

EIGHTH SEMESTER

CODE	COURSE TITLE	L	T	P	C
CS402	Mobile Communication Systems	3	0	0	3
HM402	Software Project Management	3	0	0	3
	Elective –IV	3	0	0	3
	Elective – V	3	0	0	3
CS498	Project Work				6
TOTAL CREDITS					
18					

TOTAL CREDITS – 131

LIST OF ELECTIVE FOR EIGHTH SEMESTER: (TWO)

1. CS452 REAL TIME SYSTEMS
2. CS458 SOFTWARE QUALITY ASSURANCE AND TESTING
3. CS462 ADHOC AND SENSOR NETWORKS
4. CS464 EMBEDDED SYSTEMS
5. CS454 DATA WAREHOUSING AND DATA MINING
6. CS456 ADVANCED TOPICS IN ALGORITHMS
7. CS460 ADVANCED DATABASE MANAGEMENT SYSTEMS
8. CS466 ANY ELECTIVE FROM OTHER DEPARTMENT

RESERVED LIST OF ELECTIVES

1. CS357 NETWORKED MULTIMEDIA SYSTEMS
2. CS358 DISTRIBUTED DATA BASE SYSTEMS
3. CS360 SOFTWARE DESIGN & PRACTICES

EIGHTH SEMESTER

CS402 - MOBILE COMMUNICATION SYSTEMS

Credits: 3

Objectives

- To learn the basics of Wireless Communication technologies, Wireless LAN standards and Wireless Application Programming to understand the working of a wireless system.

Unit-I Wireless Communication

Cellular systems- Frequency Management and channel Assignment- types of handoff and their characteristics, dropped call rates & their valuation -MAC – SDMA – FDMA – TDMA – CDMA –Cellular Wireless Networks.

Unit-II Wireless Networks

Wireless LAN – IEEE 802.11 Standards – Architecture – Services – Mobile Ad hoc Networks- WiFi and WiMAX - Wireless Local Loop.

Unit-III Mobile Communication Systems

GSM-architecture-Location tracking and call setup- Mobility management- Handover- Security- GSM SMS –International roaming for GSM- call recording functions-subscriber and service data mgt –Mobile Number portability -VoIP service for Mobile Networks – GPRS –Architecture- GPRS procedures-attach and detach procedures-PDP context procedure-combined RA/LA update procedures-Billing.

Unit-IV Mobile Network and Transport Layers

Mobile IP – Dynamic Host Configuration Protocol-Mobile Ad Hoc Routing Protocols–Multicast routing-TCP over Wireless Networks – Indirect TCP – Snooping TCP – Mobile TCP – Fast Retransmit / Fast Recovery – Transmission/Timeout Freezing-Selective Retransmission – Transaction Oriented TCP-TCP over 2.5/3G wireless Networks.

Unit-V Application Layer

WAP Model- Mobile Location based services -WAP Gateway –WAP protocols – WAP user agent profile- caching model-wireless bearers for WAP - WML – WMLScripts – WTA - iMode-SyncML.

Outcomes

- To be able to understand wireless communication technologies and wireless systems.

Teaching and Evaluation Guidelines

- 40% on Analysis and Application (Higher Order Thinking), and 60% on Conceptual understanding and Definitions (Lower Order Thinking).

Text Books

1. Jochen Schiller, “Mobile Communications”, Second Edition, Pearson Education, 2003.
2. William Stallings, “Wireless Communications and Networks”, Pearson Education, 2002.

Reference Books

1. Kaveh Pahlavan, Prasanth Krishnamoorthy, “Principles of Wireless Networks”, First Edition, Pearson Education, 2003.
2. Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, “Principles of Mobile Computing”, Springer, 2003.
3. C.K.Toh, “AdHoc Mobile Wireless Networks”, First Edition, Pearson Education, 2002.

HM402 - SOFTWARE PROJECT MANAGEMENT

Credits: 3

Objectives

- To understand the basic concepts and issues of software project management
- To understand successful software projects that support organization's strategic goals

Unit – I SPM concepts

Definition – components of SPM – challenges and opportunities – tools and techniques – managing human resource and technical resource – costing and pricing of projects – training and development – project management techniques.

Unit – II Software Measurements

Monitoring & measurement of SW development – cost, size and time metrics – methods and tools for metrics – issues of metrics in multiple projects.

Unit – III Software Quality

Quality in SW development – quality assurance – quality standards and certifications – the process and issues in obtaining certifications – the benefits and implications for the organization and its customers – change management.

Unit – IV Risk Issues

The risk issues in SW development and implementation – identification of risks – resolving and avoiding risks – tools and methods for identifying risk management.

Unit – V SPM Tools

Software project management using Primavera & Redmine and case study on SPM tools.

Outcomes

- Ability to maintain software projects and monitor software project process
- Ability to design and develop project modules and assign resources

Text Books

1. Richard H. Thayer, “Software Engineering Project Management”, John Wiley & Sons, 2nd edition, 2001
2. Royce, Walker, “Software Project Management”, Pearson Education, 2002
3. Kelker, S. A., “Software Project Management”, Prentice Hall, 2003

LIST OF ELECTIVES FOR EIGHTH SEMESTER: (TWO)

CS452 – REAL TIME SYSTEMS

Credits: 3

Objectives

- To study issues related to the design and analysis of systems with real-time constraints.
- To study the various Uniprocessor and Multiprocessor scheduling mechanisms.
- To learn about various real time communication protocols.
- To study the difference between traditional and real time databases.

Unit-I Introduction to Real Time Computing

Real Time Systems: Concepts - Examples - Applications – Structure – Characterization - Hard and Soft timing constraints - Design Challenges - Performance metrics. Programming Languages for Real-Time Systems

Unit-II Real Time Scheduling

Task assignment and Scheduling - Task allocation algorithms - Single-processor and Multiprocessor task scheduling - Clock-driven and priority-based scheduling algorithms- Fault tolerant scheduling

Unit-III Real Time Communication

Network topologies and architecture issues. Protocols: contention based - token based - polled bus - deadline based protocol - Fault tolerant routing.

Unit-IV Programming Languages and Tools

Hierarchical decomposition - Run-time error handling - Overloading - Timing specification - Recent trends and developments.

Unit-V Real Time Databases

Transaction priorities – Concurrency control issues – Disk scheduling algorithms – Two phase approach to improve predictability.

Outcomes

- Knowledge about Schedulability analysis.
- Ability to learn Real-time programming environments. Knowledge about real time communication and databases. Ability to develop real time systems

Teaching and evaluation guidelines

- 50% on Problems (Higher Order Thinking), and 30% on Algorithms (Medium Order Thinking), and 20% on Terms and Terminologies (Lower Order Thinking)

Text Books

1. C.M. Krishna, Kang G. Shin – “Real Time Systems”, International Edition, Tata McGraw Hill Companies, Inc., New York, 2010.
2. Philip A. Laplante and Seppo J. Ovaska, “Real-Time Systems Design and Analysis: Tools for the Practitioner” IV Edition IEEE Press, Wiley. 2011.
3. Jane W.S. Liu, Real-Time Systems, Pearson Education India, 2000.

CS458-SOFTWARE QUALITY ASSURANCE AND TESTING

Credits: 3

Objectives

- To understand the basics of Software Quality,
- To understand Functional testing, Control Flow based testing, Data Flow based testing Mutation testing, Software Reliability, and formal verification of programs.

UNIT I - Introduction To Software Quality

Ethical Basis for Software Quality – Total Quality Management Principles – Software Processes and Methodologies – Quality Standards, Practices & Conventions – Improving Quality with Methodologies – Structured/Information Engineering – Measuring Customer Satisfaction– Software Quality Engineering – Defining Quality Requirements – Management Issues for Software Quality – Data Quality Control – Benchmarking and Certification.

UNIT II - Software Quality Metrics And Reliability

Writing Software Requirements and Design Specifications – Analyzing Software Documents using Inspections and Walkthroughs – Software Metrics – Lines of code, Cyclomatic Complexity, Function Points, Feature Points – Software Cost Estimation– Reliability Models – Reliability Growth Models – OO Metrics.

UNIT III - Test Case Design

Testing as an Engineering Activity – Testing Fundamentals – Defects – Strategies and Methods for Black Box Test Case Design – Strategies and Methods for White-Box Test Case design – Test Adequacy Criteria – Evaluating Test Adequacy Criteria – Levels of Testing and different types of testing – OO Testing.

UNIT IV - Test Management

Testing and Debugging Goals and Policies – Test Planning – Test Plan Components – Test Plan Attachments – Locating Test Items – Reporting Test Results – The role of three groups in Test Planning and Policy Development – Process and the Engineering Disciplines – Introducing the test specialist – Skills needed by a test specialist – Building a Testing Group.

UNIT V - Controlling And Monitoring

Measurement and Milestones for Controlling and Monitoring – Status Meetings – Reports and Control Issues – Criteria for Test Completion – SCM – Types of reviews – Developing a review program – Components of Review Plans – Reporting review results.

Outcomes

- Ability to formally document and communicate software quality assurance processes.
- Ability to assess a software system/project for threats to project quality and describe the types of software quality, and measures that reflect software quality.
- Ability to design comprehensive tests to mitigate threats at the unit, system and user level and explain the testing process and manage and prioritise test suites in structured, organized ways.

Teaching and Evaluation guidelines

50% on Methods and Techniques (Medium Order Thinking), 30 % on Application (Higher Order Thinking), and 20% on Tool functions (Lower Order Thinking).

Text Books

1. Ilene Burnstein, “Practical Software Testing”, Springer International Edition, Chennai, 2003.
2. Stephen Kan, “Metrics and Models in Software Quality”, Addison-Wesley, Second Edition, 2004.

Reference Books

1. Milind Limaye, “Software Quality Assurance”, McGraw Hill, 2011.
2. M G Limaye, “Software Testing – Principles, Techniques and Tools”, McGraw Hill, 2011.
3. Edward Kit, “Software Testing in the Real World – Improving the Process”, Pearson Education, New Delhi, 1995.
4. Elfriede Dustin, “Effective Software Testing”, Pearson Education, New Delhi, 2003.
5. Renu Rajani and Pradeep Oak, “Software Testing – Effective Methods, Tools and Techniques”, Tata McGraw Hill, New Delhi, 2003.
6. Yogesh singh, “Software Testing”, Cambridge University Press India, 2012.

CS462-ADHOC AND SENSOR NETWORKS

Credits: 3

Objectives

- To understand the requirements and constraints of an Adhoc and Sensor Networks
- To understand the protocols suitable for Adhoc and Sensor Networks

Unit-I Routing

Cellular and Ad hoc wireless networks – Issues of MAC layer and Routing – Proactive, Reactive and Hybrid Routing protocols – Multicast Routing – Tree based and Mesh based protocols – Multicast with Quality of Service Provision.

Unit-II Quality of Service

Real-time traffic support – Issues and challenges in providing QoS – Classification of QoS Solutions – MAC layer classifications – QoS Aware Routing Protocols – Ticket based and Predictive location based QoS Routing Protocols

Unit-III Energy Management AdHoc Networks

Need for Energy Management – Classification of Energy Management Schemes – Battery Management and Transmission Power Management Schemes – Network Layer and Data Link Layer Solutions – System power Management schemes.

Unit-IV Mesh Networks

Necessity for Mesh Networks – MAC enhancements – IEEE 802.11s Architecture – Opportunistic Routing – Self Configuration and Auto Configuration - Capacity Models – Fairness – Heterogeneous Mesh Networks – Vehicular Mesh Networks

Unit-V Sensor Networks

Introduction – Sensor Network architecture – Data Dissemination – Data Gathering – MAC Protocols for sensor Networks – Location discovery – Quality of Sensor Networks – Evolving Standards – Other Issues – Recent trends in Infrastructure less Networks.

Outcomes

- Ability to understand the requirements and constraints in an AdHoc environment
- To be able to decide and build the protocols that would suit the constraints.

Teaching and Evaluation guidelines

- 30% on application (Higher Order Thinking), and 70% on (Lower Order Thinking) conceptual and protocol understanding.

Text Book

1. C. Siva Ram Murthy and B.S.Manoj, “Ad hoc Wireless Networks – Architectures and Protocols”, Pearson Education, 2004.

Reference Books

1. Feng Zhao and Leonidas Guibas, “Wireless Sensor Networks”, Morgan Kaufman Publishers, 2004.
2. C.K.Toh, “Adhoc Mobile Wireless Networks”, Pearson Education, 2002.
3. Thomas Krag and Sebastin Buettrich, “Wireless Mesh Networking”, O’Reilly Publishers, 2007.

CS464-EMBEDDED SYSTEMS

Credits: 3

Objectives

- To understand the embedded systems design
- To impart embedded programming and their operating system.

Unit-I Embedded Computing

Challenges of Embedded Systems – Embedded system design process. Embedded processors – ARM processor – Architecture, ARM and Thumb Instruction sets

Unit-II Embedded C Programming

C-looping structures – Register allocation – Function calls – Pointer aliasing – structure arrangement – bit fields – unaligned data and endianness – inline functions and inline assembly – portability issues.

Unit-III Optimizing Assembly Code

Profiling and cycle counting – instruction scheduling – Register allocation – conditional execution – looping constructs – bit manipulation – efficient switches – optimized primitives.

Unit-IV Processes And Operating Systems

Multiple tasks and processes – Context switching – Scheduling policies – Interprocess communication mechanisms – Exception and interrupt handling - Performance issues.

Unit-V Embedded System Development

Meeting real time constraints – Multi-state systems and function sequences. Embedded software development tools – Emulators and debuggers. Design methodologies – Case studies – Complete design of example embedded systems.

Outcomes

- Ability to depth knowledge about embedded processor, its hardware and software.
- Ability to understand programming concepts and embedded programming in C and assembly language.
- Ability to real time operating systems, inter-task communication and an embedded software development tool.

Teaching and Evaluation guidelines

- 30% on An Application (Higher Order Thinking), and 50% on Embedded C programming (Medium Order Thinking), and 20% on software development in embedded system (Lower Order Thinking).

Text Books

1. Andrew N Sloss, D. Symes, C. Wright, ” ARM System Developers Guide”, Morgan Kaufmann / Elsevier, 2012.
2. Michael J. Pont, “Embedded C”, First edition, Pearson Education , 2007.

Reference Books

1. Wayne Wolf, "Computers as Components: Principles of Embedded Computer System Design", Morgan Kaufmann / Elsevier, 2nd. Edition, 2008.
2. Steve Heath, "Embedded System Design", Elsevier, 2nd. Edition, 2003.

CS454-DATA WAREHOUSING AND DATA MINING

Credits: 3

Objectives

- To understand the components used in data warehousing, basic idea about OLAP.
- To understand the detailed functioning of Data Mining and various classification and prediction.
- To assess the mining object in web based application.

Unit – I Data Warehousing and Business Analysis

Data Warehousing Components – Building A Data Warehouse – Mapping Data Warehouse to a Multiprocessor Architecture – DBMS Schemas for Deduction Support – Data Extraction , Cleanup and Transformation Tools – Query Tools and Applications – Online Analytical Processing (OLAP) – OLAP and Multidimensional Data Analysis.

Unit – II Data Mining

Data Mining Functionalities – Data Preprocessing – Data Cleanup – Data Integration and Transformation – Data Reduction – Data Discretization and Concept Hierarchy Generation. Association Rule Mining: Efficient and Scalable Frequent Item Set Mining Methods – Mining Various Kinds of Association Rules – Association Mining to Correlation Analysis – Constraint Based Association Mining.

Unit – III Classification and Prediction

Issues Regarding Classification And Prediction – Classification By Decision Tree Introduction – Bayesian Classification – Rule Based Classification- Classification By Back Propagation – Support Vector Machines – Associative Classification – Lazy Learners – Other Classification Methods – Prediction – Accuracy And Error Measures – Evaluating The Accuracy of a Classifier or Predictor – Ensemble Methods – Model Section.

Unit – IV Cluster Analysis

Types of Data in Cluster Analysis – a Categorization of Major Clustering Methods – Partitioning Methods – Hierarchical Methods – Density Based Methods – Grid Based Methods – Model Based Clustering Methods – Clustering High Dimensional Data – Constraint Based Cluster Analysis – Outlier Analysis.

Unit – V Mining Object and Web Data

Multidimensional Analysis and Descriptive Mining of Complex Data Objects – Spatial Data Mining – Multimedia Data Mining – Text Mining – Mining the World Wide Web.

Outcomes

- Ability to understand the mechanism used in both Data Warehousing as well as Data Mining
- Technical understanding of various prediction and classification, how the data mining has been used in web based.

Teaching and Evaluation guidelines

- 30% on Technologies Used (Higher Order Thinking), and 50% on diagrams and architecture (Medium Order Thinking), and 20% on Definition (Lower Order Thinking).

Text Books

1. Jiawei Han and Micheline Kamber, “Data Mining Concepts and Techniques”, Elsevier, 2nd Edition, 2008
2. Alex Berson and Stephen J. Smith, “Data Warehousing, Data Mining & OLAP”, Tata McGraw-Hill, 10th Reprint 2007.

Reference Books

1. K.P. Soman, Shyam Diwakar and V. Ajay “Insight into Data mining Theory and Practice”, Easter Economy Edition, Prentice Hall of India, 2006.
2. G. K. Gupta “Introduction to Data Mining with Case Studies”, Easter Economy Edition, Prentice Hall of India, 2006.
3. Pang-Ning Tan, Michael Steinbach and Vipin Kumar “Introduction to Data Mining”, Pearson Education, 2007.

CS456-ADVANCED TOPICS IN ALGORITHMS

Credits: 3

Objectives

- To introduce fundamentals of contemporary topics in algorithms
- To provide an exposure to graduate level topics in algorithms

Unit-I Review of first level portions

Different paradigms of algorithm - different problems from various domains.

Unit-II Randomized Algorithms

Las Vegas and Monte Carlo-Chernoff Bound - Probabilistic Amplification - Typical randomised algorithms e.g. Min cut - Randomized Quick Sort - Randomized Selection - Primality testing.

Unit-III Graph Algorithms

Breadth First Search (BFS) – Depth First Search (DFS) - Topological Sort - Shortest paths B-Trees - Adelson-Velskii and Landis (AVL) Trees.

Unit-IV Advanced Graph Concepts

Maximum Independent Set - Coloring problems - vertex cover and introduction to perfect graphs.

Unit-V Approximation Algorithms

Ratio Bound vertex cover - set covering - travelling salesman problem and subset sum.

Outcomes

- Ability to use advanced algorithmic techniques
- Ability to design approximation algorithms for NP hard problems

Teaching and Evaluation guidelines

- 50% on Application (Higher Order Thinking), and 40% on Methods and Techniques (Medium Order Thinking), and 10% on Tool functions (Lower Order Thinking).

Text Books

1. T. H. Cormen, Charles. E. Leiserson, Ronald. L. Rivest, and Clifford Stein, "Introduction to Algorithms", Third Edition, The MIT press, Cambridge, Massachusetts and McGraw Hill, 2009.
2. H. S. Wilf, "Algorithms and complexity", Second Edition, Prentice hall, 2003.

CS460-ADVANCED DATABASE MANAGEMENT SYSTEMS

Credits: 3

Objectives

- To understand the basic concepts and terminology related to DBMS and Relational Database Design
- To impact to design and implement Distributed Databases.
- To understand advanced DBMS techniques to construct tables and write effective queries, forms, and reports
- To understand the concept of a database transaction and related database facilities, including concurrency control, backup and recovery, and data object locking and protocols.

Unit – I Concepts

EER-to-Relational mapping - Integrity constraints in data modeling - Review of normalization theory - Review of file structures and access methods-QBE.

Unit – II Query Processing and Optimization

Use of heuristics - Optimization algorithm - Heuristic optimization of query graphs - Using cost estimations in query optimization.

Unit – III Concurrency Control

Concurrent execution - Implementation of atomicity, durability - Isolation - Recoverability - Serializability of schedules - Testing for conflict - Serializability - View serializability.

Unit – IV Transaction Processing

Lock-based protocols - Timestamp-based protocols - Validation-based protocols - Multiversion schemes - Deadlock handling – OLAP - Object Oriented Databases.

Unit – V Recovery Techniques and Database System Architectures

Log-based recovery - Buffer management - Recovery with concurrent transactions - Recovery techniques - Shadow paging. Database System Architectures - Parallel databases - Advanced transaction processing - Emerging database applications - Recent trends and developments.

Outcomes

- Ability to write complex queries including full outer joins, self-join, sub queries, and set theoretic queries.
- Ability to knowhow of the file organization, Query Optimization, Transaction management, and database administration techniques

Teaching and Evaluation guidelines:

50% on Problems and Analysis (Higher Order Thinking), and 30% on Application (Medium Order Thinking), and 20% on Models and Architecture (Lower Order Thinking).

Text Book

1. Silberschatz, H. F. Korth, and S. Sudarshan, "Database System Concepts", Fourth Edition, McGraw Hill, 2013.

Reference Book

1. R. Elmasri and S. B. Navathe, "Fundamentals of Database Systems", Third Edition, Pearson Education, 2011.