

# University of Toledo

## Electrical Engineering Technology

### Master Syllabus

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**Course Title:** Assembly Language Programming      **Course Code & Number:** EET 2230

**Credit Hour Total:** 4 Semester Hours

**Lecture Contact Hours:** 3

**Lab Contact Hours:** 2

**Pre-requisite:** EET 2210, Digital Logic Fundamentals.

**Text:** The 8088 and 8086 Microprocessors, Authors: Walter Triebel and Avtar Singh, 4<sup>th</sup> Edition, Prentice Hall Publishers.

**Software:** DEBUG, MASM.

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#### A. Course Description

This course covers the software architecture of the 8088 and 8086 microprocessors. Basic 8086/8088 instruction sets, various machine codes, and addressing modes are covered. The DEBUG and MASM software are used.

#### B. Related Program Outcomes (a, c, f, k):

- An understanding of the analytical and laboratory skills associated with electrical engineering technology **(outcome a)**, as evidenced by the ability to:
  - Write, debug, and analyze assembly language programs for the 8086/8088 microprocessor instruction set.
- An ability to conduct, analyze, and interpret experiments concerning assembly language programming, as evidenced by **(outcome c)**:
  - The ability to perform various lab exercises using DEBUG and MASM software.
  - Written reports for select experiments.
- An ability to identify, analyze and solve technical problems associated with assembly language programming, as evidence by **(outcome f)**:
  - An ability to solve problems given in class quizzes, tests, and final examination.
  - An ability to participate in class discussions and solve problems open for discussion during class time.
- A commitment to quality and continuous improvement as evidenced by **(outcome k)**:
  - The ability to use the latest software and computers.
  - The ability to learn from past mistakes made on quizzes and tests and perform better in future, as evidenced by improvement in test scores, etc.

### **C. Course Objectives:**

- Ability to write Assembly Language programs for the Intel 8088/8086 microprocessors using DEBUG and MASM. Ability to load, verify, and save machine language programs.
- Ability to debug and interpret machine code using the DEBUG software.
- Ability to decode and encode machine code by hand.
- Ability to examine and modify the contents of Memory.
- Knowledge of various addressing modes.
- Knowledge of data transfer instructions, arithmetic instructions, logic instructions, shift instructions, and rotate instructions.
- Knowledge of Control flow and loop instructions.
- Ability to keep abreast of the latest technology by reading appropriate journal/conference papers and other scientific magazines.

### **D. Course Outline – Major Content Areas**

- Introduction to Microprocessors and Microcomputers.
- Software Architecture of the 8088 and 8086 Microprocessors.
- Assembly Language Programming.
- Machine Language Coding and the DEBUG software development program of the IBM PC.
- 8086/8088 Programming – Integer Instructions and Computations.
- 8086/8088 Programming –Control Flow Instructions and Program Structures.
- Assembly Language Program Development with MASM.

### **E. Major Laboratory Topics**

- Exploring the Software Architecture of the 8088 Microprocessor.
- Assembling and Executing Instructions with DEBUG.
- Loading, Executing, and Debugging Programs.
- Working with Data Transfer, Arithmetic Logic, Shift, and Rotate Instructions.
- Working with the Flag Control, Compare, Jump, Subroutine, Loop, and String Instructions.
- Assembling, Editing, Linking, and Executing Assembly Language Programs.
- Learning the MASM Program.
- Assembling Source Programs with MASM.
- Creating a RUN Module.
- Designing a Program for an Application.