Eligibility for Admission

Candidates who have secured 55% of marks or above in any one of the following or equivalent, are eligible to apply are B. Tech./B.E. in Computer Science & Engg./Information Technology

(OR)

M.C.A/ M. Sc. in Computer Science / Information Technology / Software Engg. with Bachelor’s degree in Computer Science / Computer Applications / Mathematics / Statistics / Electronics / Physics / Applied Sciences

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 & Classification**

Passing & Classification for the award of the M. Tech (Computer Science & Engineering) Degree shall be as per the norms of CBCS System of Pondicherry University.
# CURRICULUM

(Effective from the academic year 2009 – 2010)

**H – Hard Core Subject**  
**S – Soft Core Subject**

**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>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>613</td>
<td>Mathematical Foundations of Computer Science</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>611</td>
<td>Design and Analysis of Algorithms</td>
<td>H</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>612</td>
<td>Advanced Software Engineering</td>
<td>H</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>614</td>
<td>Advanced Computer Architecture</td>
<td>H</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>615</td>
<td>Computer Network Protocols</td>
<td>H</td>
<td>2</td>
</tr>
</tbody>
</table>
| 6      | 616  | Software Lab I  
(Algorithms and case Tools) | S   | 3       |
| 7      |      | Elective I | H   | 3       |
|        |      | **Total** |     | **21**  |

## II Semester

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Code</th>
<th>Course Title</th>
<th>H/S</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>621</td>
<td>Modern Operating System Design</td>
<td>H</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>622</td>
<td>Advanced Database Systems</td>
<td>H</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>623</td>
<td>Network Security</td>
<td>H</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>624</td>
<td>Software Lab II (Operating Systems and Network Lab)</td>
<td>H</td>
<td>2</td>
</tr>
<tr>
<td>Sl.No.</td>
<td>Code</td>
<td>Course Title</td>
<td>H/S</td>
<td>Credits</td>
</tr>
<tr>
<td>-------</td>
<td>------</td>
<td>-----------------------------------------------</td>
<td>-----</td>
<td>---------</td>
</tr>
<tr>
<td>5</td>
<td>625</td>
<td>Design Patterns and Object Oriented Systems Design</td>
<td>S</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>Elective II</td>
<td>S</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>Elective III</td>
<td>S</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Total</strong></td>
<td></td>
<td><strong>21</strong></td>
</tr>
</tbody>
</table>

**III Semester**

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Code</th>
<th>Course Title</th>
<th>H/S</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>711</td>
<td>Compiler Design</td>
<td>H</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>712</td>
<td>Internet and Web Technologies</td>
<td>H</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>Elective IV</td>
<td>S</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>714</td>
<td>Project work – Phase-I</td>
<td>H</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Total</strong></td>
<td></td>
<td><strong>18</strong></td>
</tr>
</tbody>
</table>

**IV Semester**

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Code</th>
<th>Course Title</th>
<th>H/S</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>721</td>
<td>Project Work</td>
<td>H</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td>722</td>
<td>Project Report and Viva-Voce</td>
<td>H</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Total</strong></td>
<td></td>
<td><strong>12</strong></td>
</tr>
</tbody>
</table>

**Grand Total**  **72**
# LIST OF ELECTIVES

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>651</td>
<td>Agent Technology</td>
</tr>
<tr>
<td>2</td>
<td>652</td>
<td>Knowledge Engineering</td>
</tr>
<tr>
<td>3</td>
<td>653</td>
<td>Evolutionary Algorithms</td>
</tr>
<tr>
<td>4</td>
<td>654</td>
<td>Software Architecture</td>
</tr>
<tr>
<td>5</td>
<td>655</td>
<td>Bioinformatics</td>
</tr>
<tr>
<td>6</td>
<td>656</td>
<td>Design Patterns</td>
</tr>
<tr>
<td>7</td>
<td>657</td>
<td>User Interface Designs</td>
</tr>
<tr>
<td>8</td>
<td>658</td>
<td>Software Metrics</td>
</tr>
<tr>
<td>9</td>
<td>659</td>
<td>Software Reuse</td>
</tr>
<tr>
<td>10</td>
<td>661</td>
<td>Real Time Systems</td>
</tr>
<tr>
<td>11</td>
<td>662</td>
<td>Dependable Systems</td>
</tr>
<tr>
<td>12</td>
<td>663</td>
<td>Network Security</td>
</tr>
<tr>
<td>13</td>
<td>664</td>
<td>Software Testing</td>
</tr>
<tr>
<td>14</td>
<td>665</td>
<td>Microprocessor Based System Design</td>
</tr>
<tr>
<td>15</td>
<td>666</td>
<td>Neural Networks</td>
</tr>
<tr>
<td>16</td>
<td>667</td>
<td>Pattern Recognition</td>
</tr>
<tr>
<td>17</td>
<td>668</td>
<td>Multimedia Systems</td>
</tr>
<tr>
<td>18</td>
<td>669</td>
<td>Mobile Computing</td>
</tr>
<tr>
<td>19</td>
<td>670</td>
<td>E-Commerce</td>
</tr>
<tr>
<td>20</td>
<td>670</td>
<td>Distributed Systems</td>
</tr>
<tr>
<td>21</td>
<td>671</td>
<td>Pervasive and Ubiquitous Computing</td>
</tr>
<tr>
<td>22</td>
<td>672</td>
<td>Information Storage Architecture</td>
</tr>
<tr>
<td>23</td>
<td>673</td>
<td>Sensor Networks</td>
</tr>
<tr>
<td>24</td>
<td>674</td>
<td>Image Processing</td>
</tr>
<tr>
<td>25</td>
<td>675</td>
<td>Bio-Metrics</td>
</tr>
</tbody>
</table>
UNIT-I:

UNIT-II:

UNIT-III:
Elementary Combinatorics: Basics of counting, Combinations & Permutations, with repetitions - Constrained repetitions - Binomial Coefficients - Binomial Multinomial theorems - The principles of Inclusion and Exclusion - Pigeon hole principle and its applications.

UNIT-IV:
Recurrence Relations: Generating Functions - Function of Sequences - Calculating Coefficient of generating functions - Recurrence relations - Solving recurrence relation by substitution and Generating functions - Characteristics roots solution of in homogeneous Recurrence Relation.

UNIT-V

TEXT BOOKS:

REFERENCE BOOKS:
COMS 611 – DESIGN AND ANALYSIS OF ALGORITHMS

Prerequisite: Knowledge of Data Structure and Computer Programming.

Unit I

Introduction – Divide and Conquer technique – Greedy algorithms

Unit II

Dynamic Programming – Exploring graphs – Backtracking – Branch and Bound

Unit III


Unit IV

Introduction to Parallel Algorithms – simple examples – parallel sorting – Computational Complexity – introduction to NP – completeness

Unit V

Heuristic and approximate algorithms – approximate counting – application to real time systems.

References:

COMS 61 – ADVANCED SOFTWARE ENGINEERING

Prerequisite: Knowledge of Software Engineering

Unit I


Unit II


Unit III


Unit IV


Unit V


References:

Advanced Computer Architecture

UNIT I

Overview of modern processor architectures: Advanced processor design: CPU pipelining, Data path and Control Design, Data and Control Hazards. Memory Hierarchy: Cache and Cache Coherence - Bus Architecture

UNIT II

Types of parallel machine: Vector Pipeline Architectures - Replicated Architectures: SIMD/MIMD - Shared Memory and Distributed Memory. Instruction level parallelism, Dynamic scheduling of instructions, Branch Prediction and Speculation

UNIT III

Performance Comparison: Dataflow - Virtual Concurrency - Branch prediction - Caches, including the TLB - Emulated instruction sets - VLIW - Out of order execution - Latency hiding. Multithreading and Network processor architectures

UNIT IV

Basic multiprocessor design: Shared memory and message passing; Network topologies.

UNIT V

Case Studies: iA64 - Linux clusters - IBM SP - Microcontrollers, including the PIC - Real-time processors, including TMS320

1. Main Text: Patterson and Hennessy, Computer Organization and Design, Morgan Kaufman Publisher

Reference: Hennessy and Patterson, Computer Architecture: A Quantitative Approach, Morgan Kaufman Publisher
UNIT I

UNIT II

UNIT III

UNIT IV

UNIT V

REFERENCE BOOKS:
COMS 621 – MODERN OPERATING SYSTEMS DESIGN

Prerequisite: Knowledge of Computer Architecture and Algorithms

Unit I


Unit II


Unit III


Unit IV

Distributed OS – Design issues in Distributed OS.

Unit V

Case study – Design and implementation of the UNIX OS, Process model and structure – Memory management – File system – UNIX I/O management and device drivers.

Reference:

511 ADVANCED DATABASE MANAGEMENT SYSTEMS

Aim
To expose the students to the latest industry relevant topics in modern Database Management Systems.

Objective
To enable the students to understand and appreciate and to design a Parallel and Distributed Database and to learn and practice various Data mining and Warehousing tools.

Pre-requisite
Introduction to Database Management Systems and to Datastructure.

Contents

DATABASE DESIGN AND TUNING

PARALLEL AND DISTRIBUTED DATABASE


DATA MINING AND DATA WAREHOUSING

Data Warehousing: Definition and terminology – Characteristics – Data modeling – Data warehouse Vs Views – Typical functionality of a warehouse.

EMERGING DATABASE TECHNOLOGIES
Mobile Databases: Mobile computing architecture – Mobile environment characteristics – Data management issues.

Multimedia Databases: Nature of Multimedia data and applications – Data management issues – Multimedia database applications


References
NETWORK SECURITY

UNIT I
INTRODUCTION

UNIT II
CRYPTOGRAPHY

UNIT III
DIGITAL SIGNATURE AND AUTHENTICATION PROTOCOLS

UNIT IV

UNIT V
SECURITY AUDITING AND E-MAIL SECURITY
Security Monitoring and Auditing - Designing an Auditing System, Implementation Considerations, Auditing to Detect Violations of a security Policy, Auditing Mechanisms, Audit Browsing - Electronic mail security – PEM and S/MIME security protocol – Pretty Good Privacy

REFERENCE BOOKS:
Design Patterns and Object Oriented Systems Design

Unit-1 Software Architecture: Introduction to Software Architecture- Scope of software architectures - Arriving at an architecture - Domain-specific software architectures (DSSA) - Architectural Styles-Service-Oriented Architectures

Unit-2 Design Patterns: introduction to design patterns – A case study- Design pattern catalog: creational, structural, behavioural patterns

Unit-3 Object oriented analysis: Identifying use cases - Object Analysis - Classification – Identifying Object relationships - Attributes and Methods.

Unit-4: Object oriented design: Design axioms - Designing Classes – Access Layer - Object Storage - Object Interoperability

Unit-5: Introduction to AOSE: High-Level Methodologies – Design Methods – Agents in the real world

TEXT BOOKS


3. E. Gamma, R. Helm, R. Johnson, and J. Vlissides, Design Patterns: Elements of Reusable Object-Oriented Software. Addison Wesley, 1995.


REFERENCE BOOKS


5. A survey of **Agent-Oriented Software Engineering.** Amund Tveit. Norwegian University of Science and Technology. May 8, 2001
csgsc.idi.ntnu.no/2001/pages/papers/atveit.pdf
COMPILER DESIGN

UNIT I
Introduction: Compilers-Grammars-Languages-Phases of compiler-compiler writing tools-Errors-Lexical phase errors, syntactic phase errors, semantic phase errors

UNIT II
Lexical analyzer: Role of lexical analyzer-input Buffering –Specification and Recognition of tokens –Language for specifying Lexical analyzer-Finite Automata-Regular expression to NFA-Optimization of DFA based pattern matches–Design of a Lexical Analyzer Generator

UNIT III

UNIT IV

UNIT V
Code optimization: Principal source of optimization-Issues in the design of a code generator-Run-Time storage management –Basic blocks and flow graphs Next use information-Simple code generator –DAG representation of basic blocks-Peephole optimization – Code Generation

References:
UNIT I

UNIT-II

UNIT III

UNIT IV
Web documents distribution and caching: caching the web data - Interactions with enterprise server , application server etc. Web services : architecture, design and implementation issues , advantages and applications of web services.

UNIT V

REFERENCE BOOKS:
4. Ajax in Action By Dave crane, Eric Pascarello and Darren James, 2005
COMS 651 – AGENT TECHNOLOGY

Prerequisite: Basic knowledge of Artificial Intelligence, Object Oriented Systems

Unit I


Unit II


Unit III


Unit IV


Unit V

Agents Development frameworks and languages – Development tools – applications of agents. Agent Oriented methodologies – Agent oriented analysis and design, Gaia methodology, MASE, OPEN process framework, Tropos, Agent UML.

Reference:

1. Gerhard Weiss, Multi-agent systems – A modern approach to Distributed Artificial Intelligence, MIT press
3. Walter Brenner et al, Intelligent Software agents, Springer Verlag
COMS 652 – KNOWLEDGE ENGINEERING

**Prerequisite:** Basic knowledge of Artificial Intelligence

**Unit I**


**Units II**

Knowledge acquisition: Role of Knowledge engineer – fact finding by interviews, reasoning probability theory, fuzziness in reasoning, induction, repertory gird.

**Unit III**

Knowledge representation: Propositional logic, predicate logic, production rules, frames, semantic nets, conceptual graphs.

**Unit IV**

Ontologies, search methods, reasoning methods, methodologies for intelligent systems development.

**Unit V**

Case study on Knowledge based systems.

**Reference:**

COMS 653- EVOLUTIONARY ALGORITHMS

Prerequisite: Knowledge of Algorithms.

Unit I

Introduction to evolutionary computing – Genetic algorithm (GA) : steps in GA, Genome (individual) representation, fitness, selection methods. Operators in GA, GA parameters.

Unit II

Case study on GA applications (Travelling salesman problem, sequence alignment in Bioinformatics, …)

Unit III

Genetic programming (GP): Steps in GP, individual representation, initial population, tree creation methods, fitness assessment, individual slection methods, GP operators, GP parameters.

Unit IV

Introduction to parallel genetic programming, distributed genetic programming, parallel distributed GP.

Unit V

Case study on GP applications (symbolic regression, multiplexer, artificial ant, keep-away soccer, wall-following behaviour,..)

Reference:

1. David E. Goldberg, “Genetic algorithm in search, optimization and machine learning”.
COMS 654 – SOFTWARE ARCHITECTURE

Prerequisite: Basic knowledge of Software Engineering

Unit I


Unit II


Unit III


Unit IV


Unit V

Reference:

2. Len Bass, Paul Clements & Rick Kazman, Software Architecture in Practice, Pearson Education Asia, 3rd Indian Reprint, 2002
3. Relevant Journal Papers and Web Resources
Unit I


Unit II


Unit III


Unit IV


Unit V

Reference:


Note: For Units IV and V, Lecture Notes and Research Papers in the Internet.
COMS 656 –DESIGN PATTERNS

Unit I


Unit II

Design Patterns – Kinds of pattern – Quality and elements – patterns and rules – Creativity and patterns.

Unit III

Frameworks – Algorithms and frameworks for patterns.

Unit V

Catalogs – Patterns catalogs and writing patterns.

Unit V

Advanced Patterns – Anti-patterns – Case studies in UML and CORBA.

References:

COMS 657 – USER INTERFACE DESIGN

Unit I


Unit II


Unit III


Unit IV

Information Related – Information Search – Visualization and the WWW.

Unit V

Usability – Usability of Web Sites and Case Study of e-commerce sites.

References:

COMS 658 – SOFTWARE METRICS

Unit I


Unit II


Unit III


Unit IV

Quality Metrics – Software quality metrics – Product quality – Process quality – metrics for software maintenance – Case studies of Metrics program – Motorola – Hp and IBM

Unit V


References:

Unit I

Introduction – Organizing Reuse – Introduction – Motivation for Reuse – Reuse driven organizations – Managing a reuse project – the characteristics of reuse of project – Roles in reuse projects – Adopting a project to reuse – Reuse tools.

Unit II

Reuse Metrics – Managing a repository – The REBOOT component model – Classification – Configuration management of the repository – Managing the repository – Computer supported cooperative working – Process metrics for reuse – Product metrics – Cost estimation – Forming a reuse Strategy – Assessing reuse maturity.

Unit III


Unit IV

Reuse Phases – Development with reuse – with reuse specific activities – Common reuse processes – Phase of development with reuse – Impact of reuse on development cycle.

Unit V


References:

COMS 660 – ADVANCED DATABASE SYSTEMS

Unit I


Unit II


Unit III


Unit IV


Unit V


References:

**COMS 661 – REAL TIME SYSTEMS**

**Unit I**


**Unit II**


**Unit III**


**Unit IV**


**Unit V**


**References:**

COMS 662 – DEPENDABLE SYSTEMS

Unit I


Unit II


Unit III

Error Detection – Measures and mechanism – structuring error detections – Damage confinement and Assessment, protections – protection in multilevel systems.

Unit IV


Unit V


References:

COMS 663 – NETWORK SECURITY

Unit I


Unit II


Unit III


Unit IV


Unit V

System Security – Firewalls – Current Standards.

References:

COMS 664 – SOFTWARE TESTING

Unit I


Unit II


Unit III


Unit IV

Testing Object Oriented Software – Challenges and Differences between Testing of Non-Object Oriented and Object Oriented Softwares – Testing of Object Oriented constructs, The Role of OOAD concepts in Testing of Object Oriented Constructs.

Unit V

Software Testing Measurement and Associated Metrics, Control of Software Testing, The role of software testing coverage criteria in testing control, Coverage criteria design and implementation, Automated Tools for Software Testing, Static code analyzers – Test case generators.

References:

COMS 665 – MICROPROCESSOR BASED SYSTEM DESIGN

Unit I


Unit II

Programming Issues – Programming aspects of the above processors – IA64 architecture.

Unit III

Control Applications – Microprocessors for control applications – Micro controller based design of a system – Real time control using micro controllers.

Unit IV

Interfacing – Interfacing with peripheral devices – Peripheral controllers – Bus concepts – Bus standards – Examples – Choosing a bus standard for an application.

Unit V

Special Purpose Processors – Coprocessors, DSP processors, Graphic processors and their applications.

References:

2. Barrey B. Brey, Programming the 80286, 80386, 80486, and Pentium-based Personal Microprocessor Manuals (available at Websites).
3. Microprocessor Manuals (available at Websites).
4. Texas instruments/Analog Devices Manuals for Graphic Processors and DSP Processors.
COMS 666 – NEURAL NETWORKS

Unit I


Unit II


Unit III

Counter Propagation Network and Self Organizing Maps – CPN building blocks – CPN data processing. SOM data processing – Applications.

Unit IV


Unit V


References:

Unit I


Unit II

Unsupervised Classifications – Clustering for unsupervised learning and classification – Clustering concept – C-means algorithm – Hierarchical clustering procedures – Graph theoretic approach to pattern clustering – Validity of clustering solutions.

Unit III


Unit IV


Unit V


References:

COMS 668 – MULTIMEDIA SYSTEMS

Unit I

Unit II

Unit III

Unit IV

Unit V

References:
COMS 669 – MOBILE COMPUTING

Unit I

Introduction – Medium access control – Telecommunication systems – Satellite systems – Broadcast systems.

Unit II


Unit III

Adhoc Networks – Characteristics – Performance issues – Routing in mobile hosts.

Unit IV


Unit V


References:

1. J. Schiller, Mobile Communications, Addision Wesley 2000
COMS 670 – E-COMMERCE

Unit I


Unit II


Unit III


Unit IV


Unit V


References:

**COMS 623 – DISTRIBUTED SYSTEMS**

**Prerequisite:** Knowledge of Algorithms and Networks

**Unit I**

**Characterization of Distributed Systems:** Introduction, Examples, Key, Characteristics, Historical background. **Design Goals:** Introduction, Basic Design Issues, User requirements.

**Unit II**

**Inter Process Communication:** Introduction, Building Blocks, Client Server communication, Group communication. **Remote Procedure Calling:** Introduction, Design Issues, Implementation, Asynchronous RPC.

**Unit III**

**Distributed Operating Systems:** Introduction, the kernel, Process and threads, naming and protection, Communication and invocation, virtual memory. **File Service:** A model: Introduction, File service Components, Design issues, Interfaces, Implementation Techniques – **CASE studies** – Introduction, Math, Chorous, Unix Emulation in Mach and Chorus.

**Unit IV**

**Name Services:** Introduction, The SNS a name service model, Discussion of SNS and further design issues. **Time and Co-ordination:** Introduction, synchronizing physical clock-logical time and logical clock-distributed co-ordination.

**Unit V**

**Shared data and transaction:** Conversation between client and server Fault tolerance and recovery, Transactions and nested transactions. **Distributed shared Memory:** Design and implementation issues, Sequential consistency and Levy, Release consistency and mining, Other consistency models.

**References:**

Pervasive and Ubiquitous Computing

UNIT I

**Introduction:** Pervasive computing - View of pervasive computing – Consequences for Pervasive networks. **Privacy:** User Awareness – context – accessibility – authentication.

UNIT II


UNIT III


UNIT IV

**LOCAL AREA AND WIDE AREA WIRELESS TECHNOLOGIES**

IEEE 802.11 technologies – Infrared technologies – Bluetooth networks (OBEX Protocol) – Personal Area Networks – Mobility Management – Mobile IP – Establishing Wide area wireless networks – Concept and structure of ”cell” – Call establishment and maintenance – Channel management – Frequency Assignment techniques.

UNIT V

**PROTOCOLS AND APPLICATIONS**

REFERENCES

Information Storage and Management

Prerequisites

To understand the content and successfully complete this course, a student must have an understanding of computers, operating systems, networking, and databases. Experience in specific segments of storage infrastructure would also be helpful to fully assimilate the course material.

Course Objectives

Upon successful completion of this course, participants should be able to:

- Evaluate storage architectures, including storage subsystems, DAS, SAN, NAS, CAS
- Define backup, recovery, disaster recovery, business continuity, and replication
- Examine emerging technologies including IP-SAN
- Understand logical and physical components of a storage infrastructure
- Identify components of managing and monitoring the data center
- Define information security and identify different storage virtualization technologies

Unit I:  Introduction to Storage Technology

Review data creation and the amount of data being created and understand the value of data to a business, challenges in data storage and data management, Solutions available for data storage, Core elements of a data center infrastructure, role of each element in supporting business activities

(10 periods)

Unit II:  Storage Systems Architecture

Hardware and software components of the host environment, Key protocols and concepts used by each component, Physical and logical components of a connectivity environment, Major physical components of a disk drive and their function, logical constructs of a physical disk, access characteristics, and performance Implications, Concept of RAID and its components, Different RAID levels and their suitability for different application environments: RAID 0, RAID 1, RAID 3, RAID 4, RAID 5, RAID 0+1, RAID 1+0, RAID 6, Compare and contrast integrated and modular storage systems, High-level architecture and working of an intelligent storage system

(10 periods)

Unit III:  Introduction to Networked Storage

Evolution of networked storage, Architecture, components, and topologies of FC-SAN, NAS, and IP-SAN, Benefits of the different networked storage options, Understand the need for long-term archiving solutions and describe how CAS fulfills the need, Understand the appropriateness of the different networked storage options for different application environments

(10 periods)
Unit IV: Information Availability & Monitoring & Managing Datacenter

List reasons for planned/unplanned outages and the impact of downtime, Impact of downtime, Differentiate between business continuity (BC) and disaster recovery (DR) , RTO and RPO, Identify single points of failure in a storage infrastructure and list solutions to mitigate these failures, Architecture of backup/recovery and the different backup/recovery topologies, replication technologies and their role in ensuring information availability and business continuity, Remote replication technologies and their role in providing disaster recovery and business continuity capabilities

Identify key areas to monitor in a data center, Industry standards for data center monitoring and management, Key metrics to monitor for different components in a storage infrastructure, Key management tasks in a data center

(15 periods)

Unit V: Securing Storage and Storage Virtualization

Information security, Critical security attributes for information systems, Storage security domains, List and analyzes the common threats in each domain, Virtualization technologies, block-level and file-level virtualization technologies and processes

(5 periods)

Case Studies

The technologies described in the course are reinforced with EMC examples of actual solutions.

Realistic case studies enable the participant to design the most appropriate solution for given sets of criteria.

Reference Books:

SENSOR NETWORKS

UNIT I

SENSOR NETWORKS


UNIT II LOCALIZATION AND TRACKING

A tracking scenario – sensing model – Collaborative localization – Bayes state estimation – distributed representation – Tracking multiple objects – Ranging techniques – Range based localization algorithms – location services

UNIT III


UNIT IV

NETWORKING SENSORS AND NETWORK PLATFORMS


UNIT V

RFID BASICS


References
1. Wireless Sensor Networks, Raghavendra, Cauligi S.; Sivalingam, Krishna M.; Znati, Taieb (Eds.)

Digital Image Processing

UNIT I


UNIT II


UNIT III


UNIT IV


UNIT V


TEXT BOOKS
REFERENCES
BIO-METRICS

UNIT I

Introduction to Biometrics Authentication: biometrics authentication-Traditional methods for personal authentication - Some definitions of biometrics authentication technologies and systems. Software and hardware biometrics systems - Image processing and pattern recognition in living body, including human head & face, the mechanism of human eye, hand & skin characteristics.

UNIT II

Biometrics Sensors and Data Acquisition: Biometric data acquisition and database - Biometrics Pre-processing: The related biometrics preprocessing technologies - including: noise removing, edge sharpening, image restoration, image segmentation, pattern extraction and classification.

UNIT III

Biometrics Feature Extraction: Basic elements in pattern recognition system - and some basic introduction of pattern recognition systems on biometrics (such as fingerprint, palm-print, finger, hand, face, iris, and face, as well as dental, DNA, and retina recognition). Features Matching and Decision Making: Various matching methods: including PCA and LDA - Introduce decision theory and their examples.

UNIT IV

Design and Implementation of Biometric Systems
Basic approaches of automated biometrics identification and verification systems - Various performance comparison and their analysis for large population authentication, accuracy and reliability of authentication in an e-world.

UNIT V

Biometric Authentication Applications
Various applications, including access control like a lock or an airport check-in area; immigration and naturalization; welfare distribution; military identification; banking, e.g., check cashing, credit card, ATM (automated teller machine); computer login; intruder detection; smart card; multi-media communication; WWW and an electronic purse; sensor fusion; decision fusion; categorization: e.g., age and gender; industrial automation; gesture interpretation; efficient enrollment; audio-visual tracking; stock market; on-line shopping; compact embedded systems and other commercialized services.

Indicative reading list and references:
IEEE Transaction on *Pattern Analysis and Machine Intelligence*.
IEEE Transaction on *Image Processing*. 