PONDICHERRY UNIVERSITY

MASTER OF COMPUTER APPLICATIONS (MCA)

(For CBCS system in Pondicherry University)

(Effective from the academic year 2009 – 2010)

Eligibility for Admission

Candidates who have secured 55% of marks or above in any one of the following or equivalent, are eligible to apply:

(i) Bachelor’s Degree in Computer Applications / Commerce / Corporate Secretarialship / Economics / Business Administration (with Mathematics / Business Mathematics / Statistics / Computer Applications as one of the subjects)

OR

(ii) Bachelor’s Degree in Science with Mathematics / Statistics as one of the subjects.

Duration of the Course

The course shall be of three years duration spread over six semesters. The Maximum duration to complete the course shall be 6 years.

Medium

The medium of instruction shall be English.

Passing & Classification

The minimum marks for passing and classification for the award of the MCA Degree shall be as per the existing norms of other PG degree courses of Pondicherry University offered in affiliated colleges.
# MCA CURRICULUM

Note: All Course Codes are to be preceded with ‘COMS’.

## I Semester

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Code</th>
<th>Course Title</th>
<th>H/S</th>
<th>Credits</th>
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<tbody>
<tr>
<td>1</td>
<td>301</td>
<td>Mathematical Foundation of Computer Science</td>
<td>H</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>302</td>
<td>Computer Organisation and assembly language programming</td>
<td>H</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>303</td>
<td>Data Structures</td>
<td>H</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>304</td>
<td>Problem Solving and Programming</td>
<td>H</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>305</td>
<td>Information Technology</td>
<td>H</td>
<td>3</td>
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<tr>
<td>6</td>
<td>308</td>
<td>Computer Lab I (DS using C)</td>
<td>H</td>
<td>2</td>
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<tr>
<td>7</td>
<td>309</td>
<td>Computer Lab II (Assembly language programming)</td>
<td>H</td>
<td>2</td>
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</tbody>
</table>

## II Semester

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>1</td>
<td>351</td>
<td>Fundamentals of Algorithms</td>
<td>H</td>
<td>3</td>
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<tr>
<td>2</td>
<td>352</td>
<td>Object-Oriented Programming</td>
<td>H</td>
<td>3</td>
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<tr>
<td>3</td>
<td>353</td>
<td>Operating systems</td>
<td>H</td>
<td>3</td>
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<tr>
<td>4</td>
<td>358</td>
<td>Computer Lab III (OOPS Lab)</td>
<td>H</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>359</td>
<td>Computer Lab IV (Operating systems)</td>
<td>H</td>
<td>2</td>
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<tr>
<td>6</td>
<td></td>
<td>Elective I</td>
<td>S</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>Elective II</td>
<td>S</td>
<td>3</td>
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</table>

## III Semester

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Code</th>
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<tbody>
<tr>
<td>1</td>
<td>401</td>
<td>Database Management Systems</td>
<td>H</td>
<td>3</td>
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<tr>
<td>2</td>
<td>402</td>
<td>Computer Networks</td>
<td>H</td>
<td>3</td>
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<tr>
<td>3</td>
<td>403</td>
<td>Windows and Visual Programming</td>
<td>H</td>
<td>3</td>
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<tr>
<td>4</td>
<td>408</td>
<td>Computer Lab V (DBMS)</td>
<td>H</td>
<td>2</td>
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<tr>
<td>5</td>
<td>409</td>
<td>Computer Lab VI (Visual Programming)</td>
<td>H</td>
<td>2</td>
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<tr>
<td>6</td>
<td></td>
<td>Elective III</td>
<td>S</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>Elective IV</td>
<td>S</td>
<td>3</td>
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</tbody>
</table>
### IV Semester

<table>
<thead>
<tr>
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<th>Code</th>
<th>Course Title</th>
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<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>451</td>
<td>Internet programming and Web Technology</td>
<td>H</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>452</td>
<td>Automata Theory and Compiler Design</td>
<td>H</td>
<td>3</td>
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<tr>
<td>3</td>
<td>453</td>
<td>Software Engineering</td>
<td>H</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>458</td>
<td>Computer Lab VII (Web Technology)</td>
<td>H</td>
<td>2</td>
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<tr>
<td>5</td>
<td>459</td>
<td>Computer Lab VIII (CASE Tools)</td>
<td>H</td>
<td>2</td>
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<tr>
<td>6</td>
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<td>Elective V</td>
<td>S</td>
<td>3</td>
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<tr>
<td>7</td>
<td></td>
<td>Elective VI</td>
<td>S</td>
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### V Semester

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Code</th>
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<th>Credits</th>
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<tbody>
<tr>
<td>1</td>
<td>501</td>
<td>Computer Graphics</td>
<td>H</td>
<td>3</td>
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<tr>
<td>2</td>
<td>502</td>
<td>Management Concepts and Strategies</td>
<td>H</td>
<td>3</td>
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<td>3</td>
<td>508</td>
<td>Computer Lab IX (Graphics Lab/Animation 3D 2D)</td>
<td>H</td>
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<td>4</td>
<td>509</td>
<td>Mini Project</td>
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<td>3</td>
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<td>5</td>
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<td>Elective VII</td>
<td>S</td>
<td>3</td>
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<tr>
<td>6</td>
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<td>Elective VIII</td>
<td>S</td>
<td>3</td>
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<td>7</td>
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<td>Elective IX</td>
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### VI Semester

<table>
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<tr>
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<th>Code</th>
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<th>Credits</th>
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<tr>
<td>1</td>
<td>561</td>
<td>Project Seminar</td>
<td>H</td>
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<tr>
<td>2</td>
<td>562</td>
<td>Project work</td>
<td>H</td>
<td>4</td>
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<td>3</td>
<td>563</td>
<td>Project Report And Viva-voce</td>
<td>H</td>
<td>4</td>
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</table>
**LIST OF ELECTIVES:**

Note: All Course Codes are to be preceded with ‘COMS’.

<table>
<thead>
<tr>
<th>Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>221</td>
<td>Foreign Language - Japanese I</td>
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<td>222</td>
<td>Foreign Language - Japanese II</td>
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<tr>
<td>223</td>
<td>Foreign Language - French I</td>
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<td>224</td>
<td>Foreign Language – French II</td>
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<tr>
<td>225</td>
<td>Communication Skills</td>
<td>S</td>
<td>3</td>
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<tr>
<td>226</td>
<td>Accounting and Financial Management</td>
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<tr>
<td>520</td>
<td>Business Process</td>
<td>S</td>
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<tr>
<td>521</td>
<td>Introduction to Programming</td>
<td>S</td>
<td>3</td>
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<tr>
<td>522</td>
<td>Introduction to PC and its utilities</td>
<td>S</td>
<td>3</td>
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<td>523</td>
<td>System Software</td>
<td>S</td>
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<td>524</td>
<td>Operation Research</td>
<td>S</td>
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<td>525</td>
<td>TCP/IP</td>
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<td>526</td>
<td>Architecture of Unix</td>
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<tr>
<td>527</td>
<td>Principles of Programming Languages</td>
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<td>528</td>
<td>Middleware Technology</td>
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<td>529</td>
<td>Image Processing</td>
<td>S</td>
<td>3</td>
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<td>530</td>
<td>Multimedia Systems and Applications</td>
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<td>531</td>
<td>E-Commerce</td>
<td>S</td>
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<td>532</td>
<td>Neural Networks</td>
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<td>533</td>
<td>.NET Framework and C#</td>
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<td>534</td>
<td>Client Server Systems</td>
<td>S</td>
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<td>535</td>
<td>Crypt Analysis and Security Principles</td>
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<td>536</td>
<td>ATM networks</td>
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<td>537</td>
<td>Component software</td>
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<td>538</td>
<td>Distributed database systems</td>
<td>S</td>
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<td>539</td>
<td>AI and Expert systems</td>
<td>S</td>
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<td>540</td>
<td>Artificial Intelligence</td>
<td>S</td>
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<td>541</td>
<td>Fundamentals of Agent technology</td>
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<td>542</td>
<td>Enterprise Resource Planning</td>
<td>S</td>
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<tr>
<td>543</td>
<td>Elements of software project management</td>
<td>S</td>
<td>3</td>
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<td>544</td>
<td>Software Testing and Quality Assurance</td>
<td>S</td>
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<tr>
<td>545</td>
<td>Object Oriented Analysis and Design</td>
<td>S</td>
<td>3</td>
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<td>546</td>
<td>Data Warehousing and Mining</td>
<td>S</td>
<td>3</td>
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<tr>
<td>547</td>
<td>Introduction to Bioinformatics</td>
<td>S</td>
<td>3</td>
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<tr>
<td>548</td>
<td>Introduction to Software Architecture</td>
<td>S</td>
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<td>549</td>
<td>Advanced JAVA</td>
<td>S</td>
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<td>550</td>
<td>Natural Language Processing</td>
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<tr>
<td>551</td>
<td>Microprocessor Architecture</td>
<td>S</td>
<td>3</td>
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<tr>
<td>552</td>
<td>Decision Support System</td>
<td>S</td>
<td>3</td>
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<tr>
<td>553</td>
<td>Soft Computing</td>
<td>S</td>
<td>3</td>
</tr>
<tr>
<td>554</td>
<td>Principles of Distributed System</td>
<td>S</td>
<td>3</td>
</tr>
</tbody>
</table>
COMS 301: MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE

UNIT I
Mathematical Logic: Connectives – Negation, Conjunction, disjunction, Statement Formulas and TT, Conditional and Biconditional, Well formed formulas, tautologies, Equivalence of statement formulae, Duality law, Tautological implications, Functionally complete set of connectives; Normal Forms – Disjunctive, Conjunctive, Principal disjunctive and principal conjunctive normal forms.

UNIT II
The theory of inference for statement calculus, Validity using TT, rules of inference, consistency of premises and indirect method of proof, Automatic Theorem proving- Predicate Calculus, Predicates, the statement function, variables and quantifiers.

UNIT III
Set Theory: Basic Concepts of Set theory, Notation, Inclusion and equality, Power set, Operations on sets, Set identities, Ordered pairs and n-tuples, Cartesian products - Relations and Ordering, Relations, Properties of binary relation- relation matrix and graph of a relation, partition and covering of a set, equivalence relations, composition of binary relations, partial ordering, partially ordered set - Functions, Definition, composition, Inverse, Binary and n-ary operations, characteristic function of a set, hashing function- Recursions, Functions, sets and predicates.

UNIT IV
Lattices and Boolean Algebra: Lattices as partially ordered sets, properties of lattices, Lattices as Algebraic systems, Some special lattices - Boolean algebra, functions, representation and minimization.

UNIT V
Graph theory: Definition, Examples, Paths and Cycles, Planarity, colouring graphs

TEXT BOOKS

2. Robin. J.Wilson, Introduction to Graph theory. (Fourth edition)
UNIT I

UNIT II
Introduction to Intel’s 8086/88: Register model – Bus interface Unit – Execution unit – Control Unit: hardwired and microprogrammed control. Memory organization: Basic memory cell – RAM, ROM and DRAM – associative, cache and virtual memory organizations.

UNIT III

UNIT IV

UNIT V

TEXT BOOKS

REFERENCES
2. Peter Abel, IBM PC Assembly language and Programming, PHI,2000,
COMS 303: DATA STRUCTURES

UNIT I
Introduction, algorithmic notation, Space and Time analysis of an algorithm, information and its storage representation, Representation and its manipulation of strings, Pattern Matching, Searching and sorting techniques.

UNIT II
Arrays: Array representation, Array processing – single and multi dimension arrays
Stacks: Stack Representations, stack operations
Queues: Definitions, Implementations of Queues, Circular queues, Application of Queues.
Linked lists: Singly, Doubly, Circular linked list

UNIT III
Trees: nary Trees, Binary Search Trees, Building a Binary Search Tree, Tree Traversal techniques.

Graphs: Definitions, Undirected and Directed Graphs, Traversal, Minimum cost spanning tree, topological sorting.

UNIT IV
Hash Table: Hash Functions, Collision Resolution Strategies, Hash Table Implementation.

Binary Search Trees: Binary Search Tree (BST), Insertion and Deletion in BST, Complexity of Search Algorithm, Path Length, AVL Trees, B-trees.

UNIT V
File Structures: Physical Storage Media File Organization, Organization of records into Blocks, Sequential Files, Indexing, Primary indices, Secondary indices, B+ Tree index Files, B Tree index Files, Indexing and Hashing Comparisons.

TEXT BOOKS


REFERENCE

COMS 304: PROBLEM SOLVING AND PROGRAMMING

UNIT I
Introduction to Problem Solving: Problem solving strategies, Problem identification, Problem understanding, Algorithm development, Solution planning (flowcharts, pseudo-code, etc.), Modular programming design. Basic program structure in C, Simple data types, variables, constants, operators, comments, Control Flow; if, while, for, do-while, switch.

UNIT II
Functions: Types, parameters, prototypes, recursion.
Arrays & Pointers: Array usage, Pointers, addresses and types, call by reference, Pointer - array duality, Strings, Arrays of pointers, Arguments to main, Pointers to functions.

UNIT III
Structures: Member accessing, pointers to structures, Structures and functions, Arrays of structures, linked lists, trees.
Other Data Types: Unions, enumerations and bit fields.

UNIT IV
Bitwise Operators: Usage, device accessing.
Type manipulation: Coercion, typedef, initialisation, Static, global, external, register.
Dynamic Allocation: Uses, pitfalls.
The Pre-processor: Define, include, macro's, ifdef.

UNIT V

TEXT BOOKS

REFERENCES
COMS 305: INFORMATION TECHNOLOGY

UNIT I
Introduction: Introduction to IT, Scope for IT, IT Usage, Information System, its functions and applications.

UNIT II
Hardware: Architecture (Mainframe, Mini, PC, Workstations), Real time system, Transaction Processing system, Laptop, Palmtop, Client server, N-Tier. Introduction to Networks: LAN, WAN, MAN, etc. Peripherals: Information about Input devices (Keyboard, Mouse, Joystick, Track ball, etc.) - Details about Storage devices (Floppy disk, Hard disk, Tapes (Cartridge, DAT), Compact Disk), Information about Monitors, Printers (impact, non-impact) - Various types of plotters.

UNIT III

UNIT IV
Multimedia and Internet: Introduction to multimedia - Hardware, Software and applications - Introduction to Internet, Service providers, Internet naming and addressing - Information about electronic mail, Remote login, File Transfer, Usenet-BBS, HTML. Intranet, Extranet: Introduction to Intranet and Extranet.

UNIT V

TEXT BOOKS

COMS 351: FUNDAMENTALS OF ALGORITHMS

UNIT I
INTRODUCTION: Algorithm - pseudo code for expressing algorithms – analysis - time complexity and space complexity - efficiency of algorithms - O-notation - Omega notation and Theta notation.


UNIT II

UNIT III
DYNAMIC PROGRAMMING: General method - Multistage Graphs – All pairs shortest paths, Single source shortest paths - optimal binary search trees - O/1 Knapsack problem - Traveling sales person problem.

UNIT IV

UNIT V
BRANCH AND BOUND: Least Cost(LC) search, Bounding - LC branch and bound - FIFO branch and bound - Travelling sales person problem.

TEXT BOOK


REFERENCES

COMS 352: OBJECT ORIENTED PROGRAMMING

UNIT I

UNIT II

UNIT III
Java vs. C++ - Java on the Internet – Exception handling – Multithreading and persistence – Java keywords and flow control – Garbage collection.

UNIT IV
Final declaration – Packages and interfaces – Java I/O classes – Run time type identification – User Interface design basics with swing.

UNIT V
Network programming – Applets – class - architecture - simple applet programs
Abstract window tool kit.

Note: Unit I & II deals with C++ and Java
Unit III , IV & V deals with Java.

TEXT BOOKS

REFERENCES
COMS 353: OPERATING SYSTEMS

UNIT I
Introduction Early Operating Systems – Buffering & Spooling – Multiprogramming –

Process Management: Process Concept – Hierarchy of Process – Critical Section Problem
– Semaphores – Process Coordination Problems – Inter Process Communication

UNIT II
CPU Scheduling : Scheduling Concepts – Scheduling Algorithms – Algorithms –
Algorithm Evaluation – Multiple Processor Scheduling

Deadlock: Deadlock Problem: Characterization – Prevention – Avoidance – Detection –
Recovery – Combined Approach to Deadlock Handling.

UNIT III
Memory Management: Introduction – Multiple Partition – Paging – Segmentation –
Paged Segmentation – Virtual Memory Concept – Overlays – Demand Paging and

UNIT IV
Secondary Storage Management: Physical Characteristics – Disk Scheduling – Disk
Issues.

UNIT V

TEXT BOOKS

1. Silberschatz, Peter Baer Galvin & Greg Gagne, Operating System Concepts
   Seventh Ed., Addison – Wesley Publications..

REFERENCES

1. William Stallings, Operating Systems Internals and Design Principles, PHI India,
UNIT I

UNIT II

UNIT III

UNIT IV

UNIT V

TEXT BOOK

REFERENCES

COMS 402 : COMPUTER NETWORKS
UNIT I

UNIT II

UNIT III

UNIT IV

UNIT V

TEXT BOOK

REFERENCE
UNIT I


UNIT II

**Visual Basic Programming:** Creating and using Controls – Menus and Dialogs – Programming fundamentals – Objects and instances – Programming user events – Using custom controls and grid control – inbuilt and user defined functions - Debugging - Creating graphics for application – File system controls - Accessing databases with the data controls – VB and the Internet.

UNIT III


UNIT IV

**Database Connectivity :** Mini database applications - Creating user defined DLL's - Dynamic data transfer functions - Database management with ODBC - Object linking and embedding.

UNIT V

**Advanced Topics:** Active x controls – COM – DCOM – COM+

**TEXT BOOKS**


**REFERENCES**


**COMS 451: INTERNET PROGRAMMING AND WEB TECHNOLOGY**
UNIT I
Networks, protocols, TCP/IP protocol suites, brief history of Internet, Internet Address, ports, sockets, Name Resolution, firewalls, protocol tunneling, proxy servers and Internet standards. WEB BASICS: history of web, Inside URL’s web browsers, web servers, resources of Internet, H/W and S/W requirement of Internet.

UNIT II
HTML: Anatomy of HTML document, text basics, rules, images and multimedia, document layout and webs, formatted lists, cascading style sheets, forms, tables, frames and executable content. DHTML: Adding animation, multiplying the media, adding Interactivity (dragging and dropping), working with data and dialog boxes, working with text, understanding browser object models, working with VB script and java script, embedding Active-X controls in web document.

UNIT III
Introduction to CGI - Perl: Introduction to CGI, Perl data structures, control structures, pattern matching and regular expressions, I/P and O/P in Perl, report formatting in perl, perl built-in functions, custom functions, references and anonymous data structures, object oriented programming in perl, advanced data manipulation, database programming with perl, perl-CGI programming, web programming with perl script.

UNIT IV
SERVELTS: Retrieving information, sending HTML information’s, sending multimedia content, session tracking, security, database connectivity, Applet servelet communication, Interservelet communication. ASP: Basics- variables, ASP control structures, object – properties, methods and events- request and response objects, Application, session, cookies and error handling objects. Scripting objects, ASP components, Data store Access, using Record sets and building script components for ASP.

UNIT V
XML: Anatomy of an XML Document, markup elements and attributes, creating valid documents, developing advanced DTD’s XML objects, checking validity, creating XML links, advanced addressing, viewing XML in browsers, processing, event-driven programming, programming with DOM, metadata, styling XML with css.

TEXT BOOKS

COMS 452: AUTOMATA THEORY AND COMPILER DESIGN
UNIT I

Finite Automata and Regular Expressions: Deterministic and Non-Deterministic Finite Automata, Finite Automata with $\varepsilon$-moves, regular expressions – equivalence of NFA and DFA, two-way finite automata, Moore and Mealy machines, applications of finite automata.

UNIT II


UNIT III

Introduction to Compiling: Compilers – Analysis of the source program – Phases of a compiler – Compiler construction tools
Lexical Analysis: Role of Lexical Analyzer – Input Buffering – Specification of Tokens.

UNIT IV


UNIT V


TEXT BOOK

REFERENCE BOOKS
THE PRODUCT: The evolving role of software – Software.

UNIT II

UNIT III

UNIT IV

UNIT V
SOFTWARE TESTING TECHNIQUES: Software testing fundamentals – Test case design – white box testing basis path testing – Control structure testing – Black box testing – Testing for specialized environments, architectures and applications

TEXT BOOK
REFERENCES

COMS 501: COMPUTER GRAPHICS

UNIT I

UNIT II
Output primitives, Line drawing algorithms, Circle Drawing algorithms, Circle drawing algorithms, Polynomials and spline curves, Area filling algorithms, character generation, Attributes of Output primitives, Line, Curve, Area fill, Character and bundled attributes, Anti aliasing techniques.

UNIT III
2D Transformations, 2D viewing, Graphical User interfaces and Interactive Input Methods.

UNIT IV

UNIT V

TEXT BOOK


REFERENCES
COMS 502 : MANAGEMENT CONCEPTS AND STRATEGIES

UNIT I

UNIT II
Decision making. The Nature and purpose of organizing - Basic departmentation - Line / staff Authority and decentralization - Effective Organizing and organizational culture.

UNIT III
Human Resource Management and selection - Performance appraisal and career strategy - Manager and organizational development.

UNIT IV
Managing and the Human factor - Motivation - Leadership - communication.

UNIT V
The system and Process of controlling control techniques and information Technology - Productivity and Operations Management - Overall and Preventive Control - Towards a unified, Global management theory.

TEXT BOOKS


COMS 223: FOREIGN LANGUAGE – FRENCH I

UNIT I
PAROLES ET GESTES
Objectifs linguistiques
- saluer
- se présenter
- présenter quelqu’un

UNIT II
CHIFFRES ET LETTRES
Objectifs linguistiques
- demander une information
- demander quelque chose

UNIT III
A PARIS
Objectif linguistique
- donner son opinion

UNIT IV
ACTIVITÉS ET PRÉFÉRENCES
Objectifs linguistiques
- exprimer ses préférences
- proposer / accepter ou refuser une proposition

UNIT V
AU FIL DES HEURES
Objectifs linguistiques
- préciser son identité
- s’excuser et se justifier
- dire l’heure

TEXT BOOK
1. Pierre GILBERT & Philippe GREFFET, BONNE ROUTE – Méthode de Français
COMS 224: FOREIGN LANGUAGE – FRENCH II

UNIT I
AU FIL DES HEURES
Objectifs linguistiques
- préciser son identité
- s’excuser et se justifier
- dire l’heure

UNIT II
TRAVAIL ET LOISIRS
Objectifs linguistiques
- parler de soi
- exprimer un jugement
- exprimer un souhait

UNIT III
AUTOUR DE NOUS
Objectifs linguistiques
- interroger sur le temps
- présenter des personnes

UNIT IV
DES GENS, UNE VILLE … LES JOURS
Objectifs linguistiques
- caractériser des personnes, des lieux
- donner son opinion
- compter jusqu’à 99

UNIT V
OU SONT-ILS ? OU VONT-ILS?
Objectifs linguistiques
- demander et donner des informations pratiques
- savoir téléphoner
- communiquer

TEXT BOOK
COMS 225: COMMUNICATION SKILLS

UNIT I


UNIT II

Session–V: Group Discussion: Group Discussion - Purpose - Process of Group Discussion - Preparation - Getting Started - Art of guiding and controlling discussion - Personality test through group discussion - Lateral thinking - Participation techniques - mock G.D.

UNIT III

Session–VII: Negotiation Techniques: Meaning - Importance - Fundamentals - Preparation - Techniques of Negotiation - Managing process of negotiation - Inter-personal haviour - Case Study - Mock negotiations

Session–VIII: Meetings: Meaning - Importance - Objectives - Leading and participating in meetings - Success indicators - Understanding the process of meetings - Communication skills for meetings - Mock Meetings - Seminars.

UNIT IV
Session–IX: Management Communication Relationships: Communication in Management - Semantics - Employee and Employer communication - Communication within Management - Downward and Upward communication - Communication by specialists - The Union's role in communication.

Session–X: Presentation: Meaning and types of presentation - Understanding the audience - Planning - Designing - Written and oral - Making use of notes and outlines - Techniques for delivering presentation - personal style - A postscript - model presentation

UNIT V
Session - XI: A whole review of the ten sessions and evaluation of the students.

Session – XII: Practical communication with a cross section of the society.
COMS 226: ACCOUNTING AND FINANCIAL MANAGEMENT

UNIT I

UNIT II

UNIT III

UNIT IV

UNIT V

TEXT BOOKS

COMS 520: BUSINESS PROCESS

UNIT I

UNIT II
Recognizing a Creation Company - The WHOOSH – Beginners mind - Creation Company Vs. Compliance Company.

UNIT III
Becoming a Creation company – Choosing to change – the art of collaboration – Models. Leading a Creation Company – Freedom and Focus – Creation Leadership.

UNIT IV
Introduction to Business Process Reengineering – Business Process Reengineering through IT – People view – Case Study – Empowering through IT.

UNIT V

TEXT BOOKS

COMS 521: INTRODUCTION TO PROGRAMMING

UNIT I
Introduction to Problem Solving - Flow charts - Tracing flow charts - Problem solving methods - Need for computer languages - Sample Programs written in C

UNIT II
C Language preliminaries - C character set, Identifiers and keywords, Data types, Declarations, Operators and expressions, statements and symbolic constants - Storage types

UNIT III
Arrays - Strings - Input-Output functions - Pre-processor commands – Preparing, compiling and running a complete C program

UNIT IV
Functions - Defining and accessing, passing arguments, Function prototypes, Recursion, Library functions, Static Functions - Structures - Defining and processing. Passing to a function – Unions

UNIT V
Files – Defining and processing – File operations - Pointers - Declarations, Passing pointers to a function, Operations on pointers - Searching – Sorting – String processing – applications using structures and files

TEXT BOOKS

COMS 522: INTRODUCTION TO PC & ITS UTILITIES

UNIT I
Introduction to computers: Basic components, Hardware & Software resources, Number system: Decimal, Binary, Octal, Hexadecimal, conversions, Introduction to Windows operating system, components of windows OS, Desktop properties, GUI.

UNIT II
Introduction to Microsoft Word: Various formatting Techniques, Mail merge, Tables and other features.

UNIT III
Introduction to Microsoft Excel: Worksheets, Chart wizards, function wizard and other features.

UNIT IV
Introduction to Microsoft power point: Various views, slide layout, inserting pictures and sounds, custom animation and other features.

UNIT V
Introduction to Internet, Getting connected to internet, internet features, protocols, E-mail, Internet explorer & Outlook express.

TEXT BOOKS
2. N.Krishnan, ”Computer fundamental & windows with Internet Technology”.
COMS 523: SYSTEM SOFTWARE

UNIT I

UNIT II

UNIT III

UNIT IV
MACROPROCESSORS: Basic Macroprocessor functions – machine independent features, Macroprocessor design – recursive, one pass macroprocessor –two pass macroprocessor-general-purpose and macroprocessing with language translators.

UNIT V

TEXT BOOKS


REFERENCE

COMS 524: OPERATION RESEARCH

UNIT I

UNIT II
Transportation Problem – Assignment Problem – Network Techniques

UNIT III
Integer Programming – Formulations – Cutting-plane Algorithm – Branch-and-Bound Technique – Zero-One Implicit Enumeration Technique

UNIT IV
Inventory Control – Queuing Theory

UNIT V
Dynamic Programming – Project Management – Replacement and Maintenance Analysis

TEXT BOOK


REFERENCES

COMS 525 : TCP/IP

UNIT I
**Introduction** : Inter Networking concept – Application level – Network level Interconnection – Internet Architecture – Inter Connection through IP Routers, Internet Addresses – Mapping Internet addresses to Physical addresses (ARP) – Determining an Internet address at startup (RARP).

UNIT II

UNIT III

UNIT IV

UNIT V
**Application Protocols** : Domain Name System – File transfer & access (FTP, TFTP, NFS) – electronic mail (SMTP, MIME) – Network management (SNMP) – Internet security.

TEXT BOOK


REFERENCES

UNIT I

**Introduction to Kernel**: System concepts – Kernel data structures – Buffer cache. **File representation**: Inodes – Structure of a regular file – Directories – Conversion of a path name to an Inode - Super block – Inode assignment – Allocation of disk blocks - System Calls for File system.

UNIT II


UNIT III


UNIT IV


UNIT V


**TEXT BOOKS**

COMS 527: PRINCIPLES OF PROGRAMMING LANGUAGES

UNIT I
Language design Issues: Reasons for studying concepts of programming language – language evaluation criteria- influences on language design- structure and operation of computer – virtual computers and binding times- language paradigms.

UNIT II
Data types: Properties of types and objects-elementary data types- structured data types. Abstraction: Abstract data types-encapsulation by subprograms-type definition- storage management.

UNIT III
Sequence Control: Implicit and explicit sequence control- sequencing with arithmetic and non-arithmetic expressions-sequence control between statements. Subprograms control: subprogram sequence control- attributes of data control – shared data in subprograms.

UNIT IV

UNIT V
Advances in language design: variations on subprogram control- language constructors for parallel processing language semantics-software architecture.

TEXT BOOKS

REFERENCES
## COMS 528: MIDDLEWARE TECHNOLOGY

### UNIT I
Client – Server – File Server, Data Base Server, Group Server, Object Server, Web Server  
Middleware – General Middleware – Service Specific Middleware  
Client – Client Server Building blocks – RPC – Messaging – Peer-to-Peer

### UNIT II
EJB – EJB Architecture – Overview of EJB Software Architecture – View of EJB Conversation – Building and Deploying EJBs – Roles in EJB

### UNIT III
EJB Session Beans – EJB Entity Beans – EJB Clients – EJB Deployment – Building an Application with EJB

### UNIT IV

### UNIT V

### TEXT BOOKS

### REFERENCES
UNIT I

UNIT II

UNIT III

UNIT IV

UNIT V

TEXT BOOKS

REFERENCES
COMS 530: MULTIMEDIA SYSTEMS AND APPLICATIONS

UNIT I

UNIT II

UNIT III

UNIT IV

UNIT V

TEXT BOOKS


REFERENCES

COMS 531: E-COMMERCE

UNIT I

UNIT II

UNIT III

UNIT IV

UNIT V
Internet and Web site establishment: Introduction – Technologies for web servers – Internet tools relevant to Commerce – Internet Applications for Commerce – Internet charges – Internet Access and Architecture – Searching the Internet

TEXT BOOKS

COMS 532: NEURAL NETWORKS

UNIT I
Introduction, Characteristics of Artificial Neural Networks, Learning in Biological systems and machines, Brain and Computers, Differences in simple neurons.

UNIT II
Perceptron and representation, Learning, Linear separability, Problems with the perceptron training algorithms, Multilayer perceptron, Back propagation training algorithm, Learning difficulties, Applications.

UNIT III

UNIT IV

UNIT V

TEXT BOOK

REFERENCES
COMS 533: .NET FRAMEWORK AND C#

UNIT I

UNIT II
Introduction to C# - Data Type – Operators – Flow Control and Iteration – Arrays and Strings – Basics of C# Classes – Boxing and Unboxing – Reflection – Interoperability – The Preprocessors – Attributes – Name Spaces.

UNIT III

UNIT IV
Implementing the ICloneable and IComparable Interfaces – Introduction to .NET Collections (including Custom Collections) – Custom Indexers, Delegates and Events – Multithreading and Synchronization – Type Reflection and Attributes – Programming the Windows Registry.

UNIT V

TEXTBOOKS

REFERENCES
COMS534: CLIENT SERVER SYSTEMS

UNIT I

UNIT II
Client/Server System Architecture: Client/Server building blocks, Hardware, software, Middleware, Types of Middleware, DLE, MOM, Transaction Processing Monitors, ODBC, Need for Database Connectivity, Design Overview of ODBC, Architecture, Components, Applications, Driver Managers, Drivers, Data Sources, ODBC 2.5 and ODBC 3.0, Operating System Services, Base Services, External Services, Server Scalability.

UNIT III

UNIT IV
Client/Server Protocols: RPC, IPC.

UNIT V
Recent Trends in Client/Server Computing: Intranet, Extranet, Internet, CORBA, etc.

TEXT BOOKS

UNIT I

UNIT II

UNIT III

UNIT IV

UNIT V

TEXT BOOK
COMS 536: ATM NETWORKS

UNIT I

UNIT II

UNIT III

UNIT IV
High Speed LANs: Fast Ethernet – ATM LAN’s – LANE.

UNIT V

TEXTBOOKS


REFERENCES


COMS 537: COMPONENT SOFTWARE

UNIT I
Components are for Composition-Components –Custom-made versus standard software-
Inevitability of Components-Standards-Importance of Standards-Foundation-
Components, Objects, Modules, Interfaces, Component “Weight”-Object Vs Class
Composition-Inheritance, Approaches to Disciplined Inheritance.

UNIT II
Patterns, Framework, Architecture-Component Models and Platforms-Object And
Component Using Standards-From procedures to Objects-Specification of Interfaces and
Object Interface Relationships and Polymorphism-CORBA,CORBA Component Model-
Java Component Technology- Applet, Servlets, Beans,Enterprise Beans.

UNIT III
The Microsoft Way-COM Object range,COM Object Creation-From COM To DCOM-
Component Document and OLE-Contextual Compositioin And Services-COM
Apartments-MTS,COM+.

UNIT IV
Component Architecture-Component Frameworks-Component Framework Vs
Connectors-Component Frameworks Vs Aspect Oriented Programming-Framework for
Contextual Composition-Black Box Component Framework.

UNIT V
Component Development-Component oriented Programming, Problem Of Asynchrony-
MultiThreading-Living Without Implementation Inheritance-Component Distribution
And Acquisition-Component Assembly.

TEXTBOOK

COMS 538: DISTRIBUTED DATABASE SYSTEMS

UNIT I
Introduction: Distributed data processing, distributed database design, distributed query processing, distributed directory management, distributed concurrency control, distributed deadlock management, reliability of distributed DBMS, operating system support, heterogeneous databases. Overview of Relational DBMS

UNIT II

UNIT III
Distributed Database Design: Alternative design strategies: top-down design process, bottom-up design process, distribution design issues: reasons for fragmentation, fragmentation alternatives, degree of fragmentation, correctness rules of fragmentation, allocation alternatives, information requirements, fragmentation: horizontal fragmentation, vertical fragmentation, hybrid fragmentation.

Semantic data control: View management: views in centralised DBMS, updates through views, views in distributed DBMS.

Data security: centralized authorization control, distributed authorization control.

UNIT IV
Distributed Concurrency Control: Locking-based concurrency control algorithm, timestamp-based concurrency control algorithms: basic TO algorithm, conservative TO algorithm, optimistic concurrency control algorithms.
Deadlock management: deadlock prevention, deadlock avoidance, deadlock detection and resolution.
Distributed DBMS Reliability: System, state and failure, reliability and availability, mean time between failures/mean time to report, failure and fault tolerance in distributed systems: reasons for failures, basic fault tolerance approaches and techniques.

UNIT V
Distributed Object Database Management: Object, abstract data types, composition, class, collection, subtyping and inheritance, Object distribution design: horizontal class partitioning, vertical class partitioning, path partitioning, class partitioning algorithms, allocation, replication.

TEXT BOOK
COMS 539: AI AND EXPERT SYSTEMS

UNIT I
Problem solving and AI, Puzzles and Games, Problem States and Operators, Heuristic programming, state space representations, state descriptions, graph notations, non-deterministic programs.

UNIT II
State space search methods, breadth first and depth first search, heuristic, admissibility, optimality of algorithms, performance measures, problem reduction representations, AND/OR graphs and higher level state space.

UNIT III
Problem reduction search methods, cost of solution trees ordered search, alpha beta and minimum procedure, theorem proving in predicate calculus, syntax, semantics, Herbrand universe: variables, qualifiers, unification, resolvents.

UNIT IV
Predicate calculus in problem solving, answer extraction process, resolution, automatic program writing, predicate calculus, proof finding methods.

UNIT V

TEXT BOOKS

COMS 540: ARTIFICIAL INTELLIGENCE

UNIT I

UNIT II

UNIT III

UNIT IV

UNIT V

TEXTBOOKS


REFERENCES

COMS 541: FUNDAMENTALS OF AGENT TECHNOLOGY

UNIT I


UNIT II

Deductive Reasoning Agents – Agents as Theorem Provers – Agent-Oriented Programming – Concurrent MetateM


Reactive and Hybrid Agents- Brooks and the Subsumption Architecture – The Limitations of Reactive Agents – Hybrid Agents

UNIT III


Reaching Agreements – Mechanism Design – Auctions – Negotiation – Argumentation

Communication – Speech Acts – Agent Communication Languages – Ontologies for Agent Communication – Coordination Languages

UNIT IV

Cooperative Distributed Problem Solving – Task Sharing – Combining Task and Result Sharing – Handling Inconsistency – Coordination – Multiagent planning and Synchronization

UNIT V

Methodologies – Agent-Oriented Analysis and Design Techniques – Pitfalls of Agent Development – Mobile Agents

Applications of Agents

TEXT BOOK

REFERENCES
COMS 542 : ENTERPRISE RESOURCE PLANNING

UNIT I

UNIT II

UNIT III
ERP domain- MPG/PRO – IFS/Avalon- Industrial and financial systems- Baan IV SAP – Market Dynamics and dynamic strategy.

UNIT IV
Description – Multi- client server solution- Open technology- User Interface-Application Integration.

UNIT V
Basic architectural Concepts- The system control interfaces- Services-Presentation interface – Database Interface.

TEXT BOOK

REFERENCES
COMS 543 : ELEMENTS OF SOFTWARE PROJECT MANAGEMENT

UNIT I

UNIT II
PROJECT SCHEDULE PLANNING: Top down and bottom up planning – initial and final project schedule plans – types of activity relationships – estimating the duration of an activity – critical path – identifying milestones – activity responsibility matrix – project check list.

UNIT III
PROJECT TRACKING: Overview of project progress – project outlook – occurrence of tracking – tracking meetings – tracking meeting ground rules – recovery plans – the role of escalations.

UNIT IV

UNIT V
MARKETING ISSUES:

TEXT BOOKS

COMS 544 : SOFTWARE TESTING AND QUALITY ASSURANCE

UNIT I
SOFTWARE TESTING PRINCIPLES: Need for testing - Psychology of testing - Testing economics - White box, Black box, Grey box testing – SDLC and Testing - Verification & Validation - Weyuker's adequacy axioms.

UNIT II
TESTING STRATEGIES: White box testing techniques - Statement coverage - Branch Coverage - Condition coverage - Decision/Condition coverage - Multiple condition coverage - Dataflow coverage - Mutation testing - Automated code coverage analysis - Black box testing techniques - Boundary value analysis - Robustness testing - Equivalence partitioning - Syntax testing - Finite state testing - Levels of testing - Unit, Integration and System Testing.

UNIT III

UNIT IV
Introduction to Quality and Quality Control - Evolution of Quality Control - Quality assurance - Quality circles and Quality improvement teams - Benefits of Quality control - Quality and Reliability - Quality costs - Measuring Quality costs - Total Quality Management.

UNIT V

TEXT BOOKS
8. Mordechan Ben, Chrissis Mike Konard and Sandy Shrum, CMMI, Pearson Education Ltd.

REFERENCES
COMS 545 : OBJECT ORIENTED ANALYSIS AND DESIGN

UNIT I

UNIT II

UNIT III

UNIT IV
The Object-Oriented Design Process and Design Axioms – the object-oriented design process- object-oriented design axioms- corollaries- design patterns.
Designing Classes - the object-oriented design philosophy- UML object constraint language- designing classes- the process- class visibility- designing classes- refining attributes - designing methods and procedures- Access Layer - designing access layer classes- case study -View Layer- Designing interface objects – user interface design as a creative process- designing view layer classes

UNIT V
Case Study - Use-case model- developing effective documentation- Analyzing the ViaNet Bank ATM - Relationship analysis for the ViaNet Bank ATM System- defining attributes for ViaNet Bank objects- object responsibility - defining methods for ViaNet Bank objects - refining attributes for the ViaNet Bank objects - designing methods for the ViaNet Bank objects - Designing the access layer for the ViaNet Bank ATM - designing user interface for the ViaNet Bank ATM.

TEXTBOOK
COMS 546: DATA WAREHOUSING AND MINING

UNIT I
Evolution of database technology – Introduction to data warehousing and data mining - Differences between operational databases and data warehouses.

UNIT II
Data warehouse architecture & design, Hardware & Operational design, Tuning and testing.

UNIT III
Data mining: Data preprocessing, data mining primitives, languages & system architectures, concept description: characterization and comparison, Mining association rules, classification and prediction.

UNIT IV
Cluster analysis, Applications and trends in data mining.

UNIT V
Introduction to Microsoft’s OLE DB for Data mining, DBMiner.

TEXTBOOKS

2. Jiawei Han et, al., “Data Mining: Concepts and Techniques”, Morgan Kaufmann series, 2000.

REFERENCES

COMS 547: INTRODUCTION TO BIOINFORMATICS

UNIT I

UNIT II
Literature Databases: Public databases and data formats, popular gene and protein databases – Sequence alignment and sequence searching – Database search strategies – querying strategy, similarity searching Vs homology – popular tools for database searching and querying – FETCH, LOOKUP, ENTREZ, NetFETCH, BLAST, FASTA Interpretation of results

UNIT III
Pairwise alignment: Problem Definition & Biological motivation – similarity and differences – global alignment, Local alignment – gap penalty models – substitution matrices – PAM, BLOSUM – Applying dynamic programming to pairwise alignment – Needleman-Wunsch algorithm, Smith_waterman Algorithm

UNIT IV
Multiple Sequence alignment: Computational challenges – Dynamic programming solution – approximation algorithms – center star, distance from consensus, sum of pairs, progressive alignment, multiple alignment to a phylogenetic tree – Tools for Multiple sequence alignment – CLUSTALW

UNIT V

TEXT BOOKS
3. David Mount, “Bioinformatics: Sequence & Genome Analysis”.
COMS 548 : INTRODUCTION TO SOFTWARE ARCHITECTURE

UNIT I

UNIT II
Case studies - Key word is Context – Instrumentation Software – Mobile Robotics – Cruise Control – Three Vignettes in Mixed Style

UNIT III

UNIT IV

UNIT V

TEXT BOOKS

COMS 549: ADVANCED JAVA

UNIT-I
JAVA BASICS REVIEW: Data Structures - Collection classes - Event handling - Multithreading - Byte code Interpretation - Customizing application - Java streaming - Networking.

UNIT-II
DISTRIBUTED COMPUTING: Distributed Computing: Lookup Services - Remote Method Invocation (RMI) - Common Object Request Broker Architecture (CORBA) - JDBC Technology - Servlets.

UNIT-III
JAVA BEANS AND SWING: Bean concepts - Events in bean box - Bean customization - Persistence - Application deployment using swing - Advanced swing techniques - JAR file handling.

UNIT-IV

UNIT-V
RELATED JAVA TECHNIQUES: Performance Tuning Techniques - Improving Performance by Design - Internationalization - Case study - Deploying n-tier application, E-commerce applications.

Textbook

Unit – I

Unit – II

Unit – III

Unit – IV

Unit – V

Text Book

Reference
COMS 551: MICROPROCESSOR ARCHITECTURE

Unit I
**Introduction to the Microprocessor** : History - Microprocessor-Based Personal Computer System - Number Systems - Computer Data Formats - **Architecture & Addressing** : Microprocessor Architecture - Real Mode Memory Addressing - Protected Mode Memory Addressing - Memory Paging - Addressing modes.

Unit II

Unit III
Memory Interface : Memory Devices - Address Decoding - 8088 and 80188 (8-bit) Memory Interface - Dynamic RAM. Basic I/O Interface : Introduction to I/O Interface - I/O Port Address Decoding - The Programmable Peripheral Interface - The 8279 Programmable Keyboard/Display Interface - 8254 Programmable Interval Timer - Analog-to-Digital (ADC) and Digital-to-Analog (DAC) Conversions

Unit IV

Unit V : 80186, 80188, and 80286 - The Pentium and Pentium Pro Microprocessors.

Text Books

References

UNIT I

UNIT II

UNIT III
Knowledge acquisition and validation: Knowledge engineering – Scope – Acquisition methods - Interviews – Tracking methods – Observation and other methods – Grid analysis

UNIT IV

UNIT V

TEXT BOOK
Unit I
ARTIFICIAL NEURALS: Basic-concepts-single layer perception-Multi layer perception-Supervised and un-supervised learning back propagation networks, Application

Unit II
FUZZY SYSTEMS: Fuzzy sets and Fuzzy reasoning-Fuzzy matrices-Fuzzy functions-decomposition-Fuzzy automata and languages- Fuzzy control methods-Fuzzy decision making, Applications

Unit III

Unit IV
GENETIC ALGORITHM: Survival of the fittest-pictures computations-cross over, mutation-reproduction-rank method-rank space method, Application

Unit V
SOFT COMPUTING AND CONVENTIONAL AI: AI Search algorithm-Predicate calculus- rules of interface - Semantic networks-frames-objects-Hybrid models applications

References:
COMS 554: PRINCIPLES OF DISTRIBUTED SYSTEM

UNIT I

UNIT II
Threads – Client –Server – Code Migration –S/W Agents Naming Entity – Location Mobile Entity

UNIT III
Synchronization- Clock Synchronization-Logical Clocks- Global States-Election Algorithms- Mutual Exclusion – Distributed Transaction Consistence and Replication - Introduction- Data Centric Consistence- Fault Tolerance- Reliable Client/Server Communication- Distributed Commit – Recovery

UNIT IV
Distributed Object Database System  CORBA – DCOM - GLOBE.

UNIT V
Distributed File System- Distributed Document Base System-WWW-Distributed Coordination Base System- JINI

Text Books

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