COURSE OUTLINE

Department & Faculty: Faculty of Electrical Engineering	**Page : 1 of 5**
Course Code: SEL 4533 - MICROCONTROLLER **Total Contact Hours: 3 hours/week**	**Semester: 2010/11** **Academic Session: II**

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Synopsis : This course introduces the principles and applications of microcontroller. The topics emphasized are microcontroller architecture and software programming using assembly language. The content also covers internal peripherals such as parallel input and output, analogue to digital converter, timer and counter. The student will learn technique and circuit to interface microcontroller with other devices in embedded system.

LEARNING OUTCOMES

By the end of the course, students should be able to:

No.	Course Learning Outcomes	Programme Learning Outcome(s) Addressed	Assessment Methods
CO1	Describe and differentiate all the component of microcontroller-based systems	PO1	T1, HW
CO2	Analyze and design 68HC11 assembly language	PO2	T1, F
CO3	Analyze and design 68HC11 peripherals and hardware for microcontroller systems	PO2	T2, PR, F, D
CO4	Communicate and work effectively in a team to solve 68HC11 design problems through group project.	PO5	PR, Pr, D (T=Test; HW= Homework; PR=Project; Pr=Presentation; F=Final exam; D=Demo)

Prepared by: COURSE COORDINATOR **Name: DR. YEONG CHE FAI** **Signature:** **Date: 3 JANUARY 2011**	**Certified by: (Course Panel Head)** **Name:** **Signature:** **Date:**

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STUDENT LEARNING TIME (SLT)

Teaching and Learning Activities	**Student Learning Time (hours)**
1. Face-to-Face Learning	
a. Lecturer-Centered Learning i. Lecture	38
b. Student-Centered Learning (SCL) i. Laboratory/Tutorial ii. Student-centered learning activities	4
2. Self-Directed Learning	
a. Non-face-to-face learning or student-centered learning (SCL) such as manual, assignment, module, e-Learning, etc.	30
b. Revision	34
c. Assessment Preparations	8
3. Formal Assessment	
a. Continuous Assessment	2
b. Presentation and Demonstration	1
c. Final Exam	3
Total (SLT)	**120**

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TEACHING METHODOLOGY

The teaching and learning activity will be implemented through the following method:

i. Lecturing Method

Lecturing is the main teaching method to provide basic understanding of concept and theory on the embedded system. However lecturing method will be combine with other method to make sure that the students stay focus.

ii. Cooperative and collaborative method

This method is used to develop the interactive teaching and learning environment among students and with lecturer. Since the students come from various background and course, they can share many experience and application of embedded system. They will also participate and involve directly in problem/question solving.

iii. Demonstration Method

This method will be used to explain the operation of simulation software and demonstrate the steps for using it. Beside software, this subject will be use a trainer kit and this requires comprehensive demonstration to all students. The student will have the real and hands on experience in using the software and hardware.

iv. Problem based method

The teaching and learning activity that is targeted for C04 is a group project. Usually, the nature of group project is Student Centered Approach which involves Problem Based Learning, Cooperative Learning and Presentation.

The student will be assigned into groups which consist of 3 to 4 students. Each group has to build a project which in as application of a system based on microcontroller device. For example, a house alarms system or a digital clock. They have to discuss and come out with a title for their group project (group discussion, role play). Then they have to prepare a project proposal (role play, responsibility). Next, the group shall start developing the project (role play). Usually, the project consists of software and hardware development. And, the most important part in the project is the integration of both systems (role play).

At the end of the project, the group shall present the project as a whole, from planning to design, development and testing (presentation). The presentation also involves a demonstration on the actual developed system (project work, presentation). For the final task, the group has to submit a full report on the project development (project report).

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WEEKLY SCHEDULE

Week	Topic
Week 1	INTRODUCTION TO MICROCONTROLLER Introduction to Embedded System, single chip microcontroller, M68HC11 in general, Internal architecture, M68HC11 families
Week 2	68HC11 PROGRAMMING MODEL Addressing mode, assembler, compiler, programming in assembly and flow chart
Week 3 - 4	68HC11 PROGRAMMING IN ASSEMBLY LANGUAGE AND 68HC11 INSTRUCTION SET M68HC11 instruction set , data transfer and arithmetic instruction
MID SEMESTER BREAK	
Week 5 - 6	68HC11 INSTRUCTION SET Program control instruction, logic and bit operation, shift and rotate, multiple instruction
Week 7 - 8	68HC11 SYSTEM DESIGN Pin assignment, minimum system, memory, peripheral interfacing, reset and interrupt
Week 9 - 10	68HC11 INTERNAL PERIPHERAL Parallel input/output interface and analogue to digital converter interface
Week 11 - 12	68HC11 INTERNAL PERIPHERAL Programmable timer and serial communication interface
Week 13	68HC11 APPLICATION IN CONTROL SYSTEM Mechanical switch and LED interfacing
Week 14	68HC11 APPLICATION IN CONTROL SYSTEM Interfacing with power electronics devices, dc and stepper motor
Week 15-18	Revision week and final examination

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1. Peter Spasov, Microcontroller Technology: The 68HC11, Forth edition, Prentice Hall, 2002
2. Han-Way Huang, MC68HC11: An Introduction Software and Hardware Interfacing, Second edition, 2001
3. Gene H. Miller, Microcontroller Engineering, Prentice Hall, 1998
4. Frederick M. Cady, Software and Hardware Engineering: Motorola M68HC11s, Oxford University Press, 1997
5. Michael Kheir, The M68HC11 Microcontroller: Applications in Control, Instrumentation and Communication, Prentice Hall, 1996
6. John C. Skroder, Using the M68HC11 Microcontroller: A Guide to Interfacing and Programming, Prentice Hall, 1996
7. Driscoll F.F, Coughlin R.F. and Villanucci R.S., Data Acquisition and Process Control with the M68HC11 Microcontroller, Prentice Hall, 2000

GRADING:

(Provide details on the allocation of marks and the time schedule for all quizzes, tests, assignments, etc.)

No	Type of Assessment	% total	Date
1	Test 1	10	Week 6
2	Test 2	20	Week 13
3	Homework	5	Week 4
4	Assignment 2 (Project, Presentation and Demo)	15	Week 13
5	Final Examination	50	Week 15-18
Overall Total		**100**	