Instructor: David M Kender, Russ 247, 775-5044, dkender@wright.edu

Course Description: BME 1980-01 Special Topics in Biomedical Engineering I, Fall 2015 is a guided-lecture/laboratory experience which explores implementing Arduino microcontrollers in biomedical engineering settings. In particular, the course is intended to introduce biomedical engineering students to programming and interfacing the Arduino microcontroller with compatible sensors, displays, and controls.

Course Objectives: At the conclusion of the course, students will be able to:

- Describe the function and purpose of the Arduino microcontroller.
- Use the Arduino Development Environment for creating Arduino software applications (Sketches).
- Design, develop, code, execute Arduino compatible microcontroller applications by writing programs for the Arduino which address its capability to receive, process, and transmit both digital and analog signals for the purposes of motion control, information display, and interfacing with compatible devices.
- Build and debug breadboard circuits that implement the salient features of the Arduino microcontroller.

Course Requirements:
Students must be self-actualizing, creative, organized, enthusiastic, persistent, punctual, dependable, able to function independently, and display a willingness and a try-again-in-the-face-of-setbacks attitude.

Academic Integrity: The instructor fully endorses the Wright State University policy to uphold and support standards of personal honesty and integrity for all students consistent with the goals of a community of scholars and students seeking knowledge and truth. http://www.wright.edu/students/judicial/

Reasonable Accommodations Policy: Any student with a disability that may prevent them from fully demonstrating their abilities should contact me personally so we can discuss accommodations necessary to ensure full participation and facilitate your educational opportunities.

Course Evaluation: BME 1980-01 Fall 2015 as a graded course. Grades will be based on several criteria including a subjective evaluation of effort, learning, and understanding. The following criteria will be used:

- A The overall work can be described as being excellent.
- B The overall work can be described as very good.
- C The overall work can be described as adequate.
- D The work seems to represent poor or little effort.
- F The work appears to be of little or no value.

Schedule:
Week 1 Introduction to Arduino Microcontroller Concepts and the Arduino Development Environment
Week 2 Digital Outputs
Week 3 Digital Inputs
Week 4 Analog Inputs (Digital to Analog Conversions for Sensing Light and Temperature)
Week 5 Analog Inputs (Digital to Analog Conversions Using Ultrasonic and Infrared Sensor Modules)
Week 6 Analog Outputs
Week 7 Motion Control (DC Brushless Motors)
Week 8 Motion Control (Servo Motors)
Week 9 Motion Control (Stepper Motors)
Week 10 Displaying Information
Week 11 Audio Output
Week 12 Arduino Timer and Processor Interrupts
Week 13 Interfacing with I2C (Two-Wire) Devices and One-Wire (Dallas Semiconductor Bus) Devices
Week 14 Interfacing with SPI Devices, Serial UART Programming, USB Programming