University of Asia Pacific (UAP)
Department of Computer Science and Engineering (CSE)

Course Outline

Program: Computer Science and Engineering (CSE)

Course Title: Software Engineering Lab

Course Code: CSE 314

Semester: Spring 2025

Level: 6th Semester

Credit Hour: 1.5

Name & Designation of Teacher: Tahmid Taki Rahman, Lecturer

Noor Mairukh Khan Arnob, Lecturer

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Rationale: Software Engineering lab course provides hands-on experience with industry-standard software development practices, testing methodologies, and project management tools essential for Software Quality Assurance (SQA) and Software Engineering roles. This course bridges the gap between academic learning and industry requirements by focusing on real-world software development lifecycle processes.

Pre-requisite (if any)**: -** None

Course Synopsis: This comprehensive course emphasizes modern software engineering practices including requirements analysis, system design, automated testing, quality assurance, and project management. Students will work on real-world projects using industry-standard tools and methodologies including Agile development, version control systems, automated testing frameworks, and continuous integration practices essential for SQA and software engineering careers.

Complex Engineering Problem Statement: Develop a complete software solution for a real-world problem following industry-standard software engineering practices, including requirements analysis, system design, implementation, comprehensive testing, and deployment.

Course Objectives: The objectives of this course are to:

1. Provide practical knowledge of software development lifecycle processes and quality assurance methodologies used in the software industry.

2. Develop expertise in automated testing tools and frameworks essential for SQA professionals.

3. Practice professional software development practices including version control, code review, and continuous integration.

4. Build competency in project management tools and methodologies used in modern software development teams.

Course Learning Outcomes (CLO) and their mapping with Program Learning outcomes (PLO) and Teaching-Learning Assessment methods:

CLO No.	**CO Statements: Upon successful completion of the course, students should be able to:**	**Corresponding PLOs (Appendix-1)**	**Bloom's taxonomy domain/level (Appendix - 2)**	**Delivery methods and activities**	**Assessment Tools**	**Ks**	**Ps**	**As**
CLO 1	**Analyze** complex software requirements and translate them into comprehensive system specifications	PLO(b)	1/Analyze	Lecture , Group Practice	Report + Presentation	K2	P1	A2, A3
CLO 2	**Design** software architecture and system components using modern design patterns and UML diagrams	PLO(c)	1/Apply	Lecture, Practice	Report + Continuous Evaluation	K5	P1	A1
CLO 3	**Implement** automated testing strategies including unit testing, integration testing, and system testing	PLO(e)	2/Manipulation	Practice, Demonstration	Continuous Project Evaluation + Report	K6	P1	A4, A5
CLO 4	**Utilize** modern development tools including IDEs, version control systems, and CI/CD pipelines.	PLO(e)	2/Manipulation	Practice, Individual tasks	Continuous Project Evaluation	K6	P1	A1, A5

CLO 5	**Apply** Agile development methodologies and project management principles	PLO(e)	1/Apply, 3/Characta rization	Lecture, Group Practice	Report + Viva	K6	P2	A2, A3
CLO 6	**Evaluate** software quality metrics and perform comprehensive quality assurance activities	PLO(g)	3/Valuing	Practice, Group Tasks	Continuous Evaluation + Viva	K5	P1	A1, A4
CLO 7	**Collaborate** effectively in software development teams using modern collaboration tools	PLO(i)	3/Characte rization	Group practice	Continuous Project Evaluation, Viva	K6	P6	A1, A5
CLO 8	**Communicate** technical information effectively through documentation, presentations, and code reviews	PLO(j)	1/Apply	Lecture, Practice	Report, Viva	K6		A1

Weighting CLOs with Assessment methods:

Assessment Type	**% weight**	**CLO1**	**CLO2**	**CLO3**	**CLO4**	**CLO5**	**CLO6**	**CLO7**	**CLO8**
Project Proposal & Requirements	**15%**	10	5						
Technical Report (word/pdf)	**30%**	5	5	5	5		5		5
Continuous Project Evaluation	**40%**		5	10	10	5	5	5	

Final Presentation & Demonstration	**15%**	3	2			3	4	3	2
Total	**100%**	**18**	**17**	**15**	**15**	**8**	**12**	**8**	**7**

Weeks	**Topics / Content**	**Course Learning Outcome**	**Delivery methods and activities**	**Reading Materials**
1	Introduction to the course, group selection, introduction to the objective of the course	CLO1	Lectures, Group Formation, Individual Tasks (Project idea sharing)	PPT Slides, Industry case studies, SQA methodology references
2	Submission of Three different project proposals to select one to work on.	CLO1	Group Presentation, Question Answer Session and Discussion	PPT Slides, Design pattern references, UML modeling tools
3	Submission of Requirement Analysis of the selected project with formal project presentation.	CLO1	Lectures	PPT Slides, Reading Materials, Case studies on requirement analysis
4	Getting adapted to use modern designing tools, perform example designing.	CLO2	Lectures, Hands-on figma practice	PPT Slides, Books, Blog posts
5	Design ER diagram, level 1 data flow diagram, use-case diagram	CLO2	Lectures	Online diagram designing tools

6	Design Class diagram, Select best methodology for the project development	CLO2	Lectures	Online diagram designing tools
7	Basic concept of complex engineering problems' characteristic and activities, Discussion on societal, health, safety, legal and cultural issues related to the project, Project management principles, Ethical and professional responsibilities	CLO6	Lectures	Books, Online reading materials, case studies
8	Introduction to Testing, introduction to Software quality assurance, how to write test cases, Manual testing.	CLO3	Lecture, Test Case Creation for a demo project	Books, Online tutorials (blogs, videos)
9	Software process model [Agile] Software design pattern [MVC] **Project Update-01**	CLO5, CLO8	Lecture, Code Demonstration	Book chapters on Agile and MVC
10	Collaborative development: Version control with Git/GitHub, Branching strategies, **Project Setup and Initial Implementation**	CLO7, CLO4	Lectures, Hands-on Git practice, Project work	Online blog posts and hands-on tutorials on Github project management
11	Introduction to automated Testing, **Selenium platform**, Installing Selenium and Pycharm, WebDriver installation; Synching project repository. Demonstrating WebDriver Commands with python and Selenium, WebDriver Input Box and Test Box.; Working with Radio Buttons, Check Boxes, Drop Down list, Links etc. Scrolling Web Pages, Working with Links. **Project Update-02**	CLO3, CLO8	Lectures, Hands-on Selenium practice	Selenium official documentation, Online tutorials
12	Integration testing, API testing tools (Postman, REST Assured), Database testing, Performance testing basics, **Continuous Integration setup**	CLO3	Lecture, Hands-on Postman Practice	Blogs, Hands-on tutorials

13	**Project update-03**: **Generate automated testing report** (at least up to login system), Concept of system testing, functional and non-functional, introduction to load testing, performance testing	CLO3, CLO8	Lecture, Presentation	Blogs, Hands-on tutorials
14	**Final Project Demonstration, Report submission & Viva**			

Minimum attendance: 70% class attendance is mandatory for a student in order to pass with D grade.

Textbook: - Software Engineering: A Practitioner's Approach by Roger S. Pressman

- The Art of Software Testing by Glenford J. Myers

Required References:

- Agile Testing: A Practical Guide for Testers and Agile Teams by Lisa Crispin

- Selenium WebDriver documentation and tutorials

- Git and GitHub documentation

- Industry-standard SQA and testing methodologies

Grading System: As per the approved grading scale of University of Asia Pacific (Appendix-3).

Prepared by **(**Course Teacher**)**	**Checked by** **(**Chairman, PSAC committee**)**	**Approved by** **(**Head of the Department**)**
Tahmid Taki Rahman, Noor Mairukh Khan Arnob Jayonto Dutta Plabon		

Appendix-1:

Washington Accord Program Outcomes (PO) for engineering programs:

(a) Apply knowledge of mathematics, natural science, engineering fundamentals and an engineering

specialization as specified in K1 to K4 respectively to the solution of complex engineering problems.

(b) Identify, formulate, research literature and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences. (K1 to K4)
(c) Design solutions for complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations. (K5)

(d) Conduct investigations of complex problems using research-based knowledge (K8) and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.

(e) Create, select and apply appropriate techniques, resources and modern engineering and IT tools, including prediction and modeling, to complex engineering activities with an understanding of their limitations.

(f) Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice and solutions to complex engineering problems. (K7)

(g) Understand and evaluate the sustainability and impact of professional engineering work in the solution of complex engineering problems in societal and environmental contexts. (K7)

(h) Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice. (K7)

(i) Function effectively as an individual, and as a member or leader in diverse teams and in multi disciplinary settings.

(j) Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

(k) Demonstrate knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

(l) Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Knowledge Profile

	Attribute
K1	A systematic, theory-based understanding of the natural sciences applicable to the discipline
K2	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	A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline
K4	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	Knowledge that supports engineering design in a practice area
K6	Knowledge of engineering practice (technology) in the practice areas in the engineering discipline
K7	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	Engagement with selected knowledge in the research literature of the discipline

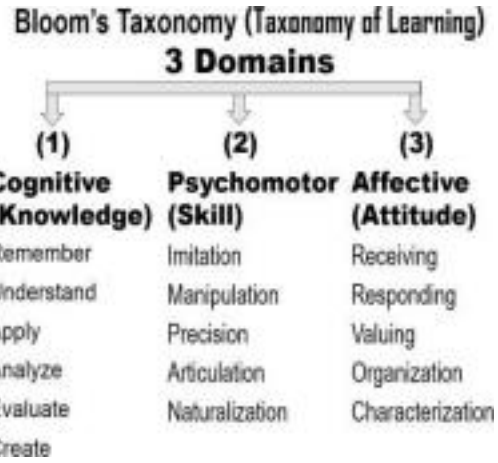
Range of Complex Engineering **P**roblem Solving

Attribute	**Complex Engineering Problems** have characteristic P1 and some or all of P2 to P7:
Depth of knowledge required	P1: Cannot be resolved without in-depth engineering knowledge at the level of one or more of K3, K4, K5, K6 or K8 which allows a fundamentals-based, first principles analytical approach
Range of conflicting requirements	P2: Involve wide-ranging or conflicting technical, engineering and other issues
Depth of analysis required	P3: Have no obvious solution and require abstract thinking, originality in analysis to formulate suitable models
Familiarity of issues	P4: Involve infrequently encountered issues
Extent of applicable codes	P5: Are outside problems encompassed by standards and codes of practice for professional engineering
Extent of stakeholder involvement and conflicting requirements	P6: Involve diverse groups of stakeholders with widely varying needs
Interdependence	P7: Are high level problems including many component parts or sub-problems

Range of Complex Engineering Activities

Attribute	**Complex activities** means (engineering) activities or projects that have some or all of the following characteristics:
Range of resources	A1: Involve the use of diverse resources (and for this purpose resources include people, money, equipment, materials, information and technologies)
Level of interaction	A2: Require resolution of significant problems arising from interactions between wide-ranging or conflicting technical, engineering or other issues
Innovation	A3: Involve creative use of engineering principles and research-based knowledge in novel ways
Consequences for society and the environment	A4: Have significant consequences in a range of contexts, characterized by difficulty of prediction and mitigation
Familiarity	A5: Can extend beyond previous experiences by applying principles-based approaches

Appendix-2



Appendix-3

UAP Grading Policy:

Numeric Grade	Letter Grade	Grade Point
80% and above	A+	4.00
75% to less than 80%	A	3.75
70% to less than 75%	A-	3.50
65% to less than 70%	B+	3.25
60% to less than 65%	B	3.00
55% to less than 60%	B-	2.75
50% to less than 55%	C+	2.50
45% to less than 50%	C	2.25
40% to less than 45%	D	2.00
Less than 40%	F	0.00