Course Title: Software Engineering & Project Management

Course No. : ICT Ed. 457	Nature of course: Theory + Case Studies
Level: B.Ed.	Credit Hour: 3 hours (3T+2T)
Semester: Fifth	Teaching Hour: 80hours (48+32)

1. Course Description

The purpose of this course is to introduce the fundamental concepts of Software Engineering, including software Project management. At the end of this course, a student will be able to understand the fundamental concepts of software engineering and project management.

2. General Objectives

Through this course, students shall

- To evaluate and relate different software processes, system models and architectural designs and assess their suitability in a given context
- To describe basic concepts and principles of requirements engineering, software implementation, testing and maintenance
- To describe the software configuration process and quality assurance
- To apply the software project manage practices and principle in software development.

3. Course Outlines:

Specific Objectives	Contents
• Identify software components and their values. • Define terms related to software Engineering. • Describe different types of software process models and their usefulness. • Understand benefits of software process model	**Unit 1: Software and software engineering (8)** 1.1. Introduction to software 1.2. Evolving role of software 1.3. Program Vs software 1.4. Characteristics of software 1.5. Types of software 1.6. Generic view of software engineering 1.7. Software process and software process model. 1.8. Myth and Ethics on software engineering.
• Explain use and importance of software development life cycle • Describe the types of software development process • Comparison of different software process model	**Unit 2: Software development process models (8)** 2.1. Waterfall model and enhance waterfall model 2.2. Incremental process models 2.3. Rapid application development 2.4. Prototype and spiral model 2.5. Spiral process model 2.6. Rational unified process model 2.7. Agile model: XP and Scrum
• Discuss about Software requirement • Requirement engineering • Explain about requirement management and SRS documents	**Unit 3: Software requirement specification (8)** 3.1 Software requirement and its types 3.2 Requirement engineering 3.3 Requirement elicitation 3.4 Requirement analysis 3.5 Requirement documentation and validation 3.6 Requirement management 3.7 SRS documents

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• Explain software project management and planning • Discuss about project estimation techniques • Understand the COCOMO model • Discuss about risk, software configuration management	**Unit IV: Software project management (20)** 4.1. Software project 4.2. Activities in project management 4.3. Software project planning 4.4. Software project management plan 4.5. Software project scheduling and techniques 4.6. Software project team management and organization 4.7. Project estimation techniques: COCOMO model 4.8. Risk analysis and management 4.9. Risk management process
• Understand importance of software design • Discuss about software design models • Compare and contrast between Function oriented design vs Object oriented design	**Unit 5 Software design (8)** 5.1. Design framework 5.2. Software design models 5.3. Design process 5.4. Architecture design 5.5. Low level design 5.6. Coupling and cohesion 5.7. Software design strategies 5.8. Function oriented design 5.9. Object oriented design 5.10. Function oriented design Vs Object oriented design
• Understand software measurement and metrics • Discuss object oriented matrices	**Unit 6: Software measurement and metrics (8)** 6.1. Software measurement 6.2. Software metrics 6.3. Control flow graph 6.4. Cyclomatic complexity 6.5. Object oriented matrices 6.6. Lossless Decomposition
• Understand the concept of software maintenance • •Discuss types of software maintenance • •Understand Software maintenance cost	**Unit 7: Configuration Management (8)** 7.1. Software configuration management 7.2. Software change management 7.3. Version and release management 7.4. Need for software maintenance 7.5. Types of software maintenance 7.6. Software maintenance process model 7.7. Software maintenance cost
• Understand the concepts of re-engineering and reverse engineering • Understand the re-engineering process model • Discuss difference between reverse, forward and re-	**Unit 8: Software re-engineering (8)** 8.1. Steps in re-engineering 8.2. Re-engineering process 8.3. Software re-engineering process model 8.4. Forward engineering 8.5. Reverse engineering process 8.6. Characteristic of reverse engineering

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engineering	8.7. Difference between reverse, forward and re-engineering 8.8. Software reuse
• Understand the concept of software testing methods and principles • Understand the concept of Software quality and assurance • Explain about maturity model	**Unit 9: Software Testing and quality assurance(4)** 9.1 Software testing principle 9.2 Software testing approach 9.3 unit, integration and system testing 9.4 Software quality attributes and Quality factors 9.5 Software Quality control and Quality assurance 9.6 Software safety 9.7 The ISO 9000 model 9.8 SEI capability maturity model 9.9 Verification and validation

4. Instructional Techniques

The instructional techniques for this course are divided into two groups. First group consists of general instructional techniques applicable to most of the units. The second group consists of specific instructional techniques applicable to particular units.

4.1 General Techniques

Reading materials will be provided to students in each unit. Lecture, Discussion, use of multi-media projector, brain storming are used in all units.

4.2 Specific Instructional Techniques

Demonstration is an essential instructional technique for all units in this course during teaching learning process. Specifically, demonstration with practical works will be specific instructional technique in this course. The details of suggested instructional techniques are presented below:

Unit 1: Self reading, and making study reports
Unit 2: Comparison about different software process model.
Unit 3: Homework and Assignment on Requirement elicitation and Requirement analysis
Unit 4: Homework and Assignment on Software design models
Unit 5: Group Discussion on Software design strategies
Unit 6: Discuss on Software measurement
Unit 7: Self reading and making study reports Types of software maintenance
Unit 8: Group discuss on reverse engineering, forward process
Unit 9: Self reading, creating and presenting study reports

5. Evaluation :

Internal Assessment	External Practical Exam/Viva	Semester Examination	Total Marks
40 Points	20 Points	40 Points	100 Points

***Note**: Students must pass separately in internal assessment, external practical exam and semester examination.*

5.1. Internal Evaluation (40 Points):

Internal evaluation will be conducted by subject teacher based on following criteria:

1) Class Attendance	5 points
2) Learning activities and class performance	5 points
3) First assignment (written assignment)	10 points

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4) Second assignment (Case Study/project work with presentation)	10 points
5) Terminal Examination	10 Points
Total	40 Points

5.2 Semester Examination (40 Points)

Examination Division, Dean Office will conduct final examination at the end of semester.

1) Objective question (Multiple choice 10 questions x 1mark)	10 points
2) Subjective answer questions (6 questions x 5 marks)	30 points
Total	40 points

5.3 External Practical Exam/Viva (20 Points):

Examination Division, Dean Office will conduct final practical exam at the end of semester.

6. Recommended books and References materials (including relevant published articles in national and international journals)

Recommended books:

References materials:

Sommerville, I. (2011). *Software engineering* (9th ed.). Boston: Pearson.

Pressman, R. S. (2010). *Software engineering: a practitioner’s approach* (7th ed.). Boston,

Mass: McGraw Hill.

Software engineering, Udit Agarwal

Software Engineering Fundamentals, “ Ali Behforooz and Frederick J. Hudson

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