National Center for Supply Chain Automation

MASTER SYLLABUS

Microprocessors and Microcontrollers

Semester Credit Hours: 3.00

Prerequisites: see ‘Entry Skills’ for recommended competencies

## COURSE DESCRIPTION

Computer number systems, codes, and arithmetic functions; microcontroller functions, architecture, instruction sets, addressing modes, internal operations, PIA interfacing, and I/O operations. Introduction to operating systems.

**ENTRY SKILLS**

Before entering the course, students will be able to perform the following:

* Convert between the binary and decimal number systems and recognize the most commonly used binary codes;
* Explain the operation of digital logic gates;
* Identify the more commonly used integrated circuit families used in digital equipment and discuss their operation and characteristics;
* Use Boolean algebra to express logic operations and minimize logic circuits in design;
* Discuss the operation and application of counters, shift registers, and other sequential and combinational logic circuits.

## STUDENT LEARNING OUTCOMES

Upon successful completion of the course, students should be able to perform the following:

* Explain the basic operation of a microcontroller;
* Describe and control input and output operations;
* Develop a flowchart to define and solve a problem;
* Write a program that implements a flow chart for a microcontroller.

**COURSE OUTLINE**

* Number systems, codes and computer arithmetic
  + Binary, Octal, Decimal & Hexadecimal
  + Addition, subtraction, multiplication, and division of each type of number system
* Microcontroller basics
  + What a microcontroller looks like
  + Inputs and outputs on the board/chip
  + How to power the chip
  + How to hook it up to a computer and develop communications with the chip
* Introduction to programming
  + Communications with the chip
  + Variable definition, manipulation and storage
  + Communications with inputs and outputs
  + Activating inputs and outputs
* Explain the specific microcontroller being used in class
* Interfacing the microcontroller to the outside world
* Operating systems
  + Programming applications
  + Using a Personal computer to program the chip
* How microprocessors are relevant to specific industries