**Course:** Engineering Foundations

**Credits:** 3 Credits / Undergraduate

**Prereqs:** Physics 1051 General Physics I Lecture

**Coreqs:** Physics 1052 General Physics II Lecture, 1061 General Physics 2 Lab

**Instructors:** Edward Berliner, Ph.D. (Lecture)/David Siegel, Grad. Student (Lab Assistant)

COURSE OVERVIEW

This course is designed to allow students of strong Science and Math aptitude to lay the groundwork for entering the Engineering field, either by continuing their education at an Engineering Graduate School, completing their BA. In Engineering Physics at Y.U., or continuing their B.S. education at an ABET accredited undergraduate school (for example through the Columbia School of Engineering and Applied Science Combined Plan Program). It has four facets: (1) discussion of matters of interest common to all Engineering fields, (2) an overview of skills applicable to Engineering design across all Engineering fields, (3) synopses of selected Engineering fields of interest to our students, and (4) completion of an interdisciplinary team-based semester long capstone product development. In a sense, facets (1), (2), and (3) feed skills and knowledge into the product development (4); students will be expected to apply good engineering skills and techniques, including budgeting, design tools, etc. along with interdisciplinary knowledge. Not only will this be a practical application of the lecture presentations, it will facilitate the students learning and experiencing more about the different disciplines so that they are better able to select the correct Engineering field in the next phase of their education,

The course will be sited in the Engineering Lab, 1307. The students will have access to “maker space” equipment including 3-D printing, laser cutting, etc.

The course will consist of a weekly 2-hour lecture and a weekly 2-hour Lab/project session.

All students will be required to pay a $150 Lab fee to be used for the project. The team members will pool their Lab fees and draw up a budget that will utilize the funds, thereby allowing the students to learn the engineering skills of budgeting and cost/benefit analysis.

COURSE LEARNING OUTCOMES

By the end of this course, students will be able to:

1. Be conversant the processes and tools that Engineers use to realize ideas into products.
2. Understand the steps in Engineering design.
3. Have an appreciation for several of the different Engineering fields.
4. Be able to use the facilities of a “Maker Space” in the building of a prototype project.
5. Confront modern challenges Engineers face including questions of ethics, economics, and patents.

REQUIRED MATERIALS

A list of reference materials will be distributed to the class prior to each session.

Asignments and Grading

Grades for this course will be based on the following assignments:

|  |  |
| --- | --- |
| **Assignment** | **Grading** |
| **Weekly Discussion** | 15% |
| **Lab Participation** | 15% |
| **Mid-Term Exam** | 20% |
| **Final Exam** | 30% |
| **Final Project** | 20% |

GRADING SCALE

|  |  |  |  |
| --- | --- | --- | --- |
| **Quality of**  **Performance** | **Letter Grade** | **Range %** | **GPA/ Quality Pts.** |
| Excellent - work is of exceptional quality | A | 93 - 100 | 4 |
| A- | 90 - 92.9 | 3.7 |
| Good - work is above average | B+ | 87 - 89.9 | 3.3 |
| Satisfactory | B | 83 - 86.9 | 3 |
| Below Average | B- | 80 - 82.9 | 2.7 |
| Poor | C+ | 77 - 79.9 | 2.3 |
| C | 70 - 76.9 | 2 |
| Failure | F | < 70 | 0 |

COURSE SCHEDULE

In addition to class time, students should expect to spend at minimum 5 hours per week on this course.

WEEK TOPIC SCHEDULE OF

MAJOR ASSIGNMENTS

Week 1 Lecture - Thinking like an engineer, examples of engineering projects

Week 1 Lab – Team Assignments, Introduction to the Maker Space and Equipment

Week 2 Lecture – Introduction to Engineering Design, Concepts in Reliability

Week 2 Lab – Teams Meet to discuss Project

Week 3 Lecture – Economics of Engineering

Week 3 Lab = Teams report on research of Project Feasibility

Week 4 Lecture – Electrical Engineering I – Principles of Digital Electronics

Week 4 Lab – Teams work on Project Plans

Week 5 Lecture – Electrical Engineering II – Advanced Signal Properties, Intro to Lightwave and Mobile Systems

Week 5 Lab – Readout and review of Project Plans

Week 6 Lecture – Intro to BioMedical Engineering

Week 6 Lab – Teams work on Project

Week 7 Lecture – Engineering Ethics

Week 7 Lab – Teams work on Project

Week 8 Lecture – Patents

Week 8 Lab – Teams work on Project

Week 9 Lecture Midterm

Week 9 Lab – Project Status Report Review

Week 10 Lecture – Intro to Mechanical Engineering

Week 10 Lab – Teams work on Project

Week 11 Intro to Chemical Engineering

Week 11 Lab – Preliminary Prototype to show proof of concept

Week 12 Intro to Civil Engineering

Week 12 Lab – Teams work on Project

Week 13 Intro to Marketing and Project Management

Week 13 Lab – Project Demo

Week 14 Discussion on the Professional Workplace and Career Paths

Week 14 Lab – Project Demo (Continued)

UNIVERSITY POLICIES & RESOURCES

**ACCESSIBILITY AND ACCOMODATIONS**

The Office of Disability Services collaborates with students, faculty and staff to provide reasonable accommodations and services to students with disabilities. Students with disabilities who are enrolled in this course and who will be requesting documented disability-related accommodations should make an appointment with the Office of Disability Services, (646) 592-4132, rkohn1@yu.edu, during the first week of class. Once you have been approved for accommodations, please submit your accommodation letter to ensure the successful implementation of those accommodations. For more information, please visit: <http://yu.edu/Student-Life/Resources-and-Services/Disability-Services/>

**ACADEMIC INTEGRITY**

The submission by a student of any examination, course assignment, or degree requirement is assumed to guarantee that the thoughts and expressions therein not expressly credited to another are literally the student’s own. Evidence to the contrary will result in appropriate penalties. For more information, visit<http://yu.edu/registrar/grad-catalog/>

**STUDENT SUPPORT SERVICES**

If you need any additional help, please visit Student Support Services:

<http://yu.edu/academics/services/>