University of Computer Studies, Yangon
B.C.Sc./B.C.Tech.

CT-403	**: Introduction to Embedded Systems**	**Second Semester**
Text Book	**:** Introduction to Embedded Systems by Shib K.V	
Period	**: 45** periods for 15 weeks (3 periods/week) (Lecture + Lab)	

Course description:

The course "Introduction to embedded systems" provides students with the basis for studying the other courses of the Module "Embedded microprocessor systems". It forms basic skills in embedded systems design. Those skills is usable in designing digital control units for consumer electronics, industrial automation, telecommunication systems, etc. This course includes lectures, laboratory work and group project.

Course objective:

- To make students familiar with the basic concepts and terminology of the target area, the embedded systems design flow.
- To give students an understanding of the embedded system architecture.
- To acquaint students with methods of executive device control and to give them opportunity to apply and test those methods in practice;

Learning outcomes At the end of the course student will be able to:

- understand basic concepts in the embedded computing systems area;
- determine the optimal composition and characteristics of an embedded system;
- design and program an embedded system at the basic level;

Assessment Plan for the Course

Paper Exam: 60%

Attendance: 10%

Test/ Quiz: 10%

Lab: 10%

Project : 10%

Tentative Lecture Plan

No.	Chapter	Page	Period	Detail Lecture Plan
	Chapter 1 Introduction to Embedded Systems	3-14	**2**	Overview
	Chapter 2 The Typical Embedded Systems	17-71	**10**	All Examples and Questions
1.	2.1 Core of Embedded System	17-28	2	
2.	2.2 Memory	28-35	1	
3.	2.3 Sensor and Actuators	35-44	2	
4.	2.4 Communication Interface	45-58	2	
5.	2.5 Embedded Fireware	59-60	1	
6.	2.6 Other System Components	60-64	1	
7.	2.7 PCB and Passive Components	64	1	
9.	**Chapter 3 Characteristics and Quality Attributes of Embedded Systems**	**72-82**	**1**	Overview
10.	**Chapter 4 Embedded Systems-Application-and Domain-Specific**	**83-91**	**1**	Overview
	Chapter 5 Designing Embedded Systems with 8bit Microcontrollers--8051	**92-163**	**7**	All Examples and Questions
11.	5.1 Factors to be Considered in Selecting a Controller	93	2	
12.	5.2 Why 8051 Microcontroller 5.3 Designing with 8051	94-154	2	
13.	5.4 The 8052 Microcontroller 5.5 8051/52 Variants	155	3	
	Chapter 6 Programming the 8051 Microcontroller	**164-203**	**4**	All Examples and Questions
15.	6.1 Different Addressing Modes Supported by 8051	165-170	2	
16.	6.2 The 8051 Instruction Set	171-195	2	
18.	**Chapter 7 Hardware Software Co-Design and Program Modelling**	**204-227**	**6**	
19.	7.1 Fundamental Issues in Hardware Software Co-Design	205-206	3	
20.	7.2 Computational Models in Embedded Design	207-213		
21.	7.3 Introduction to Unified Modelling	214-218	2	

No.	Chapter	Page	Period	Detail Lecture Plan
	Language (UML)			
22.	7.4 Hardware Software Trade-offs	219-220	1	
30.	**Chapter 8 Embedded Hardware Design and Development**	227-301	**2**	All Examples and Questions
31.	8.1 Analog Electronic Components	229	1	
32.	8.2 Digital Electronic Components	230-243		
33.	Summary Exercises		1	
34.	**Chapter 9 Embedded Firmware Design and Development**	302-380	**4**	All Examples and Questions
35.	9.1 Embedded Firmware Design Approaches	303-306	1	
36.	9.2 Embedded Firmware Development Languages	306-318	2	
37.	9.3 Programming in Embedded C	318-371	1	
44.	**Chapter 10 Real-Time Operating System (RTOS) based Embedded System Design**	382-497	**6**	All Examples and Questions
45.	10.1 Operating System Basics	382-386	1	
	10.2 Types of Operating Systems	386-390		
46.	10.3 Tasks, Process and Threads	390-402	2	
47.	10.4 Multiprocessing and Multitasking	402-404		
48.	10.5 Task Scheduling	404-422	3	
50.	Revision for All Chapters		**2**	

No.	Lab	Period (15)	Description
1.	Lab 1	1	Communications between Arduino and PC
2.	Lab 2	1	LED flashing on Digital Pin 13
3.	Lab 3	1	Button to Turn on an LED
4.	Lab 4	1	Reading an analog input with a potentiometer to the serial monitor…
5.	Lab 5	1	Light Effect & Buzzer Sound Repeated
6.	Lab 6	1	8051 Programming using Simulator
7.	Lab 7	1	8051 Simulator
8.	Lab (Project)	8	