COURSE OUTLINE TEMPLATE			
Course Title	**Microprocessors and Microcontrollers Laboratory**		
Course Code	ICLR15	**No. of Credits**	2
Department	**ICE A & B**	**Faculty**	V.SRIDEVI SRINIVASULU RAJU S
Pre-requisites Course Code	-NIL-		
Course Coordinator(s) (if, applicable)	--		
Other Course Teacher(s)/Tutor(s) E-mail	sridevi@nitt.edu ssraju@nitt.edu	Telephone No.	0431 250 3361
Course Type	☒ **Core course**	☐ **Elective course**	

COURSE OVERVIEW

This lab course exposes students to the field of instrumentation system design using processors. The aim is to teach the students about the design and development of standalone embedded system using 16 bit processors. This laboratory course will provide the practical experience on design an embedded board with 16-bit mixed signal processor and developing application software in C language.

COURSE OBJECTIVES

1. To fabricate a micro-controller circuit board using KiCAD open-source PCB design tool.
2. To teach the students on programing a mixed signal processor using Code Composer Studio-v8 (CCS-v8) compiler.

COURSE OUTCOMES (CO)

Course Outcomes

After completing this laboratory course, the students will be able to design, fabricate, implement and test their own microcontroller based systems.

Course Outcomes	Aligned Programme Outcomes (PO)
The students are able 1. Develop application code in Assembly and C language 2. The design, fabricates, implement and test their own microcontroller based systems.	1,2,3,4 4, 7,10,12

COURSE TEACHING AND LEARNING ACTIVITIES

S.No.	Week	Topic	Mode of Delivery
1	1 and 2	Familiarization of architecture of MSP430 processor.	Theoretical and practical analysis
2	2 and 3	Configuration and Programming of MSP430 parallel I/O ports	Theoretical and practical analysis
3	3 and 4	MSP430 TIMER control programming	Theoretical and practical analysis
4	4 and 5	LCD Interfacing with MSP430 processor	Theoretical and practical analysis
5	5 and 6	ADC Interfacing with MSP430 processor	Theoretical and practical analysis
6	6 and 7	DAC Interfacing with MSP430 processor	Theoretical and practical analysis
7	7 and 8	Serial Interfacing with MSP430 processor	Theoretical and practical analysis
8	8 and 9	Interface a SPI compatible peripheral(RTC) with MSP430 processor	Theoretical and practical analysis
9	9 and 10	Speed control of motor using MSP430 processor	Theoretical and practical analysis
10	10 and 11	Interface a I^2C compatible Temperature sensor with MSP430 processor	Theoretical and practical analysis
11	11 and 12	Program to verify the battery life of processor board	Theoretical and practical analysis

COURSE ASSESSMENT METHODS

Record mark will be provided based on the laboratory reports (pre and post lab) and in-lab performance. Laboratory reports must be submitted on time, in the required format.

The students must design an individual 16-bit processor based application board to run their applications. The same board is utilized for conducting the final semester examination. If the students fail to bring the board, zero mark will be awarded for the external examination.

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1.	Record preparation & viva	--	---	45%
2.	Written Test –I	--	--	15%
3.	Written Test –II	--	--	15%
4.	External Exam	--	--	25%

ESSENTIAL READINGS : Textbooks, reference books Website addresses, journals, etc

Books:

1. C P Ravikumar, MSP430 microcontroller in embedded system projects, R Gangadharan for Elite Publishing house Pvt. Ltd., reprint 2012.
2. John H Davis, MSP430 Microcontroller Basics, Elsevier, 2013.
3. Ram.B, *Fundamentals of Microprocessors and Microcontrollers,* 4thEdition, Dhanpatrai and sons, 1994.
4. Frank Vahid/Tony Givargis, Embedded System Design – A Unified Hardware/Software Introduction, John Wiley & Sons, Inc, 2005 ISBN 9971-51-405-2.
5. Prasad K.V.K.K., *Embedded/Real-Time Systems: Concepts, Design & Programming,* Dreamtech Press, 2005.

FOR SENATE'S CONSIDERATION

(S.SRINIVASULU RAJU)

(VSRIDEVI)

Course Faculty _____ **CC-Chairperson** _____ **HOD** _____ 27/9/13