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<td>Mobile computing</td>
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<td>Embedded Operating System</td>
<td>Performance Evaluation and Reliability of Information Systems</td>
<td>Database Engineering</td>
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### FOURTH SEMESTER

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TOTAL: 18 credits

TOTAL: 21 credits
Software Engineering Design Methodology: Course Outline (4-0-0-4)

Principles and Motivations
Definitions and need for engineered approach to software development; Software development process models from the points of view of technical development and project management: waterfall, rapid prototyping, incremental development, spiral models, emphasis on computer-assisted environments.

Introduction to Modeling Tools
Basics of object-oriented approach, object-oriented programming and languages, OMT, visual modeling, UML, Rational Rose Tool

Object Modeling and Design
Classes, objects, relationships, key abstractions, common mechanisms, diagrams, class diagrams, advanced classes, advanced relationships, interfaces, types, roles, packages, instances, object diagrams, interactions, use cases, use case diagrams, interaction diagrams, activity diagrams, events and signals, state machines, processes, threads, state chart diagrams, components, deployment, collaborations, patterns and frameworks, component diagrams, systems and models, code generation and reverse engineering.

Software Development Methods
Formal, semi-formal and informal methods; Requirements elicitation, requirements specification; Data, function, and event-based modeling; Some of the popular methodologies such as Yourdon’s SAD, SSADM etc; CASE tools-classification, features, strengths and weaknesses; ICASE; CASE standards.

Software Project Management
Principles of software projects management; Organizational and team structure; Project planning; Project initiation and Project termination; Technical, quality, and management plans; Project control; Cost estimation methods - Function points and COCOMO.

References:
2. Ian Sommerville; Software Engineering, Addison-Wesley Publishing Company, England
Advanced Topics in Algorithm Designing : Course Outlines (4-0-0-4)

Advanced Data Structure: Graph, B-tree, binomial heaps and, Fibonacci heap.


Linear Programming: The simplex algorithm and duality.

Number Theoretic Algorithm: GCD, modular arithmetic, solving modular linear equation and Chinese remainder theorem.


Parallel Algorithms: Model for parallel computation, basic techniques, work and efficiency, parallel evaluation of expressions, parallel sorting networks and parallel sorting.

Suggested Books
3. Basse S., Computer Algorithms - Introduction to Design and Analysis, Addison Wesley
Introduction to Project Management: Definition of the Project, Project Specification and parameters, Principles of Project Management, Project Management Life Cycle


Project Scheduling and Tracking Techniques: Why projects are delayed? Effort Estimation Techniques, Task Network and Scheduling Methods, Monitoring and Control Progress, Graphical Reporting Tools

Project Economics: Project Costing, Empirical Project Estimation Techniques, Decomposition Techniques, BEP, Automated Estimation Tools

Risk Analysis and Management: Risk Mitigation and Management, Software Metrics and Project Management

Project Control and Closure: Project Management Issues with regard to New Technologies

Suggested Readings:
1. Clements and Gido, Effective Project Management, Thomson India Edition

References:
2. Documenting Software Architectures: Views and Beyond Paul Clements, Felix Bachmann, Len Bass, David Garlen, James Ivers, Reed Little, Robert Nord, Judith Stafford
Software Testing: Course Outline (4-0-0-4)

1. Fundamentals of Testing

2. Role of Testing in SDLC
   Review of software development models (Waterfall Models, Spiral Model, W Model, V Model)
   Agile Methodology and Its Impact on testing, Test Levels (Unit, Component, Module, Integration, System, Acceptance, Generic)

3. Approaches to Testing
   Static Testing: Structured Group Examinations, Static Analysis: Control flow & Data flow, Determining Metrics
   Dynamic Testing
   Black Box Testing: Equivalence Class Partitioning, Boundary Value Analysis, State Transition Test, Cause Effect Graphing and Decision Table Technique and Used Case Testing and Advanced black box techniques
   White Box Testing
   Statement Coverage, Branch Coverage, Test of Conditions, Path Coverage, Advanced White Box Techniques, Instrumentation and Tool Support Gray Box Testing, Intuitive and Experience Based Testing

5. Test Management

6. Testing Tools

7. Testing Object Oriented Software
   Introduction to OO testing concepts, Differences in OO testing Term

References:
Service Oriented Architecture: Course Outline (4-0-4-0-4)

1. SOA Fundamental:
   Defining SOA, Business Value of SOA, Evolution of SOA, SOA characteristics, concept of a service in SOA, misperceptions about SOA, Basic SOA architecture, infrastructure services, Enterprise Service Bus (ESB), SOA Enterprise Software models, IBM On Demand operating environment

2. SOA Planning and Analysis:
   Stages of the SOA lifecycle, SOA Delivery Strategies, service-oriented analysis, Capture and assess business and IT issues and drivers, determining non-functional requirements (e.g., technical constraints, business constraints, runtime qualities, non-runtime qualities), business centric SOA and its benefits, Service modelling, Basic modelling building blocks, service models for legacy application integration and enterprise integration, Enterprise solution assets (ESA)

3. SOA Design and Implementation:
   Service-oriented design process, design activities, determine services and tasks based on business process model, choosing appropriate standards, articulate architecture, mapping business processes to technology, designing service integration environment (e.g., ESB, registry), Tools available for appropriate designing, implementing SOA, security implementation, implementation of integration patterns, services enablement, quality assurance

4. Managing SOA Environment:
   Distributing service management and monitoring concepts, operational management challenges, Service-level agreement considerations, SOA governance (SLA, roles and responsibilities, policies, critical success factors, and matrices), QoS compliance in SOA governance, role of ESB in SOA governance, impact of changes to services in the SOA lifecycle

Reference Books:

Research Methodology and Technical communication

Research: Meaning & Purpose, Review of literature, Problem definition/Formulation of research problem, Research proposal, Variables, Hypothesis, types, construction of hypothesis, 

Classification of research: Quantitative research: Descriptive Research, Experimental Research, Qualitative research: Observational studies, Historical research, Focus group discussion, Case study method,

Sources of data collection: Primary and Secondary Data Collection, Sample and Sampling technology, Non-probability and Probability Sampling


Data Analysis, Report Writing, Results and References,

Thesis Writing and Journal Publications: Writing thesis, Writing journal and conference papers, IEEE and Harvard style of referencing, Effective presentation, Copyrights, and Avoid plagiarism