

Physics 5800: Engineering Physics Design I

Description:

Present fundamentals of engineering-physics designing and leads to skills development of specific design proposal. Technical communication skills, both written and oral, are employed throughout.

Semester Offered: Au

Credit Hours: 3

Level: U

Meeting Format: 1 Lecture per week, 2 hours lab per week (typically), scheduled as needed.

Prerequisites:

Physics 2301 (263); a second writing class; senior standing in Engineering Physics.

Recommended Texts:

Engineering Design: A Project-Based Introduction by C.L.Dym and P. Little

Pocket Book of Technical Writing for Engineering and Scientists by L. Finkelstein

The Art of Oral Scientific Presentation by R.H. Anholt

A Guide to Writing as an Engineer by Beer and McMurrey

The Craft of Scientific Writing by M. Alley

Course Objectives:

1. Students will learn methods needed to explain complex technical material to diverse audiences in clear and understandable ways. ABET Criteria(a),(f),(g),(h),(i).
2. Students will learn how to make effective written and oral presentations. ABET Criteria (c),(e),(i).
3. Students will learn the principles of engineering design as applied to a capstone experience. ABET Criteria (c),(e),(i).
4. Students will research and design a complex system. ABET Criteria (c),(e),(i).
5. Students will learn to work effectively in teams. ABET Criteria (d).
6. Students will learn to develop management skills needed to oversee the design of complex engineering projects, with consideration to economic, environmental, sustainability, manufacturability, ethical, health and safety, social and political issues. ABET Criteria (c),(d),(e),(f),(h).

Topics:

Technical writing: reports, proposals, audience, manuals, etc.

Oral Presentations: graphics, multimedia.

Teamwork: organization, brainstorming, meetings.

Design: the design process with realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability.

Labwork:

Labs will typically be devoted to the completion of pre-projects related to the final Capstone Project over the course of the semester, and the development of a "Master Project" proposal for the follow-up course in the next semester.

Capstone Project:

The Master Project proposal would either be a student supplied project (typically in consultation with a faculty member in Physics or Engineering) or a course supplied project.

The purpose of the Engineering Physics Capstone design course is to pull together knowledge students have gained in their physics and engineering classes into one significant design experience. It should incorporate a variety of issues that engineers typically face: design, prototyping, creativity, working with a customer base, documentation, teamwork, economics, etc.

For this experience, students will have a choice:

1. They can work within the project chosen by the course, hereafter known as the Course Capstone Project.
2. They can work with a faculty or industry mentor on their own project, hereafter known as an Individual Capstone Project.

It will be assumed that all students are taking part in option 1), unless they explicitly tell the course instructor otherwise.

If you choose option 2, you will be required to submit a proposal, which indicates how your project will satisfy the course requirements. This proposal will have to be approved by the course instructor before you can proceed.

Instructions on how to do this will be provided in class. However, students who intend to pursue option 2) should already be having a conversation with a mentor to make sure the mentor is willing and able to invest the time to provide guidance over *both* the fall and spring semesters.

Meetings:

1. The number of lectures is limited. You are expected to attend all lectures. Absences will be noted and will negatively affect your grade.
2. There will be mandatory team meetings scheduled. Absences will be noted and will negatively affect your grade.
3. Your grade is determined by project team achievement and results. Individual performance and achievements within the team will be noted and will be reflected in your grade.

Typical Grading:

Project Documentation 10%

Participation in meetings with Project Advisor and/or Course Supervisor 15%

Intermediate Individual presentations 15%

End of semester presentation 20%

End of semester design report 20%

Team Evaluation (course cap) or Advisor Evaluation (individual cap) 20%