Software Engineering Fundamentals (3-0-3)

Evaluation:

	Theory	Practical	Total
Sessional	30	20	50
Final	50	-	50
Total	80	20	100

Course Objectives:

The purpose of the course is to introduce the concepts and techniques required to direct and control the development of medium to large-scale software, including project management, quality assurance, software process improvement and software metrics. It aims to broaden student's understanding of possible software development paradigms (e. g., structured analysis and design, object-oriented approaches). Moreover, it enables to explore some of the problems of software maintenance.

Course Contents:

1. Software Project Management Concepts   (2 hrs)
  1.1 Software: Crisis and Myths, Software Process and Process Models
  1.2 Process technology, Product and Process. People, Product, Process, Project

2. Software Metrics   (3 hrs)
  2.1 Measures, Metrics, and Indicators: Software Measurement
  2.2 Metrics for software quality, Statistical Quality Control
  2.3 Metrics for Small Organizations

3. Software Project Planning and Risk   (3 hrs)
  3.1 Objectives. Scope, Resources, Project Estimation, Decomposition Techniques
  3.2 Empirical Estimation Models, Risk Management Strategies
  3.3 Software Risks, Risk Identification, Risk Projection

4. Software Quality Assurance   (5 hrs)
  4.1 Concepts, Software Quality Assurance
  4.2 Software Reviews, Formal Technical Reviews
  4.3 Formal Approaches to SQA
  4.4 Statistical Quality Assurance. Software Reliability
  4.5 ISO 9000 Quality Standards, SQA Plan

5. Software Configuration Management   (4 hrs)
  5.1 Software Configuration Management, SCM Process

5.2 Identification of Objects in the Software Configuration, Version Control
5.3 Change Control, Configuration Audit
5.4 Status Reporting, SCM Standards

6. Analysis Concepts and Principles   (5 hrs)
6.1 Requirements Analysis, Analysis Principles
6.2 Software Prototyping. Specification and Specification Review
6.3 Analysis Modeling: Elements of Analysis Model
6.4 Data Modeling Functional Modeling and Information Flow
6.5 Behavioral Modeling, Structured Analysis- Data Dictionary

7. Design Concepts and Principles   (6 hrs)
7.1 Design Process, Principles and Concepts
7.2 Architectural and Component Level Design
7.3 Software Architecture, Data Design, Architectural Styles
7.4 Mapping Requirements into a Software Architecture
7.5 Transform Mapping, Transaction Mapping
7.6 Structured Programming, Comparison of Design Notation

8. Software Testing Techniques and Strategies   (7 hrs)
8.1 Testing Fundamentals,
8.2 Test Case Design.
8.3 White Box Testing. Basis Path Testing,
8.4 Control Structure Testing.
8.5 Black-Box Testing. Unit Testing,
8.6 Integration Testing,
8.7 Validation Testing, System Testing

9. Object-Oriented Concepts and Principles   (4 hrs)
9.1 Object-Oriented Paradigm
9.2 Object-Oriented Concepts
9.3 Identifying the Elements of an Object Model
9.4 Management of Object-Oriented Software Projects

10. Object-Oriented Analysis and Design   (6 hrs)
10.1 Domain Analysis
10.2 Components of the OO Analysis Model
10.3 The OOA Process, Design for Object-Oriented Systems
10.4 The System Design Process
10.5 The Object Design Process
10.6 Design Patterns

Laboratory:

The Laboratory Exercise includes System Analysis, Design, Development, and Testing. Debugging of a small Real Life problem and then attempting to visualize various Software Engineering activities, like Revision Control System, Version Management, Library Building, etc. using some of the Software Engineering Tool or CASE Tool.

Reference Books:

1. Mall, R., Foundations of Software Engineering, PHI, 2000, ISBN: 81-203-1445-
2. Pressman, R. S., Software Engineering a practitioners Approach, 5th Edition, McGraw Hill, 2001, ISBN: 0-07-118458-9
3. Somnterville, I., Software Engineering, 5th Edition, Addison -Wesley, 1995, ISBN: 0-201-43579 -9