

## COURSE PLAN

### 1. Course Information:

NAME OF THE PROGRAM: <i>CSE</i>	DEGREE: <i>B.Tech</i>
COURSE NAME: <i>Software Engineering Lab</i>	SEMESTER: <i>5th</i>
COURSE CODE: <i>ESC 591</i>	COURSE CREDIT: <i>2</i>
COURSE TYPE: <i>LAB</i>	CONTACT HOURS: <i>4P</i>
NAME OF THE FACULTY: <i>Prof. Poulami Dutta</i>	

### 2. Institute Vision:

Emerge as a center of excellence for engineering and management studies encouraging research and building leaders contributing towards individual and social empowerment.

### 3. Institute Mission:

1. To identify individual potential, capabilities and skills to achieve confidence and competence.
2. To practice innovative and modern methods of pedagogy encouraging holistic education and research.
3. To enhance employability skills through collaborative ventures with the industry.
4. To build leaders and entrepreneurs with integrity and ethics fostering growth and sustainability.

### 4. Departmental Vision:

Departmental Vision: To be a leader in Computer Science and Engineering education by providing a platform to produce industry and research oriented individuals contributing to the enrichment of the society.

### 5. Departmental Mission:

- To impart quality education by applying ingenious and modern methods of pedagogy thereby calibrating one's own outlook towards problem solving.
- To recognize the flair and talent of individuals who will be nurtured to become leaders and innovators in industry and education and thereby bringing them to the limelight by enhancing their entrepreneurship skills.
- To promote higher studies and research activities by indulging in innovative projects using cutting edge technologies in Computer Science and its related areas.
- To create individuals to be successful, ethical and lifelong learners by imbibing holistic education to promote sustainability and contribute to the social well-being.
- To boost employability skills through intra, inter-departmental and inter-institutional activities beyond curriculum thereby invigorating team-building activities and leadership skills to instil confidence and creativity.

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### 6. Department Program Educational Objectives (PEOs):

**PEO1:** To excel as successful career professionals in emerging fields of Computer Science and Engineering and to pursue research.

**PEO2:** To establish expertise in solving contemporary problems in analysis, design and evaluation using modern tools and technologies.

**PEO3:** To engage in lifelong learning and professional development to adapt to rapidly changing work environments.

**PEO4:** To demonstrate entrepreneurial and managerial skills to make fruitful contributions towards overall sustainable societal development.

### 7. Program Outcomes (POs):

**PO1. Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and engineering specialization to the solution of complex engineering problems.

**PO2. Problem analysis:** Identify, formulate, research literature, and analyze engineering problems to arrive at substantiated conclusions using first principles of mathematics, natural and engineering sciences.

**PO3. Design/Development of solutions:** Design solutions for complex engineering problems and design system components, processes to meet the specifications with consideration for the public health and safety and the cultural societal and environmental considerations.

**PO4. Conduct investigations of complex problems:** Use research based knowledge including design of experiments, analysis and interpretation of data and synthesis of the information to provide valid conclusions.

**PO5. 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.

**PO6. The engineer and society:** Apply reasoning informed by the contextual knowledge to access societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

**PO7. 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.

**PO8. Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

**PO9. Individual and team work:** Function effectively as an individual, and as a member or leader in teams, and in multidisciplinary settings.

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**PO10. Communications:** Communicate effectively with the engineering community and with the society at large. Be able to comprehend and write effective reports documentation. Make effective presentations and give and receive clear instructions.

**PO11. Project management and finance:** Demonstrate knowledge and understanding of engineering and management principles and apply these to one's own work, as a member and leader in a team. Manage projects in multidisciplinary environments.

**PO12. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.

### **8. Program Specific Outcomes (PSOs):**

**PSO1:** Ability to develop the solutions for scientific, analytical and research-oriented problems in the area of Computer Science and Engineering.

**PSO2:** Ability to apply suitable programming skills integrated with professional competence to develop applications catering to the industrial and societal needs in the field of Computer Science and Engineering and its allied areas.

### **9. Prerequisites:**

- Database Management Systems

### **10.Syllabus:**

- Problem Analysis and Project Planning -Thorough study of the problem – Identify Project scope, Objectives and Infrastructure.
- Software Requirement Analysis – Describe the individual Phases/modules of the project and Identify deliverables. Identify functional and non-functional requirements.
- Data Modeling – Use work products – data dictionary.
- Software Designing - Develop use case diagrams and activity diagrams, build and testclass diagrams, sequence diagrams and add interface to class diagrams.
- Prototype model – Develop the prototype of the product.
- The SRS and prototype model should be submitted for end semester examination.

### **11.Reference Book And Special Resources:**

- i. Software Engineering? A Practitioner's Approach, Roger S. Pressman, 1996, MGH.
- ii. Software Engineering by Ian Somerville, Pearson Edu, 5th edition, 1999
- iii. An Integrated Approach to software engineering by Pankaj jalote, 1991 Narosa
- iv. <http://vlabs.iitkgp.ac.in/se/>

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### 12.Course Objectives:

This course intends to provide basic knowledge of various software engineering methodologies required to develop any software product.

### 13.Course Outcome:

After this course student will be able to

CO1	Analyze various cultural, societal and environmental issues to prepare an effective SRS document.
CO2	Plan the software project with proper size, effort, time and cost estimation using various open source tools.
CO3	Develop function oriented and object oriented software design using open source tools.
CO4	Assess the progress of the project using open source tools as well as design suitable test cases by applying appropriate testing techniques for the prototype developed.
CO5	Work effectively as an individual or in a team towards proper implementation of software engineering solutions/prototypes and present them in the form of well-crafted documents/transcripts.

### 14.Teaching –Learning Activities and Assessment :

Lab assignments are explained by the instructor and students are asked to use tools for solving the assignments within the class. Students work mostly as an individual or in a team depending on the requirement of the assignment. After successful completion of the assignment, student's performances are marked following the relevant rubric.

Overall assessment process includes the following structure.

#### **Direct Assessment: Overall Lab Performance Test (100 Marks)**

(A): Internal -40% of the total marks (40)

Lab participation, solutions and report submission (40 Marks) - Execution of known & unknown assignments- assessment through Rubric.

(B): Final Lab Examination – 60% of the total marks (60)

- Technical test (40 Marks) - Execution of two unknown assignments- Evaluation through technical examination.
- Lab viva (20 Marks) - Testing cognitive skills through viva-voce.

**Indirect Assessment:** CO-specific Course exit feedback.

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### 15. Rubrics for Lab:

Core \ Criteria	Excellent (10-8)	Good (7-6)	Average (5-4)	Poor (3-1)	CO Mapping	PO/PSO Mapping
<b>1. Lab Participation</b>	Students are able to identify the problem/ analyze the problem/Design the solutions and solve the problem applying various algorithms with appropriate test cases; students are able to include boundary conditions in the test cases; students are able to modify the program or design as per requirement of the outcomes from boundary conditions (if any).	Students are able to identify the problem/ analyze the problem/Design the solutions and solve the problem applying various algorithms with appropriate test cases; students are able to include boundary conditions in the test cases.	Students are able to identify the problem/ analyze the problem/Design the solutions and solve the problem applying various algorithms with appropriate test cases.	Student is not able to understand/analyze/design the problem or interpret the problem into specified language		
<b>2. Effective utilization of the modern tools and their properties, compilers</b>	Students are able to exploit the full potential of the tool/property/topic under consideration for the specified language	Students are able to exploit the important features of the tool/property/topic under consideration for the specified language	Students are able to use specified tool/property/topic as per the problem requirement only under consideration for the specified language	Students are not able to use tool/property/topic under consideration for the specified language		

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Core \ Criteria	Excellent (10-8)	Good (7-6)	Average (5-4)	Poor (3-1)	CO Mapping	PO/PSO Mapping
<b>3. Individual or team work</b>	Students are able to work effectively, sincerely and ethically as an individual or in a member of a team	Students are able to work ethically as an individual or in a member of a team	Students are able to work as an individual or in a member of a team	Students are not able to work effectively, sincerely and ethically as an individual or in a member of a team		
<b>4. Documentation</b>	Students will prepare effective documentation of lab classes mentioning problem	Students will prepare effective documentation of lab classes mentioning problem	Students will prepare effective documentation of lab classes mentioning problem	Students will not prepare effective documentation of lab classes mentioning objective, input-output, test cases, boundary conditions		

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#### 16.Experiment Specific CO, PO and PSO Mapping:

Exp. No.	List of Experiments	CO Mapping	PO Mapping	PSO Mapping
1.	Analyze ATM System and prepare a SRS Document.	CO1, CO5	PO1, PO2, PO3, PO6, PO8, PO9, PO10	
2.	Analyze Online Social Networking System and prepare a SRS Document.	CO1, CO5	PO1, PO2, PO3, PO6, PO8, PO9, PO10	
3.	1> i. Analyse the functional requirements for an Online Library Management System and prepare a SPMP (Software Project Management Plan) Document. ii. Estimate size of the LMS using Function Point metric. iii. Design Level 0, 1, 2 DFD for the LMS using MS Project.	CO1, CO2 CO3, CO5	PO1, PO2, PO3, PO5, PO6, PO8, PO9, PO10	
	2> i. Analyse the functional requirements for an Online Hospital Management System and prepare a SPMP (Software Project Management Plan) Document. ii. Estimate size of the LMS using Function Point metric. iii. Design Level 0, 1, 2 DFD for the LMS using MS Project.			
4.	1. Considering your immense expertise in software development, The Absolute Beginners Inc. has recently allotted you a mega project. The goal of the project is to create a database of all Hindi films released since 2000. The software would allow one to generate a list of top ten hit films, top ten flop films, best comedy films, and so on. Using your prior experience, you have decided the approximate sizes of each module of the software as follows: <ul style="list-style-type: none"> <li>• Data entry (0.9 KDSI)</li> <li>• Data update (0.7 KDSI)</li> <li>• Query (0.9 KDSI)</li> <li>• Report generation and display (2 KDSI)</li> </ul> Also, take into consideration the following cost drivers with their ratings: <ul style="list-style-type: none"> <li>• Storage constraints (Low)</li> <li>• Experience in developing similar software (High)</li> <li>• Programming capabilities of the developers (High)</li> <li>• Application of software engineering methods (High)</li> <li>• Use of software tools (High)</li> </ul> (All other cost drivers have nominal rating). 1. Now answer the following:	CO1, CO2, CO3, CO5	PO1, PO2, PO3, PO5, PO6, PO8, PO9, PO10	

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Exp. No.	List of Experiments	CO Mapping	PO Mapping	PSO Mapping
	<ul style="list-style-type: none"> <li>Applying intermediate COCOMO estimate the effort required to develop this system.</li> <li>Applying intermediate COCOMO estimate the time required to develop this system.</li> <li>Calculate the phase wise effort percentage for the above application.</li> </ul> <p>Applying intermediate COCOMO estimate the minimum size of the team you would require developing this system and assuming that your client would pay Rs.50,000 per month of development. How much would be the likely billing?</p> <p>2. Prepare a Level 0 DFD of Movies database Management System using the MS Project.</p> <p>3. Decompose into Level-1, Level-2 and Level-3 DFDs applicable wrt your SRS.</p>			
5.	Draw a Use Case Diagram of “Library Management System” using the STARUML.	CO3, CO5	PO1, PO2, PO3, PO5, PO6, PO8, PO9, PO10	
6.	Draw a Use Case and Class Diagram of “Emotion Based Music Player” using the STARUML.	CO3, CO5	PO1, PO2, PO3, PO5, PO6, PO8, PO9, PO10	
7.	Draw a Use Case and Class Diagram of “Hospital Management System” using the STARUML.	CO3, CO5	PO1, PO2, PO3, PO5, PO6, PO8, PO9, PO10	
8.	Draw a Sequence Diagram on Online Shopping System	CO3, CO5	PO1, PO2, PO3, PO5, PO6, PO8, PO9, PO10	
9.	a) Draw a Gantt chart for a “Library Management System” using MS Project. b) Prepare a SPMP to plan the project. c) Estimate the size, time, cost, effort and staff requirements using Function point metric and COCOMO Model. d) Draft a test plan illustrating all test cases.	CO2, CO3, CO4, CO5	PO1, PO2, PO3, PO5, PO6, PO8, PO9, PO10, PO11	



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Exp. No.	List of Experiments	CO Mapping	PO Mapping	PSO Mapping
10.	<p>Draw the Activity Diagram and State Chart Diagram for the following:</p> <p>Multimedia information like text, audio, video, and any combination of those are most pervasive in almost every application field namely Computer, Network, Smartphone, and elsewhere. We also require a high degree of privacy of our own document. There is a problem with how such a document can be protected from unauthorized access. Of course, there are many methods such as using passwords, smartcards, biometrics, etc. are known. Nevertheless, the existing methods have their own limitations as robustness and cost issues. This project would aim to devise a (new) method and develop a user-friendly and cost-effective solution to the problem.</p> <p><b>Input:</b></p> <ul style="list-style-type: none"> <li>• A detailed profile of the user, who wishes to protect the document. The profile template will be finalized after a careful discussion with the team member (i.e., a software engineer here).</li> <li>• If any other input that might require.</li> <li>• Document itself to be protected.</li> </ul> <p><b>Functions:</b></p> <ul style="list-style-type: none"> <li>• Encryption of document</li> <li>• Decryption of document</li> <li>• Opening a document under the protection</li> <li>• Deleting a document under the protection</li> <li>• Copying a document under the protection</li> </ul> <p><b>Output:</b></p> <ul style="list-style-type: none"> <li>• Document after encryption</li> <li>• Document after decryption</li> <li>• Result on opening a document: success or failure; locking for three unsuccessful attempts</li> <li>• Results on deleting a document under protection: success or failure; locking for three unsuccessful attempts</li> <li>• Results on copying a document under protection: success or failure; locking for three unsuccessful attempts</li> </ul>	CO3, CO5	PO1, PO2, PO3, PO5, PO6, PO8, PO9, PO10	
11.	<ol style="list-style-type: none"> <li>Draw a Gantt chart for a “Hospital Management System” using MS Project.</li> <li>Prepare a SPMP to plan the project.</li> <li>Estimate the size, time, cost, effort and staff requirements using Function point metric and COCOMO Model.</li> <li>Draft a test plan illustrating all test cases.</li> </ol>	CO2, CO3, CO4, CO5	PO1, PO2, PO3, PO5, PO6, PO8, PO9, PO10, PO11	
12.	<ol style="list-style-type: none"> <li>A case study for live projects with some test cases.</li> <li>Develop a Porotype implementing all software engineering practices for the following applications: <ol style="list-style-type: none"> <li>Online Library Management System</li> <li>Online Hospital Management System</li> <li>Online Staff Attendance System</li> <li>Online Ticket Booking System</li> <li>Online Hotel Reservation System</li> </ol> </li> </ol>	CO1, CO2, CO3, CO4, CO5	PO1, PO2, PO3, PO5, PO6, PO8, PO9, PO10, PO11	

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Exp. No.	List of Experiments	CO Mapping	PO Mapping	PSO Mapping
	f. Online Event Management System g. Safe Home Automation System h. Mobile Application for Autistic Children i. Online Payroll System j. Online Food Delivery System			

### 17.CO-PO Correlation Matrix:

Count of each CO with each PO

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												

CO-PO Correlation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3		2	3		3	3	3		
CO2	1	1	1		1	1		1	1	1		
CO3	3	3	3		3	3		3	3	3		
CO4	1	1	1		1	1		1	1	1		
CO5	3	3	3		3	3		3	3	3		
ESC 591	3	3	3		3	3		3	3	3		

### 18.CO-PSO Correlation Matrix:

Count of each CO with each PSO

CO	PSO1	PSO2
CO1		
CO2		
CO3		

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CO4		
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CO-PSO Correlation Matrix

CO	PSO1	PSO2
CO1	3	
CO2	1	
CO3	3	
CO4	1	1
ESC591	3	1

### 19.CO-Specific Marks Distribution:

DIRECT ASSESSMENT	CO1	CO2	CO3	CO4	CO5	TOTAL MARKS
PCA1	9	16	10		5	40
PCA2	4	5	14	12	5	40
Exam	10	10	5	5		30
Design & Documentation					10	10
Viva	10	10				20
<b>Total</b>	<b>27</b>	<b>30</b>	<b>17</b>	<b>11</b>	<b>15</b>	<b>100</b>

PCA1 Break up	CO1	CO2	CO3	CO4	CO5	TOTAL MARKS
Internal	3	4	3		5	15
Exam day evaluation	3	8	4			15
Viva	3	4	3			10
<b>Total</b>	<b>9</b>	<b>16</b>	<b>10</b>		<b>5</b>	<b>40</b>

PCA2 Break up	CO1	CO2	CO3	CO4	CO5	TOTAL MARKS
Internal	2	2	3	3	5	15
Exam day evaluation			8	7		15
Viva	2	3	3	2		10
<b>Total</b>	<b>4</b>	<b>5</b>	<b>14</b>	<b>12</b>	<b>5</b>	<b>40</b>

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#### 20.CO Specific Marks Distribution of Experiment:

EXPERIMENT NUMBER	CO1	CO2	CO3	CO4	CO5	TOTAL MARK S
Experiment no 1	10				5	15
Experiment no 2	10				5	15
Experiment no 3	3	4	3		5	15
Experiment no 4	3	4	3		5	15
Experiment no 5			10		5	15
Experiment no 6			10		5	15
Experiment no 7			10		5	15
Experiment no 8			10		5	15
Experiment no 9		3	4	3	5	15
Experiment no 10			10		5	15
Experiment no 11		3	4	3	5	15
Experiment no 12	2	2	3	3	5	15

Annexure: Session Specific Documents have to be attached with above course plan.