Winter 2018 - EGR 2800: Design and Analysis of Electromechanical Systems
Course Outline

Lectures: 5:30 pm - 7:17 pm MW in EC254

Labs: See Sail

ECE Instructor

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ME Instructor

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Required Text/kit:

Required book for the ECE portion for the course is: Exploring Arduino by Jeremy Blum, ISBN 978-1-118-54936-0.

Required parts kit: Elegoo UNO R3 Project Complete Starter Kit (**https://www.amazon.com/dp/B01CZTLHGE?psc=1**)

Selected readings and online lectures from http://www.ecourses.ou.edu/ (free e-Book) will be assigned for the Statics and Dynamics portion of the course.

Optional text: An engineering mechanics textbook such as: *Engineering Mechanics: Statics and Dynamics* by Hibbeler (Pearson), some older versions of which can be found online for as little as $20.

Prerequisites: (EGR 120 or EGR 1200), (EGR 240 or EGR 2400), (APM 255 APM 2555)
Corequisites: (EGR 250 or EGR 2500), (EGR 260 or EGR 2600)

Course website: The course webpage will be hosted on Moodle (moodle.oakland.edu). It will contain announcements, lectures, homework, pre-labs, reading assignments, lab assignments, and links to external content relevant to the course.

Course Description: Design, analysis, and testing of electromechanical systems; statics; linear and rotational dynamics; introduction to microprocessors; team design project dealing with technical, economic, safety, environmental, and social aspects of a real-world engineering problem; written, oral, and visual communication; engineering ethics; Laboratory.

ABET/Program Outcomes: The Program Outcomes are a set of skills that assure the achievement of the program educational objectives. Before graduating, SECS students will demonstrate their skills in the following key areas:

a. an ability to apply knowledge of mathematics, science and engineering

b. an ability to design and conduct experiments, as well as to analyze and interpret data
c. an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
d. an ability to function on multidisciplinary teams
e. an ability to identify, formulate, and solve engineering problems
f. an understanding of professional and ethical responsibility
g. an ability to communicate effectively (3g1 orally, 3g2 written)
h. the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
i. a recognition of the need for, and an ability to engage in life-long learning
j. a knowledge of contemporary issues
k. an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

ABET Outcomes addressed by EGR280: a, b, c, d, e, g, i, j, k.

Course Objectives: By the end of the course you should be able to:

- Interface I/O devices such as buttons, LEDs, LCDs, sensors, and actuators to a modern microcontroller (a, e, k).
- Develop C programs for a microcontroller using modern development tools (a, e, k).
- Solve statics problems involving particles and rigid bodies (a, e).
- Solve kinematic and kinetic dynamics problems involving particles and rigid bodies using Newton's Second Law, Work and Energy, and Impulse and Momentum principles (a, e).
- Work constructively in a multidisciplinary team to design, analyze, and describe an electromechanical system subject to specific constraints (a, b, c, d, e, g, i, j, k).

Course Contents: The course is divided into 4 parts:

1. Microcontroller Digital I/O, analog to digital conversion, sensor and actuators Interfaces
2. Statics
3. Dynamic
4. Final Project

Homework, Quizzes and Labs: Several individual homework and group lab assignments will be carried out during the course. Due dates will be announced in class and/or posted on Moodle. Moodle based as well as in-class quizzes will be given throughout the semester. Not all quizzes will be announced. The lowest quiz grade will be dropped and, in exchange, no late quizzes will be given.

Exams: There will be 2 exams during the semester. The first exam will cover course Parts 1 and the second exam will cover topics 2 and 3. There will be no final exam. Instead, the final projects will be presented and demonstrated. The time and location of exams and final demos will be announced in class and on moodle.

Final Team Project: During the second half of the semester, interdisciplinary groups of approximately 4 students will be formed to work on final projects. Each group will:

- Design and implement an electromechanical device that will meet some specifications.
- Prepare a final report on the project.
- Give a public presentation and demonstration.

Grading:

Labs	10%
Homework and Quizzes	10%
Exam 1	30%
Exam 2	30%
Final Project:	
Proposal	10%
Design and Implementation	5%
Poster and Presentation	5%
	100%

The total for the course will be converted to a final grade out of 4.0 using the university standard conversion:

90 to 100%	~ 3.5 to 4.0
80 to 89%	~ 3.0 to 3.4
70 to 79%	~ 2.0 to 2.9
60 to 69%	~ 1.0 to 1.9
<60%	~ 0.0

Academic Conduct Policy: Cheating on examinations, plagiarism, falsifying reports/records, and unauthorized collaboration, access, or modifying of computer programs are considered serious breaches of academic conduct. The Oakland University Academic Conduct Policy will be followed with no exceptions. It is explained on page 93 of Oakland University 2007-'08 Undergraduate catalog and page 24 of Oakland University 2005-07 Graduate catalog. It may also be found on the OU website at www.oakland.edu/oakland/ouportal/index.asp.

Add/Drops: The University add/drop policy will be explicitly followed. It is the student's responsibility to be aware of the University deadline dates for dropping the course.

Special Considerations: Students with disabilities who may require special considerations should make arrangements with campus Disability Support Services. Students should also bring their needs to the attention of the instructor as soon as possible.

Other Policies for this Course:

- It is the responsibility of the student to routinely check the course webpage (moodle.oakland.edu) for announcements, assignment, reading assignments, quizzes, etc. (note that grades are not weighted correctly in moodle. Use above weights).
- Email broadcasts will be sent through the Moodle system. Each student should ensure that these messages are sent to their current email address.
- Permission for exceptions from the normal class-work schedule must be requested ***in advance.*** If work is accepted for a certain assignment after its due date, a significant grade penalty will apply.
- A grade of 0.0 will be given to students not receiving 60% in the Labs category and to students not participating in the final project, regardless of their performance in other parts of the course.
- For final projects, individual grades will be adjusted downwards for lack of contribution to team/group assignments. These individual grade adjustments will be based on peer evaluations completed by the students in each team.