduction to object oriented programming, C++/JAVA/Python as an object oriented language, Introduction to C++/JAVA, Basic Concepts of Object-Oriented Programming : Object, Class, Inheritance, Encapsulation, Polymorphism, Expressions in C++/JAVA, Statements and Control Structures, Arrays, Functions in C++/JAVA, Classes and Objects, Static Data Members and Member Functions, Arrays of Objects and Friend Functions, Copy Constructor, Dynamic Constructors, Constructing 2-Dimensional Arrays, Operator Overloading and Type Conversions, Introduction to Inheritance, Single Inheritance, Multiple Inheritance, Multilevel Inheritance, Pointers and Virtual Functions, Virtual Functions and Polymorphism, C++/JAVA Streams and Stream Classes, I/O Operations, Managing Output with Manipulators, Classes for File Stream Operations, File Pointers and their Manipulations, File Operations : Insertion, Updating, Exception Handling. |
|  |  |
| **CSE-2214** | **Object Oriented Programming Sessional** |
|  | Creating Classes and objects, Encapsulation, Static Data members and member functions, Arrays of objects and friend functions, Function Overloading and Polymorphism, Constructors and Destructors, Inheritance: Single, Multiple, Multilevel, Virtual functions and Polymorphisms, File Operations. |
|  |  |
| **CSE-2117** | **Computer Algorithms and Complexity** |
|  | Techniques for analysis of algorithms, Method for the design of elegant algorithms: divide and conquer, greedy method, dynamic programming, backtracking, branch and bound, Basic search and traversal techniques, graph algorithms, Algebraic simplification and transformations, Lower bound theory, NP-hard and NP-complete problems. |
|  |  |
| **CSE-2118** | **Computer Algorithms and Complexity Sessional** |
|  | Sessional classes will be conducted base on the topics covered in CSE-2117. |
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| **CSE-2319** | **Database Management System** |
|  | Introduction- purpose of database systems, view of data, data models, database languages, transaction management, storage management, database users, overall system structure; Entity relationship model- design issues, mapping constraints, keys, ER diagram, weak entities, extended ER features; Relational model; SQL- basic structures, set operations, aggregate functions, null values, nested subqueries, derived relations, views, joined relations, data definition language, embedded SQL; Integrity constraints- domain constraints, referential integrity, assertions, triggers, functional dependencies; Relational database design- decomposition, normalization, normal forms; Object oriented databases; Indexing and hashing; Concurrency control; Recovery system; Distributed databases. |
|  |  |
| **CSE-2320** | **Database Management System Sessional** |
|  | The course covers advance topics in databases like query processing and optimization, database security and transaction management, to learn how to develop database applications: Creation of Tables- Simple tables, tables with constraints, use of foreign keys and use of data base triggers; Use of SQL/PLSQL- Usage of SQL commands, usage of built in functions, simple queries, nested queries, procedures and functions; Interfacing with database- Using forms of data entry; Reports- Using report write. |
|  |  |
| **CSE-3111** | **Numerical Methods** |
|  | **Numerical analysis:** Errors in numerical calculations. Error : Definitions, sources, examples. Propagation of Error. A general error formula. **Root finding :** The bisection method and the iteration method, the method of false position. Newton-raphson method. **Methods of approximation theory :** Polynomial interpolation: Lagrange form, divided formula for interpolation. **Solution of systems of Linear equations:** Gaussian elimination. The pivoting strategy, Iteration method solution of tridiagonal systems. **Numerical solution of ordinary differential equations:** Euler's method (including modified form), Rnge-Kutta method. **Numerical Integration :** Trapezoidal method. Simpson's method. Weddle's method; Eigen value problems for matrices, Use of computer to implement projects in numerical methods. |
|  |  |
| **CSE-3113** | **Operating Systems** |
|  | An introduction to the structure of modern operating systems, History of operating systems, Operation system concept, Computer system structure, Operation system structure, Introduction to processes, Inter-process communication, Threads, CPU scheduling, Deadlocks, Memory management, I/O systems, Storage management, Secondary storage management, Files systems, Protection, Distributed system structure, Distributed coordination, Distributed file systems, Study of a representative operating system : Windows NT, UNIX. |
|  |  |
| **CSE-3114** | **Operating Systems Sessional** |
|  | Introduction: UNIX system concepts, History, C programming under UNIX, standard C libraries, Single and multi-module programming, UNIX file dependency system, UNIX archive system, UNIX source code control system, UNIX profiler, UNIX debugging, UNIX system programming. File manipulation process creation, Data manipulation, Inter process communication, communication protocols, UNIX domain protocols, Socket addresses, Elementary and advanced socket. UNIX shells, Shell functionality, Shell programming. System calls, System versus transport layer interface. Transport Endpoint addresses, TLI functions, Standard Routines. |
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| **CSE-3115** | **Computer Networks** |
|  | An introductory course on theory and practice of computer networking. Topics includes; Introduction: Goals, Applications, Network structures, Network architectures, OSI, Connection oriented and connectionless services, Service primitives. Public networks, ARPANET, SNA, Local Area Networking: Technology, Architecture, Topology, Wireless LAN. LAN system: Ethernet and Fast Ethernet. Token Ring and FDDI. ATM LAN. Wide Area Networking: Circuit switching and Packet switching. ISDN, Frame Relay and cell relay. Data Link Layer: Service provided to the network layer, Framing, Error control, Flow control, Error detection and correction. Communication Architecture and Protocols: Network reference model, TCP/IP protocol, Internetworking, Internet protocol, Routing protocol, Transport protocols. Network Security: Privacy with conventional encryption, Digital signature. Distributed Applications. |
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| **CSE-3116** | **Computer Networks Sessional** |
|  | Client/Server computing on a LAN and LAN Operating Systems, Examples – Linux, Widows 2000 server, MS Workgroups etc. Introductions to web servers, mail servers, authentication servers etc. |
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| **CSE-3117** | **Computer Architecture and Design** |
|  | Processor design: Introduction, processor organization, information representation, number formats, instruction sets, instruction formats, instruction types, fixed point arithmetic, addition, subtraction, multiplication, division, ALU design: basic ALU organization, floating point arithmetic, arithmetic processors. Control design: instruction sequence, instruction interpretation, Hardware control: CPU control unit, micro programmed control, basic concepts, control memory optimization, multiplier control unit, micro programmed computers. Memory organization, review of primary and secondary memories, memory hierarchies, high speed memories, interleaved memories, cache memory. System organization, communications, bus control, I/O systems, programmed i/o device, DMA, interrupts, i/o processors. Parallel processing: basic concepts, types of parallel processors, performance consideration, pipeline processors and systolic arrays, pipeline structures, vector supercomputer, data flow computers, multiprocessor architectures, fault-tolerant computers. RISC processors: introduction to data addressing modes, condition codes, register sets, brief study of RISC processor. |
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| **CSE-3213** | **Data Communication** |
|  | Introduction to communication, Analog and digital data, spectrum and bandwidth, transmission impairments, data rate channel capacity, Transmission media: twisted pair, coaxial and fiber optic cables, Manchester and differential Manchester encoding, ASK, FSK, PSK, QPSK encoding, modems, error detection techniques, Data encoding, Data transmission, Data link, Data communication networking. |
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| **CSE-3227** | **Theory of Computation** |
|  | Formal models of automata, language and their relationship. Finite automata and regular expressions, properties of regular sets, context-free grammars, push-down automata, properties of context-free languages, Turing machines, halting problem, undecidability and computability, recursive function theory, Chomsky hierarchy, deterministic context-free languages, closure properties families of languages, computational complexity theory, intractable problems, application in parsing, pattern matching and the design of efficient algorithms. Finite state machines, introduction to sequential circuits, basic definition of finite state model, memory elements and their excitation functions, synthesis of synchronous sequential circuits, iterative network, definition and realization of Moor and Melay machines. |
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| **CSE-3311** | **System Analysis, Design and Development** |
|  | Scope of system analysis. Information system concepts, System development life-cycle, Requirement analysis, Specification requirements. System design: Selection, Initial design, detailed design, data structure design, design documentation, Implementation and integration, Maintenance, Applications. Requirement and Specifications, Tools and Techniques, Coding, Program Verification, Testing and debugging, Programming environment, Distribution and Maintenance, Metrics, Management, design. |
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| **CSE-3315** | **Compiler Design and Construction** |
|  | Fundamentals of compilers, lexical analysis, regular expressions, regular languages, syntax analysis, syntax analysis, context free grammar, bottom-up parsing, syntactic error recovery, syntax-directed definitions, attributes evaluation, abstract syntax trees, symbol tables, type checking, semantic checks for inheritance/subtyping and for overlapping, generation of intermediate code, generation of un-optimized target code. Introduction to code optimization, control flow graphs, live-variable analysis, allocation optimized register, global common sub expression elimination, dominators, loop in control flow graphs, def-use and use-def chains, loops invariant, code motion, partial redundancy elimination, constant propagation, optimizing object-oriented programs, copy propagation, phase ordering of optimizations, instruction scheduling, optimization for memory hierarchies. |
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| **CSE-3317** | **Java Programming** |
|  | Introductory concept of Programming and Approaches, Importance of Java Programming and Object Oriented Concept, Introduction to NetBeans IDE and simple programs, Character Set, Identifiers, Variables, Constants, Data types, Operators, Expressions, Statement, Program Flow, Control Statement, Selection (If Structure), Rest of Selection (Nested if, Switch), Break Statement, Console input and related conversion methods, Loop, Access specifier, Instance variables, constructor, Methods, Polymorphism, Inheritance, Abstract Methods and class, Exception and String Handling, GUI Components, Event Handling, Threads and Multithreading, History of JAVA class libraries, Methods: Program module in JAVA, math class method, method definitions, JAVA API packages, automatic variables, recursion, method overloading, method of applet class. Array: Declaring and allocating arrays, passing arrays to methods, sorting arrays, Object based programming and object oriented programming in JAVA, Java Database Connectivity. |
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| **CSE-3318** | **Java Programming Sessional** |
|  | Simple Java programs, Introduction to NetBeans IDE, Control structures, Constructor, Methods, Polymorphism, Inheritance, Exception handling, Abstract methods and class, GUI Components, Threads and Multithreading, Recursion, Method overloading, Array operations, Java Database Connectivity. |
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| **CSE-3321** | **Software Engineering** |
|  | The course needs the background of programming and programming languages, data structure, project management, economic feasibility studies, and systems concept.  The topics include software development process paradigms, software requirement analysis, design, development, testing, implementation and maintenance of software, software reusability, documentation, manuals and topics related to software project management. |
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| **CSE-4111** | **Management Information System** |
|  | An introduction to Management Information System, Information System for Management Activity and Functional Sub-systems, Structure of MIS, Organization and management concepts, Concepts of Information, Systems Concepts, Computer Hardware and Software for MIS, Communications technology for MIS, Data Resource Management, Decision making process, Human as information processors, Concepts of Planning and Control, Support systems for planning, control and decision making, Support systems for Management, Development of Information System Plan, Database requirements, User Interface requirements, Developing and Implementing Applications, Quality Assurance and Evaluations of Information systems, Organizing and Managing Information Resources function. |
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| **CSE-4113** | **Computer Graphics** |
|  | Introduction: History of computer graphics, Applications, Graphics hardware and software, fundamental idea behind modern computer graphics. Geometric Transformation: 2D and 3D Rotation and Translation. Projective Transformation: Orthogonal and Perspective Projection. Vector: Normal Vector and its impact on 3D graphics, View Vector. Raster Graphics: Line Drawing, Polygon Filling, Scan Conversion. Shade models: Light models, Diffused Light, Ambient Light, Specular Light, Flat Shading, Lambert Shading, Phong Shading. Ray Tracing: Basic idea, Hidden Surface Removal, z-buffering. Texture Mapping: Texture Fundamentals, Texture Blending, Curves and Surfaces: Types of Curves, Cubic-Spline, β-Spline, NURBS, Animation: Real time animation, Hardware for real-time animation, Character Animation, Computer Games, Movies, Image Formats: PPM, BMP, Image Based Rendering, Morphing: View-morphing, Volume Metamorphosis. |
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| **CSE-4114** | **Computer Graphics Sessional** |
|  | 2D and 3D rotation and translation, orthogonal and perspective, polygon filling, scan conversion, line drawing and computer games. |
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| **CSE-4119** | **Artificial Intelligence** |
|  | An introductory description to the major subjects in artificial intelligence. Introduction to AI languages: LISP, PROLOG. Heuristic search, Knowledge representation and computer interference, Computational logic, knowledge engineering and expert systems, Machine Learning, Natural language processing, Pattern recognition, Computer vision, Robotics Application, social impacts. Inconsistencies and Uncertainties, Probabilistic reasoning, Knowledge acquisition. |
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| **CSE-4211** | **Web Technologies** |
|  | Topics include HTML and DHTML concepts, HTML tag emulation, commands, HTML form design, homepage design, online request, dynamic function, buttons, and animation. Common gateway interface programming: Java Script, programming concept using Java Script, embedding Java Script in HTML. Multimedia: Web graphics, animation, compressed graphics, Socket programming, socket for client server architecture, multi socket RMI, servlet programming. Online applications: Monitoring user events, database connectivity, and plug-ins. |
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| **CSE-4213** | **Optical Fiber Communication** |
|  | **Optical fiber:** Nature of list, Optics low, Optical fiber mode, Single mode fiber, Graded index structure. **Signal degradation in optical fibers:** Attenuation, Signal distortion, Pulse Broadening mode coupling. **Optical sources:** LED, Laser diodes, Light source linearity modal partition and reflection noise. **Power launching and Coupling:** Source to fiber power launching, lansing scheme, fiber to fiber joints, Splicing fiber connectors. **Photodetectors:** Basic principle, photodelectors noise, response time, Avalauch multiplication noise. **Optical receiver operation:** Receiver configuration, digital receiver performance preamplifiers. **Digital transmission system:** Point to point link, line coding, Eye pattern, system performance. **Advanced systems and techniques:** WDM, Local area networks, Optical amplifier, Photonic switching. |
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| **CSE-4215** | **Distributed Systems** |
|  | Distributed object systems, Retrieving and caching of distributed information, Distributed data replication and sharing, Performance issues, Algorithms for deadlock detection, Concurrency control and synchronization in distributed system, Models for distributed computation, Networking facilities and resource control and management methods in network and distributed operating systems, Collaborative applications, Wide area network computing, Web based commerce, Agent systems and Market based computing. |
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| **CSE-4216** | **Distributed Systems Sessional** |
|  | Laboratory Works Based on CSE-4215.  |
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| **CSE-4219** | **Object Oriented Software Development Using UML** |
|  | Survey of the paradigm including analysis, design and implementation, demonstrate the importance of modeling in the software development life cycle, become conversant with the UML notation and symbols, understand the object-oriented approach to analyzing and designing systems and software solutions, employ the UML notation to create effective and efficient system designs. The Unified Modeling Language (UML) provides a common, standard notation for recording both analysis models and design artifacts. |
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| **CSE-4220** | **Object Oriented Software Development Using UML Sessional** |
|  | Laboratory Works Based on CSE-4219. |
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| **CSE-4221** | **Simulation & Modeling**  |
|  | Simulation modeling basics: systems, models and simulation; Classification of simulation models; Steps in a simulation study; Concepts in discrete-event simulation: event-scheduling vs. process-interaction approaches, time-advance mechanism, organization of a discrete-event simulation model; Continuous simulation models; Combined discreet-continuous models; Monte Carlo simulation; Simulation of queuing systems.Building valid and credible simulation models: validation principles and techniques, statistical procedures for comparing real-world observations and simulated outputs, input modeling; Generating random numbers and random variates; Output analysis. Simulation languages; Analysis and modeling of some practical systems. |
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| **CSE-4222** | **Simulation and Modeling Sessional** |
|  | Laboratory Works Based on CSE-4221. |
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| **CSE-4223** | **Neural Network & Fuzzy Logic** |
|  | **Hopfield Model:** Associative Memory, Stochastic Networks, Correlated Patterns. **Introduction:** Neuroscience, History and Issues. **Optimization Problems:** Weighted Matching Problem, Traveling Salesman Problem. **Neural Network:** Feed-Forward Network, Multi-Layer Network. **Unsupervised Learning:** Hebbian Learning, Competitive learning. |
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| **CSE-4225** | **Advanced Algorithms** |
|  | Randomized Algorithms: Las Vegas and Monte Carlo Algorithms; Randomized Data Structures: Skip Lists; Amortized Analysis: Different methods, Applications in Fibonacci Heaps; Lower Bounds: Decision Trees, Information Theoretic Lower Bounds, Adversary Arguments; Approximation Algorithms: Approximation Schemes, Hardness of Approximation; Fixed Parameter Tractability: Parameterized Complexity, Techniques of designing Fixed Parameter Algorithms, Examples; Online Algorithms: Competitive Analysis, Online Paging Problem, k-server Problem; External Memory Algorithms; Advanced Data Structures: Linear and Non-linear Methods.  |
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| **CSE-4227** | **Graph Theory and Applications** |
|  | Graphs: simple graphs, digraphs, sub-graphs, vertex-degrees, walks, paths and cycles; Trees, spanning trees in graphs, distance in graphs; Complementary graphs, cut-vertices, bridges and blocks, k-connected graphs; Euler tours, Hamiltonian cycles, Chinese Postman Problem, Traveling Salesman Problem; Chromatic number, chromatic polynomials, chromatic index, Vizing’s theorem, planar graphs, perfect graphs. |
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| **CSE-4228** | **Graph Theory and Applications Sessional** |
|  | Laboratory Works Based on CSE-4227. |
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| **CSE-4229** | **Computer-Aided Design and Manufacturing** |
|  | Computer-aided engineering software that addresses the hierarchy of engineering analysis, design, and decision evaluation is developed with state-of-the-art computer tools. Linear graph theory is applied to the modeling of physical networks. Operator overloading, dynamic polymorphism, graphical user interfaces, dynamic link libraries, and multiple threaded programs are considered. |
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| **CSE-4230** | **Computer-Aided Design and Manufacturing Sessional** |
|  | Laboratory Works Based on CSE-4229.  |
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| **CSE-4231** | **Data Warehousing and Data Mining** |
|  | Introduction; Data warehousing and OLAP technology for data mining; Data preprocessing; Data mining primitives, languages and systems; Descriptive data mining: characterization and comparison; Association analysis; Classification and prediction; Cluster analysis; Mining complex types of data; Applications and trends in data mining. |
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| **CSE-4311** | **Cellular Mobile and Satellite Communication** |
|  | Orbital aspects: Tracking and control of communication satellite, Launch vehicles: Ariance, Space shuttle, Propagation characteristics: Attenuation and noise, Frequency bands, Satellite transponders: Intermediation low noise amplifiers: Satellite antennas, Earth station configuration, High power amplifiers antenna, LNA: Link design, Multiple access, FDMA, TDMA. CDMA, SPADE, Spot beam antenna, INTELSATs, INSAT. |
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| **CSE-4313** | **Image Processing and Computer Vision** |
|  | Introduction to image processing and computer vision: Representation of image, a basic image processing system, relationship to human visual system, computer vision applications, signal processing and pattern recognition. Discrete Fourier transform: One dimensional Fourier transform, properties of DIT, Fast Fourier Transform(FFT) algorithms, two dimensional FFT, two dimensional filtering using FFT, properties of digital images, two dimensional infinite impulse response filters.Two dimensional system; Techniques of image acquisition; Image enhancement; Image restoration and data compression; Remote sensing application. |
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| **CSE-4317** | **Human Computer Interaction** |
|  | Topics include the underlying theories of human-computer interaction, design principles,Guidelines, evaluation, and social and individual impact. Applications studies includethe World Wide Web. Practical work: Project using a language such as Delphi or VisualBasic. |
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| **CSE-4319** | **Advanced Operating Systems** |
|  | An Overview of operating system functions, Information management, Process management, Memory management and secondary storage space management, Parallel processing, distributed operating systems, Introduction, Design issues, Distributed shared memory, Algorithms of implementing distributed scheduling, Failure recovery and Fault tolerance, Protection& Security, Resource security & Protection, Data Security, Cryptography, multiprocessor operating systems, Introduction, Architecture, Interconnection Network for multiprocessing caching, Structure of multiprocessing operating system, threads, various types of threads, Design issues, Case study of any machine operating systems, database operating system, Introduction requirements of a Data base operating system, concurrency control Introduction, Transactions, Conflicts, Transaction processing, The problem of concurrency control, Searializability theory; Logs, serial logs, Log equivalence, sample concurrency control algorithms. Object oriented operating systems and its characteristics, Case study of OS such as Unix OS, Netware OS, Windows-NT, etc. |
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| **CSE-4320** | **Advanced Operating System Sessional** |
|  | Laboratory works based on Advanced Operating System. |
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| **CSE-4321** | **Decision Support System** |
|  | Introduction to decision support systems; DSS components; Decision making and DSS; DSS software and hardware; developing DSS; DSS models; types of DSS; group DSS; executive information systems; data mining; artificial intelligence and expert systems. |
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| **CSE-4322** | **Decision Support System Sessional** |
|  | Laboratory works based on Decision Support System. |
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| **CSE-4323** | **Introduction to Robotics** |
|  | Introduction to Robotics. Vision: Projection, Convolution, Edge Detection, Image Interpretation and ENS. Mobility - (mobile robot platforms). Inertial Navigation Systems. Graph Search. Controls (and encoders). Motion Planning: Potential Functions, Roadmaps, Cell Decompositions. Sensing and Sensors. Human Robot Interaction. Forward and Inverse Kinematics: Transformation Matrices. Inverse Kinematics: Geometric methods, Algebraic methods. Non-holonomic constraints. |
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| **CSE-4324** | **Introduction to Robotics Sessional** |
|  | Laboratory works based on Introduction to Robotics. |
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| **CSE-4325** | **Multimedia communication** |
|  | Multimedia system-introduction; Coding and compression standards; Architecture issue multimedia; Operating systems issues in multimedia - real-time OS issues, synchronization, interrupt handling; Database issues in multimedia – indexing and storing multimedia data, disk placement, disk scheduling, searching for multimedia document; Networking issues in multimedia - Quality-of-service guarantees, resource reservation traffic specification, happing, and monitoring, admission control; Multicasting issues; Session directories; Protocols for controlling sessions; Security issues in multimedia -digital water – making partial encryption schemes for video streams; multimedia applications – audio and video conferencing, video on demand, voice over IP. |