

Principles of Engineering -- Elective

Overview

The primary intent of the course as an elective is to allow students to experience a more in depth understanding of the 10 primary engineering disciplines that they were exposed to in the Introduction to Engineering course. Students will spend approximately 3 weeks exploring each discipline through concept lectures and hands on projects. Through these lectures and projects students will learn concepts such as electrical circuitry, computer programming on Arduino's, Rube Goldberg machines, basic 3D modeling, and pneumatics/hydraulics.

Objectives

- Understanding and applying the engineering design process
- Use an Arduino to successfully program various projects
- Explaining different ways machines do work
- Designing basic solid 3D models
- Understand the various career paths available in each of the engineering disciplines

Assessment

Students will be assessed using projects, quizzes, and exam as well as a final project.

Course Essentials

Equipment	Cost/Unit
General Supplies for projects	\$1500

First Semester Course Outline

Unit 1 – Engineering Design Process and Reverse Engineering	Take an object apart to understand how it works
Unit 2 – Mechanical Engineering	Simple and Complex Machines, Mechanical Advantage
Unit 3 – Environmental Engineering	Design tools and develop solutions to environmental problems like pollution
Unit 4 – Chemical Engineering	Unit Operations, Process Flow Diagrams
Unit 5 – Electrical Engineering	Ohm's Law, Parallel and Series Circuits, Circuit Building on Arduino
Unit 6 – Computer Science	Energy Savings, Design a Thermostat Using Arduino

Second Semester Course Outline

Unit 7 – Civil Engineering	Hydraulic and Pneumatic Systems, Robotic Arm Design Challenge
Unit 8 – Biological Engineering	RFID, Pressure gages, 3D modeling of biological devices
Unit 9 – Construction Management	Project Management, Gantt Charts, Request for Information
Unit 10 – Industrial Engineering	Work Flow and Facility Planning, Efficiency
Unit 11 – Petroleum Engineering	Upstream/Downstream, Refining process,
Unit 12 – Culminating project	Student choice of final project on preferred discipline