Course Information

Program	: B.Sc. in CSE
Course Title	: Software Engineering
Course Code	: CSE 327
Semester	: Fall 2020-21
Credit Hour	: 3.0
Intake	: 39 [Shift: Day]
Section	: 01
Prerequisites	: CSE 317 System Analysis and Design

Course Objectives

The objective of this course is to introduce the fundamental concepts, methods, tools, and procedures of Software Engineering. These include Software Process, Software Life-cycle, key elements of software development such as Requirements Engineering, Software Specification, Software Analysis, Software Design, Software Implementation, Software Testing, Software Quality Assurance, Software Design Patterns, and Software Project Management etc.

Course Synopsis

Concepts of software engineering, software process, software development life cycles - software requirements elicitation, software analysis, software architecture and design, software implementation, software testing (white box, black-box testing, unit testing, integration testing, validation testing, system testing, basis path testing), and software maintenance, etc. UML Diagrams – use case diagram, class diagram, object diagram, sequence diagram and activity diagram, package diagram, deployment diagram etc. The software quality assurance includes quality factors, software quality measures, the cost impact of software defects, etc to ensure software reliability, availability, and safety, etc. Software metrics include - metrics for analysis, metrics for source code, testing, and maintenance. The course also includes legal and business aspects of software engineering, software project management, software risk management.

Assessment

Class Participation	:	10%
Assignment/Presentation	:	10%
Class Test	:	10%
Midterm Examination	:	30%
Final Examination	:	40%
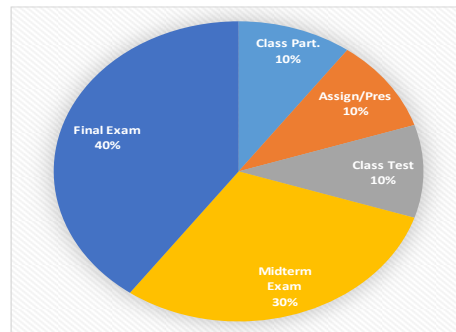
Course Outcomes (COs)

After completion of this course students will be able to:

CO1:	**Understand** the basic knowledge about software engineering, architectural view, software quality concepts and project schedule concepts.
CO2:	**Analyze** simple to complex software engineering problems using software engineering tools, techniques and methodologies.
CO3:	**Apply** software engineering techniques (models) to design effective and efficient real-world software solution.
CO4:	**Design** and implement software solutions using appropriate software engineering design principles, methodologies, tools and techniques.

Mapping of Course Outcomes (COs) to Program Outcomes (POs)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√											
CO2		√										
CO3			√									
CO4			√									

Mapping of Course Outcomes (COs) to Program Outcomes (POs)

Sl. No.	COs	Corresponding Pos	Bloom's taxonomy domain/level	Delivery methods and activities	Assessment tools
CO1	**Understand** the basic knowledge about software engineering, architectural view, software quality concepts and project schedule concepts.	PO1	*Understanding*	*Class Lectures*	*Mid Term Exam*
CO2	**Analyze** simple to complex software engineering problems using software engineering tools, techniques and methodologies.	PO2	*Analyzing*	*Class Lectures*	*Mid Term Exam*
CO3	**Apply** software engineering techniques (models) to design effective and efficient real-world software solution.	PO3	*Applying*	*Class Lectures*	*Final Exam.*
CO4	**Design** and implement software solutions using appropriate software engineering design principles, methodologies, tools and techniques.	PO3	*Applying*	*Class Lectures*	*Final Exam.*

Descriptions of Program Outcomes (POs)

PO1	**Engineering Knowledge (Cognitive):** Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.
PO2	**Problem Analysis (Cognitive):** Identify, formulate, research the literature and analyze complex engineering problems and reach substantiated conclusions using first principles of mathematics, the natural sciences and the engineering sciences.
PO3	**Design/Development of Solutions (Cognitive, Affective):** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety as well as cultural, societal and environmental concerns.

PO4	**Investigation (Cognitive, Psychomotor):** Conduct investigations of complex problems, considering design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions.
PO5	**Modern Tool Usage (Psychomotor, Cognitive):** 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 the limitations.
PO6	**The Engineer and Society (Affective):** Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.
PO7	**Environment and Sustainability (Affective, Cognitive):** Understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate the knowledge of, and need for sustainable development.
PO8	**Ethics (Affective):** Apply ethical principles and commit to professional ethics, responsibilities and the norms of the engineering practice.
PO9	**Individual Work and Teamwork (Psychomotor, Affective):** Function effectively as an individual and as a member or leader of diverse teams as well as in multidisciplinary settings.
PO10	**Communication (Psychomotor, Affective):** Communicate effectively about complex engineering activities with the engineering community and with society at large. Be able to comprehend and write effective reports, design documentation, make effective presentations and give and receive clear instructions.
PO11	**Project Management and Finance (Cognitive, Psychomotor):** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work as a member or a leader of a team to manage projects in multidisciplinary environments.
PO12	**Life-Long Learning (Affective, Psychomotor):** Recognize the need for and have the preparation and ability to engage in independent, life-long learning in the broadest context of technological change.

Weekly Schedule

Teaching Learning Method: Lecture, Class Discussion, Counselling Hours Discussion

Week	Lecture	Course Topics	Remarks	CO	Exam (Mark)
1	1	**Introduction:** Definition of software and software engineering, essential attributes of good software, software product, and importance of software engineering, characteristics of software	Sommerville Ch-1	CO1	
	2	**Introduction**: Applications of software, software process layers, software myths, fundamental software engineering activities, frame work activities, umbrella activities, Hooker's principle, software engineering ethics	Sommerville Ch-1		
2	3	**Software Processes**: Concepts of Software Process and Software process descriptions, Plan-Driven and Agile Processes	Sommerville Ch-2	CO2	
	4	**Software Processes**: Software process model, Waterfall Model, V-Model, Incremental Process Model, and Reuse-oriented Software Engineering.	Pressmen Ch-4		
3	5	**Software Processes**: Software process activities, Coping with change, Software prototyping, Prototyping and Spiral Model, Agility, Agile method, Plan-driven and agile development, Agility Principle.	Sommerville Ch-2	CO2	Mid-Term Exam (30)
	6	**Scenario Based Modeling**: Use Case Diagram, Activity Diagram, Swim lane Diagram	Pressmen Ch-9		
4	7	**Class Based Modeling**: Class Diagram, CRC, Composite Aggregate Class, Analysis Packages	Pressmen Ch-10 [CT – 1]	CO2	
	8	**Requirements engineering**: Basic concepts of requirement engineering, Types of requirements, Functional and non-functional requirements, Extreme programming (XP), refactoring, pair programming ,Software requirements documentation,	Sommerville Ch-3		
5	9	**Requirements engineering**: Software requirements elicitation and analysis, SRS preparation, Requirement validation and management, Specification, Processes	Sommerville Ch-4	CO2	
	10	**Architectural Design**: Software architecture, Architectural Design decisions, Software architecture	Pressmen Ch-13		

		and system characteristics.			
6	11	**Architectural Design**: Architectural views, Architectural pattern	Pressmen Ch-13	**CO2**	
	12	**Architectural Design**: Model View-Controller (MVC) Patterns, Client-server architecture.	Pressmen Ch-13		
7	**Mid Term Examination**				
8	13	**Design and implementation**: Design patterns, Implementation issue, Reuse, Configuration management, Host-target development, Open source development, Open source licensing	Sommerville Ch-7	**CO4**	
	14	**Functional Independence**: Cohesion and coupling, modular programming.	Sommerville Ch-7		
9	15	**Software quality assurance (SQA):** Elements of software quality assurance, SQA tasks , SQA goals and metrics, Statistical software quality assurance, Six sigma for software engineering	Pressmen Ch-21	**CO3**	
	16	**Software testing strategies:** Definition of testing, verification and validation (V&V), software testing strategy, Unit testing	Pressmen Ch-22		
10	17	**Software testing strategies**: Integration testing, alpha and beta testing, White-box and black-box testing.	Pressmen Ch-22	**CO3**	
	18	**Software testing strategies**: Cyclomatic Complexity, Path Testing.	Pressmen Ch-22		
11	19	**Software testing strategies**: BPT Graph analysis, Equivalence Partitioning, Loop Testing (simple loop, nested loop).	Pressmen Ch-22	**CO3**	**Final Exam (40)**
	20	**Project management concepts:** The management spectrum, the people, the product.	Pressman Ch-31 [CT – 02]		
12	21	**Project management concepts:** The process, the project etc, 90-90 rule, W^5HH principle.	Pressman Ch-31	**CO4**	
	22	**Project scheduling:** Basic concepts, Project scheduling, basic principles, Time line chart, tracking the schedule	Pressman Ch-34		
13	23	**Risk management**: Reactive vs. proactive risk strategies, Software risks, Risk identification.	Pressman Ch-35	**CO4**	
	24	**Risk management:** Risk projection, Risk mitigation, monitoring and management, RMMM plan.	Pressman Ch-35 [CT – 03]		
14	25	**Estimation for software projects:** Metrics in the process and project domains, Project metrics, Project	Pressman Ch-33		

	26	**Estimation for software projects:** Software measurement, Software project estimation	Pressman Ch-33		
		planning process, Resources.			
15		**Final Examination**			

Descriptions of Cognitive Domain (Anderson and Krathwohl's Taxonomy 2001):

Level	Category	Meaning	Keywords
C1	**Remembering**	Recognizing or recalling knowledge from memory. Remembering is when memory is used to produce or retrieve definitions, facts, or lists, or to recite previously learned information.	Define, describe, draw, find, identify, label, list, match, name, quote, recall, recite, tell, write
C2	**Understanding**	Constructing meaning from different types of functions be they written or graphic messages or activities like interpreting, exemplifying, classifying, summarizing, inferring, comparing, or explaining.	Classify, compare, exemplify, conclude, demonstrate, discuss, explain, identify, illustrate, interpret, paraphrase, predict, report
C3	**Applying**	Carrying out or using a procedure through executing, or implementing. Applying relates to or refers to situations where learned material is used through products like models, presentations, interviews or simulations.	Apply, change, choose, compute, dramatize, implement, interview, prepare, produce, role play, select, show, transfer, use
C4	**Analyzing**	Breaking materials or concepts into parts, determining how the parts relate to one another or how they interrelate, or how the parts relate to an overall structure or purpose. Mental actions included in this function are differentiating, organizing, and attributing, as well as being able to distinguish between the components or parts. When one is analyzing, he/she can illustrate this mental function by creating spreadsheets, surveys, charts, or diagrams, or graphic representations.	Analyze, characterize, classify, compare, contrast, debate, deconstruct, deduce, differentiate, discriminate, distinguish, examine, organize, outline, relate, research, separate, structure
C5	**Evaluating**	Making judgments based on criteria and standards through checking and critiquing. Critiques, recommendations, and reports are some of the products that can be created to demonstrate the processes of evaluation.	Appraise, argue, assess, choose, conclude, critique, decide, evaluate, judge, justify, predict, prioritize, prove, rank, rate, select, monitor
C6	**Creating**	Putting elements together to form a coherent or functional whole; reorganizing elements into a new	Construct, design, develop, generate,

		pattern or structure through generating, planning, or producing. Creating requires users to put parts together in a new way, or synthesize parts into something new and different creating a new form or product. This process is the most difficult mental function.	hypothesize, invent, plan, produce, compose, create, make, perform, plan, produce

Teaching Materials/Equipment

1. **Software Engineering –** Ian Sommerville
2. **Software Engineering: A Practitioner's Approach** – Roger S. Pressman (8th Edition)

Other materials: Lecture Notes, Software tools, Online Resources

Overall Assessment Scheme

Assessment Area	CO				Assessment Area Mark
	CO1	**CO2**	**CO3**	**CO4**	
Class Participation					
Assignment					
Class Test					
Midterm Exam	10	20			30
Final Exam			30	10	40
Total Mark	**10**	**20**	**30**	**10**	**70**

Rubrics for CSE 327

COs (Bloom's Level)	Excellent (80%-100%)	Good (70%-79%)	Satisfactory (60%-69%)	Poor (40%-59%)	Unsatisfactory (0-39%)	Marks (70)
CO1 (Understand)	Answer is complete and sufficient detail provided to support issues related to the question.	Answer is brief with sufficient detail provided to support issues were introduced.	Answer is brief with insufficient detail provided to support issues were introduced.	Answer is incomplete and excessive discussion of unrelated issues.	None of the relevant details were included or didn't answer.	10
CO2 (Discuss)	Answer is complete and sufficient	Answer is brief with sufficient	Answer is brief with insufficient	Answer is incomplete and excessive	None of the relevant details were included or	20

	detail provided to support issues related to the question. And also deals fully with the entire question.	detail provided to support issues were introduced. And most of the basic details are included but some are missing.	detail provided to support issues were introduced.	discussion of unrelated issues. And serious gaps in the basic details.	didn't answer.	
CO3 (Apply)	The question is answered appropriately by applying the suggested procedure in the question.	The question is answered briefly by applying the suggested procedure in the question.	The question is answered correctly by applying the suggested procedure in the question but some steps are missing.	The question is answered incompletely by applying the suggested procedure in the question but some steps are correct.	No attempt to implement the suggested procedure.	30
CO4 (Analyze)	A clear, complete, and properly ordered chain of analyzing steps (i.e. proper explanation of the procedure) is followed to answer the question.	The chain of analyzing steps is complete and correctly ordered but lack of expected explanation.	One or more intermediate analyzing steps are missing or unclear, but the correctness of the analysis is not compromised.	One or more intermediate analyzing steps are missing or unclear to answer the question.	The stated chain of analysis does not lead to the stated question.	10

Grading System

Numerical Grade	Letter Grade		Grade Point
80% and above	A+	(A Plus)	4.00
75% to less than 80%	A	(A Regular)	3.75
70% to less than 75%	A-	(A Minus)	3.50
65% to less than 70%	B+	(B Plus)	3.25

60% to less than 65%	B	(B Regular)	3.00
55% to less than 60%	B-	(B Minus)	2.75
50% to less than 55%	C+	(C Plus)	2.50
45% to less than 50%	C	(C Regular)	2.25
40% to less than 45%	D		2.00
Less than 40%	F		0.00

Instructor Information

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Class Schedule

Day	**Time**	**Room No**
Monday	2:50 PM – 4:10 PM	B2/909
Tuesday	1:20 PM – 2:40 PM	B2/319

Office Hour

Day	8:30 a.m. - 9:50 a.m.	10:00 a.m. – 11:20 a.m.	11:30 a.m. – 12:50 p.m.	1:20 p.m. – 2:40 p.m.	2:50 p.m.- 4:10 p.m.	6:00 p.m. – 7:30 p.m.	7:30 p.m.- 9.00 p.m.
Sun	C.H.			C.H.	C.H.		
Mon	C.H.	C.H.					
Tue	C.H.				C.H.		
Thu	C.H.	C.H.			C.H.		
Fri							

Special Instructions

- Students are expected to attend all classes and examinations. A student MUST have at least 70% class attendance to sit for the final exam.
- Students will get demerits to enter into the classroom after 20 minutes of the starting time regularly.
- For plagiarism, the grade will automatically become zero for that exam/assignment.
- All mobile phones MUST be turned to silent mode during class and exam period.
- There is zero tolerance for cheating in exam. The only penalty for cheating is expulsion for several semesters as decided by the Disciplinary Committee of the university

Prepared by: **Checked by:**   **Approved by:**