Eligibility for Admission

Candidates who have secured 55% of marks or above in any one of the following or equivalent, are eligible to apply:
Bachelor’s Degree in Computer Science/ Technology/ Applications

Duration of the Course

The course duration shall normally be of two years duration spread over four semesters. The maximum duration to complete the course shall be 4 years

Medium

The medium of instruction shall be English.

Passing Minimum

Passing Eligibility & Classification for the award of the Degree are as per the Choice Based Credit System norms
PONDICHERRY UNIVERSITY
RAMANUJAN SCHOOL OF MATHEMATICS AND COMPUTER SCIENCE
DEPARTMENT OF COMPUTER SCIENCE
MASTER OF SCIENCE CURRICULUM
(Effective from the academic year 2009-2010)

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

**FIRST SEMESTER**

<table>
<thead>
<tr>
<th>S.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>411</td>
<td>Design of Algorithms</td>
<td>H</td>
<td>3</td>
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<tr>
<td>2</td>
<td>413</td>
<td>Computer Architecture and Organization</td>
<td>H</td>
<td>3</td>
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<tr>
<td>3</td>
<td>414</td>
<td>Visual Programming</td>
<td>H</td>
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<td>4</td>
<td>415</td>
<td>Database Systems</td>
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<td>5</td>
<td></td>
<td>Elective - I</td>
<td>S</td>
<td>3</td>
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<tr>
<td>6</td>
<td>418</td>
<td>Practical I - Visual Programming Lab</td>
<td>H</td>
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<tr>
<td>7</td>
<td>419</td>
<td>Practical II - Algorithms Lab</td>
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**SECOND SEMESTER**

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<tbody>
<tr>
<td>1</td>
<td>412</td>
<td>Automata Theory &amp; Formal Languages</td>
<td>H</td>
<td>3</td>
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<tr>
<td>2</td>
<td>462</td>
<td>Data Communication Networks</td>
<td>H</td>
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<td>3</td>
<td>463</td>
<td>Software Engineering Concepts</td>
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<td>4</td>
<td>464</td>
<td>Object Oriented System Design</td>
<td>H</td>
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<td>5</td>
<td>465</td>
<td>Web Technology</td>
<td>H</td>
<td>3</td>
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<tr>
<td>6</td>
<td></td>
<td>Elective II</td>
<td>S</td>
<td>3</td>
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<tr>
<td>7</td>
<td>467</td>
<td>Practical III –Networks Lab</td>
<td>H</td>
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<td>8</td>
<td>469</td>
<td>Practical IV – Case Tools Lab (OOAD)</td>
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**THIRD SEMESTER**

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<th>S.No.</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>511</td>
<td>Principles of Compiler Design</td>
<td>H</td>
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<tr>
<td>2</td>
<td>512</td>
<td>Computer Graphics</td>
<td>H</td>
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<td>3</td>
<td>513</td>
<td>Cryptography and Network Security</td>
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<td>4</td>
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<td>Elective III</td>
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<td>Elective IV</td>
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<td>6</td>
<td>518</td>
<td>Practical V- Compiler Design Lab</td>
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<td>7</td>
<td>519</td>
<td>Practical VI - Client/Server Lab</td>
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</table>
FOURTH SEMESTER

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<th>Sl.No.</th>
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<tr>
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<td>561</td>
<td>Project Seminar</td>
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<td>2</td>
<td>562</td>
<td>Project Work</td>
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<td>3</td>
<td>563</td>
<td>Project Report &amp; Viva-voce</td>
<td>H</td>
<td>4</td>
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</table>

LIST OF ELECTIVES

<table>
<thead>
<tr>
<th>Code</th>
<th>Course Title</th>
<th>H/S</th>
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<tbody>
<tr>
<td>461</td>
<td>Unix &amp; Shell Programming</td>
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<tr>
<td>527</td>
<td>Principles of Programming Languages</td>
<td>S</td>
<td>3</td>
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<tr>
<td>528</td>
<td>Middleware Technologies</td>
<td>S</td>
<td>3</td>
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<tr>
<td>530</td>
<td>Multimedia Systems &amp; Applications</td>
<td>S</td>
<td>3</td>
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<tr>
<td>531</td>
<td>E-Commerce</td>
<td>S</td>
<td>3</td>
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<tr>
<td>532</td>
<td>Neural Networks</td>
<td>S</td>
<td>3</td>
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<tr>
<td>533</td>
<td>.NET Framework and C#</td>
<td>S</td>
<td>3</td>
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<tr>
<td>538</td>
<td>Distributed database systems</td>
<td>S</td>
<td>3</td>
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<tr>
<td>540</td>
<td>Artificial Intelligence</td>
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<td>541</td>
<td>Fundamentals of Agent technology</td>
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<tr>
<td>544</td>
<td>Software Testing and Quality Assurance</td>
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<tr>
<td>546</td>
<td>Data Mining and Warehousing</td>
<td>S</td>
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<tr>
<td>550</td>
<td>Natural Language Processing</td>
<td>S</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 Systems</td>
<td>S</td>
<td>3</td>
</tr>
</tbody>
</table>
COMS 411: DESIGN AND ANALYSIS OF ALGORITHMS

UNIT I
Introduction: Data structure concepts - List, Stacks, Queues, Trees, Heaps, Sets, Graphs, Design of Efficient Algorithms and their Computational Complexities. **Divide and Conquer Method:** Binary search, finding maximum and minimum, merge sort, quick sort.

UNIT II
**Greedy Method:** Knapsack problem, Minimum spanning trees, Single source shortest path problem. **Dynamic Programming:** Multi stage graphs, All pairs shortest path problem, 0/1 Knapsack problem, Travelling sales man problem.

UNIT III
**Search and Traversal Techniques for Graphs:** Tree traversal techniques (inorder, preorder, postorder, levelorder), Graph traversals (BFS, DFS). **Hashing Techniques:** Internal and External hashing methods.

UNIT IV
**Backtracking:** Knight’s tour, Eight Queen Problem, Sum of Subsets, Graph Coloring, Hamiltonian Cycles, Knapsack Problem.

UNIT V
**Branch and Bound Techniques:** The method, 0/1 Knapsack problem, Travelling Salesman Problem.

TEXT BOOKS
1. Ellis Horowitz and Sartaj Sahani, “Fundamentals of computer Algorithms”, (Unit I to Unit IV).

REFERENCES
COMS 413: COMPUTER ARCHITECTURE AND ORGANIZATION

UNIT I
BOOLEAN ALGEBRA AND COMBINATIONAL LOGIC
Review of binary number systems - Binary arithmetic – Binary codes – Boolean algebra and theorems - Boolean functions – Simplifications of Boolean functions using Karnaugh map and tabulation methods – Logic gates.

Combinational circuits – Analysis and design procedures - Circuits for arithmetic operations - Code conversion – Introduction to Hardware Description Language (HDL)

UNIT II
DESIGN WITH MSI DEVICES
Decoders and encoders - Multiplexers and demultiplexers - Memory and programmable logic - HDL for combinational circuits.

Sequential circuits – Flip flops – Analysis and design procedures - State reduction and state assignment - Shift registers – Counters.

UNIT III
Introduction to Organization - Address Modes - Instruction set - Opcode format.
Processor Design: Processor Organization, Arithmetic Logic Unit, Design of Arithmetic Circuit, Design of Logic Circuit, Design of ALU, Status Register, Design of Shifter, Processor Unit, Design of Accumulator, Design of Floating point Arithmetic Unit.

Unit IV
Hardwired Control Logic Design: Control organization, Hardwired control for binary adder/subtractor, Design of Multiplier Control Unit, PLA Control. Micro programmed Control: Microinstructions, Grouping of control signal, Microprocessor sequencing - Microinstructions with next address fields, prefetching of Microinstructions and evaluations, bit slices.

Unit V
Memory System Design: Memory hierarchy, Associative memory, and Virtual memory, Cache memory, Memory management hardware.
I/O ORGANIZATION

Text Books
COMS 414 : VISUAL PROGRAMMING

UNIT I

UNIT II

UNIT III

UNIT IV
Advanced Features in VB and VC++: Creating user defined DLL’s – Dynamic data transfer functions – User interface classes – Database management with ODBC – Object Linking and Embedding – Communicating with other applications.

UNIT V
Introduction to .NET: Common Language Runtime - Overview of .NET languages - Simple windows applications using VB .NET.

TEXT BOOKS
4. Gray J.
COMS 415: DATABASE SYSTEMS

UNIT - I

UNIT – II
Entity relationship model: Mapping constraints – Primary Keys – Foreign Keys – Structural Constraints. – ER notations - ER model examples – Enhanced Entity Relationship Model: EER Concepts like Generalization, Specialization, Union, Category, Disjoint, Overlapping etc. EER model examples

UNIT- III

UNIT- IV

UNIT- V

Text Books:

Reference Books:
1. Fundamentals of Database Systems (Chapters 1, 2, 3, 4.1, 7, 8, 9, 14) – Ramez Elmasri and B. Navathe – Addison Wesley, III Edition
COMS 418: VISUAL PROGRAMMING LAB

1. Design and develop an analog clock
2. Design and Develop an File Explorer
3. Design and Develop an intranet Chatting tool
4. Developing any system utility using win32 API.
COMS 412: AUTOMATA THEORY AND FORMAL LANGUAGES
(Only statements and applications of Theorems)

UNIT I

UNIT II

UNIT III
Turing Theory: Turing Machines – Computable Language and Functions – Techniques for TM Construction – Modification of TM. Non regular languages and Pumping Lemma

UNIT IV

UNIT V
Case Studies: Application of Finite Automata – Parsing.

TEXT BOOKS

REFERENCE
2. DANIEL I.A. COHEN,” INTRODUCTION TO COMPUTATION THEORY”, JOHN WILEY & SONS, 2ND EDITION.
UNIT I

UNIT II

UNIT III

UNIT IV

UNIT V

TEXT BOOK

REFERENCE
COMS 463: SOFTWARE ENGINEERING CONCEPTS

UNIT I

UNIT II
Software process and Project Metrics, Risk Management, Quality Assurance and Quality models – McCall’s model, FURPS model and ISO 9126 model, Configuration management.

UNIT III

UNIT IV
Software Testing, Test-case Design, White Box Testing, Black Box testing, Testing GUI and Client/Server Architecture, Testing Strategies, Unit Testing, Integration testing, Validation testing, System testing, Software Maintenance.

UNIT V

TEXT BOOK

REFERENCES
COMS 464: OBJECT ORIENTED SYSTEM DESIGN

UNIT I

UNIT II

UNIT III
Object-Oriented Analysis Process - identifying Use Cases - Use-case driven object-oriented analysis - business process modeling - Use-case model - Object Analysis - Classification - classifications theory - approaches for identifying classes - Identifying object relationships - identifying attributes and methods - defining attributes by analyzing use cases and other UML diagrams.

UNIT IV
The Object-Oriented Design Process and Design Axioms - the object-oriented design process - object-oriented design axioms - corollaries - Design patterns and frameworks – Describing Design patterns – Façade Design pattern. 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.

UNIT V
Access Layer - designing access layer classes - case study - View Layer - Designing interface objects – user interface design as a creative process - designing view layer classes – User satisfaction and usability testing
Case Study - Analyzing the Bank ATM - Use-case model - developing effective documentation - Relationship analysis - defining attributes - object responsibility - defining methods for - refining attributes - designing methods - Designing the access layer - designing user interface
TEXT BOOKS
2. Erich Gamma, Richard Helm, Ralph Johnson and John Vlissides, “DESIGN PATTERNS Elements of reusable Object Oriented Software”, Addison Wesley Professional Computing Series - Pearson Education - 2003
COMS 465: WEB TECHNOLOGY

UNIT I
**Introduction to Internet:** Web Vs Internet - Internet Address, Ports, Sockets, DNS - firewall - proxy- Internet Service Provider-Internet services-protocols- Static Page Creation: HTML – Cascaded Style Sheets.

UNIT II

UNIT III

UNIT IV:

UNIT V
AJAX : Introduction – Creating and sending requests- XML in Javascript and AJAX – Server side AJAX.

TEXT BOOKS
4. Web Database Application with PHP and MySQL, 2nd Edition By David Lane, Hugh E. Williams
COMS 511: PRINCIPLES OF COMPILER DESIGN

UNIT I ELABORATE ON SYSTEM SOFTWARE
Introduction to Compilers: Compilers and Translators, structure of a Compiler, Compiler Writing tools, Lexical and syntactic structure of a language - Finite Automata and Lexical Analysis, Role of a lexical analyzer.

UNIT II
Syntactic specification of programming languages: Context free grammars, derivations and parse trees, capabilities of context free grammars Basic Parsing techniques: Shift reduce parsing – Operator precedence parsing – Top-Down Parsing - Predictive Parsers – Automatic Construction of efficient Parsers

UNIT III

UNIT IV
Symbol Tables, Contents data structures, representing scope information. Run-Time Storage administration, Implementation and storage allocation of simple stack allocation schemes and block structured languages, Error detection and recovery, Lexical Phase Errors, Syntactic Phase errors, Semantic Errors.

UNIT V
Introduction to Code Optimization, Principle Sources of optimization, Loop Optimization, DAG Representation of basic blocks, Global Data Flow Analysis, Code Generation, Problems in code generation Register allocation and assignment, Code Generation from DAG’s, Peephole Optimization.

TEXT BOOK
2. Beck

REFERENCE
COMS 518: COMPILER DESIGN LAB

1. Simulation of Lexical Analyser
2. Regular Expression to NFA Conversion
3. Parser implementation – Recursive Decent, Shift Reduce, Predictive parsers
5. Developing applications with LEX and YACC Ex. Calculator generation
6. Dynamic Storage Allocation and Overloaded functions
COMS 512: 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
3D Concepts, 3D Object representations, 3D Transformations, 3D Viewing.

UNIT V
Visible Surface Detection Methods.

TEXT BOOK

REFERENCES
COMS 513: CRYPTOGRAPHY AND NETWORK SECURITY

UNIT I

UNIT II

UNIT III

UNIT IV

UNIT V

TEXT BOOK
COMS 461: UNIX AND SHELL PROGRAMMING

Unit I

Unit II

Unit III
Shell Programming - Environmental & user defined variables - Argument processing - Shell’s interpretation at prompt - Arithmetic expression evaluation - Control structure - Redirection - Background process & priorities of process - Conditional execution - Parameter & quote substitution - Text editor

Unit IV
Advanced shell programming - Filtering units - Awk - Batch process - Splitting, comparing, sorting, Merging & ordering files - Communications with other users - Spooling & Print Management - Backup & Recovery.

Unit V
Memory management - Swapping - Demand paging - Memory management - TCP/IP Network Configuration, Managing Ethernet Connections, Graphical Network - Configuration, Network Configuration Files, Managing Services.

Text Books
3. ISRD Group, Basics of OS, UNIX and SHELL Programming” TMH (2006)

Reference Books
COMS 527: PRINCIPLES OF PROGRAMMING LANGUAGES

UNIT I

UNIT II

UNIT III

UNIT IV
INPUT-OUTPUT.

UNIT V

TEXT BOOKS
COMS 528: MIDDLEWARE TECHNOLOGIES

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

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

REFERENCE
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
Introducing Windows Forms - GDI+ - Programming with Windows Forms Controls - The System.IO Namespace - Data Access with ADO.NET.

UNIT V

TEXTBOOKS
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 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

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
2. Walter Brenner et al, Intelligent Software agents, Springer Verlag
COMS 544: SOFTWARE TESTING AND QUALITY ASSURANCE

UNIT I
SOFTWARE TESTING TECHNIQUES: Software Testing Fundamentals, Psychology of testing - Testing economics, White box testing techniques, Black box testing techniques - Weyuker's adequacy axioms.

UNIT II

UNIT III

UNIT IV

UNIT V
CMM Model and its stages - Introduction to PCMM, CMMI and Six Sigma concepts. 
Introduction to ISO 9000, ISO 9000 – Part3 for software Quality.

TEXT BOOKS

REFERENCES
COMS 546: DATA MINING AND WAREHOUSING

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 Kaufmaan series , 2000.

REFERENCES

COMS 550: NATURAL LANGUAGE PROCESSING

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

COMS 552: DECISION SUPPORT SYSTEM

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
COMS 553: SOFT COMPUTING

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
SOFTWARE 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 SYSTEMS

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

REFERENCE