Course Syllabus

Department: Science and Technology

Date: 02-02-2015

I. Course Prefix and Number: ESC 240

Course Name: Engineering Design

Credit Hours and Contact Hours: 3 credit hrs (2 lec hr, 3 lab hrs)
Catalog Description including pre- and co-requisites: supporting data required for grade prerequisite of ‘C’ or higher.
An introductory course in engineering design where student teams are guided through a comprehensive engineering design-build project. In this course, students will learn about programming microcontrollers, using machine tools, fabricating mechanisms, designing circuit boards, and selecting engineering materials. Teamwork, problem solving, prototype testing, and troubleshooting are skills that are emphasized throughout the course.
Prerequisite: MAT 272.

Relationship to Academic Programs and Curriculum including SUNY Gen Ed designation if applicable:

This is a required course primarily for the sophomore level A.S. Engineering Science students. Other students from other programs may also take the course if they have the appropriate background.

II. Course Student Learning Outcomes: State the student learning outcome(s) for the course (e.g. Student will be able to identify...)
Upon completion of the course the student will be able to:

1. Program a microcontroller to perform simple tasks
2. Use basic machine tools to create prototype designs
3. Identify engineering materials suitable for a given application
4. Use position sensors and electric motors effectively in an engineering design project
5. Identify a problem using troubleshooting techniques

College Learning Outcomes Addressed by the Course: (check each College Learning Outcome addressed by the Student Learning Outcomes)
III. Assessment Measures (Summarize how the college and student learning outcomes will be assessed): For each identified outcome checked, please provide the specific assessment measure.

<table>
<thead>
<tr>
<th>List identified College Learning Outcomes(s)</th>
<th>Specific assessment measure(s)</th>
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</thead>
<tbody>
<tr>
<td>eg: writing</td>
<td>eg: student will complete a research paper</td>
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<tr>
<td>Critical Thinking</td>
<td>Student will complete a series of lab reports</td>
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<tr>
<td>Computer Literacy</td>
<td>Student will complete a series of lab reports</td>
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IV. Instructional Materials and Methods

**Types of Course Materials:**
No textbook is required for this course. Instructor notes are the main source of information for the course content. All the necessary equipment to carry out the design and to build the required prototype components listed for this course is provided by the department. A course website is maintained on the internet for lecture schedule, instructor notes, and other supplemental learning material.

**Methods of Instruction (e.g. Lecture, Lab, Seminar ...):**
The instruction is done in a traditional lecture format as well as in the form of coaching student groups through their various assignments and projects in the lab. Small class sizes allow instructor to engage the students on a one-on-one basis. Hands-on approach is emphasized throughout the course. Teamwork among the students are required.

V. General Outline of Topics Covered:
Fundamentals of engineering design
Use of machine tools
Material identification
Troubleshooting
Position sensors
Sensor housing
Sensor circuit
Circuit board design
Microcontroller
Microcontroller circuit
Microcontroller programming
Control programs
Steering System
Steering linkage
Servo motor
Servo motor, steering interface
Drive System
DC Motors
Motor mounts, adapters
DC Motor control
Assembly, battery mounts, switches
Control program