ECE 251: Introduction to Microcontrollers and IoT

**Concepts:**
- Number and character representations
- Components of a microcontroller
  - CPU, register model
  - I/O subsystems
  - Memory subsystems
- Computer Instruction Set
- C and Assembly Language programs
  - Math and logical 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, keypads, LEDs, displays
  - Interrupt I/O: hardware and interrupt software

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

**Tools:**
- Assembler and C Compiler
- Debugger

**Microprocessor Systems**
- Understand major components of a microprocessor system

**Instruction Sets and C/Assembly Programs**
- Know basics of C language, assembler and microprocessor instruction set
- Write programs to perform computational and I/O tasks

**Interfaces**
- Write interrupt handlers and perform interrupt I/O

**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)
- Understand various serial I/O protocols, including UART, SSI, SPI, I2C

**Pre-requisites**
- ECE 102 with minimum grade of C

**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**
- Have a basic understanding of structure and behavior of ROM and RAM devices

**IN**

**OUT**

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