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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
I YEAR I SEMESTER M.Tech (Software Engineering)

COURSE STRUCTURE

SL.NO	SUBJECT	L	P	C	INT	EXT	TOTAL
MSE1.1	Advanced Data Structures & algorithms	4	-	8	40	60	100
MSE1.2	ERP & Supply Chain Management	4	-	8	40	60	100
MSE1.3	Software Quality Assurance & Testing	4	-	8	40	60	100
MSE1.4	Software Requirements & Estimation	4	-	8	40	60	100
MSE1.5	Mobile computing	4	-	8	40	60	100
MSE1.6	Elective 1: MSE1.6.1 Business Process Modeling MSE1.6.2 Web Technologies	4	-	8	40	60	100
MSE1.7	Advanced Data Structures Lab	-	4	4	40	60	100
MSE1.8	Mobile Computing Lab (using J2ME)	-	4	4	40	60	100

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I YEAR I SEMESTER M.Tech (Software Engineering)

MSE1.1 ADVANCED DATA STRUCTURES AND ALGORITHMS

Unit I: Lists, Stacks, Queues and Trees

Lists, Stacks and Queues: Abstract Data Types (ADTs), The List ADT, vector and list in the STL, Implementation of vector, Implementation of list, The Stack ADT, The Queue ADT.

Trees: The Search Tree ADT - Binary Search Trees, AVL Trees, Splay Trees, B-Trees

Unit II: Hashing and Priority Queues

Hashing: General Idea, Hash Function, Separate Chaining, Hash Tables Without Linked Lists, Rehashing, Extendible Hashing

Priority Queues: Implementations, Binary Heap, Applications of Priority Queues, *d*-Heaps, Leftist Heaps, Skew Heaps, Binomial Queues.

Unit III: Sorting

Sorting: A Lower Bound for Simple Sorting Algorithms, Shellsort, Heapsort, Mergesort, Quicksort, Indirect Sorting, A General Lower Bound for Sorting, Bucket Sort, External Sorting.

Unit IV: The Disjoint Set Class

Equivalence Relations, The Dynamic Equivalence Problem, Basic Data Structure, Smart Union Algorithms, Path Compression, Worst Case for Union-by-Rank and Path Compression, An Application

Unit V: Graph Algorithms

Definitions, Topological Sort, Shortest-Path Algorithms, Network Flow Problems, Minimum Spanning Tree, Applications of Depth-First Search, Introduction to NP-Completeness

Unit VI: Algorithm Design Techniques

Greedy Algorithms, Divide and Conquer, Dynamic Programming, Randomized Algorithms, Backtracking Algorithms.

Unit VII: Amortized Analysis

An Unrelated Puzzle, Binomial Queues, Skew Heaps, Fibonacci Heaps, Splay Trees

Unit VIII: Advanced Data Structures and Implementation

Top-Down Splay Trees, Red-Black Trees, Deterministic Skip Lists, AA-Trees, Treaps, *k*-d Trees, Pairing Heaps

Text Books:

1. Data Structures and Algorithm Analysis in C++, 3/e, Mark Allen Weiss, Pearson , 2007

Reference Books:

1. Data Structures Algorithms and Applications in C++, 2/e, Sartaj Sahni, Universities Press, 2007
2. Of Computer Algorithms, 2/e, Ellis Horowitz, Sartaj Sahni, Rajasekharan, Universities Press, 2008
3. Data Structures and Algorithms, Aho, Ullman, Pearson
4. Data Structures and Algorithms in JAVA, Adam drozdek, Cengage
5. Fundamentals of Data Structures in C++, 2/e, Horowitz, Sahni, Mehta, Universities Press,2007.

Dr E. V. Prasad, Chairman, B.O.S – CSE.

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I YEAR I SEMESTER M.Tech (Software Engineering)

MSE1.2 ERP & SUPPLY CHAIN MANAGEMENT

Unit I: Introduction to ERP

Overview – Benefits of ERP – ERP and Related Technologies – Business Process Reengineering – Data Warehousing – Data Mining – On–line Analytical Processing – Supply Chain Management.

Unit II: ERP Implementation

Implementation Life Cycle – Implementation Methodology – Hidden Costs – Organizing Implementation – Vendors, Consultants and Users – Contracts – Project Management and Monitoring.

Unit III: Business Modules

Business Modules in an ERP Package – Finance – Manufacturing – Human Resource – Plant Maintanance – Materials Management – Quality Management – Sales and Distribution.

Unit IV: Fundamentals of Supply Chain Management

Supply chain networks, Integrated supply chain planning, Decision phases in s supply chain, process view of a supply chain, supply chain flows, Overview of supply chain models and modeling systems, Supply chain planning: Strategic, operational and tactical, Understanding supply chain through process mapping and process flow chart.

Unit V: SCM Strategies, Performance

Supply chain strategies, achieving strategic fit, value chain, Supply chain drivers and obstacles, Strategic Alliances and Outsourcing, purchasing aspects of supply chain, Supply chain performance measurement: The balanced score card approach, Performance Metrics. Planning demand and supply: Demand forecasting in supply chain, Aggregate planning in supply chain, Predictable variability.

Unit VI: Planning and Managing Inventories

Introduction to Supply Chain Inventory Management. Inventory theory models: Economic Order Quantity Models, Reorder Point Models and Multiechelon Inventory Systems, Relevant deterministic and stochastic inventory models and Vendor managed inventory models.

Unit VII: Distribution Management

Role of transportation in a supply chain - direct shipment, warehousing, cross-docking; push vs. pull systems; transportation decisions (mode selection, fleet size), market channel structure, vehicle routing problem. Facilities decisions in a supply chain. Mathematical foundations of distribution management, Supply chain facility layout and capacity planning,

Unit VIII: Strategic Cost Management in Supply Chain

The financial impacts, Volume leveraging and cross docking, global logistics and material positioning, global supplier development, target pricing, cost management enablers, Measuring service levels in supply chains, Customer Satisfaction/Value/Profitability/Differential Advantage.

Text books:

1. ERP Demystified, 2/e, Alexis Leon, TMH, 2007.
2. Supply Chain Management: Strategy, Planning, Operation, Sunil Chopra , Peter Meindel, Pearson, 2002.

Reference Books:

1. Enterprise Resource Planning – concepts and Planning, Vinod Kumar, Venkata Krishnan, PHI.
2. Designing and Managing the Supply Chain: Concepts, Strategies, and Case Studies, 2/e, David Simchi-Levi, Philip Kaminsky, and Edith Simchi-Levi, TMH/Irwin, New York, 2003.

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I YEAR I SEMESTER M.Tech (Software Engineering)

MSE1.3 SOFTWARE QUALITY ASSURANCE AND TESTING

Unit I: Introduction

Software quality - challenges – objectives – quality factors – components of SQA – contract review – development and quality plans – SQA components in project life cycle – SQA defect removal policies – Reviews

Unit II: Software Testing Preliminaries

Basics of software testing, Test generation from requirements.

Unit III: Techniques for test generation and configuration

Test generation from finite state models, combinatorial designs.

Unit IV: Regression testing

Techniques for selection, minimization and prioritization. Test adequacy, assessment and enhancement.

Unit V: Testing strategies

White box and black box approach – integration testing – system and acceptance testing – performance testing – regression testing – internationalization testing – ad-hoc testing – website testing – usability testing – accessibility testing Test plan – management – execution and reporting – software test automation – automated testing tools

Unit VI: Software Quality Models and Metrics

Hierarchical models of software quality – software quality metrics –function points - Software product quality – software maintenance quality – effect of case tools – software quality infrastructure – procedures – certifications – configuration management – documentation control.

Unit VII: Software Measurements

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.

Unit VIII: Software Quality Standards

Project progress control – costs – quality management standards – project process standards – management and its role in SQA – SQA unit

Reference books:

1. Software quality assurance – from theory to implementation, Daniel Galin , Pearson, 2009. (U1)
2. Foundations of software Testing, Aditya Mathur, Pearson, 2008 (U2, U3, U4)
3. Software Quality, Mordechai Ben-Menachem/Garry S. Marliss, Thomson
4. Software Testing – principles and practices, Srinivasan D , Gopalaswamy Ramesh, Pearson, 2006(U5)
5. Software Quality Theory and Management, 2/e, Alan C Gillies, Cengage Learning, 2003 (U6, U8)
6. Black-Box Testing: Techniques for Functional Testing of Software and Systems, Boris Beizer, John Wiley 1995(U7)
7. Software Testing, 2 /e, Ron Patton, Pearson, 2007
8. The Art of Software Testing , Glenford J. Myers, John Wiley & Sons, 1979

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MSE1.4 SOFTWARE REQUIREMENTS AND ESTIMATION

Unit I: Requirements Engineering Overview

Software Requirement Overview – Software Development Roles – Software Development Process Kernels – Commercial Life Cycle Model – Vision Development – Stakeholders Needs & Analysis.

Unit II: Requirements Elicitation

The Process of Requirements Elicitation – Requirements Elicitation Problems – Problems of Scope – Problems of Understanding – Problems of Volatility – Current Elicitation Techniques – Information Gathering – Requirements Expression and Analysis – Validation – An Elicitation Methodology Framework – A Requirements Elicitation Process Model – Methodology over Method – Integration of Techniques – Fact-Finding – Requirements Gathering – Evaluation and Rationalization – Prioritization – Integration and Validation.

Unit III: Requirements Analysis

Identification of Functional and Non Functional Requirements – Identification of Performance Requirements – Identification of safety Requirements – Analysis – Feasibility and Internal Compatibility of System Requirements – Definition of Human Requirements Baseline.

Unit IV: Requirements Development

Requirements analysis – Requirements Documentation – Requirements Development Workflow – Fundamentals of Requirements Development – Requirements Attributes Guidelines Document – Supplementary Specification Document – Use Case Specification Document – Methods for Software Prototyping – Evolutionary prototyping – Throwaway prototyping.

Unit V: Requirements Validation

Validation objectives – Analysis of requirements validation – Activities – Properties – Requirement reviews – Requirements testing.

Unit VI: Software Size Estimation

Software Estimation: Components of Software Estimations, Estimation methods, Problems associated with estimation, Key project factors that influence estimation

Size Estimation: Two views of sizing, Function Point Analysis, Mark II FPA, Full Function Points, LOC Estimation, Conversion between size measures.

Unit VII: Effort, Schedule and Cost Estimation

What is Productivity? Estimation Factors, Approaches to Effort and Schedule Estimation, COCOMO II, Putnam Estimation Model, Algorithmic models, Cost Estimation

Unit VIII: Tools for Requirements Management and Estimation

Requirements Management Tools: Benefits of using a requirements management tool, commercial requirements management tool, Rational Requisite pro, implementing requirements management automation,

Software Estimation Tools: Desirable features in software estimation tools.

Text Books:

1. Requirements Engineering: A Good Practice Guide, Ian Sommerville, Pete Sawyer, Pearson, 2004.
2. Software Requirements and Estimation, *Rajesh Naik , Swapna Kishore*, TMH

Reference Books:

1. Managing Software Requirements A Use Case Approach, 2/e, Dean, Don, Addison - Wesley, 2003.
2. Software Requirements, Karl Eugene Wiegers, Word Power Publishers, 2000.
3. Requirements Engineering and Rapid Development, Ian Graham, Addison - Wesley, 1998.
4. Matsering the Requirements Process, 2/e, S. Robertson, J. Robertson, Pearson, 2006.

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I YEAR I SEMESTER M.Tech (Software Engineering)

MSE1.5 MOBILE COMPUTING

Unit 1: Introduction to Mobile Communications and Computing: Mobile Computing (MC): Introduction to MC, novel applications, limitations, and architecture GSM: Mobile services, System architecture, Radio interface, Protocols, Localization and calling, Handover, Security, and New data services.

Unit 2: (Wireless) Medium Access Control: Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA.

Unit 3: Mobile Network Layer: Mobile IP (Goals, assumptions, entities and terminology, IP packet delivery, agent advertisement and discovery, registration, tunneling and encapsulation, optimizations), Dynamic Host Configuration Protocol (DHCP).

Unit 4: Mobile Transport Layer: Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/fast recovery, Transmission /time-out freezing, Selective retransmission, Transaction oriented TCP.

Unit 5: Database Issues: Hoarding techniques, caching invalidation mechanisms, client server computing with adaptation, power-aware and context-aware computing, transactional models, query processing, recovery, and quality of service issues.

Unit 6: Data Dissemination: Communications asymmetry, classification of new data delivery mechanisms, push-based mechanisms, pull-based mechanisms, hybrid mechanisms, selective tuning (indexing) techniques.

Unit 7: Mobile Ad hoc Networks (MANETs): Overview, Properties of a MANET, spectrum of MANET applications, routing and various routing algorithms, security in MANETs.

Unit 8: Protocols and Tools: Wireless Application Protocol-WAP. (Introduction, protocol architecture, and treatment of protocols of all layers), Bluetooth (User scenarios, physical layer, MAC layer, networking, security, link management) and J2ME.

Text Books:

1. Mobile Communications, 2/e, Jochen Schiller, 2004, *Addison-Wesley*. (Chapters 4, 7, 9, 10, 11)
2. Handbook of Wireless Networks and Mobile Computing, Stojmenovic , Cacute, *Wiley*, 2002, (Chapters 11, 15, 17, 26 and 27)

Reference Books:

1. Mobile Computing Principles: Designing and Developing Mobile Applications with UML and XML, Reza Behravanfar, Cambridge, University Press, 2004.
2. Fundamentals of Mobile and Pervasive Computing, Adelstein, Frank, Gupta, Sandeep KS. Richard III, Golden , Schwiebert, Loren, TMH , 2005.
3. Principles of Mobile Computing, 2/e, Hansmann, Merk, Nicklous, Stober, *Springer*, 2003.
4. Mobile and Wireless Design Essentials, Martyn Mallick, Wiley *DreamTech*, 2003
5. Mobile Computing, Rajkamal, Oxford, 2008
6. Adhoc Wireless Networks, 2/e, Sivaram murthy, manoj, Pearson, 2009

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I YEAR I SEMESTER M.Tech (Software Engineering)

MSE1.6.1 BUSINESS PROCESS MODELING

Unit I:
Introduction to Business Process Design.

Unit II:
Process Management and Process Oriented Improvement Programs.

Unit III:
A Simulation Based Methodology for Designing Business Processes.

Unit IV:
Basic Tools for Process Design.

Unit V:
Managing Process Flows.

Unit VI:
Introduction to Queuing and Simulation.

Unit VII:
Modelling and Simulating Business Processes.

Unit VIII:
Input and Output Data Analysis; Optimizing Business Process Performance.

Text Book:

1. Business Process Modeling, Simulation and Design, Laguna, M. Marklund, J. (2005), Pearson Prentice Hall.

Reference Books:

1. Business Process Management: Concepts, Languages , Architectures, Mathias Weske, 2007, Springer
2. Design , Control of Workflow Processes, H. A. Reijers, 2003, Springer

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I YEAR I SEMESTER M.Tech (Software Engineering)

MSE1.6.2 WEB TECHNOLOGIES

Unit I:

Introduction to Java Scripts, Objects in Java Script, Dynamic HTML with Java Script

Unit II:

XML: Document type definition, XML Schemas, Document Object model, Presenting XML, Using XML Processors: DOM and SAX

Unit III:

Java Beans: Introduction to Java Beans, Advantages of Java Beans, BDK; Introspection, Using Bound properties, Bean Info Interface, Constrained properties; Persistence, Customizes, Java Beans API, Introduction to EJB's

Unit IV:

Web Servers: Introduction to Servelets: Lifecycle of a Serverlet, JSDK, The Servelet API, The javax.servelet Package, Reading Servelet parameters, Reading Initialization parameters. The javax.servelet HTTP package, Handling Http Request & Responses, Using Cookies-Session Tracking, Security Issues,

Unit V:

Introduction to JSP: The Problem with Servelet. The Anatomy of a JSP Page, JSP Processing. JSP Application Design with MVC Setting Up and JSP Environment: Installing the Java Software Development Kit, Tomcat Server & Testing Tomcat

Unit VI:

JSP Application Development: Generating Dynamic Content, Using Scripting Elements Implicit JSP Objects, Conditional Processing – Displaying Values Using an Expression to Set an Attribute, Declaring Variables and Methods Error Handling and Debugging Sharing Data Between JSP pages, Requests, and Users Passing Control and Date between Pages – Sharing Session and Application Data – Memory Usage Considerations

Unit VII:

Database Access: Database Programming using JDBC, Studying Javax.sql.* package,Accessing a Database from a JSP Page, Application – Specific Database Actions, Deploying JAVA Beans in a JSP Page, Introduction to struts framework.

Unit VIII:

Online Applications: Simple applications – On–line Databases – Monitoring User Events – Plug–ins – Database connectivity – Internet Information Systems – EDI application in business – Internet commerce – Customization of Internet commerce.

Text Books

1. Web Programming, building internet applications, 2/e, Chris Bates, Wiley Dreamtech (UNIT s 1,2 ,3)
2. The complete Reference Java 2 ,5/e, Patrick Naughton , Herbert Schildt. TMH (Chapters: 19, 20, 21, 22, 25, 27) (UNIT 4)
3. Java Server Pages –Hans Bergsten, SPD O'Reilly (UNITs 5,6,7,8)

Reference Books

1. Internet , World Wide Web – How to program, Dietel , Nieto PHI/Pearson
2. Jakarta Struts Cookbook , Bill Siggelkow, S P D O'Reilly for chap 8
3. Murach's beginning JAVA JDK 5, Murach, SPD
4. An Introduction to web Design , Programming –Wang-Thomson
5. Web Applications Technologies Concepts-Knuckles, John Wiley
6. Programming world wide web-Sebesta, Pearson
7. Building Web Applications-NIIT, PHI
8. Web Warrior Guide to Web Programmming-Bai/Ekedaw-Thomas

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9. Beginning Web Programming-Jon Duckett WROX.
10. Java Server Pages, Pekowsky, Pearson.

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MSE1.7 ADV. DATA STRUCTURES LAB

Implementation of data structures and algorithms using C / C++ / Java covered in the Course MSE1.1.

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MSE1.8 MOBILE COMPUTING LAB

Covering experiments of MSE1.5 Course.