

# ECE 251: Introduction to Microprocessors

IN

OUT

## Concepts:

- Unsigned and signed number and character representations
  - Components of a microcontroller
  - CPU, register model
  - I/O subsystems
  - Memory subsystems
- Instruction Set and Assembly Language programs
  - Math, logical, and bit instructions
  - Data transfer instructions
  - Programming techniques, flowcharting
  - Using subroutines and stacks
- I/O Capabilities
  - Parallel and serial I/O
  - Memory mapped I/O, I/O programming
  - Interfacing simple devices: pullup resistors, LED biasing, 7-segment display circuitry
  - Interrupt I/O: hardware and interrupt software
- Memory interfacing: logic, timing, and physical

## Applications:

- Use of Microprocessors for computational and I/O tasks in stand-alone and embedded systems

## Tools:

- Assemblers
- Debuggers

## Number Systems

- Understand number systems
- Understand 2's complement representation and manipulation

## Combinational and Sequential Logic

- Understand Boolean algebra
- Understand gate level design
- Understand finite state machines

## Memory

- Has basic understanding of structure and behavior of ROM and RAM devices

## Pre-requisites

- ECE 102 with a C or higher

## Microprocessor Systems

- Understand major components of a microprocessor system

## Instruction Sets and Assembly Programs

- Knows microprocessor instruction set and addressing modes
- Write programs to perform computational and I/O tasks

## Interfaces

- Write interrupt handlers and perform interrupt I/O

## Interrupts and I/O

- Understand basics of random signals and noise
- Analyze signal to noise ratio of an analog-modulated communication system

## Clocks, A/D, Serial I/O

- Program and use internal I/O devices (e.g. real-time clock, timers, A/D converters, serial I/O)