

## **EEL4746L - Microcomputers I Lab**

One Credits, Two hours, Engineering Topic.

**Instructor:** Rafi Ahmed

**Textbook:** Rob Toulson and Tim Wilmshurst, Fast and Effective Embedded Systems Design: Applying the ARM mbed, Second edition, Elsevier, ISBN: 978-0-08-100880-5, 2017.

### **Specific Course Information:**

Hands-on design experience with microcomputer systems and applications including buses, interfaces, and in-circuit emulation.

### **Specific Goals for the Course**

#### **a. Specific outcomes of instruction**

Upon successful completion of this course, the student will:

In lab students will use ARM based LPC1768 microcontroller and mbed API to gain experience with interfacing and programming microcontrollers.

**b. Explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.**

In this course the student will have to show

- (a) an ability to apply knowledge of mathematics, science, and engineering (N/A)
- (b) an ability to design and conduct experiments (simulations), as well as to analyze, interpret data (X)
- (c) an ability to design a system, component, or process to meet desired needs (N/A)
- (d) an ability to function in multi-disciplinary teams (N/A)
- (e) an ability to identify, formulate, and solve engineering problems (homework) (X)
- (f) an understanding of professional and ethical responsibility (N/A)
- (g) an ability to communicate effectively (through project reports) (X)
- (h) the broad education necessary to understand the impact of engineering solutions in a global and societal context (N/A)
- (i) a recognition of the need, and an ability to engage in life-long learning (N/A)
- (j) a knowledge of contemporary issues (N/A)
- (k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice (X)
- (l) a knowledge of probability and statistics (N/A)

### **Brief list of the topics to be covered**

- 1.Using mbed API to program LPC1768 microcontroller
- 2.Connecting LEDs and Switches to the digital system
- 3.Generating constant output voltage and PWM
- 4.Processing data from analog input
- 5.Interfacing LCD with LPC1768 microcontroller and sending data to LCD
- 6.Programming SPI-linked ADXL345 accelerometer
- 7.Communicating with I2C enabled TMP102 temperature sensor
- 8.Interrupts on LPC1768, testing interrupt latency, disabling interrupts
- 9.Using the mbed timers and timer interrupts

10.LPC1768 low-power modes

11.Same as EEL4746 course project, managed by Dr. Tehrani

**GRADING:**

Course Requirements	Weight
Labs	50%
Final project	50%
Overall Grade	100%

**Conversion of Numerical Grade to Letter Grad**

A- to A: 100-90	B- to B+: 89-80	C- to C+: 79-70	D- to D+: 69-60	F: below 60
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