ELEG3923 Microprocessor System Design
Course Syllabus

General Information:

Instructor: Jingxian Wu
Office: Bell 3181
Email: wuj@uark.edu
Phone: (479) 575-6584
Office Hour: T. Th. 11:00-12:00
Lecture location: Bell 2291
Lecture: T. Th. 9:30-10:50
Lab location: Bell 3139
Lab schedule: F. 12:30-3:00
TA: Jaber Hasan (jhasan@uark.edu)

Required Material:

- Textbook: Muhammad Ali Mazidi and Janice Gillespie Mazidi, *The 8051 Microcontroller and Embedded Systems Using Assembly and C*, 2nd Ed., Prentice Hall, 2005. ISBN 0138610223.
- Software: Keil uVision3 trial version (https://www.keil.com/demo/eval/c51.htm)

Reference: I.Scott MacKenzie and Raphael C.-W. Phan, *The 8051 Microcontroller*, 3rd Ed., Prentice Hall, 1999. ISBN 0137800088. (optional)

Prerequisites: Digital Design I, Programming I

- Familiarity with C Programming
- Knowledge of Binary and Hexadecimal Numbering Systems and Basic Computer Arithmetic
- Knowledge of Boolean Logic Functions and Basic Combinational Components
- Knowledge of Boolean Algebra, K-maps, and Combinational Logic Design Knowledge of Latches, Flip-Flops, Counters, and Registers
- Knowledge of Memory and Peripherals (e.g., RAM, ROM, ADC, DAC)

Learning Objectives: To understand basic microcontroller architecture and operation, to be able to interface a microcontroller with the outside world, and to be able to program a microcontroller using both assembly language and C to implement a given design.

Course Outcomes:

- Interpret and design hardware and software for simple real-time digital systems using an 8051 microcontroller
- Describe the fundamentals of microcontroller organization and operation. Show the transfer of information, from register to register to memory for each instruction.
- Describe the basis for interaction between the 8051 microcontroller and external hardware. Interpret and design digital systems incorporating an 8051 and common peripherals (i.e., RAM, ROM, ADC, DAC, etc). Explain the operation of 8051 hardware, including digital I/O ports, register banks, special function registers, internal and external memory, timers, counters, and interrupts, and be able to apply this knowledge in simple programs.
- Define the operations performed by each assembly language instruction for the 8051. Interpret and design assembly language programs. Develop, simulate, and debug assembly language programs for the 8051 using Keil software development tools.
- Explain what occurs within the 8051 on an interrupt. Write programs using interrupts to: perform a task at regular intervals using timers; to communicate serially; or to provide immediate service to external hardware.

Grading:

- Test 1 25%
- Test 2 25%
- Homework 20%
- Lab 20%
- Attendance 5%
- Participation 5%

- A 90 – 100
- B 80 – 89
- C 70 – 79
- D 60 – 89
- F 0 – 59

- Each student has 1 free personal day: you can miss 1 class and still get full attendance point
- Due dates for homework and lab report will be strictly enforced. Late submission within one week after due date will receive a 20% grade deduction, and no credit if submitted after one week from the due date.
- If for some legitimate reason (sickness, death in the family, etc.), you cannot take an **exam** on the scheduled day, you must notify the instructor **prior** to the exam.

Online Resources:

- Course materials (Slides, Homework, Labs, References, etc) can be found at http://comp.uark.edu/~wuj/teaching/eleg3923
- Please check course website **at least once per week** for updates.

Academic Honesty:

Academic honesty is fundamental to the activities of an academic institution and success of students. Any form of copy and plagiarism will not be tolerated in this class. Any kind of activities related to academic dishonesty will be dealt with on a case-by-case basis and may be grounds for dismissal from the class.

Tentative Schedule:

- Week 1 (8/25, 8/27): Ch.0 Introduction, Ch.1 8051 Microcontroller
- Week 2 (9/1, 9/3): Ch. 2 8051 Assembly Language
- Week 3 (9/8, 9/10): Ch. 2 Assembly Language; Ch. 3 JUMP, LOOP, and CALL
- Week 4 (9/15, 9/17): Ch. 3 JUMP, LOOP, and CALL; Ch. 4 I/O Port
- Week 5 (9/22, 9/24): Ch. 8 Hardware connection, Ch. 5 Addressing Modes
- Week 6 (9/29, 10/1): Ch. 5 Addressing Modes,
- Week 7 (10/6, 10/8): No Class on 10/6; Test 1 on 10/8
- Week 8 (10/13, 10/15): Ch. 6 Arithmetic & Logic Instructions
- Week 9 (10/20, 10/22): Ch. 6 Arithmetic & Logic Instructions
- Week 10 (10/27, 10/29): Ch. 7 8051 Programming in C
- Week 11 (11/3, 11/5): Ch. 9 8051 Timer Programming
- Week 12 (11/10, 11/12): Ch. 8 8051 Timer Programming, Ch.10 Serial Port
- Week 13 (11/17, 11/19): Ch. 10 Serial Port
- Week 14 (11/24): Ch. 11 Interrupts (holiday on 11/26)
- Week 15 (12/1, 12/3): Ch. 11 Interrupts
- Week 16 (12/8): Review (dead day: 12/9)

Lab Schedule:

- Week 2 & 3 (9/4 – 9/17): Lab 1 Introduction to Development Environment
- Week 4 & 5 (9/18 – 10/1): Lab 2 Square Waveform Generator
- Week 6 & 7 (10/2 – 10/15): Lab 3 Traffic Light Controller
- Week 8 & 9 (10/16 – 10/29): Lab 4 LCD Display
- Week 10 & 11 (10/30 – 11/12): Lab 5 Temperature Sensor
- Week 12, 13, & 14 (11/13 – 12/3): Lab 6 Keypad and Serial Port

The above schedule is subject to change without prior notice.