

**HOWARD UNIVERSITY**  
Department of Electrical and Computer Engineering

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**EECE416 Microcomputer Design (5:10 - 6:30PM TR)**

- Catalog Data:** Examines microprocessor and support architectures, hardware/software system design, assembly language coding, and microcontroller applications.
- Textbook(s):** Assembly Language for x86 Processors, Kip Irvine, 6<sup>th</sup> Ed (or 7<sup>th</sup> Ed) Prentice Hall  
Essentials of 80x86 Assembly Language, Richard Detmer, Jones & Bartlett Learning, 2012.
- Instructor:** Dr. Charles Kim  
Room: 3014LKD 202-806-4821 [ckim@howard.edu](mailto:ckim@howard.edu)  
Office Hour: T-R-F 2 – 4 pm
- Goals:** This course teaches assembly language programming and architecture for Intel and AMD processors. The coding is done with Microsoft Macro Assembler (MASM) running on Windows operating system. **The following goals** are designed to broaden students' interest and knowledge in topics related to assembly language: Intel and AMD processor architecture programming; assembly language directives, macros, operators, and program structure; programming methodology; computer hardware manipulation, interaction between assembly language programs, the operating system, and other application programs; and approach programming problems with a machine-level mind set. **The other goal** of the course is to give students opportunity to work with small microcontrollers with handy tools and easier programming environments so that real world applications are practiced.
- Prerequisites:** Digital Systems
- Topics:**
- I. INTRODUCTION**  
An Overview of Digital Computer Systems and Microcomputers & Computer History  
Princeton Architecture and Harvard Architecture & CISC and RISC  
A Basic Organization of Microprocessor-based System  
Address and Data Bus; Binary and Hex Numbers  
Hardware / Software Requirements of a Microprocessor-based System
- II. INTEL X86 ARCHITECTURE AND ASSEMBLY LANGUAGE**  
Basic Concepts  
X86 Processor Architecture  
Assembly Language Fundamentals  
Data Transfers, Addressing, and Arithmetic  
Procedures  
Conditional Processing  
Strings and Arrays  
Structures and Macros  
MS-Windows Programming  
16-bit MS-DOS Programming
- III. MICROCONTROLLERS**  
Basic Stamp 2  
Arduino

PIC  
Raspberry Pi

**Class Projects:** 1. X86 Coding Project  
2. Microcontroller Project

**Grading:**

Homework/Coding Exercise	30%
Projects	20%
Quizzes	20%
Final Exam	20%
Other assignment	10%

**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.”

## ABET Engineering Criteria

- (c) **An ability to design a system component, or process to meet desired needs**  
Programming Project. 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.*
- (g) **A knowledge of contemporary issues**  
Reading Assignment. 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.*
- (h) **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, can be reached at (202) 238-2420.

Howard University takes sexual assault, dating violence, domestic violence, stalking and sexual harassment seriously. If a student reveals that he or she needs assistance with any of these issues, all Responsible Employees, which includes faculty, are required to share this information with the University Title IX Office (806-2550) or a student can be referred for confidential services to the Interpersonal Violence Prevention Program (IVPP) (238-2382) or University Counseling Services (806-6870). For more information about these services, please go to [www.CampusSafetyFirst.Howard.Edu](http://www.CampusSafetyFirst.Howard.Edu)

**Classnote Webpage:** [www.mwfr.com/416F15.html](http://www.mwfr.com/416F15.html)