HOWARD UNIVERSITY
Department of Electrical and Computer Engineering

Syllabus for Fall 2009

ELEG 416 Microcomputers and Microprocessors
5:10 - 6:30pm TR @LKD #3121

Catalog Data:
Examines microprocessor and support architectures, hardware/software system design, and microprocessor project applications.

Textbook:
(1) The 68000 Microprocessor Hardware and Software Principles and Applications, 4th ed., James L. Antonakos, Merrill Publishing Co., 1999. (2) Embedded Computing using PIC16F877 - Assembly Language Approach. Charles Kim, 2006

Instructor:
Dr. Charles Kim (Office Hours 3-4pm TR and 1-2 pm MF) .Office: 3121A. 202-806-4821 ckim@howard.edu

Goals:
To give students an introduction to microprocessor fundamentals and their applications in 2 distinct CPUs. First, software and hardware model of **MC68000 microprocessor** will be studied and a substantial introduction to I/O interfacing principles will be provided. A number of (MC68000) microprocessor-based applications will be discussed. Students will use the 68K assembler and its companion simulator (emulator), to develop and test programs (in assembly language) for these systems. Second, Microchip's **16F877 8-bit flash memory microcontroller** will be investigated in architecture and instruction. The program testing will similarly be done using a protoboard.

Prerequisites:
Digital Systems of instructor's approval.

Topics:
I. COMPUTER ARCHITECTURE (August - Mid-September)
　　An Overview of Digital Computer Systems and Microcomputers; Princeton Architecture and Harvard Architecture; CISC and RISC; A Basic Organization of Microprocessor-based Systems; Address and Data Bus; Binary and Hex Numbers; Microprocessor Operation; Requirements of a Microprocessor-based System

II. MOTOROLA 68000 MICROPROCESSOR (Mid-September - Mid-October)
　　A Functional Description; Data Size/Organization: Even/Odd Addresses (UDS and LDS); Instruction Types; Developing Software for MC68000: 68K Assembler and Simulator; Program Practices; Program Project

III. MICROCHIP PIC 16F877 MICROCONTROLLER (October - December)
　　PIC Architecture; Memory Structure; Register Files; I/O; A/D Converter; Instruction Sets; Developing Software for 16F877; Built-in Functions and Modules; Program Practices; Program Project

Class Projects:
1. 68000 Program Project　　2. 16F877 Program Project

Grading Policy:

Program Practices on 68000	10%		
Program Project on 68000	20%		
Exam on 68000	10%		
Program Practices on PIC	20%		
Program Project on PIC	20%	Attendance	5%

| Exam on PIC | 10% | Special Assignment on Contemporary Issues | 5% |

Final Course Grade:

100-90	A
89-80	B
79-70	C
69-60	D
59 and below	F

Safety/Ethics:
Follow instructions carefully, avoid touching live bare wires and equipment. See "Safety Manual" in Room 3113, L.K. Downing Hall. Do your own work. If there is a group assignment, participate fully. See "Undergraduate Handbook."

E-mail and Web-Site:
Check your e-mail frequently: Assignments are important information will be announced over e-mail. Also a class note web-site is available at http://www.hirstbrook.com/classnotes.html

Course Outcomes based on ABET Engineering Criteria:
(c) An ability to design a system component, or process to meet desired needs
   Programming Projects. Students are required to develop software (assembly language programs) for the system component/process defined in each project. Solutions are typically open-ended. Students must demonstrate (through simulation/execution) that the developed software meets the desired specifications and needs. *Minimum competence: demonstrated working solution/software and its simulation; a grade of C on subsequent written reports.*
(e) An ability to identify, formulate, and solve engineering problems
   Exams. Students must identify and develop solution (software) for the (engineering) problem (process) the assigned projects. *Minimum competence: demonstrated working software and its simulation; a grade of C on the subsequent written reports.*
(g) An ability to communicate effectively
   Programming projects. Communication/writing skill are required in the written reports detailing requested process/design, developed programs and their simulation, execution/simulation results and analysis, as well as the oral presentation of the project. *Minimum competence: grades of C on written reports, and average communication skill.*
(j) A knowledge of contemporary issues
   Special Assignments. Readings from special sections of the textbook, as well as articles on contemporary issues (technical journals) such as advanced microprocessors and microcomputers, are assigned to complement the class lectures. Class assignments (problems, unfinished designs, etc) require the knowledge gained from the reading assignments. *Minimum competence: A grade of C on the class assignments and written reports.*
(k) An ability to use the techniques, skills and modern engineering tools necessary for engineering practice
   Programming Assignment: Students are required to use necessary assembler and emulator in the programming and testing program. *Minimum competence: A grade of C on the Program Assignments*

SPECIAL NOTE:
Howard University is committed to providing an educational environment that is accessible to all students. In accordance with this policy, students in need of accommodations due to a disability should contact the Office of the Dean for Special Student Services for verification and determination of reasonable accommodations as soon as possible after admission to the University, or at the beginning of each semester. The Dean of the Office of Special Student Services, Dr. Barbara Williams, can be reached at (202) 238-2420.