



**GR GOVINDARAJULU SCHOOL OF
APPLIED COMPUTER TECHNOLOGY**

CURRICULUM AND SYLLABUS

MASTER OF COMPUTER APPLICATIONS (MCA)

(Effective from 2010-11)

Contents

| | | |
|--|-----|----|
| MCA Programme Overview | ... | 3 |
| List of Courses | ... | 5 |
| List of Electives | ... | 7 |
| Scheme of Examination | ... | 8 |
| Semester I – Course Outline and Syllabus | ... | 11 |
| Semester II – Course Outline and Syllabus | ... | 19 |
| Semester III – Course Outline and Syllabus | ... | 29 |
| Semester IV – Course Outline and Syllabus | ... | 37 |
| Semester V – Course Outline and Syllabus | ... | 45 |
| Electives – Database Management Group | ... | 51 |
| Electives – Network Security Group | ... | 55 |
| Electives – Wireless Communication Group | ... | 59 |
| Electives – Graphics and Multimedia Group | ... | 63 |
| Electives – Computational Intelligence Group | ... | 67 |

Programme overview

MASTER OF COMPUTER APPLICATIONS (MCA)

(Effective from the academic year 2010-11)

ABOUT THE PROGRAMME

The MCA programme of GRGSACT shall be a three-year, full-time programme that follows a semester pattern. The programme consists of six semesters - five semesters of course work and one semester of project work.

OBJECTIVE OF THE PROGRAMME

The Course Objective of the MCA programme is to provide advanced and in-depth knowledge of computer science and its applications to enable students pursue a professional career in ICT related industry, business and research.

CURRICULUM

The MCA programme follows the credit system and is designed with 135 credits. One credit is equivalent to 10 contact sessions of 75 minutes each. The curriculum consists of core and elective theory courses, laboratory sessions, two summer internships, and final year project work.

Electives are offered in groups in specialised areas like Database Management System, Computer Networks, Wireless Communication, Graphics and Multimedia and Computational Intelligence. Students can opt to specialise in two different elective groups. An elective group is offered only if the number of students opting for that group is at least 15. To opt for a particular group of electives, the student is required to secure a minimum of 70% in the related core courses.

Theoretical knowledge gained in the classroom is put into practice and tested in laboratory sessions. The lab sessions provide necessary exposure to the application oriented languages / packages and tools. The curriculum provides a chance for students to undertake real-time projects and training in industries during summer holidays and in the final semester of the programme enabling them to gain industry exposure and knowledge in various domains. An opportunity is provided to the students for their holistic development through the co-curricular activities such as the Outbound and Personality Development Programmes. Guest lectures, workshops, seminars, and industrial visits are an essential part of the programme.

ASSESSMENT AND EVALUATION

Evaluation of students' performance is based on both Continuous Internal Assessment (CIA) and End Semester Examination (ESE). Each theory course will be evaluated for a total of 100 marks, comprising CIA of 40% and ESE of 60%. Each laboratory-based course shall be evaluated only through CIA and carry 50 marks. Summer internship work shall also be evaluated for 100 marks comprising certification from the organization, evaluation of the written report by the faculty guide, and assessment of the student presentation by a group of faculty.

CIA shall comprise multiple components of evaluation such as class attendance and participation, quiz, presentations, case discussions, simulation exercises, mini projects, tests and written examination. Each course will have a minimum of three components of CIA evaluation in addition to a mid-semester examination which is mandatory for all the courses. The mid-semester examination shall carry a minimum of 15 and a maximum of 25 marks.

The project work carried out during the 6th semester shall be evaluated for a total of 200 marks, comprising CIA component of 80 and a viva-voce evaluation of 120 marks. The CIA component shall include project presentation (30 marks), choice of technology and application (20 marks), and evaluation of written report (30 marks). Viva-voce evaluation shall be done jointly by an internal and an external examiner.

There will not be any minimum marks stipulated for passing CIA. However, in the ESE students shall be required to secure a minimum of 50% for passing. In order to successfully complete a Course, students will need to secure a minimum total of 50% (50 out of 100 marks) in CIA and ESE put together.

Students who are not satisfied with the CIA score for any course may appeal to the Director for a review. Director's decision in the matter shall be final and binding.

The records of CIA and ESE for each student and each Course shall be maintained in safe custody of the department for a period of six months.

ATTENDANCE

1. Students are expected to attend a minimum of 75% of all scheduled classroom sessions during each semester.
2. The Director may condone the shortage in attendance in exceptional circumstances, up to a maximum of 10%.
3. Students falling short of the required attendance will not be permitted to appear for the final examination of the semester.
4. Students who do not complete a semester on account of such shortage of attendance may seek to repeat the semester in the subsequent academic year.

COMPLETION OF THE MCA PROGRAMME

Students are also required to complete their MCA programme in all respects within a maximum of six years from the date of their first joining the programme, or as per the rules and regulations of the Bharathiar University in regard.

GRADING

The grading of students, based on the assessment and evaluation of their performance, will be as below.

| <u>Grading</u> | | <u>Marks secured</u> |
|------------------------------|-----|-----------------------------|
| First Class with Distinction | ... | 75% and above |
| First Class | ... | 60% and above but below 75% |
| Second Class | ... | 50% and above but below 60% |

LIST OF COURSES**SEMESTER I**

| S.No | Course Code | Course Title | Credits |
|------|-------------|--|---------|
| 1 | MC10T01 | Computer Organization and Architecture | 2 |
| 2 | MC10T02 | Problem solving and programming | 3 |
| 3 | MC10T03 | Discrete Mathematics | 2 |
| 4 | MC10T04 | Data Structures | 3 |
| 5 | MC10T05 | Operating Systems | 3 |
| 6 | MC10P01 | C and Data Structures Lab | 3 |
| 7 | MC10P02 | Unix Lab | 3 |
| | | Sub-Total | 19 |

Additional co-curricular activity: Oral Communication Skill (5 days)

SEMESTER II

| S.No | Course Code | Course Title | Credits |
|------|-------------|-----------------------------------|---------|
| 1 | MC10T06 | Object Oriented Programming | 3 |
| 2 | MC10T07 | Probability and Statistics | 3 |
| 3 | MC10T08 | Database Management Systems | 3 |
| 4 | MC10T09 | Software Engineering | 3 |
| 5 | MC10T10 | Design and Analysis of Algorithms | 3 |
| 6 | MC10T11 | Introduction to Open Source Tools | 3 |
| 7 | MC10P03 | Java Lab | 3 |
| 8 | MC10P04 | RDBMS lab | 3 |
| | | Sub-total | 24 |

Additional co-curricular activity:

Personality Development Programme (5 days)

Domain knowledge programme (3 days)

Summer Internship between Semester II and III (6 to 8 weeks)

SEMESTER III

| S.No | Course Code | Course Title | Credits |
|------|-------------|---|---------|
| 1 | MC10T12 | System Software | 3 |
| 2 | MC10T13 | Computer Networks | 3 |
| 3 | MC10T14 | Optimization Techniques | 3 |
| 4 | MC10T15 | Introduction to Open Source Environment | 3 |
| 5 | | Elective I Paper I | 3 |
| 6 | | Elective II Paper I | 3 |
| 7 | MC10P05 | System Software Lab | 3 |
| 8 | MC10P06 | Networks Lab | 3 |
| 9 | | Summer Internship - I | 3 |
| | | Sub-Total | 27 |

Additional co-curricular activity:

Outbound programme (3 – 5 days)

Domain knowledge programme (3 days)

SEMESTER IV

| S.No | Course Code | Course Title | Credits |
|------|-------------|--|---------|
| 1 | MC10T16 | Web Technology | 3 |
| 2 | MC10T17 | Component Based Technology | 3 |
| 3 | MC10T18 | Principles and Evolution of Management Thought | 2 |
| 4 | MC10T19 | Software Testing | 3 |
| 5 | MC10T20 | Advanced programming in open source - PHP | 3 |
| 6 | | Elective I Paper II | 3 |
| 7 | | Elective II Paper II | 3 |
| 8 | MC10P07 | Web Technology Lab | 3 |
| 9 | | Elective Lab | 3 |
| | | Sub-Total | 26 |

Additional co-curricular activity:

Analytical Skill Development Programme (7 days)

Domain knowledge programme (3 days)

Summer Internship between Semester IV and V (6 to 8 weeks)

SEMESTER V

| S.No | Course Code | Course Title | Credits |
|------|-------------|-----------------------------|---------|
| 1 | MC10T21 | Enterprise Computing | 3 |
| 2 | MC10T22 | SOA and Web Services | 3 |
| 3 | MC10T23 | Software Project Management | 3 |
| 4 | | Elective I Paper III | 3 |
| 5 | | Elective II Paper III | 3 |
| 6 | MC10P08 | Enterprise Computing Lab | 3 |
| 7 | | Elective Lab | 3 |
| 8 | MC10P09 | Open Source Lab | 3 |
| 9 | | Summer Internship - II | 3 |
| | | Sub-Total | 27 |

Additional co-curricular activity:

Industrial Tour (3 to 5 days)

SEMESTER VI

| S.No | Course Code | Course Title | Credits |
|------|-------------|--------------|---------|
| 1 | MC10V01 | Project Work | 12 |

LIST OF ELECTIVES

(Each Course shall of 3 Credits)

GROUP: DATABASE MANAGEMENT SYSTEM

| | | |
|----------|--------------|---|
| MC10E11: | Paper I | Advanced Database Systems |
| MC10E12: | Paper II | Data Mining |
| MC10E13: | Paper III | Information Retrieval |
| MC10E1P: | Elective Lab | Database software and Data mining tools |

GROUP: COMPUTER NETWORKS

| | | |
|----------|--------------|---------------------------|
| MC10E21: | Paper I | Network Security |
| MC10E22: | Paper II | Internet Protocols |
| MC10E23: | Paper III | Information Security |
| MC10E2P: | Elective Lab | Network programming tools |

GROUP: WIRELESS COMMUNICATION

| | | |
|----------|--------------|------------------------------|
| MC10E31: | Paper I | Wireless Networks |
| MC10E32: | Paper II | Wireless Programming |
| MC10E33: | Paper III | Wireless Ad hoc Networks |
| MC10E3P: | Elective Lab | Wireless programming in J2ME |

GROUP: GRAPHICS AND MULTIMEDIA

| | | |
|----------|--------------|------------------------------|
| MC10E41: | Paper I | Computer Graphics |
| MC10E42: | Paper II | Multimedia Systems |
| MC10E43: | Paper III | Virtual Reality |
| MC10E4P: | Elective Lab | Graphics and Animation tools |

GROUP: COMPUTATIONAL INTELLIGENCE

| | | |
|----------|--------------|--|
| MC10E51: | Paper I | Artificial Intelligence and Expert Systems |
| MC10E52: | Paper II | Machine Learning |
| MC10E53: | Paper III | Neural Networks and Fuzzy Logic |
| MC10E5P: | Elective Lab | Machine learning tools |

SCHEME OF EXAMINATIONS**SEMESTER I**

| S.No | Course Code | Course Title | CIA | ESE | TOTAL | CREDITS |
|------|-------------|--|------------|------------|------------|-----------|
| 1 | MC10T01 | Computer Organization and Architecture | 40 | 60 | 100 | 2 |
| 2 | MC10T02 | Problem Solving and Programming | 40 | 60 | 100 | 3 |
| 3 | MC10T03 | Discrete Mathematics | 40 | 60 | 100 | 2 |
| 4 | MC10T04 | Data Structures | 40 | 60 | 100 | 3 |
| 5 | MC10T05 | Operating Systems | 40 | 60 | 100 | 3 |
| 6 | MC10P01 | C and Data Structures Lab | 50 | - | 50 | 3 |
| 7 | MC10P02 | Unix Lab | 50 | - | 50 | 3 |
| | | SUB-TOTAL | 300 | 300 | 600 | 19 |

SEMESTER II

| S.No | Course Code | Course Title | CIA | ESE | TOTAL | CREDITS |
|------|-------------|-----------------------------------|------------|------------|------------|-----------|
| 1 | MC10T06 | Object Oriented Programming | 40 | 60 | 100 | 3 |
| 2 | MC10T07 | Probability and Statistics | 40 | 60 | 100 | 3 |
| 3 | MC10T08 | Database Management Systems | 40 | 60 | 100 | 3 |
| 4 | MC10T09 | Software Engineering | 40 | 60 | 100 | 3 |
| 5 | MC10T10 | Design and Analysis of Algorithms | 40 | 60 | 100 | 3 |
| 6 | MC10T11 | Introduction to Open Source Tools | 40 | 60 | 100 | 3 |
| 7 | MC10P03 | Java Lab | 50 | - | 50 | 3 |
| 8 | MC10P04 | RDBMS lab | 50 | - | 50 | 3 |
| | | SUB-TOTAL | 340 | 360 | 700 | 24 |

SEMESTER III

| S.No | Course Code | Course Title | CIA | ESE | TOTAL | CREDITS |
|------|-------------|---|------------|------------|------------|-----------|
| 1 | MC10T12 | System Software | 40 | 60 | 100 | 3 |
| 2 | MC10T13 | Computer Networks | 40 | 60 | 100 | 3 |
| 3 | MC10T14 | Optimization Techniques | 40 | 60 | 100 | 3 |
| 4 | MC10T15 | Introduction to Open Source Environment | 40 | 60 | 100 | 3 |
| 5 | | Elective I : Paper I | 40 | 60 | 100 | 3 |
| 6 | | Elective II : Paper I | 40 | 60 | 100 | 3 |
| 7 | MC10P05 | System Software Lab | 50 | - | 50 | 3 |
| 8 | MC10P06 | Networks Lab | 50 | - | 50 | 3 |
| 9 | | Summer Internship I | 100 | - | 100 | 3 |
| | | SUB-TOTAL | 440 | 360 | 800 | 27 |

SEMESTER IV

| S.No | Course Code | Course Title | CIA | ESE | TOTAL | CREDITS |
|------|-------------|--|-----|-----|-------|---------|
| 1 | MC10T16 | Web Technology | 40 | 60 | 100 | 3 |
| 2 | MC10T17 | Component Based Technology | 40 | 60 | 100 | 3 |
| 3 | MC10T18 | Principles and Evolution of Management Thought | 40 | 60 | 100 | 2 |
| 4 | MC10T19 | Software Testing | 40 | 60 | 100 | 3 |
| 5 | MC10T20 | Advanced programming in open source – PHP | 40 | 60 | 100 | 3 |
| 6 | | Elective I: Paper II | 40 | 60 | 100 | 3 |
| 7 | | Elective II: Paper II | 40 | 60 | 100 | 3 |
| 8 | MC10P07 | Web Technology Lab | 50 | - | 50 | 3 |
| 9 | | Elective Lab | 50 | - | 50 | 3 |
| | | SUB-TOTAL | 380 | 420 | 800 | 26 |

SEMESTER V

| S.No | Course Code | Course Title | CIA | ESE | TOTAL | CREDITS |
|------|-------------|-----------------------------|-----|-----|-------|---------|
| 1 | MC10T21 | Enterprise Computing | 40 | 60 | 100 | 3 |
| 2 | MC10T22 | SOA and Web Services | 40 | 60 | 100 | 3 |
| 3 | MC10T23 | Software Project Management | 40 | 60 | 100 | 3 |
| 4 | | Elective I : Paper III | 40 | 60 | 100 | 3 |
| 5 | | Elective II : Paper III | 40 | 60 | 100 | 3 |
| 6 | MC10P08 | Enterprise Computing Lab | 50 | - | 50 | 3 |
| 7 | | Elective Lab | 50 | - | 50 | 3 |
| 8 | MC10P09 | Open Source Lab | 50 | - | 50 | 3 |
| 9 | | Summer Internship - II | 100 | - | 100 | 3 |
| | | SUB-TOTAL | 450 | 300 | 750 | 27 |

SEMESTER VI

| S.No | Course Code | Course Title | CIA | ESE | TOTAL | CREDITS |
|------|-------------|--------------|-----|-----|-------|---------|
| 1 | MC10V01 | Project Work | 80 | 120 | 200 | 12 |
| | | SUB-TOTAL | 80 | 120 | 200 | 12 |

SEMESTER I

COURSE OUTLINE AND SYLLABUS

| S.No | Course Code | Course Title | Credits |
|-------------|--------------------|--|----------------|
| 1 | MC10T01 | Computer Organization and Architecture | 2 |
| 2 | MC10T02 | Problem solving and programming | 3 |
| 3 | MC10T03 | Discrete Mathematics | 2 |
| 4 | MC10T04 | Data Structures | 3 |
| 5 | MC10T05 | Operating Systems | 3 |
| 6 | MC10P01 | C and Data Structures Lab | 3 |
| 7 | MC10P02 | Unix Lab | 3 |

Course Title: **Computer Organization and Architecture**
Course Code: MC10T01
Semester / Credits: I / 2

Course Objective

- It offers a good understanding of the various functional units of a computer system and prepares the student to be in a position to design a basic computer system.
- To familiarize with the design of digital circuits and provide the fundamental concepts used in the design of digital systems.

Course Coverage

Number System: Binary - Decimal - Octal - Hexadecimal - Conversion from one to another - Complements - Binary Codes. Basic Logic Gates - Basic theorems and Properties of Boolean Algebra - Sum of Products - Karnaugh Map - Don't Care conditions.

Combinational Logic: Data processing circuits - Multiplexers - Demultiplexers - Decoders - Encoders - Half Adder - Full Adder - Subtractor - Parallel Adders.

Flip-flops: RS Flip-Flops - JK Flip - Flops - Shift Registers.

Register Transfer and Micro Operations: Arithmetic Micro operations - Logic Micro operations – Shift Micro operations - Arithmetic Logic Shift unit.

Central Processing Unit: Stack Organization - Instruction formats - Addressing modes - Data Transfer and Manipulation - Program Control Instructions.

Input - Output organization: Peripheral Devices - Input / Output Interface - Asynchronous Data Transfer - Modes of transfer - Priority Interrupt – Direct Memory Access – Input-Output Processor

Memory Organization: Memory Hierarchy - Main Memory - Auxiliary Memory - Associative Memory - Cache Memory - Virtual Memory.

Pedagogy

Classroom Lectures, Role play and Simulator

Evaluation and Grading

| | | |
|-------------------|-----|----|
| Exercises | ... | 10 |
| News Collection | ... | 5 |
| Quiz | ... | 5 |
| Mid Semester Exam | ... | 20 |
| End Semester Exam | ... | 60 |

Text Books

M. Morris Mano (2005). *Computer System Architecture, 3/e* ; New Delhi: Prentice Hall of India

Reference Books

1. M. Morris Mano (2008). *Digital Logic and Computer Design*; New Delhi: Pearson Education

2. Donald P. Leach (2008). *Digital Principles and Applications*; New Delhi: Tata McGraw-Hill
3. Harris, D.M. (2008). *Digital Design and Computer Architecture*; New Delhi: Elsevier India

Course Title: **Problem Solving and Programming**
 Course Code: MC10T02
 Semester / Credits: I / 3

Course Objective

- To provide sound understanding of C programming
- To acquire knowledge in the fundamental techniques of problem solving and develop efficient programmes in C

Course Coverage

Introduction: Algorithms – Flowcharts - C Data types - Variables and Arrays - Operators and Expressions - Data Input and Output - Control Statement.

Functions: Definition - Accessing a Function - Function Prototypes - Passing Arguments to a Function - Recursion.

Program Structure: Storage Classes - Automatic Variables - External Variables - Static variables.

Arrays: Definition - Processing Array - Passing Arrays to Function - Multidimensional Arrays - Arrays and Strings.

Pointers: Fundamentals - Pointer declarations - Passing Pointers to a Function - Pointers and One Dimensional Arrays - Dynamic Memory Allocation - Pointers and Multidimensional Arrays - Arrays of Pointers - Passing Functions to other functions.

Structures and Unions: Definition - Processing a Structure - Structures and Pointers - Passing Structures to Functions - Unions.

Data Files: Opening and Closing a Data File - Reading and Writing a Data File - Processing a Data File - Binary Files - Unformatted Data Files. Pre-processor directives – Bit Manipulation

Pedagogy

Classroom Lectures, Problem Solving Exercises, Demonstration of Software

Evaluation and Grading

| | | |
|---------------------------|-----|----|
| Quiz | ... | 10 |
| Problem solving exercises | ... | 10 |
| Mid Semester Exam | ... | 20 |
| End Semester Exam | ... | 60 |

Text Book

Gottfried, B. (2005). *Programming with C, 2/e*; New Delhi: McGraw-Hill

Reference Books

1. Brian W. Kernighan, Dennis M. Ritchie (2004). *The C Programming Language, 2/e*; New Delhi: Prentice Hall of India
2. Deitel & Deitel (2001). *C - How to Program, 5/e*; New Delhi: Pearson Education

Course Title: **Discrete Mathematics**
Course Code: MC10T03
Semester / Credits: I / 2

Course Objective

Understand and solve problems in Set Theory, Mathematical Logic, Formal Languages, Automata Theory and Turing Machine.

Course Coverage

Set Theory: Basic set operations, Relations and Functions, Relation Matrices - Transitive Closure Relation, Principle of Mathematical Induction. Boolean algebra: Definition, Sub-algebra, Boolean Functions - Boolean Expressions

Mathematical Logic: Connectives - NAND And NOR Connectives - Functionality Complete Set of Connectives. Logical Networks, Principle Conjunctive and Disjunctive Normal Forms, Equivalence of Statements, Formula derivations - Conditional Proof, Indirect Method of Proof: Automatic Theorem Proving.

Formal Languages: Four Classes of Grammars (Phrase Structure, Context Sensitive, Context Free, Regular) - Definitions - Context Free Grammar: Right Most, Left Most Derivations - Syntax trees - Unambiguity, Ambiguity - Construction of Grammars for Languages - Derivation of Languages from Grammars.

Introduction to Automata Theory: Finite State Automata - Deterministic and Non - Deterministic - NDFSA with e-Transitions, Equivalence of these without proofs - Regular Expressions

Turing Machine (TM): Introduction - Construction of Simple Turing Machines - Universal TM - Halting Problem

Pedagogy

Classroom Lectures, Exercises, Applications of Discrete Mathematical Structures

Evaluation and Grading

| | | |
|--------------------------|-----|----|
| Surprise Test | ... | 10 |
| Problem Solving Exercise | ... | 10 |
| Mid Semester Exam | ... | 20 |
| End Semester Exam | ... | 60 |

Text Book

J.P. Tremblay and R. Manohar (2005). *Discrete Mathematical structures with Applications to Computer Science*; New Delhi: Tata McGraw-Hill

Reference Books

1. Alan, Levasseur, Kenneth Doerr (2008). *Applied Discrete Structures for Computer Science*; Macmillan
2. John .E. Hopcroft, Molwani R, Rot Wani and Jeffrey D.Ullman (2001), *Introduction to Automata theory, Languages and Computability*; New York: Addison - Wesley Longman Publishing
3. Bernard Kolman, Robert C. Busby and Sharon Ross (2004), *Discrete Mathematical Structures*; New Delhi: Prentice Hall
4. Peter Linz (2006), *An Introduction to Formal Language and Automata, 4/e*; London: Jones & Bartlett Publishers

Course Title: **Data Structures**
 Course Code: MC10T04
 Semester / Credits: I / 3

Course Objective

- Demonstrate understanding of the abstract properties of various data structures such as stacks, queues, lists, and trees.
- Demonstrate knowledge of different methods for representing a graph.
- Use various data structures effectively in application programs.
- Implement various data structures in more than one manner.
- Demonstrate understanding of various sorting algorithms.
- Compare the efficiency of various sorting algorithms in terms of time.

Course Coverage

Introduction: Algorithms - Analyzing Programmes.

Arrays: Ordered lists - Sparse Matrices - Representation of Arrays.

Stacks & Recursion: Stacks - Introduction to Recursion - Principles of Recursion.

The Polish Notation: Evaluation of Polish Expressions - Translation from Infix form to Polish form.

Queues: Definitions - Implementations of Queues - Circular queues - Application of Queues - Linked Queues - Polynomial Arithmetic. **Lists:** List Specification - Implementation of Lists - Strings - Linked Lists in Arrays.

Trees: Binary Trees - Binary Search Trees - Building a Binary Search Tree - AVL Trees - Splay Trees - Multiway **Trees:** Tries - B - Trees - Red Black Trees.

Graphs: Definitions - Undirected and Directed Graphs - Graph Traversal.

Searching: Introduction and Notation - Sequential Search - Binary Search.

Sorting: Introduction and Notation - Insertion Sort - Selection Sort - Shell Sort - Merge sort - Quick Sort - Heaps and Heap Sort.

Tables and Information Retrieval: Introduction - Rectangular Arrays - Tables of various shapes - Abstract Tables - Application - Hashing.

Files: Files - Sequential organizations - Index Techniques - File Organizations.

Pedagogy

Classroom Lectures, Group Discussion, Problem solving

Evaluation and Grading

| | | |
|----------------------------|-----|----|
| Concept Implementation | ... | 10 |
| Advance Topic Presentation | ... | 5 |
| Quiz | ... | 5 |
| Mid Semester Exam | ... | 20 |
| End Semester Exam | ... | 60 |

Text Book

Robert L Kruse (2008). *Data Structures & Program Design*; New Delhi: Prentice Hall

Reference Books

1. Ellis Horowitz and Sartaj Sahni (2003). *Fundamentals of Data Structures*; Gurgaon: Galgotia Publication
2. Tanenbaum A.M. (2008). *Data Structures Using C*; New Delhi: Prentice Hall of India

Course Title: **Operating Systems**
Course Code: MC10T05
Semester / Credits: I / 3

Course Objective

- Understand functional modules of operating systems.
- Understand design concepts and implementation of operating systems.

Course Coverage

Introduction: Mainframe Systems - Desktop Systems - Multiprocessor Systems - Distributed Systems - Clustered Systems - Real Time Systems - Handheld Systems

Operating System Structures: System Components - Operating System Services - System Calls - System Programmes - System Structure

Processes: Process Concepts - Process Scheduling - Operations on Processes - Cooperating Process - Inter-Process Communication.

CPU Scheduling: Scheduling Criteria - Scheduling Algorithms - Multiple Processor Scheduling - Real - Time Scheduling.

Deadlocks: Deadlock Characterization - Methods for Handling Deadlocks - Deadlock Prevention - Deadlock Avoidance - Deadlock Detection - Recovery from Deadlock.

Memory Management: Introduction - Swapping - Contiguous Memory Allocation - Paging - Segmentation - Segmentation with Paging. Virtual Memory - Demand Paging - Page Replacement - Allocation of Frames - Thrashing.

File - System Interface: File Concept - Access Methods - Directory Structure - File System Mounting - Protection.

File System Implementation: File System Structure - File System Implementation - Directory Implementation - Allocation Methods - Free Space Management.

I/O Systems: I/O Hardware - Application I/O Interface - Kernel I/O Subsystem - Transforming I/O to Hardware Operations.

Mass Storage Structure: Disk Structure - Disk Scheduling - Disk Management - Swap-Space Management.

Case Study: LINUX - Mobile OS - Windows NT.

Pedagogy

Classroom Lectures, Group Discussion, Case Study.

Evaluation and Grading

| | | |
|-----------------------------|-----|----|
| Advanced Topic Presentation | ... | 10 |
| Concept Implementation | ... | 5 |
| Quiz | ... | 5 |
| Mid Semester Exam | ... | 20 |
| End Semester Exam | ... | 60 |

Text Book

Silberschatz, Galvin, Gagne (2004). *Operating System Concepts, 6/e*; New Delhi : John Wiley & Sons

Reference Books

1. Andrew S.Tanenbaum (2007). *Modern Operating Systems*; New Delhi: Prentice Hall
2. William Stallings (2006). *Operating Systems*; New Delhi: Pearson Education
3. Deitel H.M (2008). *Operating Systems*; New Delhi: Pearson Education

Course Title: **C and Data Structures Lab**
 Course Code: MC10P01
 Semester / Credits: I / 3

Course Objective

The course aims to enable the students to gain expertise in the various features of the C programming language and implementing the concepts of data structures as C programmes.

Course Coverage

Exercises to explore branching statements, loop statements, Arrays, Functions, Pointers, Structures, Union and Files.

Exercises using Stacks, Queues, Linked lists, Doubly linked list, Binary tree, Sorting Algorithms, Searching Algorithms.

Design and develop a small application.

Evaluation and Grading

| | | |
|--------------------------------------|-----|----|
| Documentation | ... | 5 |
| Lab Performance | ... | 15 |
| Creativity in implementing exercises | ... | 5 |
| Oral Comprehensive test | ... | 10 |
| Final Test | ... | 15 |

Course Title : **Unix Lab**
Course Code: MC10P02
Semester / Credits : I / 3

Course Objective

The course aims to enable the students to gain expertise basic and shell programming in UNIX.

Course Coverage

Exercises to explore Basic commands, Shell Structured Language constructs, and advanced shell scripting commands

Design and develop a small application.

Evaluation and Grading

| | | |
|--------------------------------------|-----|----|
| Documentation | ... | 5 |
| Lab Performance | ... | 15 |
| Creativity in implementing exercises | ... | 5 |
| Oral Comprehensive test | ... | 10 |
| Final Test | ... | 15 |

SEMESTER II

COURSE OUTLINE AND SYLLABUS

| S.No | Course Code | Course Title | Credits |
|-------------|--------------------|-----------------------------------|----------------|
| 1 | MC10T06 | Object Oriented Programming | 3 |
| 2 | MC10T07 | Probability and Statistics | 3 |
| 3 | MC10T08 | Database Management Systems | 3 |
| 4 | MC10T09 | Software Engineering | 3 |
| 5 | MC10T10 | Design and Analysis of Algorithms | 3 |
| 6 | MC10T11 | Introduction to Open Source Tools | 3 |
| 7 | MC10P03 | Java Lab | 3 |
| 8 | MC10P04 | RDBMS lab | 3 |

Course Title: **Object Oriented Programming**
Course Code: MC10T06
Semester / Credits: II / 3

Course Objective

To understand and apply the concepts of Object Oriented Programming and develop Java applications.

Course Coverage

Introduction to Object Oriented Programming: Classes – Objects – Encapsulation – Data abstraction – Inheritance – Polymorphism – Message Communication.

An overview of Java: Classes – Objects – Inheritance – Array Handling – String Handling.

Packages and Interfaces: Defining a Package - CLASS PATH - Access Protection - Importing Packages - Defining an Interface - Implementing Interfaces - Applying Interfaces.

Exception Handling: Fundamentals - Types - Uncaught Exceptions - try and catch - throw - throws - finally - Built in Exception - User defined Exception.

Multithreaded Programming: Thread Priorities - Synchronization – Interthread Communication - Suspending, Resuming and Stopping Threads.

Applet: Applet Basics - Applet Architecture - Applet Life Cycle - Display methods - Requesting, Repainting - Using the status window - HTML Applet Tag - Passing parameters to Applet.

Event Handling: Mechanisms - Event classes - Event Listener Interfaces.

AWT: AWT controls - Layout Managers - Menus.

Input/Output: The Stream Classes - The Byte Streams - The Character Streams.

Pedagogy

Classroom Lectures, Problem Solving Exercises, Demonstration of Software

Evaluation and Grading

| | | |
|-----------------------------|-----|----|
| Advanced Topic Presentation | ... | 10 |
| Quiz | ... | 5 |
| Exercises | ... | 5 |
| Mid Semester Exam | ... | 20 |
| End Semester Exam | ... | 60 |

Text Book

Patrick Naughton and Herbertz Schildt (2005). *Java – 2: The Complete Reference, 5/e*; New Delhi: Tata McGraw-Hill

Reference Books

1. Rich Raposa (2004). *Learning Java*; New Delhi: Wiley Publishing Inc
2. Joseph Weber L (2005). *Using Java2 Platform*; New Delhi: Prentice Hall

Course Title: **Probability and Statistics**
 Course Code: MC10T07
 Semester / Credits: II / 3

Course Objective

Understand basic concepts of Probability, Statistical Theory and their applications to solve real world problems.

Course Coverage

Probability Theory: Introduction - Sample Space and Events - Axioms of Probability - Conditional Probability - Baye's Theorem - Independence of Events. Treatment of Data – Frequency Distributions - Descriptive Measures - Quartiles and other percentiles

Random Variables: Discrete Random variables - Probability mass function – Distribution function – Independent random variables. Continuous Random variable – Probability density function

Correlation and Regression: Correlation analysis - Regression – Nonlinear Regression - Least squares curve fitting.

Probability Distributions: Discrete Distributions - Bernoulli distribution - Binomial Distribution - Poisson distribution - Geometric Distribution. Continuous Distributions - Exponential Distribution - Normal Distribution

Testing of Hypothesis: Sampling and Large Sample Tests for Means, Variance and Proportion - Properties of t, F, Chi - Square Distributions - Small Sample tests for Means, Variance, and Goodness of fit

Analysis of Variance (ANOVA): One-way Classification – Two-way Classification

Design of Experiments: Completely Randomized Designed (CRD) - Randomized Block Design (RBD) - Latin Square Design (LSD)

Pedagogy

Classroom Lectures, Problem solving sessions using tools like SPSS, EXCEL, and Matlab

Evaluation and Grading

| | | |
|--------------------------|-----|----|
| Problem Solving Exercise | ... | 10 |
| Mathematical Modeling | ... | 10 |
| Mid Semester Examination | ... | 20 |
| End Semester Exam | ... | 60 |

Text Book

Trivedi, K.S (2003). *Probability and Statistics with Reliability, Queuing and Computer Applications*; Prentice Hall

Reference Books

1. Richard A. Johnson, Miller & Freund's (2001). *Probability and Statistics for Engineers*; New Delhi: Pearson Education
2. David Freedman, Robert Pisani, Roger Purves (2001). *Statistics*, 4/e; Wiley
3. Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers and Keying Ye (2002). *Probability and Statistics for Engineers and Scientists*; Pearson Education
4. Beverly Dretzke (2008). *Statistics with Microsoft Excel*; Prentice Hall

Course Title: **Database Management Systems**
Course Code: MC10T08
Semester / Credits: II / 3

Course Objective

The objective of this course is to introduce students to fundamentals of building a database management system (DBMS), in particular a relational one. After completing this course students must be able to:

- Understand the concepts and terms of the data base analysis, design and some implementations.
- Understand the structural constraints of relationships and how to perform them.
- Understand the types of attributes, primary keys, foreign keys, super keys ... etc.
- Understand the process drawing the ER-Diagrams.
- Understand carefully how to perform the normalization process of relations and then producing the final ER-Diagram of any database application before implementation.
- Understand the issues involved in the operation of a DBMS including query processing, concurrency, and security.

Course coverage

Overview of database systems: Managing Data - A Historical Perspective - File System versus DBMS – Advantages of a DBMS - Describing and Storing data in a DBMS - Queries in a DBMS - Transaction Management - Structure of a DBMS. Database Design & ER diagrams - Entities, Attributes and Entity Sets - Relationships and Relationship Set - Additional features of the ER model - Conceptual Database design with ER Model.

Relational Model: Introduction - Integrity Constraints Over Relations - Enforcing Integrity Constraints on Relational Data - Logical Database Design: ER to Relational - Introduction to Views - Destroying / Altering Tables and Views - Relational Algebra and Calculus.

SQL Queries, Constraints, Triggers: The form of a Basic SQL Query - UNION, INTERSECT and EXCEPT - Nested Queries - Aggregate Operators - Null Values - Complex integrity constraints in SQL - Triggers and Active Data bases – Query Evaluation.

Transaction management Overview: The ACID properties - Transaction Management and Schedules - Concurrent Execution of Transactions - Lock Based Concurrency Control - Performance of Locking - Transaction support in SQL- Introduction to Crash Recovery.

Concurrency Control: 2PL, Serialization and Recoverability - Introduction to Lock Management - Lock Conversions - Specialized Locking Techniques - Concurrency Control without Locking.

Schema Refinement and Normal Forms: Introduction to Schema Refinement - Functional Dependencies - Reasoning about Functional Dependencies - Normal Forms - Properties of Decompositions – Normalization - Schema Refinement in Database Design - Other Kinds of Dependencies.

Security and Authorization: Introduction to Database Security - Access control - Discretionary Access Control - Mandatory Access Control - Security for Internet Applications - Additional Issues related to Security.

Pedagogy

Classroom Lectures, Demonstration of software and tools, Case studies, Discussions

Evaluation and Grading

| | | |
|-------------------|-----|----|
| Exercises | ... | 10 |
| Assignment | ... | 5 |
| Quiz | ... | 5 |
| Mid Semester Exam | ... | 20 |
| End Semester Exam | ... | 60 |

Text Book

Raghu Ramakrishnan and Johannes Gehrke (2003). *Database Management System*, 3/e; Singapore: McGraw-Hill

Reference Books

- 1 Abraham Silberschatz, Henry F. Korth and Sudarshan S.(2005). *Database System Concepts*, 5/e; Singapore: McGraw-Hill
2. Date C.J., (2003). *An Introduction to Database Systems*, 8/e; New Delhi: Pearson Education

Course Title: **Software Engineering**
 Course Code: MC10T09
 Semester / Credits: II / 3

Course Objective

- Recognize the need for a disciplined approach to software development
- Aware of software project life cycle
- Compare different process models, tools and techniques
- Draw analysis model and design model diagrams
- Understand the importance of disciplined approach in constructing high quality software

Course Coverage

Introduction: Phases in Software Development - Process Models - Software Engineering Practice.

Requirements Engineering: Tasks - Initiating the Process - Eliciting Requirements - Negotiating Requirements - Validating Requirements.

Analysis Model: Requirements Analysis - Analysis Modeling Approaches - Data Modeling Concepts - Flow Oriented Modeling.

Requirement Specification: Characteristics of an SRS - Components of an SRS - Specification Languages - Structure of a Requirement Document.

Design Engineering: Design Concepts - Design Model.

Architectural Design: Software Architecture - Data Design - Styles and Patterns - Architectural Design - Assessing alternate Architectural Designs - Mapping Data Flow into Software Architecture.

Coding: Programming Principles - Coding Process.

Software Testing: Fundamentals - Functional Testing - Structural Testing - Testing Process - Unit Testing - Integration Testing - System Testing - User Acceptance Testing.

Software Implementation: Conversions - User Training - Post Implementation Review.

Maintenance: Types of Maintenance – Maintenance Procedure - Issues on Maintenance.

Pedagogy

Classroom Lectures, Group Discussion, Case Analysis, Demonstration of Tools

Evaluation and Grading

| | | |
|-----------------------------|-----|----|
| Exercises | ... | 5 |
| Advanced Topic Presentation | ... | 10 |
| Quiz | ... | 5 |
| Mid Semester Exam | ... | 20 |
| End Semester Exam | ... | 60 |

Text Book

Roger S. Pressman (2005). *Software Engineering - A Practitioner's Approach*, 6/e; Singapore: McGraw-Hill

Reference Books

1. Pankaj Jalote (2005). *An Integrated approach to Software Engineering* 3/e; New Delhi: Narosa Publishing House
2. Ian Sommerville (2006). *Software Engineering* 6/e; New Delhi: Pearson Education

Course Title: **Design and Analysis of Algorithms**

Course Code: MC10T10

Semester / Credits: II / 3

Course Objective

- Analyze the asymptotic performance of algorithms.
- Demonstrate a familiarity with major algorithms and data structures.
- Apply important algorithmic design paradigms and methods of analysis.
- Synthesize efficient algorithms in common engineering design situations.

Course Coverage

Introduction: Algorithm - Analysis of Algorithms - Best Case and Worst-Case Complexities, Analysis of some Algorithms using Simple Data Structures - Amortized Time Complexity. Divide and Conquer Method - Examples - Finding the Maximum and Minimum - Merge Sort - Quick Sort.

Greedy Method: The General Method - Optimal Storage on Tapes - Knapsack Problem - Job Sequencing with Deadlines - Optimal Merge Patterns – Minimum-Cost Spanning Trees - Single Source Shortest Paths.

Dynamic Programming: The General Method - Multistage Graphs - All Pairs Shortest Path - Optimal Binary Search Trees - The Travelling Salesperson Problem.

Backtracking: The General Method - The Eight Queens Problem - Sum of Subset Problem - Graph Coloring - Hamiltonian Cycles.

Branch And Bound: The General Method - 0/1 Knapsack Problem - Travelling Sales Person Problem - Efficiency Consideration.

NP-Hard, NP-Complete Classes: Basic Concepts - Non-Deterministic Algorithms - Satisfiability Problem - NP-Hard and NP-Complete Problems - Cooks Theorem.

Pedagogy

Classroom Lectures, Problem Solving, Group Discussion

Evaluation and Grading

| | | |
|----------------------------|-----|----|
| Concept Implementation | ... | 10 |
| Advance Topic Presentation | ... | 5 |
| Quiz | ... | 5 |
| Mid Semester Exam | ... | 20 |
| End Semester Exam | ... | 60 |

Text Book

Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran (2008). *Fundamentals of Computer Algorithms, 2/e*; Hyderabad: Universities Press (India) Private Limited

Reference Books

1. Sahni Sartaj (2005). *Data Structures, Algorithms and Applications in C++*; Hyderabad: Universities Press (India) Private Limited
2. Mark Allen Weiss (2006). *Data Structures and Algorithm Analysis in C ++*; Addison Wesley Publishing Company
3. Thomas H. Cormen, Charles E.Leiscerson and Ronald L.Rivest (2002). *Introduction to Algorithms*; New Delhi: Prentice Hall

Course Title: **Introduction to Open Source Tools**
 Course Code: MC10T11
 Semester / Credits: II / 3

Course Objective

Understand Linux Programming, Python Programming Basics, and Perl Programming and make them to develop applications using it

Course Coverage

Linux: Introduction to UNIX, Linux and GNU - Programming Linux.

Shell Programming: basics - Pipes and Redirection - The Shell as a Programming Language.

Working with files: Linux File Structure - System Calls and Device Drivers - Library Functions - Low-Level File Access - The Standard I/O Library - Formatted Input and Output - File and Directory Maintenance - Scanning Directories - Errors - The / proc File System.

The Linux Environment: Program Arguments - Environment Variables - Time and Date - Temporary Files - User Information - Host Information - Logging Resources and Limits.

Terminals: Reading from and writing to the Terminal - Talking to the Terminal - The Terminal Driver and the General Terminal Interface - The termios structure - Terminal Output - Detecting Keystrokes.

PYTHON: Introduction to PYTHON - Syntax and Style - Python Objects - Numbers - Sequences - Strings - Lists and Tuples - Dictionaries - Conditionals and Loops – Files and Input/ Output - Errors and Exceptions – Functions and Functional Programming - Modules - OOP - Execution Environment.

PERL: Introduction to PERL - Data types - Operators - Variables - Variable Interpolation - Lists Arrays - Hashes - Loops and Decisions - Regular Expressions - Fileshandles - Writing to Files - Permissions - Opening Pipes - File Tests - Directories - Subroutines.

Pedagogy

Classroom Lectures, Exercises, Demonstration of Tools

Evaluation and Grading

| | | |
|-------------------|-----|----|
| Surprise Test | ... | 10 |
| Assignment | ... | 5 |
| News collection | ... | 5 |
| Mid Semester Exam | ... | 20 |
| End Semester | ... | 60 |

Reference Books

1. Neil Matthew and Richard Stones (2009). *Beginning Linux Programming*, 4/e; New Delhi: Wiley-India
 2. Wesley J. Chun(2010). *Core Python Programming*, 2/e; New Delhi: Pearson Education
 3. Simon Cozens with Peter Wainwright(2000). *Beginning Perl*, Mumbai:Wrox Press
-

Course Title: **Java Lab**
 Course Code: MC10P03
 Semester / Credits: II / 3

Course Objective

To practice the Object Oriented Programming concepts Function overloading, Inheritance, Polymorphism, String Manipulation, Threads, Files, Applets, AWT in JAVA

Course Coverage

Exercises to implement Function overloading, Inheritance, Polymorphism, String Manipulation, Threads, Files, Applets, AWT

Design and develop a small application.

Evaluation and Grading

| | | |
|--------------------------------------|-----|----|
| Documentation | ... | 5 |
| Lab Performance | ... | 15 |
| Creativity in implementing exercises | ... | 5 |
| Oral Comprehensive test | ... | 10 |
| Final Test | ... | 15 |

Course Title: **RDBMS Lab**
 Course Code: MC10P04
 Semester / Credits: II / 3

Course Objective

- Understand the concepts of Database system and Client Server Architecture
- Design a database and implement database processing tasks using SQL and PL / SQL
- Develop a simple application using RDBMS package

Course Coverage

Develop applications such as Financial Accounting, Library Management, Inventory Management, Railway Reservation, Hotel Management, Hospital Management, ATM Banking.

Design and develop a small application.

Evaluation and Grading

| | | |
|--------------------------------------|-----|----|
| Documentation | ... | 5 |
| Lab Performance | ... | 15 |
| Creativity in implementing exercises | ... | 5 |
| Oral Comprehensive test | ... | 10 |
| Final Test | ... | 15 |

SEMESTER III

COURSE OUTLINE AND SYLLABUS

| S.No | Course Code | Course Title | Credits |
|-------------|--------------------|---|----------------|
| 1 | MC10T12 | System Software | 3 |
| 2 | MC10T13 | Computer Networks | 3 |
| 3 | MC10T14 | Optimization Techniques | 3 |
| 4 | MC10T15 | Introduction to Open Source Environment | 3 |
| 5 | | Elective I : Paper I | 3 |
| 6 | | Elective II : Paper I | 3 |
| 7 | MC10P05 | System Software Lab | 3 |
| 8 | MC10P06 | Networks Lab | 3 |
| 9 | | Summer Internship - I | 3 |

Course Title: **System Software**
 Course Code: MC10T12
 Semester / Credits: III / 3

Course Objective

- To understand the basic functioning of various system software.
- To familiarize with various tools like LEX and YACC for scanning and parsing etc.
- To understand the fundamental principles in compiler design and to provide the skills needed for building compilers for various situations that one may encounter in a career in Computer Science.

Course Coverage

Language Processor: Introduction – Language Processing Activities – Fundamentals of Language Processing – Fundamentals of Language Specification – Language Processor Development Tools. Data Structure for Language Processing.

Assemblers: Elements of Assembly Language Programming – Design of Two Pass Assembler.

Macro and Macroprocessor : Macro Definition and Call – Macro Expansion – Nested Macro Calls – Advanced Macro Facilities – Design of Macro Preprocessor.

Loaders : Loader Schemes – Compile and Go Loaders, general load scheme – Absolute Loaders – Direct Linking Loaders and their Design. Other Loading Schemes: Linking Loaders, Overlays, Dynamic Binders.

Compilers : Introduction – Compilers – Analysis of Source Program – Phases of Compiler – Cousins of Compilers.

Lexical Analysis : Role of a Lexical Analyzer – Input Buffering – Specification of Tokens – Recognition of Tokens – Language for Specifying Lexical Analyzer – Finite Automata – Form a Regular Expression to a NFA – Design of a Lexical Analyzer Generator .

Syntax Analysis : Role of a Parser – Context Free Grammar – Writing a Grammar – Top Down Parsing – Bottom Up Parsing.

Intermediate Code Generation : Intermediate Languages – Declarations – Assignments Statements – Boolean Expression – Case Statements – Back Patching – Procedure Calls.

Code Generation : Issue in Design of Code Generator – The Target Machine – Run Time Storage Management – Basic Blocks and Flow Graphs – Simple Code Generator – Register Allocation and Assignment.

Code Optimization : Introduction – Principle Sources of Code Optimization – Optimization of Basic Blocks – Loops in Flow Graphs – Introduction to Global Flow Analysis – Interactive Solution for Data Flow Equations – Code Improving Transformations.

Pedagogy

Classroom Lectures, Demonstration of Tools

Evaluation and Grading

| | | |
|----------------------------|-----|----|
| Concept Implementation | ... | 10 |
| Advance Topic Presentation | ... | 5 |
| Quiz | ... | 5 |
| Mid Semester Exam | ... | 20 |
| End Semester Exam | ... | 60 |

Text Books

1. D.M. Dhamdhere (2003). *Systems Programming and Operating Systems, 2/e*; New Delhi: Tata Mc Graw Hill
2. Alfred V. Aho, Ravi Sethi, Jeffrey D. Ullman (2006). *Compilers: Principles Techniques and Tools*; New Delhi: Pearson Education

Reference Books

1. John J. Donovan (1999). *Systems Programming*; New Delhi: Tata McGraw Hill
2. Leland L. Beck (2000). *System Software – An Introduction to Systems Programming*; Singapore: Addison Wesley
3. Charles Fischer, Richard Leblanc, Ronald Cytron (2009). *Crafting A Compiler, 1/e*; Addison Wesley

Course Title: **Computer Networks**
Course Code: MC10T13
Semester / Credits: III/3

Course Objective

To provide the fundamentals of Computer Networks and detailed study of the different layers of OSI Reference Model.

Course Coverage

Introduction: Uses of Computer Networks - Network Hardware - Network Software - Reference Models - Example Networks.

The Physical Layer: Guided Transmission Media - Wireless Transmission - Communication Satellites - The Public Switched Telephone Network - The Mobile Telephone System - Cable Television.

The Data Link layer: Data Link Layer Design Issues - Error Detection and Correction - Elementary Data Link Protocols - Sliding Window Protocols.

Medium Access Control Sublayer: The Channel Allocation Problem - Multiple Access Protocols - Ethernet - Data Link Layer Switching.

The Network Layer: Network Layer Design Issues - Routing Algorithms - Congestion Control Algorithms - QOS - Internetworking.

The Transport Layer: The Transport Service - Elements of Transport Protocols. The Internet Transport Protocols: UDP - TCP.

The Presentation Layer: ASN - Data Compression Techniques.

The Application Layer: DNS - Email - SMTP – FTP - HTTP - TELNET.

Network Security: Cryptography - Symmetric Key Algorithms - Public Key Algorithms - Digital Signatures - Email Security - Web Security.

Pedagogy

Class Room Lectures, Case Analysis, Demonstration of Network concepts using Tools

Evaluation and Grading

| | | |
|-----------------------------|-----|----|
| Simulation | ... | 10 |
| Advanced Topic Presentation | ... | 10 |
| Assignment | ... | 5 |
| Mid Semester Exam | ... | 15 |
| End Semester Exam | ... | 60 |

Text Book

Andrew S. Tanenbaum (2003). *Computer Networks*, 4/e; New Delhi: Prentice Hall of India

Reference Books

1. Behrouz A. Forouzan (2007). *Data communication and Networking*, 4/e; New Delhi: Tata McGraw-Hill
2. William Stallings (2006). *Data and Computer Communication*, 8/e; New Delhi: Pearson Education
3. Achyut S Godbole (2007). *Data Communication and Networking*, 3/e; New Delhi: Tata McGraw-Hill

Course Title: **Optimization Techniques**

Course Code: MC10T14

Semester / Credits : III / 3

Course Objective

At the end of the course the students

- will understand the optimization methods
- will understand the various optimization techniques in solving constrained and unconstrained optimization problems.
- will have the skill in designing and constructing programs of the optimization methods.
- capable of determining which models are appropriate to use in practical situations.
- become knowledgeable in applying the operations research models in practical situations.

Course Coverage

Introduction: Optimization Algorithms – Classification of Optimization Techniques – Linear and Non Linear - Single variable Optimizations - Multivariable Optimization – Equality Constraints – Inequality Constraints – No Constraints.

Linear Programming: Introduction to Linear Programming – LPP Formulation - Graphical Method - Simplex Method - Big M Method - Two Phase Method - Revised Simplex Method. Duality in Linear Programming - Primal and Dual Problems - Dual Simplex Method. Sensitivity Analysis.

Non linear Single Variable Unconstrained Optimization Techniques: Single Variable Optimization Algorithms - Bracketing Methods, Region Elimination Method, Gradient Based Methods.

Non Linear Multi Variable Unconstrained Optimization Techniques: Multivariable Optimization Algorithms - Optimality Criteria - Unidirectional Search - Direct Search Methods - Simplex Method - Hooke and Jeeves Pattern Search Method - Powell's Method. Gradient Based Methods - Steepest Descent Method-Conjugate Gradient Method - Newton Method.

Non linear Constrained Optimization Techniques: Introduction - Characteristics of the problem - Kuhn Tucker conditions - Random search methods - Complex method. Lagrangian Duality.

Nontraditional Optimization Techniques - Genetic Algorithms - Simulated Annealing.

Pedagogy

Classroom Lectures, Problem solving using optimization tools, Exercises

Evaluation and Grading

| | | |
|-------------------|-----|----|
| Problem Solving | ... | 10 |
| Surprise Test | ... | 5 |
| Mid Semester Exam | ... | 25 |
| End Semester Exam | ... | 60 |

Text Book

Hamdy A Taha, (2006). *Operations Research: An Introduction*, 7/e; New Delhi: Prentice Hall of India

Reference Books

1. Singiresu S. Rao, (2009). *Engineering Optimization Theory and Practice*, 4/e; John Wiley & Sons
2. Kalyanmoy Deb, (2004). *Optimization for Engineering Design: Algorithms and Examples*, New Delhi: Prentice-Hall of India

Course Title: **Introduction to Open Source Environment**
Course Code: MC10T15
Semester / Credits: III / 3

Course Objective

- Understand the programming constructs of PHP Scripting Language
- Work with PHP and interact with MySQL database.
- Constructing simple and complex queries using MySQL and PHP.
- Implement the basics of MySQL database tables by adding, changing and deleting data
- Developing web pages using PHP and HTML forms.

Course Coverage

Introduction: Server - Side Web Scripting - Syntax and Variables - Control and Functions.

Passing Information between Pages: GET Arguments - POST Arguments - Formatting Form Variables - PHP Super global Arrays.

String: Strings in PHP - String Functions.

Arrays and Array Functions: Creating Arrays - Retrieving Values - Multidimensional Arrays - Inspecting Arrays - Deleting from Arrays - Iteration. Numbers: Numerical Types - Mathematical Operators - Simple Mathematical Functions - Randomness.

Object Oriented Programming with PHP: Basic PHP Constructs for OOP - Advanced OOP Features - Introspection Functions - OOP style in PHP.

Advanced Array Functions: Transformation of Arrays - Stacks and Queues - Translating between variables and Arrays - Sorting - Printing Functions for Visualizing Arrays.

String and Regular Expression Functions: Tokenizing and parsing Functions - Regular Expressions - Perl - Compatible Regular Expressions - Advanced String Functions.

File system and System Functions: PHP File Permissions - File Reading and Writing Functions - File system and Directory Functions - Network Functions - Date and time Functions - Calendar Conversion Functions.

Sessions, Cookies, and HTTP: session in PHP - Session Functions - Configuration Issues - Cookies - Sending HTTP Headers - Types and Type Conversions

Advanced Use of Functions: Variable Numbers of Arguments - Call-by-Value - Call-by-Reference - Variable Function Names.

Choosing a database for PHP-PHP/MYSQL Functions: Connecting to MySQL - Making MySQL Queries - Fetching Data Sets - Multiple Connections - Error Checking - Creating MySQL Databases with PHP - MySQL Functions.

Displaying Queries in Tables: HTML Tables and Database Tables - Complex mapping - Creating the sample Tables.

Building Forms from Queries: HTML Forms - Basic Form Submission to a Database - Self Submission - Editing Data with an HTML Form.

Pedagogy

Classroom Lectures, Exercises, Demonstration of Tools.

Evaluation and Grading

| | | |
|-------------------|-----|----|
| Problem Solving | ... | 5 |
| Quiz | ... | 10 |
| Mid Semester Exam | ... | 25 |
| End Semester | ... | 60 |

Text Book

Tim Converse and Joyce Park with Clark Morgan (2008). *PHP 5 and MySQL Bible*; New Delhi: Wiley-India

Reference Books

1. W. Jason Gilmore (2007). *Beginning PHP and MySQL from Novice to Professional, 2/e*; New Delhi: Apress

2. Steven Holzner(2009).*The complete Reference PHP*, NewDelhi: Tata McGraw Hill Edition
-

Course Title: **System Software Lab**
Course Code: MC10P05
Semester / Credits: III / 3

Course Objective

To enable the students to do exercises in the design and implementation of a text editor, Separation of tokens, Updating location counter, System table generation, Relocation, Implementation of symbol table, Processor Scheduling Algorithms, Page Replacement Algorithms, Disk scheduling algorithms, Parsing Techniques

Course Coverage

Exercises to design and implement text editor, symbol table, parser, lexical analyzer

Evaluation and Grading

| | | |
|--------------------------------------|-----|----|
| Documentation | ... | 5 |
| Lab Performance | ... | 15 |
| Creativity in implementing exercises | ... | 5 |
| Oral Comprehensive test | ... | 10 |
| Final Test | ... | 15 |

Course Title: **Networks Lab**
Course Code: MC10P06
Semester / Credits: III / 3

Course Objective

Understand the principles of networking and develop small networking applications.

Course Coverage

Exercises to implement UDP and TCP communication, Broadcasting, encryption, routing algorithms.

Evaluation and Grading

| | | |
|--------------------------------------|-----|----|
| Documentation | ... | 5 |
| Lab Performance | ... | 15 |
| Creativity in implementing exercises | ... | 5 |
| Oral Comprehensive test | ... | 10 |
| Final Test | ... | 15 |

SEMESTER IV**COURSE OUTLINE AND SYLLABUS**

| S.No | Course Code | Course Title | Credits |
|-------------|--------------------|--|----------------|
| 1 | MC10T16 | Web Technology | 3 |
| 2 | MC10T17 | Component Based Technology | 3 |
| 3 | MC10T18 | Principles and Evolution of Management Thought | 2 |
| 4 | MC10T19 | Software Testing | 3 |
| 5 | MC10T20 | Advanced programming in open source - PHP | 3 |
| 6 | | Elective I : Paper II | 3 |
| 7 | | Elective II : Paper II | 3 |
| 8 | MC10P07 | Web Technology Lab | 3 |
| 9 | | Elective Lab | 3 |

Course Title: **Web Technology**
Course Code: MC10T16
Semester /Credits: IV / 3

Course Objective

To provide the fundamentals to understand Web Technologies and to create Static and Dynamic Web pages using DHTML, ASP and XML

Course Coverage

Introduction to Web Technology: Types and Issues - Tiers Concept - Comparison of Microsoft and Java Technologies - Web Pages - Static Web Pages - Plug Ins - Introduction to Frames and Forms.

Dynamic Web Pages: The Need for Dynamic Web Pages - The Magic of Dynamic Web Pages -An Overview of Dynamic Web Page Technologies - An Overview of Dynamic HTML - Common Gateway Interface - Server Side Scripting and Client Side Scripting.

VBScript Functions and Objects: Data Conversion Functions - Mathematical Functions - Data Formatting Functions-Text Manipulations Functions - Date and Time Functions - Built-in Objects.

ASP Concepts: Using Server Side Includes - Request Object - Response Object - Using Cookies - Applications, Session, and Server Objects.

ASP Databases: Setting Up ASP and ADO - Simple Recordsets - Reading Data - Basic SQL for ADO Recordsets - Connections - Record Set Methods and Properties - SQL Statements to Modify Data.

XML Basics: Creating Markup with XML - Document Type Definition (DTD) - Schemas - Document Object Model (DOM) - XML Path Language (XPath).

XSLT Basics: XSLT Processing - XSLT Elements - Default Templates - Template Match Conflicts - XSLT Functions

Pedagogy

Classroom Lectures, Demonstration of Software, Group Discussion

Evaluation and Grading

| | | | |
|-----------------------------|-----|----|-----|
| Advanced Topic Presentation | ... | 10 | |
| Problem Solving Exercises | ... | 10 | ... |
| Mid Semester Exam | ... | 20 | |
| End Semester Exam | ... | 60 | |

Text Book

Achyut S Godbole, Atul Kahate (2005). *Web Technologies TCP/IP Internet Application Architectures, 2/e*; New Delhi: Tata McGraw-Hill

| | | |
|-----------------------------|-----|----|
| Advanced Topic Presentation | ... | 10 |
| Quiz | ... | 5 |
| Mid Semester Exam | ... | 20 |
| End Semester Exam | ... | 60 |

Text Book

Clemens Szyperski (2003). *Component Software: Beyond Object-Oriented Programming*; New Delhi: Pearson Education

Reference Book

Ed Roman (2004). *Enterprise Java Beans, 3/e*; New Delhi: Wiley

Course Title: **Principles and Evolution of Management Thought**
Course Code: MC10T18
Semester /Credits: IV / 2

Course Objective

To introduce the principles of business management that will provide fundamental exposure to the theories in management and practice by contemporary executives with international perspective. Explore the concepts and practices across all the major functions and contemporary themes of management.

Course Coverage

Management : Meaning - Nature - Principles - Management and administration - management and society -Social responsibility - Professional ethics. Evolution of management thought - Contribution of Taylor, Fayol, Bernard, Simon - Peter Drucker - Hawthorne Experiments.

Coordination - Techniques - Managerial Hierarchy - Levels of Management. Planning - Policy and Strategy - Need - Criteria for sound policy strategy formulation and evaluation.

Forecasting - Decision Making - Creativity in decision making. Organising - Departmentation - Span of Management - Authority responsibility relationship - Delegation and decentralization of authority - Formal and informal groups in organization.

Centralisation & Decentralisation. Forms of organization - Conflict resolution - Project Organization - Matrix organization.

Directing - Controlling meaning – Techniques for control of overall performance. International Management - Japanese and American styles of management.

Pedagogy

Classroom Lectures, Case Analysis and Presentation

Evaluation and Grading

| | | |
|-------------------|-----|----|
| Assignment | ... | 5 |
| Case Analysis | ... | 10 |
| Quiz | ... | 5 |
| Mid Semester Exam | ... | 20 |
| End Semester Exam | ... | 60 |

Reference Books

1. Harold Koontz and Heinz Weirich(1990), *Essentials of Management*, 5/e ; New Delhi: Tata McGraw-Hill
2. Stoner and Wankal, *Management* ; PHI
3. Tim Hannagan(2002), *Management – Concepts and Practice* :Pearson education
4. Robert Kreitner(2008), *Management*, 11/e ; AIIBS

Course Title: **Software Testing**
 Course Code: MC10T19
 Semester /Credits: IV / 3

Course Objective

- Aware of testing concepts that are managerial, technical and process oriented
- Know the role of manual and automated testing in development of high quality software
- Enhance the testing skills necessary to become a software tester
- Promote the growth and value of software testing as a profession

Course Coverage

Introduction: Software Testing Fundamentals - Testing Principles - Test Organization. Process Models: V Model - Modified V Model - Levels of Testing.

White box Testing: Static Testing - Structural Testing.

Black Box Testing: Requirement Based Testing - Positive and Negative Testing - Boundary Value Analysis - Decision Tables - ECP - State Based Testing - Compatibility Testing - Cause- Effect Graphing. Integration Testing - Regression Testing - Acceptance Testing.

Object Oriented Testing: Testing OOA and OOD Models - Strategies - Test Case Design for OO Software - Test Methods at Class Level - Interclass Test Case Design.

Testing Web Application: Testing Concepts for Web Apps - Content Testing - User Interface Testing - Component Level Testing - Navigation Testing - Configuration Testing - Security Testing - Performance Testing.

Testing Process: Test Planning - Test Management - Test Case Design - Test Procedure Specification - Test Case Execution and Analysis - Test Reports - Automation Tools - TMM.

Pedagogy

Classroom Lectures, Group Discussion, Demonstration of tools.

Evaluation and Grading

| | | |
|-----------------------------|-----|----|
| Test case preparation | ... | 10 |
| Advanced Topic Presentation | ... | 5 |
| Quiz | ... | 5 |
| Mid Semester Exam | ... | 20 |
| End Semester Exam | ... | 60 |

Text Book

Srinivasan Desikan, Gopaldaswamy Ramesh (2006). *Software Testing: Principles and Practices*, 2/e; New Delhi: Pearson Education

Reference Books

1. Roger S.Pressman (2005). *Software Engineering - A Practitioner's Approach*, 6/e; Singapore : McGraw-Hill
2. Ilene Burnstein (2004). *Practical Software Testing*, New Delhi : Springer
3. Boris Beizer (2009). *Software Testing Technique*, 2/e; New Delhi : Dreamtech Press

Course Title: **Advanced Programming in Open Source - PHP**
Course Code: MC10T20
Semester / Credits: IV / 3

Course Objective

To learn the Advanced Concepts with PHP- PEAR and Ruby on Rails, Ajax. To understand the web service architecture and technologies and CMS

Course Coverage

PEAR: Introduction - The PEAR Package System - PHP Foundation Classes - PHP Extensions Code Library - The PEAR Coding Style. PHP and Java: PHP for Java Programmers - Integrating PHP and Java - Web logs.

Ruby on Rails: Ruby Programming Environment - Techniques of interpreting invocation - Rails Framework - Tracing the lifecycle of a rails run - Objects and variables - Organizing objects with classes.

Web Services: Introduction to Web services - REST, XML - RPC, SOAP, .NET Services - Current issues with Web Services – Project: REST Client - Project: A SOAP Server and Client.

AJAX: Introduction to Ajax - pre-Ajax Javascript Communication Techniques: One-way Communication - Two-way Communications - XML Httprequest Object - Overview of XHRS -Instantiation and Cross-Browser Concerns - Other HTTP Requests - Response Basics - Data Formats.

CMS: Content Management Systems: Types of CMSs - Open Source Web CMS Packages – All Inclusive Web CMSs - Micro CMSs - Other Helpful Resources.

Pedagogy

Classroom Lectures, Group Discussion, Demonstration of tools.

Evaluation and Grading

| | | |
|-----------------------------|-----|----|
| Problem solving | ... | 5 |
| Advanced Topic Presentation | ... | 5 |
| Quiz | ... | 10 |
| Mid Semester Exam | ... | 20 |
| End Semester Exam | ... | 60 |

Reference Books

1. Tim Converse and Joyce Park with Clark Morgan(2008), *PHP 5 and MySQL Bible*, New Delhi:Wiley India Pvt.Ltd.
2. David A Black(2006), *Ruby for Rails*, New Delhi:Dream tech Press.
3. Thomas A.Powell(2008),*The Complete Reference Ajax*, New Delhi:Tata McGraw-Hill Edition.
4. Jason Gerner, Elizabeth Naramore, Morgan L. Owens and Matt Warden(2006), *Professional LAMP Linux, Apache, Mysql and PHP 5 Web Development*, New Delhi: Wiley-India

Course Title: **Web Technology Lab**
 Course Code: MC10P07
 Semester / Credits: IV / 3

Course Objective

To make the students to be familiar with the design and development of static and dynamic web pages

Course Coverage

Exercises to design and develop static and dynamic web pages using HTML, XML, DTD, Schema, XSLT, ASP and VB Script

Design and develop a small application.

Evaluation and Grading

| | | |
|--------------------------------------|-----|----|
| Documentation | ... | 5 |
| Lab Performance | ... | 15 |
| Creativity in implementing exercises | ... | 5 |
| Oral Comprehensive test | ... | 10 |
| Final Test | ... | 15 |

SEMESTER V

COURSE OUTLINE AND SYLLABUS

| S.No | Course Code | Course Title | Credits |
|-------------|--------------------|-----------------------------|----------------|
| 1 | MC10T21 | Enterprise Computing | 3 |
| 2 | MC10T22 | SOA and Web Services | 3 |
| 3 | MC10T23 | Software Project Management | 3 |
| 4 | | Elective I : Paper III | 3 |
| 5 | | Elective II : Paper III | 3 |
| 6 | MC10P08 | Enterprise Computing Lab | 3 |
| 7 | | Elective Lab | 3 |
| 8 | MC10P09 | Open Source Lab | 3 |
| 9 | | Summer Internship - II | 3 |

Course Title: **Enterprise Computing**
 Course Code: MC10T21
 Semester / Credits: V / 3

Course Objective

The objective of this course is to provide the student with an expertise in .NET Programming and C# Technology. After doing the course the student will be able to design, develop and maintain web based enterprise applications effectively.

Course Coverage

.Net Framework: Basics - .Net framework Technology - .Net Architecture - .Net Language - .Net framework Class library - MSIL - JIT Compiler - Working with assemblies.

VB.Net: Procedures - Modules - Arrays - Structures – Collections - Dialog Boxes – Dictionary Object.

C#: Forms - Classes: Access Modifiers - Abstract Class - Concrete Class. Methods: Constructor - Destructor -Overriding - Overloading - Operator Overloading. Arrays – Collections, Enumerators and Iterators – Exceptions - Serializing objects - Deep serialization -XML based serialization - Multithreading – Interfaces and Structures - Delegates and Events – Indexers and Properties.

Working with ADO.Net (VB.Net and C#): Introduction to ADO.Net - Features of ADO.Net - Object model - Connection - Data Binding.

Pedagogy

Classroom Lectures, Exercises, Demonstration of Software.

Evaluation and Grading

| | | |
|----------------------|-----|----|
| Exercises | ... | 5 |
| Surprise Test | ... | 5 |
| Concept applications | ... | 10 |
| Mid Semester Exam | ... | 20 |
| End Semester Exam | ... | 60 |

Reference Books

1. Joe Duffy(2006). *Professional .Net Framework 2.0*; New Delhi: Wiley
2. Bill Evjen, Jason Beres (2002). *Visual Basic .Net Bible*; New York: Hungry Minds Inc
3. Francesco Balena(2003). *Programming MS VB.Net*; Bangalore: WP Publishers
4. Robert Ian Oliver (2003). *Designing Enterprise Application with MS VB.Net*; New Delhi: Tata McGraw-Hill
5. Herbert Schildt (2006). *Complete Reference C#*; New Delhi: Tata McGraw-Hill

Course Title: **SOA and Web Services**
 Course Code: MC10T22
 Semester / Credits: V / 3

Course Objective

The objective of this course is to understand the principles of service oriented architecture and to understand how web services can be used to build SOA based systems. After completing this course, the students can be able to build SOA based systems using Web services technology.

Course Coverage

Introduction to SOA with Web Services: The Service-Oriented Enterprise - Service-Oriented Development - Service-Oriented Architecture - SOA and Web Services - Rapid Integration - Multi-Channel Access - Business Process Management - Extended Web Services Specifications.

Overview of Service-Oriented Architecture: Service-Oriented Business and Government - Service-Oriented Architecture Concepts - Service Governance, Processes, Guidelines, Principles, Methods, and Tools - Key Service Characteristics - Technical Benefits of a Service-Oriented Architecture - Service-Oriented Architecture - Business Benefits.

SOA and Web Services: The Web Services Platform - Service Contracts -Service-Level Data Model-Service Discovery-Registration and Lookup - Service-Level Security - Service-Level Interaction Patterns - Atomic Services and Composite Services - Generating Proxies and Skeletons from Service Contracts - Service-Level Communication and Alternative Transports.

SOA and Web Services for Integration: Overview of Integration - Integration and Interoperability using XML and Web Services - WSI and SOI - .NET and J2EE Interoperability -Service - Enabling Legacy Systems - Enterprise Service Bus Pattern.

SOA and Multi-Channel Access: Business Benefits - Architectural Challenges - Architecture for Multi-Channel Access - Client/Presentation Tier - Channel Access Tier - Communication Infrastructure - Business Service Access Tier - Business Service Tier.

Web Services Security: Authentication - Attacks – Challenges - Securing the Communications Layer - Message-Level Security - Data-Level Security.

Pedagogy

Classroom Lectures, Information collection from Internet, Lecture – Discussion

Evaluation and Grading

| | |
|---|----|
| Information collection & File submission... | 10 |
| Surprise Test | 5 |
| Group Assignments | 5 |
| Mid Semester Exam | 20 |
| End Semester Exam | 60 |

Text Book

Eric Newcomer and Greg Lomow(2004).*Understanding SOA with Web Services*; Addison-Wesley Professional

Reference Books

1. Thomas Erl (2005). *Service-Oriented Architecture: Concepts, Technology, and Design*; India:Prentice Hall
2. Thomas Erl(2004). *Service-Oriented Architecture: A Field Guide to Integrating XML and Web Services*; India: Prentice Hall
3. Sandy Carter(2007).*The New Language of Business: SOA & Web 2.0*; Indiana: IBM Press

Course Title: **Software Project Management**
 Course Code: MC10T23
 Semester /Credits: V / 3

Course Objective

- Recognize the importance of planning and controlling the software engineering activities to meet the project goals for cost, schedule and quality
- Aware of issues related to software projects
- Analyze the tools and techniques used in software project management
- Know the different quality standards adopted in software life cycle

Course Coverage

Introduction: Software Project – Categories - Problems with Software Projects. An Overview of Project Planning – Programme Management and Project Evaluation. Project Analysis and Technical Planning: Choosing Technologies – Technical Plan contents – Process models.

Software Effort Estimation: Problems with Software estimation - Basis for software estimation – Effort estimation techniques. Activity Planning: Objectives – Project Schedules - Sequencing and scheduling activities - Network Planning Models.

Risk Management: Risk management cycle – Risk identification – Risk assessment – Risk planning – Risk management. Resource Allocation - Monitoring and Control - Managing People and Organizing Teams.

Software Configuration Management: Software Configuration Identification – Software Configuration control - Software Configuration Auditing - Software Configuration status Accounting – Dynamics of SCM – Tools of SCM - SCM Standards.

Quality Management: Quality concepts – Software Quality Assurance – Software Reviews – Formal Technical Reviews – Statistical Software Quality Assurance – Software Reliability – ISO and CMM & CMM/I Standards.

Pedagogy

Classroom Lectures, Case Study, Role Play.

Evaluation and Grading

| | | |
|-----------------------------|-----|----|
| News Collection | ... | 5 |
| Advanced Topic Presentation | ... | 10 |
| Open book test | ... | 5 |
| Mid Semester Exam | ... | 20 |

End Semester Exam ... 60

Text Book

Mike Cotterell, Bob Hughes (2006). *Software Project Management*, 4/e; New Delhi: Tata McGraw-Hill

Reference Books

1. Gopaldaswamy Ramesh (2002). *Managing Global software projects*, 1/e; New Delhi: Tata McGraw-Hill
2. Watts S. Humphrey(2005). *Managing the Software Process*, 6/e; New Delhi: Pearson Education
3. Roger S.Pressman (2005). *Software Engineering - A Practitioner's Approach*, 6/e; Singapore: McGraw-Hill
4. James F. Peters, Witold Pedrycz (2007). *Software Engineering – An Engineering Approach*, 3/e; John Wiley.

Course Title: **Enterprise Computing Lab**
Course Code: MC10P08
Semester /Credits: V / 3

Course Objective

To practice the program constructs learnt in theory course Enterprise Computing.

Course Coverage

Exercises to design and develop packages using VB.NET, ADO.NET and C#

Design and develop a small application.

Evaluation and Grading

| | | |
|--------------------------------------|-----|----|
| Documentation | ... | 5 |
| Lab Performance | ... | 15 |
| Creativity in implementing exercises | ... | 5 |
| Oral Comprehensive test | ... | 10 |
| Final Test | ... | 15 |

Course Title: **Open Source Lab**
Course Code: MC10P09
Semester / Credits: V / 3

Course Objective

To make the students to be familiar with working in open source software like, PHP, Perl, Python, MySQL

Course Coverage

Exercises to create web pages using PHP and MySQL

Design and develop a small application.

Evaluation and Grading

| | | |
|--------------------------------------|-----|----|
| Documentation | ... | 5 |
| Lab Performance | ... | 15 |
| Creativity in implementing exercises | ... | 5 |
| Oral Comprehensive test | ... | 10 |
| Final Test | ... | 15 |

ELECTIVES

DATA BASE MANAGEMENT SYSTEMS

Course Title: **Advanced Database Systems**
Course Code: MC10E11
Semester / Credits: III / 3

Course Objective

The goal of the course is to introduce students to modern database and data management systems. After completing this course students can be able to:

- Understand query processing, transaction management, concurrency control etc. in distributed environment.
- Understand how to develop an application using an advanced database system.

Course Coverage

Parallel and Distributed Database: Introduction - Architecture for Parallel Databases - Parallel Query Evaluation - Parallelizing Individual Operations - Parallel Query Optimization - Introduction to Distributed Database - Distributed DBMS Architectures - Storing Data in a Distributed DBMS - Distributed Catalog Management - Distributed Query Processing - Update Distributed Data - Distributed Transaction - Distributed Concurrency Control - Distributed Recovery.

Object Database System: Motivating Example - Structure Data Types - Operations on Structured Data - Encapsulation and Adts - Inheritance - Object, Oids, and Reference Types - Database Design For ORDBMS - ORDBMS Implementation Challenges - OODBMS - Comparing RDBMS, OODBMS, and ORDBMS - ORDBMS Vendors And Products.

Data Warehousing And Decision Support: Introduction to Decision Support - OLAP: Multidimensional Data Model - Multidimensional Aggregation Queries - Implementation Techniques For OLAP - Data Warehousing - Data Warehouse Architecture - Data Warehouse Implementation - Views And Decision Support - View Materialization - Maintain Materialized Views - Data Warehousing To Data Mining - Information Visualization.

Advanced Databases: Main Memory Database - Temporal Databases - Sequence Databases - Time Serious Databases - Spatial Databases - Geographic Information Databases - Multimedia Databases - Moving Object Databases - Personal Databases - Heterogeneous Databases - Legacy Databases - Web Database.

Pedagogy

Classroom Lectures, Case Study, Group discussion

Evaluation and Grading

| | | |
|-------------------|-----|----|
| News Collection | ... | 5 |
| Group discussion | ... | 10 |
| Quiz | ... | 5 |
| Mid Semester Exam | ... | 20 |

End Semester Exam ... 60

Text Book

Raghu Ramakrishnan and Johannes Gehrke (2003). *Database Management System*, 3/e; Singapore: McGraw-Hill

Reference Books

1. Abraham Silberschatz, Henry F. Korth and Sudarshan S.(2005). *Database System Concepts*, 5/e; Singapore: McGraw-Hill
2. Date C.J., (2003). *An Introduction to Database Systems*, 8/e; New Delhi: Pearson Education

Course Title: **Data Mining**
 Course Code: MC10E12
 Semester / Credits: IV / 3

Course Objective

The course objectives are organized to help students:

- understand the fundamental processes, concepts and techniques of data mining and develop an appreciation for the inherent complexity of the data-mining task.
- have the ability to select methods and techniques appropriate for the task.

Course Coverage

Introduction: Data Mining - Mining from Database – Data Mining vs. Query Tools - Data Mining Functionalities - Mining Patterns - Classification of Data Mining Systems - Major issues in Data Mining.

Data preprocessing: Preprocess the data - Data Summarization - Data Cleaning - Data Integration - Data Transformation - Data Reduction - Data Discretization - Concept Hierarchy Generation

Classification and Predication: Introduction - Issues regarding Classification and Predication - Classification by Decision Tree Induction - Bayesian Classification - Rule Based Classification - Classification by Backpropagation - Support Vector Machines - Associative Classification - Lazy learners - Other Classification Methods - Accuracy and error measures - Evaluating the accuracy of a Classifier or Predictor - Ensemble Methods - Model Selection.

Cluster Analysis: Types of data in Cluster Analysis - Major Clustering Methods - Partitioning Methods - Hierarchical Methods - Density Based Methods - Grid Based Methods - Model Based Clustering Methods - Clustering High-Dimension Data - Constraints Based Cluster Analysis - outlier analysis.

Association Rules: Basic Concepts - Frequent Item set Mining Methods - Mining various kinds of Association Rules - From Association Mining to Correlation Analysis - Constraint Based Association Mining - Visualization Techniques

Advance Data mining Techniques: Mining Data streams - Mining Time Series Data - Mining Sequence Patterns in Transactional Databases - Mining Sequence Patterns in Biological Data - Graph Mining - Social Network Analysis - Multirelational Data Mining -

Multidimensional Analysis and Descriptive Mining of Complex Data Objects - Spatial Data Mining - Multimedia Data Mining - Text Mining - Mining the World Wide Web - Applications and trends in Data Mining .

Pedagogy

Classroom Lectures, Demonstration of Software, Case Analysis.

Evaluation and Grading

| | | |
|-----------------------------|-----|----|
| Concept Implementation | ... | 10 |
| Advanced Topic Presentation | ... | 5 |
| Surprise Test | ... | 5 |
| Mid Semester Exam | ... | 20 |
| End Semester Exam | ... | 60 |

Text Book

Jaiwei Han, Micheline Kamber (2002). *Data Mining-concepts and techniques*, 2/e; New Delhi: Elsevier

Reference Books

1. David Hand, Heikki Mannila and Padhraic Smyth (2001). *Principles of Data Mining*; New Delhi: Prentice Hall of India
2. Arun K. Pujari (2001). *Data Mining Techniques*; Hyderabad: Universities Press
3. K.P. Soman, (2005). *Data mining from theory to practice*; New Delhi: Prentice Hall

Course Title: **Information Retrieval**
Course Code: MC10E13
Semester / Credits: V / 3

Course Objective

Main topics of the course include document representation, document indexing, digital information storage, retrieval, and distribution. Specifically, students will learn how to:

- Understand the advantages and disadvantages of different information-retrieval design models.
- Translate vague information needs into specific queries that a given system can parse and execute correctly.
- Develop effective search strategies, including selecting appropriate sources of information.
- Select effective index terms for a document collection and create inverted files.

Course Coverage

Boolean retrieval: information retrieval problem - Processing Boolean queries - Boolean model versus ranked retrieval.

The term vocabulary and postings lists: Document delineation and character sequence decoding - Determining the vocabulary of terms - Faster postings list intersection via skip pointers - Positional postings and phrase queries.

Dictionaries and tolerant retrieval: Search structures for dictionaries - Wildcard queries - Spelling correction - Phonetic correction.

Index construction: Hardware basics - Blocked sort-based indexing - Single-pass in-memory indexing - Distributed indexing - Dynamic indexing - Other types of indexes.

Scoring, term weighting and the vector space model: Parametric and zone indexes - Term frequency and weighting - The vector space model for scoring.

Evaluation in information retrieval: Information retrieval system evaluation - Standard test collections - Evaluation of unranked retrieval sets - Evaluation of ranked retrieval results - Assessing relevance - Critiques and justifications of the concept of relevance - A broader perspective: System quality and user utility - Results snippets.

XML retrieval: Basic XML concepts - Challenges in XML retrieval - A vector space model for XML retrieval - Evaluation of XML retrieval - Text-centric vs. data-centric XML retrieval.

Text classification and Naive Bayes: The text classification problem - Naive Bayes text classification - Properties of Naive Bayes - Feature selection - Evaluation of text classification.

Vector space classification: Document representations and measures of relatedness in vector spaces - Rocchio classification - k nearest neighbor - Linear versus nonlinear classifiers - Classification with more than two classes - The bias-variance tradeoff.

Flat clustering: Clustering in information retrieval - Problem statement - Evaluation of clustering - K-means - Cluster cardinality in K-means - Model-based clustering.

Web search basics: Background and history - Web characteristics - Advertising as the economic Model - The search user experience - Index size and estimation - Near-duplicates and shingling - Introduction to web.

Pedagogy

Classroom Lectures, Case Analysis.

Evaluation and Grading

| | | |
|-----------------------------|-----|----|
| News Collection | ... | 10 |
| Advanced Topic Presentation | ... | 5 |
| Quiz | ... | 5 |
| Mid Semester Exam | ... | 20 |
| End Semester Exam | ... | 60 |

Text Book

Christopher D. Manning, Prabhakar Raghavan, Henrich Schutze (2008). *Introduction to Information Retrieval*, 1/e; New York: Cambridge University Press

Reference Books

William Hersh (2002). *Information Retrieval*, 2/e; United States of America: Springer – Verlag

Course Title: **Database Software and Data Mining Tools (Elective Lab)**
Course Code: MC10E2P
Semester / Credits: Elective/3

Course Objective

Understand the implementation of data mining tasks

Course Coverage

Exercises to solve real world problems by implementing data mining tasks using various data mining techniques

Design and develop a small application.

Evaluation and Grading

| | | |
|---------------------------------|-----|----|
| Documentation | ... | 5 |
| Lab Performance | ... | 15 |
| Exploring the data mining tools | ... | 5 |
| Oral Comprehensive test | ... | 10 |
| Final Test | ... | 15 |

ELECTIVES**NETWORK SECURITY SYSTEMS**

Course Title: **Network Security**
 Course Code: MC10E21
 Semester / Credits: III / 3

Course Objective

To provide a theoretical survey of both the principles and practice of Cryptography and Network Security. It provides an insight into Classical and Advanced Encryption Standards and Techniques, Message Authentication Codes, Digital Signatures, Email Security, IP Security, Web Security, Firewalls and Mobile Network Security

Course Coverage

Introduction: Security Trends - The OSI Security Architecture - Security Attacks - Security Services - A model for Internet work Security.

Classical Encryption Techniques: Symmetric Cipher Model - Substitution Techniques - Transposition Techniques - Steganography.

Block Ciphers and the DES: Block cipher Principles - The DES - The Strength of DES - Differential and Linear Crypt Analysis - Block Cipher Design Principles.

Advanced Encryption Standard : Evaluation Criteria for AES - The AES Cipher.

Public key cryptography and RSA: Principles of Public – Key Cryptosystems – The RSA Algorithm.

Key management; Other Public – Key Cryptosystems: Diffie-Hellman Key exchange – Elliptic Curve Arithmetic - Elliptic Curve Cryptography.

Message Authentication and Hash Functions: Authentication Requirements - Authentication Functions - Security of Hash Functions and MACs.

Digital Signatures and Authentication Protocols: Digital Signatures - Authentication Protocols - Digital Signature Standard.

Authentication Applications: Kerberos - X.509 Authentication Service, Public-Key Infrastructure.

Email Security : Pretty Good Privacy - S/MIME.

IP Security: IP Security Overview - IP Security Architecture - Authentication Header - Encapsulating Security Payload

Web Security : Security Considerations - SSL and TLS-SET.

System Security: Intruders - Intrusion Detection – Password Management.

Malicious Software: Viruses and Related Threats.

Firewalls: Design Principles - Trusted systems.

Pedagogy

Class room lectures, Demonstration of concept using Tools (CRYPTOOL)

Evaluation and Grading

| | | |
|-----------------------------|-----|----|
| Exercises | ... | 10 |
| Advanced Topic Presentation | ... | 10 |

| | | |
|-------------------|-----|----|
| Assignment | ... | 5 |
| Mid Semester Exam | ... | 20 |
| End Semester Exam | ... | 60 |

Text Book

William Stallings (2007). *Cryptography and Network Security - Principles and Practices*, 4/e; New Delhi: Prentice Hall of India

Reference Books

1. Atul Kahate(2006). *Cryptography and Network Security*, New Delhi: Tata McGraw-Hill
2. Charles P Fleege, Sharilawrence P Fleege (2006). *Security in Computing*, 3/e; New Delhi: Pearson education

Course Title: **Internet Protocols**
Course Code: MC10E22
Semester / Credits: IV / 3

Course Objective

To provide fundamentals with the latest technologies. Includes all protocols in the TCP/IP suite fit into the five-layer model. The course covers voice video over IP(RTP), IP coverage, a discussion of Routing Architectures, Internet Application Services such as domain name system(DNS), Electronic Mail(SMTP,MIME), File Transfer and Access (FTP,TFTP, NFS), Remote Login(TELNET, rlogin) and Network Management (SNMP), a description of private network interconnections such as NAT and VPN.

Course Coverage

Introduction and Overview: The TCP/IP Internet - Internet Services - History and Scope Of The Internet - Two Approaches to Network Communication - Wide Area and LAN - Ethernet Technology - Switched Ethernet - Asynchronous Transfer Mode.

Internetworking Concept And Architectural Model: Application-Level Interconnection - Network -Level Interconnection - Internet Architecture - Interconnection Through IP Routers - Classful Internet addresses .

Mapping Internet Addresses of Physical Addresses (ARP) - Internet Protocol: Connectionless Datagram Delivery (IPv4) – Internet Protocol : Forwarding IP Datagrams, – Internet Protocol : Error And Control Messages (ICMP) - A Next Generation IP(IPv6) - User Datagram Protocol(UDP) .

Reliable Stream Transport Service (TCP) - Routing Between Peers (BGP)-Routing Within An Autonomous System (RIP,OSPF) - Mobile IP.

Private Network Interconnection (NAT, VPN) - Domain Name System (DNS) - Remote Login and Desktop (TELNET, SSH) - File Transfer And Access (FTP, TFTP, NFS) - Electronic Mail (SMTP, POP, IMAP, MIME) .

World Wide Web (HTTP) - Voice And Video Over IP (RTP, RSVP, QOS) - Network Management (SNMP) .

Pedagogy

Class room lectures, Case analysis, Group Discussion

Evaluation and Grading

| | | |
|-----------------------------|-----|----|
| Simulation | ... | 5 |
| Advanced Topic Presentation | ... | 10 |
| Surprise test | ... | 5 |
| Mid Semester Exam | ... | 20 |
| End Semester Exam | ... | 60 |

Text Book

Douglas E. Comer (2006). *Internetworking with TCP/IP Principles, Protocols and Architecture*, 5/e; New Delhi: Prentice Hall India

Reference Books

1. Behrouz A. Forouzan (2006). *TCP/IP Protocol Suite*; New Delhi: Tata McGraw-Hill
2. Richard Stevens(2003). *TCP/IP Illustrated, Volume 2*; New Delhi: Prentice Hall of India

Course Title: **Information Security**
 Course Code: MC10E23
 Semester / Credits: V / 3

Course Objective

To provide the importance of Information Security, Ethical Hacking, Policies Standards and Security practices, Risk Management, Implementation and Maintenance. It focuses on both the Managerial and Technical aspects. It includes the real world examples and scenario that made students to be updated to the latest capabilities and trends.

Course Coverage

Introduction to Information Security: Introduction- - Security - Critical Characteristics of Information - NSTISSC Security Model - Components of an Information System - Security Components - Approaches to Information Security Implementation - The Systems Development Life Cycle - The Security Systems Development Life Cycle.

The Need for Security: Business Needs First - Threats - Attacks - Secure Software Development

Risk management: Overview - Risk Identification - Risk Assessment- Risk Control Strategies - Selecting a Risk Control Strategy - Quantitative Versus Qualitative Risk Control Practices

Planning for Security: Information Security Policy, Standards and Practices - The Information Security Blue print.

Security Technology: Firewalls and VPNS - Intrusion Detection, Access Control, and other Security Tools - Intrusion Detection and Prevention Systems - Honey Pots - Honey Nets, and

Padded Cell Systems - Scanning and Analysis Tools - Access Control Devices - Cryptography - Physical Security.

Implementation of Information Security: Information Security Project Management - Technical Topics of Implementation - Non Technical aspects of Implementation –

Information Security Maintenance: Security Management Models - The Maintenance Model - Digital forensics.

Pedagogy

Class Room Lectures, Case Analysis, Group Discussion

Evaluation and Grading

| | | |
|-----------------------------|-----|----|
| Advanced Topic Presentation | ... | 10 |
| Assignment | ... | 5 |
| Mid Semester Exam | ... | 25 |
| End Semester Exam | ... | 60 |

Text Book

Michael E. Whitman and Herbert J. Mattord (2008). *Principles of Information Security*, 2/e; Thomson Course Technology

Reference Books

1. Charles A.Sennewald(2003). *Effective Security Management*,4/e; Butterworth-Heinemann
2. Gerald L.Kovacich(2003). *Information System Security Officer's guide*, 2/e; Butterworth-Heinemann

Course Title: **Network Programming Tools (Elective Lab)**
Course Code: MC10E2P
Semester / Credits: Elective / 3

Course Objective

To gain hands on experience in network simulation tools

Course Coverage

Exercises to design applications using different network simulation tools

Evaluation and Grading

| | | |
|---------------------------------|-----|----|
| Documentation | ... | 5 |
| Lab Performance | ... | 15 |
| Exploring the data mining tools | ... | 5 |
| Oral Comprehensive test | ... | 10 |
| Final Test | ... | 15 |

ELECTIVES

WIRELESS COMMUNICATIONS

Course Title: **Wireless Networks**
Course Code: MC10E31
Semester / Credits: III / 3

Course Objective

- To provide the students a common foundation for understanding any contemporary network, voice or data.
- To understand the issues such as electromagnetic wave propagation, modulation, multiple access for wireless systems.
- To provide the students with the basics for various techniques in Wireless Communication Networks.
- To familiarize students with standards and acronyms that play an intricate role in Wireless Networks.
- To make the students to study and analyze currently available commercial implementations of several Wireless Technologies

Course Coverage

Introduction to wireless Networks: Evolution of Wireless Networks - Challenges.

Wireless communications Principles and Fundamentals: The Electromagnetic Spectrum - Wireless Propagation Characteristics and Modeling - Analog and Digital Data transmission - Modulation Techniques for Wireless Systems - The Cellular Concept - Wireless Services.

Generation of Cellular Systems: First Generation (1G) Cellular Systems - Second Generation (2G) Cellular Systems - Third Generation (3G) Cellular Systems - Fourth Generation (4G) Cellular Systems.

Principles of AIR-Interface Design - Characteristics of the Wireless Medium - Physical Layer Alternatives for Wireless Networks - Wireless Medium Access Alternatives. Principles of Wireless Network Operation: Network Planning - Wireless network Operation.

Satellite Networks: Introduction - Satellite Systems - VSAT Systems - Examples of Satellite based Mobile Telephony Systems - Satellite-based Internet Access.

Fixed Wireless Access Systems: Wireless Local Loop versus Wired Access - Wireless Local Loop - Wireless Local Loop Subscriber Terminals (WLL) - Wireless Local Loop Interfaces to the PSTN, IEEE 802.16 Standards.

Wireless Local Area Networks: Introduction - Wireless LAN Topologies - Wireless LAN Requirements - The Physical Layer - The Medium Access Control (MAC) Layer - Latest Developments.

Wireless ATM and Ad Hoc Routing: Introduction - Wireless ATM Architecture - HIPERLAN 2: An ATM Compatible WLAN - Routing in Wireless Ad Hoc Networks.

Wireless WANS: GSM and TDMA Technology - CDMA Technology, IS-95 and IMT-2000 349-Mobile Data Networks.

Personal Area Networks: Introduction to PAN Technology and Applications, Commercial Alternatives: Bluetooth - Commercial Alternatives: HomeRF. Security Issues in Wireless Systems: The Need for Wireless Network Security - Attacks on Wireless Networks - Security Services - Wired Equivalent Privacy (WEP) Protocol - Mobile IP -Weaknesses in the WEP Scheme - Virtual Private Network (VPN).

Pedagogy

Lectures, Case Analysis and Presentation

Evaluation and Grading

| | | |
|-----------------------------|-----|----|
| Model preparation | ... | 10 |
| Advanced Topic Presentation | ... | 5 |
| Quiz | ... | 5 |
| Mid Semester Exam | ... | 20 |
| End Semester Exam | ... | 60 |

Text Book

P.Nicopolitidis, M.S. Obaidat, G.I Papadimitriou, A.S. Pomportsis(2003).*Wireless Network*;
New Delhi: John Wiley & Sons(ASIA) Pte Ltd

Reference Book

Kaveh Pahlavan, Prashant Krishnamurthy(2002). *Principles of Wireless Networks - A Unified Approach*;New Delhi : Pearson Education

Course Title: **Wireless Programming**
Course Code: MC10E32
Semester / Credits: IV / 3

Course Objective

- To make the students to learn the various wireless programming technologies and to work with WML, WML Script, J2ME
- To design graphical interfaces for popular wireless devices
- To design and implement location-based services
- To understand J2ME and be able to write applications quickly

Course Coverage

WML: Fundamentals of WML - writing and formatting text - Navigating between cards and decks - displaying images - Tables - Using Variables - Acquiring user input.

WML Script: An Introduction to WML script - WML script control structures - WML script techniques - Events -Phone.com extension - Developing WAP Applications using Emulators.

J2ME Basics: J2ME Overview - J2ME Architecture and Development Environment - J2ME User Interface - J2ME Data Management - Record management System - J2ME database Concepts - JDBC and Embedded SQL - J2ME networking and Web services.

Pedagogy

Lectures, Demonstration of Tools

Evaluation and Grading

| | | |
|-----------------------------|-----|----|
| Assignment | ... | 10 |
| Advanced Topic Presentation | ... | 5 |
| Quiz | ... | 5 |
| Mid Semester Exam | ... | 20 |
| End Semester Exam | ... | 60 |

Reference Books

1. Yi Bing Lin, Imrich Chlamtac(2008). *Wireless and Mobile Network Architectures*; New Delhi : John Wiley & Sons
2. Tomasz Imielinski, et. al.,(1996). *Mobile Computing*; Kluwer Academic Publishers
3. Wei Meng Lee,Soo Mee Foo ,Karli Watson,Ted Wugofski(2001). *Beginning WAP,WML & WML Script*; Wrox Press
4. James Keogh(2008). *The Complete Reference – J2ME*; New Delhi: Tata Mc-graw Hill Edition
5. Yu Feng, Jun Zhu(2001). *Wireless Java Programming with J2ME*, Sams Publishing

Course Title: **Wireless Adhoc Networks**
 Course Code: MC10E33
 Semester / Credits: V / 3

Course Objective

- To provide the students with the principles, technologies, and techniques of Wireless Ad hoc Networks
- To make the student understand the key challenges such as device heterogeneity, diverse traffic profiles, mobility and power conservation
- To enable the students to be familiar with the standards and acronyms that play an intricate role in wireless networks
- To gain familiarity with ad hoc networks routing methods, power, connections, traffic management, and security
- To study and analyze currently available commercial implementations of several wireless technologies

Course Coverage

Introduction : Fundamentals of Wireless Communication Technology - Characteristics of the Wireless Channel - Modulation Techniques - Multiple Access Techniques - Networking Standards - Wireless Networks - Mobile IP - Ad Hoc Wireless Networks.

MAC Protocols : Designing a MAC Protocol for Ad Hoc Wireless Networks, Classifications of MAC Protocols - Contention - Based, Contention-Based with Reservation Mechanisms, Contention - Based with Scheduling Mechanisms - MAC Protocols that Use Directional Antennas.

Routing Protocols : Designing a Routing Protocol for Ad Hoc Wireless Networks - Classifications of Routing Protocols - Table-Driven, On-Demand, Hybrid, Routing Protocols with Efficient Flooding Mechanisms - Hierarchical, Power-Aware Routing Protocols.

Multicast Routing: Designing a Multicast Routing Protocol - Operation of Multicast Routing Protocols - Classifications of Multicast Routing Protocols - Tree-Based, Mesh-Based, Energy-Efficient - Multicasting with Quality of Service Guarantees.

Transport Layer and Security Protocols: Designing a Transport Layer Protocol for Ad Hoc Wireless Networks - Classification of Transport Layer Solution - TCP Over Ad Hoc Wireless Networks - Security in Ad Hoc Wireless Networks - Network Security Requirements - Issues and Challenges in Security Provisioning - Network Security Attacks - Key Management - Secure Routing in Ad Hoc Wireless Network.

Quality of Service: QOS in Ad Hoc Wireless Networks - Classifications of QOS Solutions - MAC Layer Solutions - Network Layer Solutions - QOS Frameworks for Ad Hoc Wireless Networks.

Energy Management: Energy Management in Ad Hoc Wireless Networks -Classification of Energy Management Schemes - Battery Management Schemes - Transmission Power Management Schemes - System Power Management Schemes.

Advances in Wireless Networks: Ultra-wide-band radio communication - Wireless fidelity systems - Optical wireless networks - Multimode 802.11 - IEEE 802.11a/b/g.

Pedagogy

Classroom Lectures, Case Analysis and Presentation

Evaluation and Grading

| | | |
|-----------------------------|-----|----|
| Assignment | ... | 10 |
| Advanced Topic Presentation | ... | 5 |
| Surprise Test | ... | 5 |
| Mid Semester Exam | ... | 20 |
| End Semester Exam | ... | 60 |

Reference Books

1. C. Siva Ram Murthy, B.S. Manoj (2004). *Ad Hoc Wireless Networks: Architectures and Protocols*; New Delhi: Prentice Hall
2. Charles E. Perkins (2008). *Ad Hoc Networking*; New Delhi: Addison-Wesley
3. C. K. Toh (2008). *Ad Hoc Mobile Wireless Networks: Protocols and Systems*; Prentice Hall
4. Mohammad Ilyas (2002). *The Handbook of Ad Hoc Wireless Networks*;CRC Press
5. S. Basagni, Marco Conti, Silvia Giordano, Ivan Stojmenovi & Cacute (2004). *Mobile Ad Hoc Networking*; John Wiley & Sons

Course Title : **Wireless Programming in J2ME (Elective Lab)**
Course Code : MC10E3P
Semester / Credits: Elective / 3

Course Objective

Design and develop java-based services to enhance wireless phone.

Course Coverage

Exercises to design and develop MIDlet applications using J2ME, WAP applications using emulators

Evaluation and Grading

| | | |
|--------------------------------------|-----|----|
| Documentation | ... | 5 |
| Lab Performance | ... | 15 |
| Creativity in implementing exercises | ... | 5 |
| Oral Comprehensive test | ... | 10 |
| Final Test | ... | 15 |

ELECTIVES

GRAPHICS AND MULTIMEDIA

Course Title: **Computer Graphics**
Course Code: MC10E41
Semester / Credits: III / 3

Course Objective

To understand the basic concepts, principles and techniques of computer graphics systems and to analyze the various algorithms used in the design of 2 dimensional and 3 dimensional graphics leading to the ability to design complex graphics systems in various application areas.

Course Coverage

Graphics Input - Output Devices: Raster scan Displays - Random scan displays - Direct view storage tubes - Flat panel displays - Mouse - Track Ball - Joy Stick - Digitizers - Touch panels.

Digital Image Processing: Digital image Fundamentals – Components of an image processing system – color image processing – color transformations, smoothing and sharpening segmentation.

Two Dimensional Graphics: Basic transformations - Matrix representation and homogeneous coordinates - composite transformations - Line drawing algorithms: DDA and Bresenham's algorithms - Circle generation algorithms: Mid point circle algorithm - Point clipping - Line clipping: Cohen Sutherland algorithm - Polygon clipping: Sutherland Hodgeman algorithm - Line covering.

Raster Graphics: Fundamentals: generating a raster image, representing a raster image, scan converting a line drawing, display characteristics, speed of scan conversion, natural images - Solid area scan conversion: Scan conversion of polygons, Y-X algorithm, properties of scan conversion algorithms - Interactive raster graphics: painting model, moving parts of an image, feed back images.

Curves And Surfaces: Parametric representation of curves - Bezier curves - B-Spline curves - parametric representation of surfaces - Bezier surfaces - curved surfaces - ruled surfaces - quadric surfaces.

Three Dimensional Graphics: 3D transformations - viewing 3D graphical data - orthographic, oblique, perspective projections - hidden lines and hidden surface removal.

Animation Graphics: Design of Animation sequences - animation function - raster animation - key frame systems - motion specification -morphing - tweening.

Computer Graphics Realism: Tiling the plane - Recursively defined curves - Koch curves - C curves - Dragons - space filling curves - fractals - Grammar based models - graftals - turtle graphics - ray tracing.

Pedagogy

Classroom Lectures, Demonstration using tools, Problem solving

Evaluation and Grading

| | | |
|-----------------------------|-----|----|
| Assignment | ... | 5 |
| Advanced Topic Presentation | ... | 5 |
| Exercises | ... | 10 |
| Mid Semester Exam | ... | 20 |
| End Semester Exam | ... | 60 |

Text Book

Donald Hearn and Pauline Baker M (1998). *Computer Graphics*, 2/e; New Delhi: Prentice Hall

Reference Books

1. Foley James D, Vandam Andries, Feiner Steven.K and Hughes John F (1996). *Computer Graphics: Principles and Practice*, 2/e ; New York: Addison-Wesley
2. Gonzalez R.C and Woods R.E. (2002). *Digital Image Processing*, 2/e; New Delhi: Pearson Education
3. William M. Newmann and Robert F. Sproull (1997). *Principles of Interactive Computer Graphics*, 2/e; New Delhi: McGraw Hill
4. Roy. A. Plastock and Gordon Kalley (1986). *Theory and Problems of Computer Graphics*, 2/e; New Delhi: Schaum's outline series, McGraw Hill

Course Title: **Multimedia Systems**
 Course Code: MC10E42
 Semester / Credits: IV / 3

Course Objective

To understand the core multimedia technologies, underlying infrastructure, multimedia standards, and to analyze the issues in effectively representing, processing, and retrieving multimedia data such as sound, music, graphics, image and video.

Course Coverage

Introduction: Definition - Tools of multimedia system – Need - Aspects of multimedia – Classification

Audio: Digital Audio - Sound Card – Digital audio playback and recording – MIDI – Working with MIDI. Sound and music file formats – Computer sound hardware capabilities.

Graphics: Color representation – Digital imaging fundamentals – Digital image development and editing – Interactive and Non interactive graphics – 2D graphics

Animation: Computer animation fundamentals – Object and cell animation – 2D & 3D animation – 3D Modeling and animation

Video: Digital video fundamentals – Scanning principles – Digital video production techniques – Shooting the sequences – Video capture and editing techniques – Streaming – Morphing – File formats and special effects - MPEG coding.

Multimedia Storage And Project: CD-ROMs – CD-Digital Audio – CD-Write Once – CD-Read Once - Project design concepts – Multimedia authoring

Architecture Of Multimedia Systems: QoS architecture – Standards – Framework for multimedia systems.

Multimedia Operating Systems: Introduction – Real Time - Resource Management - Process Management - File Systems.

Multimedia Database Systems: Characteristics of an MDBMS - Data Structure - Operation on Data - Integration in Database Model.

Multimedia Applications: Video conferencing- Tele conferencing – Media entertainment.

Pedagogy

Classroom Lectures, Demonstration using tools, Group Discussion

Evaluation and Grading

| | | |
|-----------------------------|-----|----|
| Assignment | ... | 5 |
| Advanced Topic Presentation | ... | 5 |
| Surprise Test | ... | 5 |
| Mid Semester Exam | ... | 25 |
| End Semester Exam | ... | 60 |

Text Books

John F.Koegal Buford(1994). *Multimedia Systems*; New Delhi: Pearson Education

Reference Books

1. Stephen McGloughlin(2001). *Multimedia Concepts and Practices* ; New Jersey: Prentice Hall
2. Ralf Steinmetz, Klara Nahrstedt (1995). *Multimedia: Computing, Communications and Applications*; New Delhi : Pearson Education
3. Tay Vaughan (2002) . *Multimedia: Making it work*; New Delhi: Tata McGraw-Hill
4. Gokul S. (2002). *Multimedia Magic* ; New Delhi: BPB Publications

Course Title: **Virtual Reality**
Course Code: MC10E43
Semester / Credits: V / 3

Course Objective

To understand the technologies, underlying infrastructure of virtual reality systems and to learn the modeling techniques in virtual reality leading to the ability to design virtual reality applications.

Course Coverage

Introduction: Virtual Reality – VR software – VR Devices – History of VR –Future directions of VR.

Input Devices: Trackers- Navigation-Gesture interfaces.

Output Devices : Graphics - 3D sound – Haptic displays. Computer Architecture for VR.

Modeling: Geometric modeling – Kinematics modeling – Physical modeling – Modeling management.

VR programming Tool Kit - Human factors in VR -Applications of VR

Pedagogy

Classroom Lectures, Simulation, Demonstration of tools

Evaluation and Grading

| | | |
|-----------------------------|-----|----|
| Exercises | ... | 10 |
| Advanced Topic Presentation | ... | 5 |
| Surprise Test | ... | 5 |
| Mid Semester Exam | ... | 20 |
| End Semester Exam | ... | 60 |

Text Book

Grigore C. Burdea, Philippe Coiffet (2003). *Virtual Reality Technology*, 2/e; New Delhi : Wiley Dreamtech India

Reference Books

1. John Vince (2004). *Introduction to Virtual Reality*; New York: Springer
2. William R. Sherman, Alan B. Craig (2003), *Understanding virtual reality: Interface, Application, and Design*; San Francisco: Morgan Kaufmann

Course Title: **Graphics and Animation Tools (Elective Lab)**
 Course Code: MC10E4P
 Semester / Credits: Elective / 3

Course Objective

To practice the concepts learnt in theory course and to get hands on experience in the design and development of graphics and multimedia tools

Course Coverage

Exercises to work with graphics and animation tools

Design and develop a small application.

Evaluation and Grading

| | | |
|--------------------------------------|-----|----|
| Documentation | ... | 5 |
| Lab Performance | ... | 15 |
| Creativity in implementing exercises | ... | 5 |
| Oral Comprehensive test | ... | 10 |
| Final Test | ... | 15 |

ELECTIVES

COMPUTATIONAL INTELLIGENCE

Course Title: **Artificial Intelligence and Expert Systems**
Course Code: MC10E51
Semester / Credits: III / 3

Course Objective

- Understand the basic knowledge representation, problem solving, learning methods of Artificial Intelligence and role of expert systems
- Analyze the applicability, strengths, and weaknesses of the basic knowledge representation, problem solving, and learning methods in solving particular engineering problems
- Develop an interest in the field sufficient to take more advanced subjects.

Course Coverage

Problems and Search: The AI problems – The underlying Assumption – AI Technique - The level of the Model – Criteria for Success – Problems, Problem Space, and Search: Defining the problem as a state space search – Production systems – problem characteristics – Production system characteristics – Issues in the design of Search Programmes

Heuristic Search Techniques: Generate and Test – Hill Climbing – Best First Search – Problem Reduction – constraint Satisfaction – Means ends Analysis

Knowledge Representation Issues: Representations and Mappings – Approaches to Knowledge Representation – Issues in Knowledge Representation – The Frame problem

Using Predicate Logic: Representing Simple Facts in Logic – Representing Instance and ISA Relationships – Computable Functions and Predicates - Resolution Knowledge Representation using Rules: Procedural versus Declarative Knowledge – Logic programming – Forward versus Backward Reasoning – Weak slot –and- Filler Structures : semantic Nets – Frames – Strong Slot- and –Filler Structures : Conceptual Dependency – Scripts – CYC

Expert systems: Introduction to Expert systems -Expert system Tools – Building an Expert System – Difficulties with Expert System development

Pedagogy

Classroom Lectures, Exercises, Role Play

Evaluation and Grading

| | | |
|----------------------------|-----|----|
| Problem Solving | ... | 10 |
| Advance Topic Presentation | ... | 5 |
| Quiz | ... | 5 |
| Mid Semester Exam | ... | 20 |
| End Semester Exam | ... | 60 |

Text Book

Elaine Rich and Kevin Knight (2009). *Artificial Intelligence*, 3/e; New Delhi: Tata McGraw-Hill

Reference Books

1. Donald A. Waterman (2003). *A Guide to Expert Systems*; New Delhi: Techknowledge Series in Knowledge Engineering
2. Charniak, E., C.K. Reiesbeck, and D.V. McDermott (2000). *Artificial Intelligence Programming*; New Jersey: Lawrence Erlbaum Associates
3. Nils J. Nilsson (2001). *Principles of Artificial Intelligence*; New Delhi: Narosa Publishing

Course Title: **Machine Learning**
 Course Code: MC10E52
 Semester / Credits: IV / 3

Course Objective

- Examine the theory and practice of machine learning from a variety of perspectives.
- Understand the background and knowledge of machine learning.

Course Coverage

Introduction: Machine learning – Types of learning- Applications- performance evaluation

Linear Learning Models: Linear models for Regression- Linear discriminant Analysis- Logistic regression

Decision Tree Learning: Decision tree representation – Decision tree learning – Issues in decision tree learning

Bayesian Learning: Naïve Bayes classifier - Bayesian Networks - EM Algorithm

Instance Based Learning: Introduction – k nearest neighbor Learning - Radial Basis Function, Case based reasoning

Support Vector Machines: Maximum Margin Classifier - Soft Margin classifier - Risk minimization *principal* - General formulation of linear and non-linear SVM.

Unsupervised Learning: Data Analysis – PCA – kernel PCA –ICA. Clustering Methods.

Pedagogy

Lectures, Demonstration of tools

Evaluation and Grading

| | | |
|-----------------------------|-----|----|
| Summative Assessment | ... | 10 |
| Advanced Topic Presentation | ... | 5 |
| Quiz | ... | 5 |
| Mid Semester Exam | ... | 20 |
| End Semester Exam | ... | 60 |

Reference Books

1. Hastie.T, Tibshirani.R, and Friedman.J (2001). *The Elements of Statistical Learning: Data Mining Inference and Prediction*; New Delhi : Springer
2. Tom M. Mitchell (1997). *Machine Learning*; New Delhi : Tata McGraw-Hill
3. Christopher M. Bishop (2007) *Pattern Recognition and Machine Learning - Information Science and Statistics*, 1/e; New Delhi : Springer
4. Shawe-Taylor J. and Cristianini N (2000). *An Introduction to Support Vector Machines*; United Kingdom : Cambridge University Press

Course Title: **Neural Networks and Fuzzy Logic**
Course Code: MC10E53
Semester / Credits: V / 3

Course Objective

- Understand the role of neural networks in creating independent, autonomous, intelligent machines and to apply neural networks to model real world problems.
- Understand theoretical foundations of fuzzy set theory and fuzzy logic

Course Coverage

Neural Networks : Basic concepts in Neural computing – Biological neurons – History of Neural Network (NN) research – NN application – NN structures – NN characteristics – Learning methods – NN Taxonomies.

Simple Perceptions – Multilayer Perception – Multilayer Feed forward Networks – Back propagation learning – capabilities and Limitations – Applications.

Associative Memory Networks: Auto Associative, Hetero associative, Bidirectional Associative memory – Recurrent Networks – Hopfield Networks – Applications.

Learning Vector Quantization – Self Organizing Feature Maps – Adaptive Resonance Theory (ART 1) – Boltzmann machine and Simulated Annealing - Applications.

Fuzzy Logic : Classical sets – fuzzy sets – Cartesian product – crisp relations – fuzzy relations – equivalence relations – value assignments – membership functions – standard forms and boundaries.

Lambda Cuts for fuzzy sets, fuzzy relations , defuzzification methods : fuzzy numbers.

Classical predicate logic – fuzzy logic – approximate reasoning – fuzzy tautologies, contradictions, equivalence – linguistic hedges – rule based systems – graphical techniques of inference.

Pedagogy

Lectures, Archival Analysis, Demonstration of Tools

Evaluation and Grading

| | | |
|-----------------------------|-----|----|
| News Collection | ... | 10 |
| Advanced Topic Presentation | ... | 5 |
| Quiz | ... | 5 |

| | | |
|-------------------|-----|----|
| Mid Semester Exam | ... | 20 |
| End Semester Exam | ... | 60 |

Reference Books

1. Simon Haykin (2001). *Neural Networks – A Comprehensive Foundation*; New Delhi : Pearson Education
2. Laurene Fausett (2004). *Fundamentals of Neural Networks*; New Delhi : Pearson Education
3. Klir George J. and Yuan Bo (1997). *Fuzzy sets and Fuzzy Logic: Theory and Applications*; New Delhi : Prentice Hall
4. Ross Timothy J (1997). *Fuzzy Logic with Engineering Applications*; New Delhi : Tata McGraw-Hill
5. Rajasekaran S and Vijayalakshmi Pai G.A (2003). *Neural Networks, Fuzzy Logic and Genetic Algorithms*; New Delhi : Prentice Hall

Course Title: **Machine Learning Tools (Elective Lab)**
 Course Code: MC10E5P
 Semester / Credits: Elective / 3

Course Objective

Students will gain exposure to the various machine learning tools

Course Coverage

Exercises to solve real world problems by implementing machine learning techniques.

Design and develop a small application.

Evaluation and Grading

| | | |
|--------------------------------------|-----|----|
| Documentation | ... | 5 |
| Lab Performance | ... | 15 |
| Exploring the machine learning tools | ... | 5 |
| Oral Comprehensive test | ... | 10 |
| Final Test | ... | 15 |