

University of Computer Studies (Thaton)
2023-2024 Academic Year
Fourth Year (B.C.Tech.)
Lecture Plan

CT-4134 Embedded System I

First Semester

References. :

- [1] Introduction to Embedded Systems by Shibu KV, 2019.
- [2] Real-time Embedded Systems by Jiacun Wang, 2017.
- [3] Introduction to Embedded Systems Using ANSI C and the Arduino Development Environment by David Russell, 2010.
- [4] A Practical Introduction to Real-time Systems for Undergraduate Engineering by Douglas Wilhelm Harder, Jeff Zarnett, Vajih Montaghami, Allyson Giannikouris, 2020.
- [5] Embedded System Design, Embedded Systems Foundations of Cyber-Physical Systems, and the Internet of Things, 4th Edition, by Peter Marwedel, 2021.
- [6] Introduction to Embedded Systems: A Cyber-Physical Systems Approach, 2nd Edition by Edward Ashford Lee and Sanjit Arunkumar Seshia, 2017.
- [7] An Introduction to Microcontroller and Embedded Systems by Tyler Ross Lambert, 2017.
- [8] Embedded Systems Design: A Beginner's Guide to Designing Embedded System Applications on Arm Cortex-M Microcontrollers by Ariel Lutenberg, Pablo Gomez, Eric Pernia, 2022.

Prerequisites : Computer Networks I

Period : 64 periods for 16 weeks (4 periods * 16 weeks) (1 period – 1 hr)

No.	Chapter	Page	Period	Ref. No.	Detail Lecture Plan
	Chapter 1 Introduction to Embedded Systems	3-14	1	1	Overview
	Chapter 2 The Typical Embedded Systems	17-71	4		All Examples and Questions
1.	2.1 Core of Embedded System	17-28			
	Communication Interface	45-59			
2.	2.5 Embedded firmware	59-60			
3.	2.6 Other System Components	60-64			
4.	2.7 PCB and Passive Components	64			
5.	Chapter 3 Characteristics and Quality Attributes of Embedded Systems	72-82	1		Overview
6.	Chapter 4 Embedded Systems-Application-and Domain-Specific	83-91	1		Overview
7.	Chapter 5 Designing Embedded Systems with 8bit Microcontrollers--8051	92-163	4		All Examples and Questions

No.	Chapter	Page	Period	Ref. No.	Detail Lecture Plan
8.	5.1 Factors to be Considered in Selecting a Controller	93			
9.	5.2 Why 8051 Microcontroller 5.3 Designing with 8051	94-154			
	Chapter 6 Programming the 8051 Microcontroller	164-203	4		
11.	6.1 Different Addressing Modes Supported by 8051	165-170			
12.	6.2 The 8051 Instruction Set	171-195			
	Chapter 7 Hardware Software Co-Design and Program Modelling	204-227	4		
13.	7.1 Fundamental Issues in Hardware Software Co-Design	205-206			
14.	7.2 Computational Models in Embedded Design	207-213			
15.	7.3 Introduction to Unified Modelling Language (UML)	214-218			
16.	7.4 Hardware Software Trade-offs	219-220			
	Chapter 1 Introduction to Real-Time Embedded Systems	1-13	4	2	Overview
27.	1.1 Real-Time Embedded Systems	1		2	
28.	1.2 Example: Automobile Antilock Braking System	3		2	
29.	1.3 Real-Time Embedded System Characteristics	10-13			
30.	1.4 Hard and Soft Real-Time Embedded Systems	13			
	Chapter 2 Hardware Components	17-29	4		
	2.1 Processors	17-			
	2.3 I/O Interfaces	26-27			
	2.4 Sensors and Actuators	27-29			
	2.5 Timers and Counters	29-30			

No.	Chapter	Page	Period	Ref. No.	Detail Lecture Plan
	Chapter 3 Real-Time Operating Systems	33-52	3		
31.	3.1 Main Function of General-Purpose Operating Systems	33-41			
32.	3.2 Characteristics of RTOS Kernels	42-47			
33.	3.3 RTOS Examples	48-50			
	Chapter 4 Task Scheduling	53-97	4		
	4.1 Task	53-59			
	4.2 Clock-Driven Scheduling	59-68			
	4.3 Round-Robin Approach	69			
	4.4 Priority-Driven Scheduling Algorithms	70-87			
	4.5 Task Assignment	89-97			

Lab Periods : 30

No.	Lab	Description
1.	Lab 1	
2.	Lab 2	
3.	Lab 3	
4.	Lab 4	
5.	Lab 5	
6.	Lab 6	Assembly Programming using 8051 Simulator (All Examples in Chapter-5)
	Group Project	

Assessment Plan for the Course

Exam	: 60%
Tutorial	: 10%
Lab	: 10%
Quiz	: 10%
Group Project	: 10%