

Department of Computer Science & Engineering

M.Tech., Computer Science & Engineering (Mobile Computing) Teaching Scheme (2011 onwards)

FIRST SEMESTER

S.No.	Course No.	Course Title	L	T	P	Hours/Week	C
1.	CS-600	Topics in Computer Networks	3	0	0	3	3
2.	CS-610	Distributed Computing	3	0	0	3	3
3.	CS-611	Topics in Mobile Computing	3	0	0	3	3
4.		Programme Elective-1	3	0	0	3	3
5.		Programme Elective-2	3	0	0	3	3
6.	CS-612	Computational Lab-I	0	0	3	3	2
Total			15	0	3	18	17

SECOND SEMESTER

S.No.	Course No.	Course Title	L	T	P	Hours/Week	C
1.	CS-604	Advanced Algorithms	3	0	0	3	3
2.	CS-613	Mobile Adhoc Networks	3	0	0	3	3
3.	CS-614	Wireless Sensor Networks	3	0	0	3	3
4.		Programme Elective-3	3	0	0	3	3
5.		Open Elective-1 (from other Dept)	3	0	0	3	3
6.	CS-615	Computational Lab-II	0	0	3	3	2
Total			15	0	3	18	17

THIRD SEMESTER

S.No.	Course No.	Course Title	L	T	P	Hours/Week	C
1.	CS-799	Self Study				3	2
2.	CS-800	Seminar	0	0	3	3	2
3.	CS-801	Dissertation (to be continued in IV th Sem)				24	12
Total						30	16

FOURTH SEMESTER

S.No.	Course No.	Course Title	L	T	P	Hours/Week	C
1.	CS-801	Dissertation (continued from III rd Sem)				40	20
Total						40	20

Programme Electives

CS-730	Mobile Databases
CS-731	Multimedia Computing
CS-732	Data Mining
CS-733	Security in Wireless & Mobile System
CS-734	Distributed and Mobile Architecture
CS-735	Programming Mobile Devices

In addition to these electives, any other core/elective floated for M.Tech., Computer Science & Engineering may also be floated as elective for M.Tech., Mobile Computing

Overview and motivation, Resource sharing, Design issues for the network layers

Networking devices

Principles of internetworking, Tunneling, Fragmentation, Naming and addressing concepts, Hierarchical naming, Domain name system, Name resolution process, IP address classes and concept of subnetting, Classless Inter-domain routing (CIDR) and DHCP concepts, The internet protocols: IP, ICMP, ARP, RARP

The design issues for the transport layer, addressing, establishing connection, flow control and multiplexing.

The internet protocols: TCP and UDP.

Multicast routing

Mobility in networks, Mobile IP

Emerging trends in networking

Books and References

1. B.A. Forouzan, Data Communications and Networking, McGraw Hill.
2. A.S. Tanenbaum, Computer Networks, PHI.
3. Libor D. and Alena K., Understanding TCP/IP. PACKT Publishing.
4. Dharma P. Agrawal and Q-An Zeng, Introduction to Wireless and Mobile Systems, Thomson Learning Inc.

Introduction

Distributed systems, processes and models, remote invocation

Time Synchronization and Coordination

Clocks, events and process states, physical time and clocks, logical time and clocks, global states, distributed debugging, Coordination and Agreement

Distributed mutual exclusion, Elections, coordination agreement, consensus

Transactions and Concurrency Control

Failure model for transactions; Concurrency control; Recoverability from aborts; Nested transactions Deadlocks; Increasing concurrency in locking schemes; Optimistic concurrency control, Timestamp ordering, Comparison of methods for concurrency control, Distributed Transactions

Replication

System model and group communication, Fault-tolerant services, Transactions with replicated data

Distributed Shared Memory

Structure; Synchronization model; Consistency model; Update options; Granularity; Thrashing

Books and References

1. G. Coulouris, J. Dollimore, and T. Kindberg, Distributed Systems: Concepts and Design, Pearson Education.
2. Taunenbaum, Distributed Systems: Principles and Paradigms, PHI.
3. M. Singhal & N. Shivaratri, Advanced Concepts in Operating Systems, TMH.

CSE-611 Topics in Mobile Computing

L-T-P-C: 3-0-0-3

Introduction, issues in mobile computing, overview of wireless telephony: cellular concept, GSM, channel structure, location management: HLR-VLR, hierarchical, handoffs, channel allocation in cellular systems, CDMA, GPRS.

Wireless Networking, Wireless LAN Overview: MAC issues, IEEE 802.11, Blue Tooth, Wireless multiple access protocols, TCP over wireless, Wireless applications, data broadcasting, Mobile IP, WAP: Architecture, protocol stack, application environment, applications.

Data management issues, data replication for mobile computers, adaptive clustering for mobile wireless networks, File system, Disconnected operations.

Mobile Agents computing, security and fault tolerance, transaction processing in mobile computing environment.

Books & references

1. Frank Adelstein, S.K.S. Gupta, Golden G. Richard III and Loren Schwiebert, "Fundamentals of Mobile and Pervasive Computing", McGraw-Hill Professional.
2. David Taniar, "Mobile Computing: Concepts, Methodologies, Tools, and Applications".
3. Asoke. K Talukder, Roopa R. Yavagal, Asoke K. Talukder, "Mobile Computing".
4. J. Schiller, Mobile Communications, Addison Wesley.
5. M. V. D. Heijden, M. Taylor, Understanding WAP, Artech House.
6. Charles Perkins, Mobile IP, Addison Wesley.
7. Charles Perkins, Ad hoc Networks, Addison Wesley.

CSE-604 Advanced Algorithms

L-T-P-C: 3-0-0-3

Introduction: Algorithm Design paradigms- motivation, concept of algorithmic efficiency, run time analysis of algorithms, Asymptotic

Notations; Divide and Conquer approach, examples of some sorting techniques; Greedy Algorithms; Graph Algorithms: Representation of graphs, BFS, DFS, single source shortest path, all pair shortest path; Dynamic programming: Overview, difference between dynamic programming and divide and conquer, Traveling salesman Problem, longest Common sequence, 0/1 knapsack., Backtracking: 8-Queen Problem, Sum of subsets, graph coloring, Hamiltonian cycles; Branch and bound: its application for some of above problems; Computational Complexity: Complexity measures, Polynomial Vs non-polynomial time complexity; NP-hard and NP-complete classes, examples.

Books and References

1. T. Cormen, C. Leiserson, R. Rivest, and C. Stein. Introduction to Algorithms. MIT Press / McGraw-Hill
2. Michael T. Goodrich and Roberto Tamassia. Algorithm Design: Foundations, Analysis, and Internet Examples. John Wiley & Sons
3. J. Kleinberg and É. Tardos. Algorithm Design. Addison-Wesley

CSE-613 Mobile Adhoc Networks

L-T-P-C: 3-0-0-3

INTRODUCTION

Introduction to adhoc networks - definition, characteristics features, applications. Characteristics of Wireless channel, Adhoc Mobility Models:- Indoor and outdoor models.

MEDIUM ACCESS PROTOCOLS

MAC Protocols: design issues, goals and classification. Contention based protocols- with reservation, scheduling algorithms, protocols using directional antennas. IEEE standards: 802.11a, 802.11b, 802.11g, 802.15. HIPERLAN.

NETWORK PROTOCOLS

Routing Protocols: Design issues, goals and classification. Proactive Vs reactive routing, Unicast routing algorithms, Multicast routing algorithms, hybrid routing algorithm, Energy aware routing algorithm, Hierarchical Routing, QoS aware routing.

END-END DELIVERY AND SECURITY

Transport layer : Issues in designing- Transport layer classification, adhoc transport protocols. Security issues in adhoc networks: issues and challenges, network security attacks, secure routing protocols.

CROSS LAYER DESIGN AND INTEGRATION OF ADHOC FOR 4G

Cross layer Design: Need for cross layer design, cross layer optimization, parameter optimization techniques, Cross layer cautionary perspective. Integration of adhoc with Mobile IP networks.

Mesh Networks, Vehicular Area Networks

Books and References

1. Toh C.K., Ad-Hoc Mobile Wireless Networks - Protocols and Systems, Prentice Hall.
2. Siva-RAM-Murthy, Ad-Hoc Wireless Networks - Architectures and Protocols, Addison-Wesley.
3. Stojmenovic and Cacute, Handbook of Wireless Networks and Mobile Computing, Wiley, 2002, ISBN 0471419028. (Chapters 11, 15, 17, 26 and 27)
4. Edgar H. Callaway, Wireless sensor networks: architectures and protocols, Auerbach Publications.
5. Feng Zhao, Leonidas J. Guibas, Wireless sensor networks: an information processing approach.

CSE-614 Wireless Sensor Networks

L-T-P-C: 3-0-0-3

Introduction to sensor networks and its applications: Architecture and factors influencing the sensor network design. Routing protocols- data centric routing protocols, hierarchical routing protocols, location based routing, energy efficient routing etc; Node Scheduling and coverage issues, topology control. Querying, data collection and processing, Collaborative information processing and group connectivity. Target tracking and identity management using sensor networks. Localization . Application & future research Challenges.

Books and References

1. R. Jurdak "Wireless Ad Hoc and Sensor Networks". Springer Publications.
2. Feng Zhao, Leonidas Guibas "Wireless Sensor Networks-An Information Processing Approach". Morgan Kauffman.
3. Research Publications.
4. Technical documents.

CSE-730 Mobile Databases

L-T-P-C: 3-0-0-3

Introduction to conventional databases, distributed databases
Mobile Data Access Systems: Mobility issues, On-demand services, Broadcast services, Transaction Processing, Security
Moving Object Databases: Basic concepts and challenges, Accessing methods of moving object databases, Current Information Oriented Indexing, Historical Information Oriented Indexing, Mixed-type indexing, Indexing Moving Objects with Special Characteristics
Moving Object Queries: Basic Queries (nearest neighbor query, range query), Advanced Queries (density query, continuous query)
Trends and Open Issue

Books and References

1. Kumar Vijay, Mobile Database Systems. John Willy & Sons.

2. Research Publication
3. Technical Documents.

CSE-731 Multimedia Computing

L-T-P-C: 3-0-0-3

An overview of multimedia system and media streams; Source representation and compression techniques text, speech and audio, still image and video; Graphics and animation; Multi-modal communication; Multimedia communication, video conferencing, video-on-demand broadcasting issues, traffic shaping and networking support; Transcoding; Multimedia OS and middleware; Synchronization and QoS; Multimedia servers, databases and content management; Multimedia information system and applications.

Books and References

1. John F. Koegel Buford, Multimedia Systems, Pearson Education.
2. Nalin K. Sharda, Multimedia Information Networking, Prentice Hall.

CSE-732 Data Mining

L-T-P-C: 3-0-0-3

Types of data mining problems. The process of data mining. Statistical evaluation of big data: statistical prediction, performance measures, pitfalls in data-mining evaluation. Data preparation: data models, data transformations, handling of missing data, time-dependent data, textual data. Data reduction: feature selection, principal components, smoothing data, case subsampling. Predictive modeling: mathematical models, linear models, neural nets, advanced statistical models, distance solutions, logic solutions, decision trees, decision rules, model combination. Solution analyses: graphical trend analyses, comparison of methods. Case studies. Future trends: text mining, visualization, distributed data. Practical sessions using open-source software.

Books and References

1. Jiawei Han and Michelen Kamber, Data Mining Concepts and Techniques, Morgan Kaufmann.
2. Alex Berson and Stephen Smith, Data Warehousing, Data mining and OLAP, McGraw Hill.

CSE-733 Security in Wireless & Mobile System

L-T-P-C: 3-0-0-3

IP Layer Security, Link Layer Security, Network Security options.

Security Issues in a Mobile IPV6 Network, Mobile Code Issues: Security Measures for Mobile Agents, Security Issues for Downloaded code in Mobile phones
Secure Mobile Commerce: MCommerce and its security challenges, Security of the radio interface
Security Issues in Single Hop Wireless Networks: Cellular Network Security, Access Control and Roaming Issues, Mobile IP Security
Security Issues in Multihop Wireless Networks: Mobile Adhoc Network Security, Trust Management and Routing Issues, Wireless Sensor Network Security, Key Management, Sybil Attacks and Location Privacy, Vehicular Network Applications and Security, Wireless Metropolitan Area Networks (e.g. 802.11b)

Books and References

1. Nichols and Lekkas, Wireless Security - Models, Threats, and Solutions, McGraw-Hill.

CSE-734 Distributed and Mobile Architecture L-T-P-C: 3-0-0-3

Hardware Architecture, Symmetric Multiprocessing , Distributed and Shared Memory. Multicomputers.
Software Architecture, Client server architecture, 3-tier architecture, N-tier architecture, Peer-to-peer.
Cluster computing concepts, Grid computing, Virtualisation and Cloud Computing.
Recent trends in processor technologies - Superscalar processors, Multi-core processors, Embedded processors

Books and References

1. Research Publications
2. Technical documents

CSE-735 Programming Mobile Devices L-T-P-C: 3-0-0-3

Motivation and Programming Strategies

Memory Management - Design Patterns for Limited Memory, Memory Management in Mobile Java, Memory Management in example OS

Applications - Workflow for Application Development, Techniques for Composing Applications, Application Models in Mobile Java, Case study: Symbian OS Application Infrastructure

Dynamic Linking - Implementation Techniques, Implementing Plugins, Managing Memory Consumption Related to Dynamically Linked Libraries, Rules of Thumb for Using Dynamically Loaded Libraries, Mobile Java and Dynamic Linking

Concurrency - Infrastructure for Concurrent Programming, MIDP Java and Concurrency, **Case study:** Symbian OS and Concurrency

Resource Management - Resource-Related Concerns in Mobile Devices, MIDP Java.

Networking - MIDP Java and Web Services, Bluetooth Facilities with an example OS

Security - Secure Coding and Design, Infrastructure for Enabling Secured Execution, Security Features in MIDP Java, Case study: Symbian OS Security Features

Books and References

1. Steve Atkinson, Rob Machin, Professional Java Mobile Programming.
2. Tommi Mikkonen, Programming Mobile Devices - An Introduction for Practitioners.