University of Texas at El Paso

Course Syllabus

COURESE DESCRIPTION

Dept., Numbe	CS4311	**Course Title**	Software Engineering II: Design and Implementation
Approva l Date	Oct 2024	**Course Coordinator**	Salamah Salamah

CATALOG DESCRIPTION

Methodologies, approaches, and techniques associated with software design, implementation, and testing of a software system; other topics include cooperative teamwork, project management, and documentation; second semester of a two-semester capstone project in which students design and implement a real-world application specified in CS4310.

TEXT BOOK

- Wirfs-Brock, R. Wilkerson, and L. Wiener, Designing Object-Oriented Software, Prentice Hall, 1990
- Roger S. Pressman, Software Engineering: A Practitioner's Approach, 7th Edition, McGraw-Hill Education, 2009
- Paul C. Jorgenson, Software Testing: A Craftsman's Approach, 4th Edition, Auerbach Publications, 2013

COURSE OUTCOMES

Level 1: Knowledge and Comprehension:

Level 1 outcomes are those in which the student has been exposed to the terms and concepts at a basic level and can supply basic definitions. Upon successful completion of this course, students will able to:

a. Articulate design principles, including cohesion and coupling, encapsulation, and information hiding.
b. Describe software design concerns related to maintenance.
c. Describe different software architectural styles (distributed, cloud, blackboard, event systems, layered system, and pipe and filters).
d. Relate the importance of professional societies.

Level 2: Application and Analysis:

Level 2 outcomes are those in which the student can apply the material in familiar situations, e.g., can work a problem of familiar structure with minor changes in the details. Upon successful completion of this course, students will be able to:

a. Identify appropriate software architectural styles (specifically distributed and cloud) given a software design problem.
b. Apply assertion-based techniques (such as pre- and post-conditions) to specify behavior of program modules.
c. Distinguish between the different levels of cohesion
d. Distinguish between the different levels of coupling.
e. Use software development and maintenance tools, such as software documents creation and editing tools, GUI generators, comprehension and analysis tools,

supporting activities tools (configuration management tools), verification and validation tools, and security vulnerability analysis tools.

f. Describe differences between unit, integration, system, and acceptance testing.
g. Apply black testing techniques to develop test cases for a variety of test coverages.
h. Apply white-box testing techniques to develop test cases for a variety of test coverages.
i. Apply static and dynamic techniques to analyze non-functional properties, including common security vulnerabilities such as password weakness, over/underflows, and race conditions.
j. Engage in self-directed study to learn new techniques and tools for software design, implementation, and/or testing.

Level 3: Synthesis and Evaluation

Level 3 outcomes are those in which the student can apply the material in new situations. This is the highest level of mastery. Upon successful completion of this course, students will be able to:

a. Conduct a technical review of software design, implementation, and V&V.
b. Create and implement a software configuration management plan.
c. Make use of appropriate architectural styles and diagramming techniques to define an architecture.
d. Make use of appropriate textual notations and diagramming techniques to create a detailed design for a software system.
e. Write code based on a detailed design.
f. Develop a test plan for a software system.
g. Demonstrate an ability to orally present a software design and implementation.
h. Compose software design-related documents that are grammatically correct and technically sound.
i. Apply effective techniques for collaboration and problem-solving within a team.

ABET STUDENT OUTCOMES MAPPING

Course outcomes	ABET Student outcome
2b	1
2a-b,2h	2 (ABET 1)
1a-c, 2a-c, 2e-h, 3a, 3c-f	3 (ABET 2)
3i	4 (ABET 5)
None	5 (ABET 4)
3g-h	6 (ABET 3)
None	7
2i	8
2d, 3b, 3e	9
2a-c, 2f-h, 3a-f	10 (ABET 6)

PREREQUISITES BY TOPIC

CS 4310 with a grade of C or better