East West University
Department of Computer Science and Engineering
Course Outline
Summer 2025

Course: CSE412- Software Engineering

Credits and Teaching Scheme

	Theory	Laboratory	Total
Credits	3	1	4
Contact Hours	3 Hours/Week for 11 Weeks + Final Exam in the 12th Week	2 Hours/Week for 12 Weeks	5 Hours/Week for 11 Weeks + Final Exam in the 12th Week

Prerequisite

CSE347 Information System Analysis and Design

Course Objective

The objective of this course is to learn different principles and practices of modern software engineering. It also builds an understanding of the challenges faced in the industry and their resolutions. This course enhances the skills of using different modern tools and languages to analyze, design, and evaluate a real-life complex software system. This software engineering knowledge will be needed on the CSE430 Software Testing and Quality Assurance course.

Knowledge Profile

K2 (Conceptually based mathematics, numerical analysis, statistics, and formal aspects of computer and information science): Conceptually based mathematics, numerical analysis, statistics, and the formal aspects of computer and information science to support analysis and modeling applicable to the discipline

K3 (Theory-based engineering fundamentals): A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline

K4 (Forefront engineering specialist knowledge for practice): Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline

K5 (Engineering design): Knowledge that supports engineering design in a practice area.

K6 (Engineering practice (technology): Knowledge of engineering practice (technology) in the practice areas in the engineering discipline

K7 (Comprehension of engineering in society): Comprehension of the role of engineering in society and identified issues in engineering practice in the discipline: ethics and the engineer's professional responsibility to public safety; the impacts of engineering activity; economic, social, cultural, environmental, and sustainability.

K8 (Research literature): Engagement with selected knowledge in the research literature of the discipline

Learning Domains

Cognitive - C3: Applying, C4: Analyzing, C5: Evaluating C6: Creating
Psychomotor - P2: Manipulation, P3: Precision
Affective - A2: Responding, A3-Valuing

Program Outcomes (POs)

PO3: Design/Development of Solutions (Cognitive, Affective)
PO6: The Engineer and Society (Affective, Cognitive)
PO9: Individual Work and Teamwork (Psychomotor, Affective)

Complex Engineering Problem Solution

EP1: Depth of knowledge required
EP2: Range of conflicting requirements
EP3: Depth of analysis required
EP4: Familiarity of issues

Complex Engineering Activities

None

Course Outcomes (COs) with Mappings

After completion of this course, students will be able to:

CO	CO Description	PO	Learning Domains	Knowledge Profile	Complex Engineering Problem Solving
CO1	**Apply** and **analyze** source code management and version control system, appropriate software development model for developing software projects, dependable systems, and dependability properties,	PO3	C3, C4	K2, K3, K4	-
CO2	**Apply** and **analyze** software reuse, and design patterns, use and	PO6	C3, C4	K4, K5, K6	-

	examine different software testing techniques appropriate for project planning, and estimate project costs for project evaluation.				
CO3	**Select, use**, and **justify** different software tools; demonstrate skills and write reports to design, build, and test software.	PO9	C5, C6, P2, P3	K5, K6, K7	EP1, EP2
CO4	**Demonstrate** skills, **present,** and **develop** concepts, and **write** reports to design, build, and test software for complex real-life applications as a team.	PO11	A2, A3	K8	EP3, EP4

Course Topics, Teaching-Learning Method, and Assessment Scheme

Course Topic	Teaching-Learning Method	CO	Mark of Cognitive Learning Levels		Exam (Mark)
			C3	C4	
1. Plan-driven model: Software Process Models, Iterative process models, Incremental software development, Spiral model, Rapid Application Development (RAD) model, Component Assembly Model, Concurrent Development Model, Prototyping Model (Evolutionary prototyping, Throwaway prototyping, Rapid prototyping techniques) **2.** Agile Software Development, Extreme programming (XP), Scrum, Agile VS Plan- driven model **3.** Source Code Management, and version control system **4.** Dependable Systems and dependability properties (Security, Reliability, Safety) **5.** Reliability Engineering (Availability and reliability, Reliability requirements, Fault-tolerant architectures, Programming for reliability, Reliability measurement) **6.** Software reuse (The reuse landscape,	Lecture, Class Discussion, Discussion outside class with Instructor/ TA	CO1	20	10	Midterm Assessment Exam (30)

Application frameworks, Software product lines, Application system reuse)					
1. Software Testing Basics- white box & black box testing, Integration and System Testing, Unit Testing, Code complexity analysis: Cyclomatic complexity, Halstead's complexity **2.** Design Pattern (Singleton, Factory method, Builder, Adapter, Bridge, Observer) **3.** Software Measurement and Estimation (Project cost estimation techniques, Functional Point Analysis, FP counting method for determining software cost), COCOMO cost modeling, **4.** Software Engineering Tools, Fourth Generation Techniques (4GT)	Do	CO2	20	10	Final Exam (30)

Laboratory Experiments and Assessment Scheme

Experiment	Teaching-Learning Method	CO	Mark of Cognitive Learning Levels		Mark of Psychomotor Learning Levels		Mark of Affective Learning Levels		CO Mark
			C5	C6	P2	P3	A2	A3	
1. Group formation and selecting topics for mini project 2. Source Code version Management tool Demonstration 3. Mid-semester mini-project update 4. Black box testing 5. White box testing 6. Design Pattern	Lab Experiment and Result Analysis and Discussion with Instructor, Post-Lab Report	CO3	2	2	2	1	2	1	10

implementation **7.** Project Demonstration and presentation with VIVA									

Mini Project

Teaching-Learning Method	CO	Mark of Cognitive Learning Level		Mark of Psychomotor Learning Levels		Mark of Affective Learning Level		CO Mark
		C5	C6	P2	P3	A2	A3	
Group-based, moderately complex project development along with Report, VIVA, and oral presentation	CO4	4	3	2	2	2	2	15

Overall Assessment Scheme

Assessment Area	CO			Total
	CO1	CO2	CO3	
Class Test	05	05	-	10
Midterm Assessment Exam	30	-	-	30
Final Exam	-	30	-	30
Laboratory Performance	-	-	10	10
Assignment	-	-	05	05
Mini Project with presentation and report	-	-	15	15
Total	**35**	**35**	**30**	**100**

Teaching Materials/Equipment

Reference books:

1. Software Engineering: A Practitioner's Approach (8th Edition) by Roger S. Pressman, Bruce Maxim
2. Sommerville, Ian. *Software engineering* (9th Edition)

Notes:

- **Late report submission will suffer a penalty rate of 20% per day, up to 5 days (weekends count towards 5 days).** Report submissions that are more than 5 days late are penalized by 100%.
- **STRICTLY NO COPYING** from others.

Grading System

Marks (%)	Letter Grade	Grade Point	Marks (%)	Letter Grade	Grade Point
80-100	A+	4.00	55-59	B-	2.75
75-79	A	3.75	50-54	C+	2.5
70-74	A-	3.5	45-49	C	2.25
65-69	B+	3.25	40-44	D	2
60-64	B	3.00	Below 40	F	0.00

Academic Code of Conduct

Academic Integrity:

Any form of cheating, plagiarism, personification, or falsification of a document as well as any other form of dishonest behavior related to obtaining academic gain or the avoidance of evaluative exercises committed by a student is an academic offense under the Academic Code of Conduct and **may lead to severe penalties as decided by the Disciplinary Committee of the university.**

Special Instructions:

- Students are expected to attend all classes and examinations. A student MUST have at least 80% class attendance to sit for the final exam.
- Students will not be allowed to enter the classroom 20 minutes after the starting time.
- For plagiarism, the grade will automatically become zero for that exam/assignment.
- Normally there will be **NO make-up exam**. However, in case of **severe illness, death of any family member, any family emergency, or any humanitarian ground**, if a student misses any exam, the student MUST get approval for a makeup exam by written application to the Chairperson through the Course Instructor **within 48hours**of the exam time. Proper supporting documents in favor of the reason for missing the exam must be presented with the application.
- For the **final exam**, there will be NO makeup exam. However, in case of **severe illness, death of any family member, any family emergency, or any humanitarian ground**, if a student misses the final exam, the student MUST get an approval of **Incomplete Grade** by written application to the Chairperson through the Course Instructor **within 48 hours** of the final exam time. Proper supporting documents in favor of the reason for missing the final exam must be presented with the application. **It is the responsibility of the student to arrange an Incomplete Exam within the deadline mentioned in the Academic Calendar in consultation with the Course Instructor**.

- All mobile phones and smart watches MUST be turned to silent mode during class and exam periods. Students cannot carry any Bluetooth device in the exam hall.

- There is **zero tolerance for cheating** in exams. Students caught with cheat sheets in their possession, whether used or not; writing on the palm, back of calculators, chairs, or nearby walls; copying from cheat sheets or other cheat sources; copying from other examinees, etc. would be treated as cheating in the exam hall. The only penalty for cheating is **expulsion for several semesters as decided by the Disciplinary Committee of the university**.
