ENGR 1166: Foundations of Engineering

Credits and contact hours: 3 Credits (2 75-minutes lecture/lab per week for 14 weeks)

Instructor: John A. Chandy

Textbook: None

a. *Other supplemental materials*: Arduino microcontroller board

***Specific course information*:**

a. *Catalog Description*: Introductory topics in a specific engineering major. Topics selected by Department or Program, or Regional Campus faculty. Students to select section based on their selected or intended major. In the context of the discipline, students would develop skills transferable to other engineering disciplines.

b. *Prerequisite*: None

c. *Required, elective, or selected elective:* Selected elective (EE)

***Specific goals for the course*:**

a. *Specific outcomes of instruction*: Freshmen learn to use the basic software tools needed in subsequent coursework and future electrical engineering practice. This early exposure will greatly enhance their ability and enjoyment of numerous advanced courses in Electrical Engineering and in Computer Engineering. In addition, students learn to distinguish various aspects of electrical engineering, such as circuits, signal analysis and amplifiers, through the use of Arduino microcontroller-based lab projects.

b. *ABET Criterion Student Outcomes addressed by the course*:

(1) an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics

Students use their knowledge of engineering, science, and mathematics, to analyze sensor data, do simple Boolean algebra, analyze circuit currents and voltages, evaluate filter designs, and design microcontroller systems for engineering applications.

(2) an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors

Students learn how to design software modules and building blocks to meet desired specifications. Students also are required to design simple op amp circuits, filter circuits, and LabView virtual instruments to meet given

specifications. These designs are verified for performance using PSpice or LabView

(3) an ability to communicate effectively with a range of audiences

N/A

(4) an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

N/A

(5) an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives

N/A

(6) an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions

Students learn how to design and conduct experiments and analyze the experimental data, particularly in labs collecting sensor data. Students also learn how to use MatLab to help in data analysis and visualization.

(7) an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Students learn how to use other resources to build on classroom lectures to learn material required for laboratories, homework, and exams.

Topics covered:

- PSpice
- MATLAB
- LabView
- Introductory to microcontrollers and embedded controllers.
- Introduction to C programming.
- Measurement and analysis of sensor data.
- Serial data transfer to/from microcontroller
- A/D conversion
- PWM D/A conversion
- Motor control
- Simple signal processing using microcontroller and MATLAB