

## ENPH/CS 441(4) Microprocessor System Design

Department: Mathematics, Physics and Engineering

Credit Hours: 4

### Current Catalog Description:

Introduction to microprocessors; 8/16 bit single board computer hardware and software designs; chip select equations for memory board design; serial and parallel I/O interfacing; ROM, static and dynamic RAM circuits for no wait-state design; assembly language programming, stack models, subroutines and I/O processing.

### Course Schedule:

3 lecture hr/ wk, 3 lab hr/week

### Coordinator:

Dr. Mircea Agapie

### Prerequisites by Topic:

ENPH or CS 248 – Intro to Digital System Design

### Program Outcome and Course Learning Goals Map:

The Program Outcomes for Engineering Physics are:

- A. an ability to apply knowledge of math, engineering & science
- B. an ability to design and conduct experiments, as well as to analyze and interpret data
- C. an ability to design system, component or process to meet needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- D. an ability to function on multi-disciplinary teams
- E. an ability to identify, formulate, and solve engineering problems
- F. an understanding of professional and ethical responsibility
- G. an ability to communicate effectively
- H. the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
- I. a recognition of need for, and ability to engage in life-long learning
- J. a knowledge of contemporary issues
- K. an ability to use techniques, skills, and modern engineering tools necessary for engineering practice.
- L. a depth and breadth of knowledge in engineering and physics necessary to work in a multidisciplinary environment.

Course Goals	Program Outcome(s):
Upon completion of this course with a C or better, students will	
1. Know the addressing modes and main instructions of a family of 8/16 bit microcontrollers (Motorola HC11/12).	A, K
2. Know how to program in assembly language (arithmetic, control structures, assembler directives, subroutines, stack), with emphasis placed on writing code that is modular, well-structured, well-documented, and reusable.	A, D, K
3. Have a solid understanding of computer hardware structure: a. Memory in general, and the memory used by a specific family of microcontrollers (HC11/12) in particular. b. Interrupts (and resets).	K, L
4. Have a working knowledge of the peripheral functions of microcontrollers: serial and parallel ports, timers, ADC and DAC.	K, L

5. Have a general overview of the large spectrum of applications microcontrollers are used in. Be able to design simple hardware and software systems, or modules of larger, more complex systems.	A, C, E, K
6. Be able to communicate orally and in writing concerning their solutions to problems, designs, performance predictions and measurements.	G

**Academic Honesty:**

Cheating, plagiarism (submitting another person's materials or ideas as one's own), or doing work for another person who will receive academic credit are all-impermissible. This includes the use of unauthorized books, notebooks, or other sources in order to secure or give help during an examination, the unauthorized copying of examinations, assignments, reports, or term papers, or the presentation of unacknowledged material as if it were the student's own work. Disciplinary action may be taken beyond the academic discipline administered by the faculty member who teaches the course in which the cheating took place.

**Students with Disabilities Policy:**

It is the policy of Tarleton State University to comply with the Americans with Disabilities Act (ADA) and other federal, state, and local laws relative to the provision of disability services. Students with disabilities attending Tarleton State University may contact the Office of Disability Services at (254) 968-9478 to request appropriate accommodation. Furthermore, formal accommodation requests cannot be made until the student has been officially admitted to Tarleton State University.

**Contribution of Course to Meeting the Professional Requirement:**

Engineering Topics: 100%

**Status of Continuous Improvement Review of this Course:**

**Prepared by:** *Mircea Agapie*

**Date:** *May 1<sup>st</sup> 2005.*

**Reviewed by:** *Richard Reese*

**Date:** *May 19, 2005*

**Review Notes:**

I assume that this is an embedded system course. However, I see no reference to this topic. There is no discussion of embedded software issues. The assembly language material seems to duplicate the 3303 course. I would expect to see more coverage of topics like RTOS, the use of C in embedded systems, and a broader coverage of the field.

**Reviewed by:** *Denise Martinez*

**Date:** *March 15, 2009*

**Review Notes:**

Updated prerequisite.