Software Engineering

Course Objectives

The course emphasizes on the software concepts. These concepts will equip management graduates to understand the key elements in software development. Also the students will get an understanding on the industry standards, quality requirements and latest models in the field.

Syllabus

Overview of Software Engineering, Software Requirements Specification (SRS), Planning and executing a software Project, Software Design Concepts, Principles and Testing and Capability Maturity Model (CMM) for Software.

Expected Outcomes

Upon completion of this course, the students will be able to:

1. Help the student understand about software engineering and role of management.

2. Identify areas where management concepts are applied in software development projects.

3. Learn project planning and estimation principles in software projects.

4. Understand the latest quality models applicable in IT and its application.

References

1. Ian Sommerville, Software Engineering, Pearson Education, 2013

2. Pressman R.S, Software Engineering: A Practitioner's Approach, McGraw-Hill Higher Education, 2014

3. Pankaj Jaiote, An Integrated Approach to Software Engineering, Narose Publishing House, 2005

4. Richard Fairly, Software Engineering Concepts, McGraw Hill Education India Private Limited, 2001

5. Mall R., Fundamentals of Software Engineering, PHI Learning Private Limited-New Delhi, 2014 S. Mukherjee, Project Management for Software Development, Jaico Publishing House, 2008

6. Behferooz A. and Hudson F.J., Software Engineering Fundamentals, Oxford University Press, 1997

7. Tory Dimes, Scrum Essentials: Agile Software Development and Agile Project Management for Project Managers, Scrum Masters, Product Owners, and Stakeholder, CreateSpace Independent Publishing Platform, 2014

8. Sumit Prakash. T, Software Project Management, Kindle Edition, University Science Press, 2011

9. Mark C.P, The Capability Maturity Model, Amazon Publishing, 2015

10. Carnegie Mellon University, The Capability Maturity Model, Guidelines For Improving The Software Process, Pearson Education, 1995

11. Charles Orton-Jones, 7 global project management trends, http://raconteur.net/business/seven- global-project-management-trends

12. Project Management Report, Raconteur, https://raconteur.uberflip.com/i/549582-project-management

Units Topics

1 Overview of Software Engineering

Overview - Software and Software Engineering –Phases in Software Development – Software Development process, Models; Software Life Cycle Models: Classical and Iterative Waterfall Model, Prototyping, Evolutionary Model, Spiral Model , Comparison of different life cycle models; Role of Management in Software Development – Role of Matrices Measurement; Software Quality Metrics; Professional software development; software engineering ethics;

Agile software development – Agile methods, plan-driven and agile development. Extreme programming, agile project management, scaling agile methods.

2 Software Requirements Specification (SRS)

Role of SRS; Analysis Principles, Functional and non-functional requirements; the software requirements document; requirements specifications; requirements specification; requirements engineering processes; requirements elicitation and analysis; requirements validation; requirements management; Software Prototyping.

First Internal Examination

3 Planning and executing a software Project

Software Project Management - Project size estimation metrics, Line of Code (LOC), Function Point (FP). Project estimation techniques- empirical estimation techniques, Putnam's model, basic COCOMO model, Halstead's Software Science. Staffing Level Estimation, risk management, managing people, group, working, choosing and keeping people.

Software cost estimation- software productivity, estimation of productivity, factors effecting programming productivity, project duration and staffing; Quality Assurance Plans– Project

Monitoring Plans – Risk Management.

4 Software Design Concepts, Principles and Testing

Software Design, Design Process, Design Fundamentals, Modular Design, Data Design, Architectural Design, Procedural Design, Design Documentation.

Software Testing Techniques and Technical Metrics - Software Testing Fundamentals, White Box Testing, Control Structure Testing, Black Box Testing, Testing Real Time System, Automated Testing.

Second Internal Examination

5 Capability Maturity Model (CMM) for Software

Fundamentals, Five Maturity Levels, Key Process Areas, ISO 9000 Series of Standards for Quality Management Systems, Mapping ISO 9001 to the CMM

CMM Based Process Improvement - Introduction, Management Role, Process Focus, Useful Processes, Training, Risk Management, Customer-Supplier Relationship, Peer Reviews;

Software Quality Assurance- Fundamentals, Software Quality Assurance, Quality Concepts, Quality Movement, Reviews, Software Reliability, Background Issues, Software Quality Assurance Activities, SQA Plan.

Final Examination