CHITKARA UNIVERSITY
HIMACHAL PRADESH - NAAC Accredited

Bachelor of Engineering (Computer Science & Engineering)

Course Code: CS107 **Course Name:** Object Oriented Software Engineering
Credits: 04 **L-T-P:** 3-0-2
Total Contact Hours: 60 Hrs.

Pre-requisite (if any): NA
Course Coordinator: Dr. Vijay Kumar Sinha
Course Facilitator (s): Dr. Utpal Shrivastava, Dr. Praveen Kantha, Dr. Ramamani Tripathy, Mr. Pankaj Singh

Assessment Components:

Evaluation Component	Description	Syllabus Covered (%)	Timeline of Examination
Component 01*	Sessional Test 01	Session 1-24 (1-40%)	20-24 Feb 2023***
	Sessional Test 02	Session 25-50 (41-80%)	03-07 Apr 2023***
	Sessional Test 03	Session 1-60 (1-100%)	24-28 Apr 2023***
Component 02#	Formative Assessment 01	Session 1-30 (1-50%)	13 Mar 2023***
	Formative Assessment 02	Session 31-60 (51-100%)	18 Apr 2023***
Component 03**	End Term Examination	Session 1-60 (100%)	As per the academic calendar
Note: For Assessment Pattern please refer to Annexure I.			

*Out of 03 STs, the ERP system automatically picks the best 02 STs as final marks.
#Mandatory component.
**75% attendance is mandatory to appear in End Term Examination.
***Tentative Exam dates

Programme Outcomes (POs):

At the end of the programme, students will be able to:	
PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with

	appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	**Modern tool usage**: 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.
PO 6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO 7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	**Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and teamwork**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	**Communication**: 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.
PO11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	**Life-long learning**: 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.

Course Learning Outcomes (CLOs):

At the end of the course, students will be able to:

CLO1	Acquire strong fundamental knowledge in science, mathematics, fundamentals of computer science, software engineering and multidisciplinary engineering to begin in practice as a software engineer.
CLO2	Design applicable solutions in one or more application domains using software engineering approaches that integrate ethical, social, legal and economic concerns.
CLO3	Deliver quality software products by possessing the leadership skills as an individual or contributing to the team development and demonstrating effective and modern working strategies by applying both communication and negotiation management skill.
CLO4	Apply new software models, techniques and technologies to bring out innovative and novelistic solutions for the growth of the society in all aspects and evolving into their continuous professional development.

CLO-POs Mapping:

Course Learning Outcomes	Program Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
1	H	L	L	L	L	L	-	-	-	L	L	-
2	H	M	L	L	L	L	-	-	-	-	L	-
3	L	L	L	L	L	L	-	-	-	-	L	-
4	L	H	H	H	H	L	-	-	-	-	L	-

Session-Wise Plan:

Session	Topic	Readings and References	Pedagogy/ Activity Planned	CLO	Mode of Delivery	Link for Online Resource
1-2	Introduction to Software Engineering: The Evolving Role of Software, Changing nature of software	R1/R3	Visual Learning and Group Discussion	CLO1	PPT and Discussion	L1/L2
3-4	The Software Process: Software Engineering– Layered Technology, Process Models: The Waterfall Model	R1/R3	Case-based pedagogy	CLO1	Interactive learning, PPT and Discussion	L1/L3
5-6	Evolutionary Process Models: Incremental Models, Spiral Model	R1/R3	Case-based pedagogy	CLO1	Blackboard demonstration, PPT and Discussion	L1/L4
7-10	An Agile View of Process: what is agility, what is an agile process, Agile Process Models: extreme programming (XP), ASD, Scrum	R2/R4	Visual Learning and Group Discussion	CLO1	Brain Storming Discussions	L2/L4
11-12	Introduction to UML and modelling software	R2/R4	Visual Learning and Group Discussion	CLO1	Hands on learning, PPT	L1/L5
13-14	Requirements Engineering: Requirements Engineering Tasks: Initiating Requirement, Engineering Process, Eliciting Requirements	R2/R4	Visual Learning and Group Discussion	CLO1	Classroom teaching, PPT and Group Discussion	*L2L3
15-17	Introduction to Use-case Diagram	R2/R4	Visual Learning and Group	CLO1	Flowchart, PPT and Discussion	L1/L2

			Discussion			
18-19	Building Analysis Model: Requirement Analysis, Data modelling Concepts, Flow Oriented Modelling	R2/R4	Visual Learning and Group Discussion	CLO1	Diagrams, PPT and Group Discussion	L1/L3
20-23	Design Engineering: Design concepts and model, Data design, Architectural design, designing class-based components, User interface analysis and design, Interface analysis and Interface design steps	R2/R4	Visual Learning	CLO1, CLO2	PPT and Group Discussions	L1/L4
24-26	Introduction to Class diagram	R2/R4	Visual Learning	CLO1, CLO2	Interactive learning, PPT and Discussion	L2/L4
27-28	Software Testing Strategies and Tactics: A strategic approach for Software Testing, Software Testing Strategies: Unit Testing	R2/R4	Case-based pedagogy	CLO1, CLO2	Blackboard demonstration, PPT and Discussion	L1/L2
29-30	Integration Testing, Validation Testing, System Testing, Test strategies for Object Oriented Software- Unit Testing in the OO Context, Integration Testing in the OO Context	R2/R4	Case-based pedagogy	CLO1, CLO2	Brain Storming Discussions	L1/L3
31-32	White-Box Testing Techniques: Basis Path Testing, Control Structure Testing: condition and loop testing	R2/R4	Software Development Approach	CLO1, CLO2	Hands on learning, PPT	L1/L4
33-34	Black-Box Testing Techniques: Equivalence Partitioning and Boundary Value Analysis	R2/R4	Case-based pedagogy/ Software Development Approach	CLO1, CLO2	Classroom teaching, PPT and Group Discussion	L2/L4

35-36	Testing Object Oriented Applications: Testing OOA and OOD model, Object Oriented Testing Strategies, Object Oriented Testing Methods	R2/R4	Software Development Approach	CLO1, CO2	Flowchart, PPT and Discussion	L1/L2
37-39	Introduction to Interaction diagrams	R2/R4	Software Development Approach	CLO1, CO2	Diagrams, PPT and Group Discussion	L1/L3
40-41	Project Management & Metrics: The management spectrum, Metrics for process & project, Metrics for Software Quality, Estimation	R2/R4	Visual Learning	CLO1, CLO2	PPT and Discussion	L1/L4
42-43	Product Metrics: Metrics for the requirement model, Metrics for the design model, Metrics for testing	R2/R4	Case-based pedagogy/ Software Development Approach	CLO1, CLO2	Interactive learning, PPT and Discussion	L2/L4
44-46	Introduction to Activity diagram	R2/R4	Case-based pedagogy/ Software Development Approach	CLO1, CLO2	Blackboard demonstration, PPT and Discussion	L1/L2
47-49	Software Project Planning: Objective, Software Scope and Resources, Software Project Estimation and Decomposition Techniques (LOC, FP)	R2/R4	Software Development Approach	CLO1, CLO2	Brain Storming Discussions	L1/L3
50-52	Empirical Estimation Models: COCOMO Model, Estimation of Object-Oriented Projects	R2/R4	Think-pair-Share	CLO1, CLO2	Hands on learning, PPT	L1/L4
53-54	Project Scheduling: Basic concepts of scheduling, Project Scheduling, Earned Value Analysis	R2/R4	Think-pair-Share	CLO1, CLO2	Classroom teaching, PPT and Group Discussion	L2/L4
55-57	Risk Management: Software Risks & Risk	R2/R4	Visual Learning	CLO1	Flowchart, PPT and	L1/L2

	Strategies, Risk Identification, Risk Projection, Risk Mitigation, Monitoring and Management (RMMM) plan		and Implement ation of Problems		Discussion	
58-60	Overview of Quality Management and Change Management	R1/R3	Visual Learning and Implement ation of Problems	CLO1	Diagrams, PPT and Group Discussion	L1/L3

Sample List of Problems	
1	Use-case Diagram of College Information System
2	Library Management system
3	Use-case Diagram of Hospital Management System
4	Use-case Diagram of Online shopping system/Banking System
5	Class diagram for College Information System
6	Class diagram for Library Management system/ Hospital Management System/ Online shopping system/Banking System
7	Class diagram for Online shopping system/Banking System
8	Draw interactive diagram for college information system
9	Draw interactive diagram for Library Management system/ Hospital Management System
10	Draw interactive diagram for Online shopping system / Banking System
11	Activity diagram for college information system /Library Management system
12	Activity diagram for Hospital Management System/ Online shopping system/ Banking System/Bug Removal

Reference Books:

R1: Software Engineering, A practitioner's Approach by Roger S. Pressman.
R2: Software Engineering by Ian Sommerville, Sixth Edition, Adison-Wesley Pub. Co.
R3: An Integrated Approach to Software Engineering by Pankaj Jalote, Third Edition.
R4: Fundamentals of Software Engineering by Rajib Mall, 5th Edition, PHI Learning

Link of Online Resources:

L1: https://onlinecourses.swayam2.ac.in/cec21_cs21/preview
L2: https://onlinecourses.nptel.ac.in/noc20_cs84/preview
L3: https://www.uml.org/resource-hub.htm
L4: https://in.coursera.org/courses?query=software%20engineering
L5: https://archive.nptel.ac.in/courses/106/101/106101061/
L6: https://nptel.ac.in/courses/106105224

Assessment Scheme:

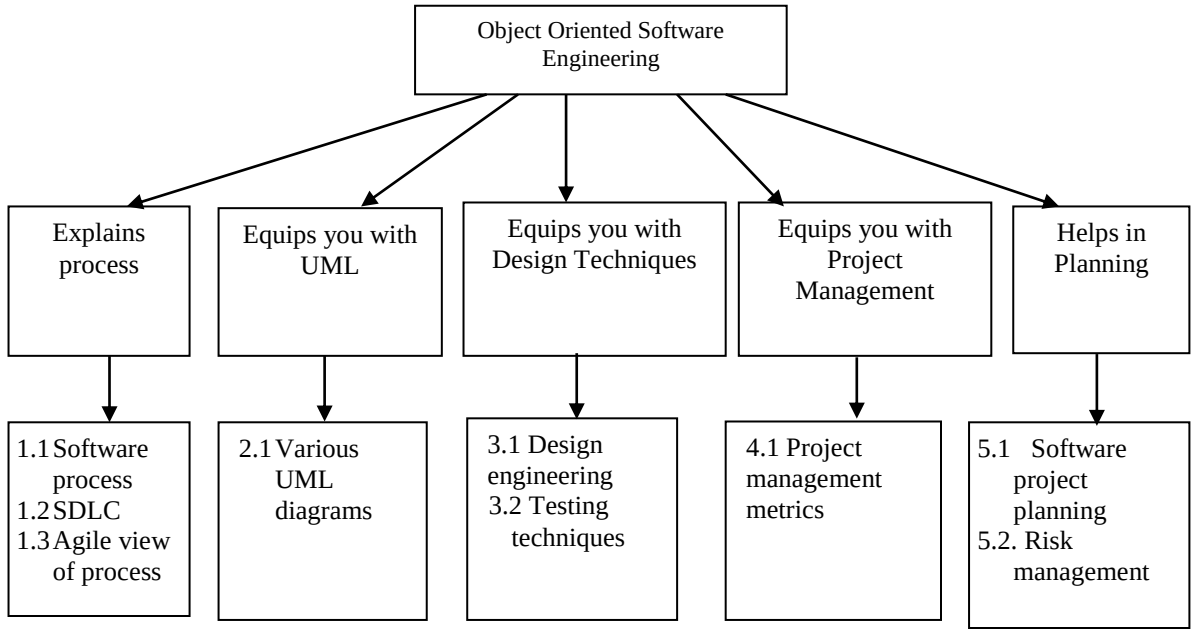
Sr. No.	Assessment Instrument	Formative/ Summative	Frequency	Weightage (%)	CLO
1.	Formative Assessment	Formative	02	20	CLO1 – CLO5
2.	Sessional Tests	Formative	03	30	CLO1 – CLO5
3.	End Term Examination	Summative	01	50	CLO1 – CLO5
			Total	100	

Proposed Course Evaluation Scheme:

Questions for internal and ETE will be designed to evaluate cognitive skills the various educational levels (Bloom's taxonomy) such as:

Sr. No.	Bloom's category	ST1	ST2	ST3	ETE
1.	Remember	10	5	5	5
2.	Understand	10	5	5	10
3.	Apply	10	10	5	10
4.	Analyze	10	10	5	10
5.	Evaluate	0	10	10	10
6.	Create	0	0	10	15

Concept Map:



Annexure I: Assessment Pattern

Assessment Component	Description	Assessment Pattern	Duration of Examination
Component 01	Sessional Test 01	1 mark- 5 MCQ 2 marks- 5 questions 5 marks- 3 questions 10 marks- 1 question	90 Minutes
	Sessional Test 02	1 mark- 5 MCQ 2 marks- 5 questions 5 marks- 3 questions 10 marks- 1 question	90 Minutes
	Sessional Test 03	1 mark- 5 MCQ 2 marks- 5 questions 5 marks- 3 questions 10 marks- 1 question	90 Minutes
Component 02	Formative Assessment	Will be notified	Will be notified
Component 03	End Term Examination	1 mark- 5 MCQ 2 marks- 5 questions 5 marks- 5 questions 10 marks- 2 questions	180 Minutes

Approved by:

Designation	Name	Signature/Remarks
Course Coordinator	Dr. Vijay Kumar Sinha	
Program In-charge	Dr. Hakam Singh	
Dean (Academics)	Prof. (Dr.) Meenu Khurana	
Date	22 Dec. 2022	