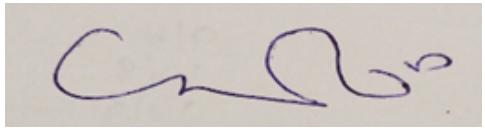
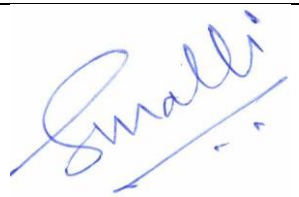
MANIPAL SCHOOL OF INFORMATION SCIENCES
MANIPAL
(A constituent unit of MAHE, Manipal)

Master of Engineering - ME (Embedded Systems)

Course File

Course Name	:	Embedded Software Design Lab
Course Code	:	ESD 5253
Academic Year	:	2024 – 25
Semester	:	II
Name of the Course Coordinator	:	Dr. SATHYENDRANATH MALLI
Name of the Program Coordinator	:	Dr. DINESH RAO

	
Signature of Program Coordinator with Date	**Signature of Course Coordinator with Date**

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Program Education Objectives (PEOs)

The overall objectives of the Learning Outcomes-based Curriculum Framework (LOCF) for **ME (Embedded Systems)**, program are as follows.

PEO No.	Education Objective
PEO 1	Enable to draw upon fundamental and advanced knowledge to apply analytical and computational approaches to solve technological problems in embedded systems..
PEO 2	Introduce state of art technologies in the area of embedded systems and inculcate ethical practices to make industry-ready professionals.
PEO 3	Promote scientific and societal advancement through research and entrepreneurship.

Program Outcomes (POs)

By the end of the postgraduate program in **ME (Embedded Systems)**, graduates will be able to:

PO1	An ability to independently carry out research /investigation and development work to solve practical problems.
PO2	An ability to write and present a substantial technical report/document.
PO3	Students should be able to demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor program.
PO4	Ability to develop and implement embedded systems requirements based on theoretical principles and practical knowledge.
PO5	Ability to demonstrate knowledge of the underlying principles and evaluation methods for analyzing and decision-making.

1. Course Plan

1.1 Primary Information

Course Name	**:**	Embedded Software Design [ESD 5253]
L-T-P-C	**:**	0-0-0-3
Contact Hours	**:**	36 Hours
Pre-requisite	**:**	Basic Knowledge on OOP's, Java
Core/ PE/OE	**:**	Core

1.2 Course Outcomes (COs)

CO	At the end of this course, the student should be able to:	No. of Contact Hours	Program Outcomes (PO's)	BL
CO1	Apply the OOP concepts for the embedded system applications	6	PO3, P04	3
CO2	Implement the applications using JAVA constructs for general purposes and embedded systems	14	PO3	4
CO3	Use of UML tools to represent an embedded application model using suitable diagrams	8	PO4, PO5	3
CO4	Apply the UML concepts for the embedded applications	8	PO5	3

1.3 Assessment Plan

Components	**Lab Test**	**Flexible Assessments (2 – 3 in number)**	**End semester/ Makeup examination**
Duration	120 minutes	To be decided by the faculty.	180 minutes
Weightage	0.3	0.2	0.5
Typology of questions	Applying; Analyzing.	Applying; Analyzing. Evaluating.	Applying; Analyzing; Evaluating.
Pattern	Answer all the questions. Maximum marks 30.	**Assignment:** Apply, analyze and evaluate all the applications covering all the topics of OOP's, core java, UML: Maximum 20 marks. [To be decided by the faculty members.	Answer all the questions. Maximum marks 50.

		May be Assignments, Problem solving, etc.]	
Schedule	As per academic calendar.	**Assignment submission:** April 2024	As per academic calendar.
Topics covered	OOP's concepts, Core java, UML		Comprehensive examination covering the full syllabus.

1.4 Lesson Plan

L. No.	TOPICS	Course Outcome Addressed
L0	Course delivery plan, Course assessment plan, Course outcomes, Program outcomes, CO-PO mapping, reference books	---
L1	Installation of the eclipse software and StarUML software. Practice session by creating a java project and executing it so that get familiarize on the features.	CO1
L2	Exercises on OOP's concepts – Classes, Interface	CO1
L3	Exercises on OOP's concepts – Inheritance	CO2
L4	Exercises on generic classes	CO2
L5	Exercises on lambda expression	CO1
L6	Exercises on OO relations – Composition, Inheritance, Aggregation (UML)	CO1
IT1		CO1 & CO2
L7	Exercises on OO relations – Composition, Inheritance, Aggregation (UML)	CO2
L8	Exercises on OO relations – Composition, Inheritance, Aggregation (UML)	CO2
L9	Exercises to build a model using Use case Diagrams (UML)	CO3

L10	Exercises to build a model using Sequence Diagrams (UML)	CO3
L11	Exercises to build a UML model for thread based systems	CO3
L12	Exercises to build a UML model for thread based systems	CO3
IT2		CO3 & CO4

1.5 References

1. UML Distilled: A Brief Guide to the Standard Object Modeling Language (3rd Edition), Addison-Wesley Professional. 2003.
2. The Java Programming Language. Ken Arnold, James Gosling and David Holmes. Addison-Wesley Professional; 4th edition (August 27, 2005)
3. http://www.oracle.com/technetwork/java/embedded/resources/tech/compact-profiles-overview-2157132.html
4. Realtime Specification for Java 2.0 https://java.net/projects/rtsj-2/pages/Home .

1.6 Other Resources (Online, Text, Multimedia, etc.)

1. Web Resources: Blog, Online tools and cloud resources.
2. Journal Articles.

1.7 Course Timetable

	9-10	10-11	11-12	12-1	1-2	2-3	3-4	4-5
MON						ESD Lab		
TUE								
WED								
THU								
FRI								
SAT								

1.8 Assessment Plan

Cos		**Marks & weightage**			
CO No.	CO Name	Lab Test (Max. 30)	Assignment (Max. 20)	End Semester (Max. 50)	CO wise Weightage
CO1	Apply the OOP concepts for the embedded system applications	10	10	10	**0.3**
CO2	Implement the applications using JAVA constructs for general purposes and embedded systems	10		20	**0.3**
CO3	Use of UML tools to represent an embedded application model using suitable diagrams	10		10	**0.2**
CO4	Apply the UML concepts for the embedded applications		10	10	**0.2**
	Apply the OOP concepts for the embedded system applications	**0.3**	**0.2**	**0.5**	**1.0**

Note:

- In-semester Assessment is considered as the Internal Assessment (IA) in this course for 50 marks, which includes the performances in lab participation, assignment work, lab work, lab tests, quizzes etc.
- End-semester examination (ESE) for this course is conducted for a maximum of 50.
- End-semester marks for a maximum of 50 and IA marks for a maximum of 50 are added for a maximum of 100 marks to decide upon the grade in this course.

Weightage for CO1 = (Lab Test marks for CO1 + Assignment marks for CO1 + ESE marks for CO1) /100

= (5 + 2 +5)/100 = 0.12

1.9 Assessment Details

The assessment tools to be used for the Current Academic Year (CAY) are as follows:

SI. No.	Tools	Weightage	Frequency	Details of Measurement (Weightage/Rubrics/Duration, etc.)
1	Lab Test	0.3	2	• Performance is measured using lab internal test attainment level. • Reference: question paper and answer scheme. • Lab internal test is assessed for a maximum of 30 marks.
2	Assignments	0.2	1	• Performance is measured using assignments attainment level. • Assignment is evaluated for a maximum of 20 marks.
3	ESE	0.5	1	• Performance is measured using ESE attainment level. • Reference: question paper and answer scheme. • ESE is assessed for a maximum of 50 marks.

1.10 Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5
CO1			**Y**	**Y**	
CO2				**Y**	
CO3				**Y**	**Y**
CO4					**Y**
Average Articulation Level			*	*	*