CALIFORNIA STATE POLYTECHNIC UNIVERSITY, POMONA

ETE 344

COURSE OUTLINE

Course Information	ABET Unit Classification (4 Quarter Units)
Department: Engineering Technology Course Number: ETE 344/L Course Title: Microcontroller Applications/Lab Revision Date: 10/20/2004 Revised by: Tariq Qayyum Compliant: Catalog 2004/05	Math: Basic Science: Engineering Topics: 4 *Contains significant design content:* Yes Other: Curriculum Designation: Required

I. Catalog Description

ETE 344/344L Microcontroller Applications/Lab (3/1)

Analysis and advanced operations of a selected microcontroller. Memory and I/O interface. I/O Ports, SCI & SPI interface, timer. Three one-hour lectures, one three hour lab.

II. Prerequisites and Corequisites

ETE 110, ETE 240 or Equivalent. ETE 344 and ETE 344L are corequisities.

III. Textbook and/or other Required Material

Han Way Huang, MD 68HC11 An Introduction, , West Publishing: Required

IV. Course Objectives

The student will be able to differentiate between at least 2 microcontrollers such as the 68HC11 and the 8581.

The student will know the difference between a microcontroller and a microprocessor, a minicomputer and a "mainframe" computer.

The student will be familiar with terminology used in the microcomputer field.

The student will be able to convert a word problem into a flowchart, then write an assembly language program to solve the work problem. The student will be able to use different features of the MC68HC11.

V. Expanded Course Description

Expanded Description of the Course

1. General Aspects of Microcomputers
   a. Computer Classifications
   b. Processor Hardware Elements
   c. Information Paths
   d. Memory mapping design
   e. Interrupts
   f. Stack Operations

2. I/O Ports

        a.   Fixed direction/programmable ports
        b.   Polling method
        c.   Handshake method
        d.   I/O design

3.   SCI Interface
        a.   Registers of SCI
        b.   SCI interrupts
        c.   Transmitting
        d.   Receiving data

4.   SPI Interface
        a.   SPI Registers
        b.   SPI Interrupts
        c.   Transmitting and Receiving data
        d.   Master/Slave operations

5.   Timer
        a.   Input Capture
        b.   Output Compare
        c.   Pulse Accumulator

6.   A/D Converter
        a.   Single-scan operations
        b.   Multi-scan operations

Typical Laboratory Experiments

Lab1   Review of Microcontroller Assembly language programming
Lab 2   I/O Operations (interfacing 7-segment display)
Lab 3   Traffic light controller
Lab 4   SCI Functions; input capture output compare.
Lab 5   SPI Functions; master/slave operation
Lab 6   A/D converter as digital voltmeter
Lab 7   Timer applications

VI. Class/Laboratory Schedule

Two 75 minutes lecture sessions per week.
One three-hour laboratory session per week.

VII.   Contribution of Course to Professional Component

Students learn about advanced applications of 68HC11 microcontroller. A wide range of programming and interfacing exercises are completed. Students also learn about practical applications of microcontrollers in appliances and automobiles. Several laboratory exercises are performed in the lab to give students practical experience.

VIII.   Evaluation of Students

The instructor evaluates outcomes using the following methods:
- Homework assignment submittals
- Examinations: Midterm and Final
- Laboratory experiments
- Laboratory reports

The student grades are typically based on the following factors:

Quizzes, homework, midterm exams, midterm and final Exam.

IX. Relationship of Course to Program Outcomes

Crse Obj	Program Outcomes										
	(a) Use of modern tools of discipl	*(b)* Use of math, science, Engg & Tech	*(c)* Do experi -ments	*(d)* Dsn of sys & compo nents	*(e)* Work on teams	*(f)* Do Tech probs	*(g)* Eff Com	*(h)* Life-long learn	*(i)* Prof, ethics, social resps	*(j)* Prof, soc, globl, diversity	*(k)* Qual, Cont impr, timeli ness
1		X	X			X					
2		X	X			X					
3	X	X	X			X					
4		X	X		X	X					
5	X	X	X		X	X					
6	X				X		X				