

University of Toledo

Electrical Engineering Technology

Master Syllabus

Course Title: Microcomputer Architecture

Course Code & Number: EET 4250

Credit Hour Total: 4 Semester Hours

Lecture Contact Hours: 3

Lab Contact Hours: 2

Coordinator: Dr. Ted Evans

Text: Microcontroller Theory and Applications: HC12 and S12, Daniel J. Pack and Steven F. Barrett, 2nd Edition, Prentice Hall

Software: To be determined

Program Required Course

Pre-requisite: EET 3150, C Programming

A. Course Description

In today's fast paced control, the majority of applications come with an onboard microcontroller (embedded) designed to do a specific job as fast and as efficiently as possible. This microcontroller comes with an onboard processor, memory and programmable input/output peripherals. This course is about learning the different types of microcontrollers, their architecture and programming and finally, lab testing and troubleshooting. Topics include but are not limited to: Basic Structure, Programming Fundamentals, Algorithms and Data Structures, Application Development, I/O Interfacing, Interrupts, Communications and Development Tools.

B. Related Program Outcomes (a, b, c, e, f, g):

- An understanding of the analytical and laboratory skills associated with electrical engineering technology (**outcome a**), as evidenced by the ability to perform:
 - Learning complex software to program common microcontrollers.
 - Lab testing and troubleshooting of common microcontrollers.
- An ability to apply current knowledge and adapt to emerging applications of mathematics, science and technology (**outcome b**), as evidenced by the ability:
 - To review, digest, and apply the latest technology in the area of microcontrollers.
- An ability to conduct, analyze, and interpret experiments concerning software development, as evidenced by (**outcome c**):
 - The ability to perform various lab exercises involving programming and testing the latest microcontrollers.

- Written reports for select experiments.
- An ability to function as part of a team, as evidenced by **(outcome e)**:
 - Working with other students in a team of 2 students on lab projects.
- An ability to identify, analyze and solve technical problems associated with microcomputer systems, as evidence by **(outcome f)**:
 - An ability to solve problems on class quizzes, tests, and final examination.
 - An ability to participate in class discussions and solve problems open for discussion during class time.
- An ability to communicate effectively, as evidenced by **(outcome g)**:
 - Written reports of projects.

C. Course Objectives:

- To understand basics of Microcontrollers and applications.
- To design and understand the different types of Microcontrollers.
- To learn the architecture of Microcontrollers.
- To learn and understand the different memory types and uses.
- To design and understand input/output data structures.
- To design and understand software algorithms.
- To understand and debug microcomputer hardware.
- To understand and debug microcomputer software.
- To design and understand interfacing, program construction, testing, and troubleshooting.
- To further develop the students' problem solving skills.
- To work as part of a team. All students are required to do team projects for this course. Students will be required to submit a written report as well as give an oral presentation.

D. Course Outline – Major Content Areas

- Introduction to Microcontrollers.
- Architecture of Microcontrollers.
- Memory types and Interfaces
- I/O interface.
- Interrupts.
- Communication.
- Programming Fundamentals
- Algorithms and Data Structures
- Application Development
- Testing and Debugging

E. Major Laboratory Topics

Lab Experiments to be written as part of first offering, will be described at that time.