Course Syllabus

University of Pittsburgh
Department of Electrical and Computer Engineering
ECE 1895: Junior Design Fundamentals

Course Description

This course teaches students the engineering design process. Emphasis is placed on the development of fundamental hands-on-skills commonly used in the design of modern electrical and computer engineering technologies. Students participate in a series of mock design experiences, culminating in the participation of a large scale design project. After completion of this course, students will be able to design a system that meets specifications and satisfies a stakeholder's needs and requirements. Students will also learn how to create functional design prototypes and verify them.

Prerequisites

ECE 0102: Microelectronics,

ECE 0202: Microcontrollers

ECE 0302: Data Structures and Algorithms

ECE 0402: Signals, Systems and Probability

Instructor

Dr. Samuel J. Dickerson
dickerson@pitt.edu
1238 Benedum Hall
Office Hours: Mondays and Wednesdays 9:00 AM to 10:00 AM

Teaching Assistants

There are three undergraduate TAs and one graduate TA assigned to this course.

Click here to read about your TAs and their availability!

Textbooks

Susan McCahan et. al, Designing Engineers: An Introductory Text, 1st Edition. Wiley, 2015. (not required)
Clive L. Dym. Engineering Design: A Project-Based Introduction, 4th edition. Wiley, 2013 (not required)

Schedule

Time: Mondays and Wednesdays 10:00 AM - 11:15 PM

Location: 1223 Benedum Hall

Topics

Engineering Design

- Engineering design process
  - Problem Definition
  - Specifying design functions and requirements
  - Generating and evaluating design alternatives
  - Communicating the design outcome
  - Managing the design process
  - Team organization and budgeting
  - Design for manufacturing, affordability and reliability
  - Ethical considerations in design
  - Technical standards

Hands-On-Skills

- Component and technology selection
- Embedded system design using off-the-shelf microprocessors
- Sensor interfacing
- Printed-Circuit Board Design
- Soldering and prototype assembly
- Software Engineering basics
- Rapid prototyping and additive manufacturing

Learning Objectives

- Explain the steps in the engineering design process.
- Identify and explain how to meet a client's objectives.
- Define design requirements and articulate a design in engineering terms. Generate and evaluate design alternatives, and select the best based on technical and non-technical constraints.

- Communicate design outcomes, including written documents such as a conceptual design and a test plan, and give oral presentations to describe a project.
- Design functional electronic prototypes that incorporate customized printed circuit boards, microprocessors, sensors and power supplies.
- Implement a prototype for their design using modern tools and techniques.

ABET Outcomes

2. **Ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors**

   This course focuses on engineering design and thus contains extensive coverage of the design process. Students are taught how to meet stakeholders' needs while considering realistic and relevant constraints.

5. **Ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives**

   The basics of project management and effective team organization are covered in this course by way of participation in mock and real design experiences.

Grading*

Homework and Lab Assignments 25%
Design Projects 75%

*Grading Distribution is Subject to Change

Late Policy

All work submitted after the specified date and time deadline will receive a 30% deduction penalty. An additional 30% deduction will also occur for every class period that occurs after the assignment deadline if the late assignment has not yet been submitted.

Course Policies

Academic Integrity

All students are expected to adhere to the standards of professional conduct and academic honesty. Any student engaged in cheating, plagiarism, or other acts of academic dishonesty would be subject to disciplinary action. Any student suspected of violating this obligation for any reason during the semester will be required to participate in the procedural process, initiated at the instructor level, as outlined in the SSOE Academic Integrity Policy found at:

https://www.engineering.pitt.edu/Academic-Integrity-Guidelines/ (https://www.engineering.pitt.edu/Academic-Integrity-Guidelines/) .

Disability Services

If you have a disability for which you are or may be requesting an accommodation, you are encouraged to contact both your instructor and Disability Resources and Services (http://www.studentaffairs.pitt.edu/drswelcome) (DRS), 140 William Pitt Union, (412) 648-7890, drsrecep@pitt.edu (mailto:drsrecep@pitt.edu?subject=Request%20for%20Accommodation) , (412) 228-5347 for P3 ASL users, as early as possible in the term. DRS will verify your disability and determine reasonable accommodations for this course.

Student Opinion of Teaching Surveys

Students in this class will be asked to complete a *Student Opinion of Teaching Survey*. Surveys will be sent via Pitt email and appear on your Canvas landing page during the last three weeks of class meeting days. Your responses are anonymous. Please take time to thoughtfully respond, your feedback is important to me. Read more (http://www.cidde.pitt.edu/omet/student-information/) about *Student Opinion of Teaching Surveys*.

Diversity and Inclusion

The University of Pittsburgh does not tolerate any form of discrimination, harassment, or retaliation based on disability, race, color, religion, national origin, ancestry, genetic information, marital status, familial status, sex, age, sexual orientation, veteran status or gender identity or other factors as stated in the University's Title IX policy. The University is committed to taking prompt action to end a hostile environment that interferes with the University's mission. For more information about policies, procedures, and practices, see: https://www.diversity.pitt.edu/civil-rights-title-ix-compliance (https://www.diversity.pitt.edu/civil-rights-title-ix-compliance) .

I ask that everyone in the class strive to help ensure that other members of this class can learn in a supportive and respectful environment. If there are instances of the aforementioned issues, please contact the Title IX Coordinator, by calling 412-648-7860, or e-mailing titleixcoordinator@pitt.edu (mailto:titleixcoordinator@pitt.edu) . Reports can also be filed online: https://www.diversity.pitt.edu/make-report/report-form (https://www.diversity.pitt.edu/make-report/report-form) . You may also choose to report this to a faculty/staff member; they are required to communicate this to the University's Office of Diversity and Inclusion. If you wish to maintain complete confidentiality, you may also contact the University Counseling Center (412-648-7930).

COVID-19 Statement

In the midst of this pandemic, it is extremely important that you abide by public health regulations and University of Pittsburgh health standards and guidelines. While in class, at a minimum this means that you must wear a face covering and comply with physical distancing requirements;

other requirements may be added by the University during the semester. These rules have been developed to protect the health and safety of all community members. Failure to comply with these requirements will result in you not being permitted to attend class in person and could result in a Student Conduct violation. For the most up-to-date information and guidance, please visit **coronavirus.pitt.edu (http://coronavirus.pitt.edu/)** and check your Pitt email for updates before each class.