EE/CPE 424-A Engineering Design VIII

The Schaefer School of Engineering and Science

Spring 2024

Lecture-Lab-Study: 1-7-4

Credits: 3

Meeting Time: Tuesday and Thursday 2:30 PM to 4:20 PM

Classroom Location: Gateway South GS-122

Lab Location: ECE Teaching Labs at Library B12

Instructor: Dr. Kevin Lu, Teaching Professor and Associate Chair for Undergraduate Studies, Electrical and Computer Engineering (ECE)

Contact Information: Burchard B-308E, kevin.lu@stevens.edu

Office Hours: Tuesday/Thursday 12:00 PM to 2:30 PM

Prerequisite(s): EE/CPE 423 Engineering Design VII

Corequisite(s): IDE 402 Senior Innovation III (Venture Planning and Pitch)

Cross-listed with: CPE/EE 424-A

COURSE DESCRIPTION

A continuation of EE/CPE 423 in which the design is implemented and demonstrated. This includes the completion of a prototype (hardware or software), testing and demonstrating the performance, and the evaluation of results. To be taken during the student's last spring semester as an undergraduate student.

LEARNING OBJECTIVES

After successful completion of this course, students will be able to:

- Identify a substantial, yet achievable, design problem
- Assemble a (potentially multi-disciplined) team to address the problem
- Identify design alternatives
- Incorporate appropriate engineering standards and multiple constraints
- Apply the knowledge and skills acquired in earlier course work
- Estimate implementation costs
- Analyze market potentials for the design
- Plan all phases of the design
- Set realistic design schedules
- Identify component sources and obstacles in obtaining them
- Negotiate to obtain resources
- Meet agreed-to schedules
- Create a high-level and a detailed design
- Implement the design
- Document the results, including status, progress, final reports, and a project presentation and demonstration

STUDENT LEARNING OUTCOMES

Program Outcome 1: Complex Problem Solving

1.1 The student will understand fundamental engineering principles of electronics and computing systems, and will demonstrate their ability to apply the principles to the design of their senior design project.

Program Outcome 2: Design

2.1 The student will demonstrate the ability to design, implement, test, and present a senior design project of a significant level of complexity.

2.2 The student will demonstrate that they have considered system performance design trade-offs, design features, and the practicality of their approach and nontechnical issues.

Program Outcome 3: Communications

3.1 The student will demonstrate the ability to effectively present their project ideas through verbal presentation, written reports, and poster presentations of their design project.

Program Outcome 5: Teaming and Leadership

5.1 The student will be able to contribute effectively in a team-based project with adequate distribution of tasks to team members and coordination of the collective outcome. Every team member will be fully engaged in the project as possible. The students will demonstrate coordination of their teamwork through regular discussions and written team assessments.

5.2 The student will be able to develop and maintain a project plan and task breakdown, and will be able to adapt their plan to changing requirements and understanding of the technical problems. They will demonstrate this ability through standard project management tools and timely completion of their senior design project.

Program Outcome 6: Experimentation

6.1 The student will be able to define operational and performance tests to evaluate the operation of their senior design project. They will demonstrate the ability to perform these tests, adapt their design based on the results, and present the outcome in their Innovation Expo poster session and the Spring final report.

COURSE FORMAT AND STRUCTURE

ECE Senior Design projects are conducted with the guidance of a member of the ECE, CS, or PEP faculty, potentially with significant input from engineers at sponsoring industry organizations. In essence, Senior Design should be viewed as a very detailed, realistic simulation of the real-world design process in an academic setting.

COURSE SCHEDULE

2024-01-18 Senior Design Overview
2024-01-23
2024-01-25
2024-01-30
2024-02-01
2024-02-06
2024-02-08
2024-02-13
2024-02-14 Download Stevens Ducks App and create a Guidebook profile
2024-02-15
2024-02-20
2024-02-21 Project abstract due
2024-02-22
2024-02-27

2024-02-28 Milestone 3: Design Performance and Cost Review With Alpha Prototype Demonstration
2024-02-29
2024-03-05
2024-03-07
2024-03-12 No Class (Spring Recess)
2024-03-14 No Class (Spring Recess)
2024-03-19
2024-03-20 First date to submit poster
2024-03-21
2024-03-26
2024-03-28
2024-04-02
2024-04-04
2024-04-09
2024-04-10 Last date to submit poster
2024-04-11
2024-04-16
2024-04-18
2024-04-23
2024-04-24 Milestone 4: Beta Demonstration of Optimized Design
2024-04-25
2024-04-26 Innovation Expo

COURSE MATERIALS

Lessons in Google slides based on Gerard Voland's *Engineering by Design*:

https://sites.google.com/view/ece322
Course Web Address: https://sites.google.com/view/ece423
Senior Design Projects: https://sites.google.com/view/ece423/projects
ECE Engineering Design VI projects: https://sites.google.com/view/ece322/projects
Interdisciplinary projects are available via announcements
Academic Calendar: https://www.stevens.edu/page-basic/academic-calendar
Academic Catalog: https://www.stevens.edu/academics/academic-catalog
Program Completion: https://www.stevens.edu/page-basic/program-completion
ECE Student Advisement Modules: https://sit.instructure.com/courses/43625/modules
Workday Student Modules: https://sit.instructure.com/courses/35399
Stevens Library Database and Research Guide: https://library.stevens.edu/
Courtney Walsh, Research & Instructional Services Librarian, Research Guides

COURSE REQUIREMENTS

Required submissions:

- Milestone reports
- Team Responsibilities and Assessments
- Innovation Expo

GRADING PROCEDURES

Attendance: 20%
Outcomes: 80%
Total: 100%

ACADEMIC INTEGRITY

Generative AI Technologies

You may use AI programs, e.g., ChatGPT, to help generate ideas and brainstorm. However, you should note that the material generated by these programs may be inaccurate, incomplete, or otherwise problematic. Beware that use may also stifle your own independent thinking and creativity.

You may not submit any work generated by an AI program as your own. If you include material generated by an AI program, it should be cited like any other reference material (with due consideration for the quality of the reference, which may be poor).

Any plagiarism or other form of cheating will be dealt with under relevant Stevens policies.

Undergraduate Honor System

Enrollment into the undergraduate class of Stevens Institute of Technology signifies a student's commitment to the Honor System. Accordingly, the provisions of the Stevens Honor System apply to all undergraduate students in coursework and Honor Board proceedings. It is the responsibility of each student to become acquainted with and to uphold the ideals set forth in the Honor System Constitution. More information about the Honor System including the constitution, bylaws, investigative procedures, and the penalty matrix can be found online at http://web.stevens.edu/honor/

The following pledge shall be written in full and signed by every student on all submitted work (including, but not limited to, homework, projects, lab reports, code, quizzes and exams) that is assigned by the course instructor. No work shall be graded unless the pledge is written in full and signed.

"*I pledge my honor that I have abided by the Stevens Honor System*."

Reporting Honor System Violations

Students who believe a violation of the Honor System has been committed should report it within ten business days of the suspected violation. Students have the option to remain anonymous and can report violations online at www.stevens.edu/honor.

ACCOMMODATIONS

Stevens Institute of Technology is dedicated to providing appropriate accommodations to students with documented disabilities. The Office of Disability Services (ODS) works with undergraduate and graduate students with learning disabilities, attention deficit-hyperactivity disorders, physical disabilities, sensory impairments, psychiatric disorders, and other such disabilities in order to help students achieve their academic and personal potential. They facilitate equal access to the educational programs and opportunities offered at Stevens and coordinate reasonable accommodations for eligible students. These services are designed to encourage independence and self-advocacy with support from the ODS staff. The ODS staff will facilitate the provision of accommodations on a case-by-case basis.

For more information about Disability Services and the process to receive accommodations, visit https://www.stevens.edu/student-diversity-and-inclusion/disability-services. If you have any questions please contact: Phillip Gehman, the Director of Disability Services Coordinator at Stevens Institute of Technology at pgehman@stevens.edu or by phone: 201.216.3748.

Disability Services Confidentiality Policy

Student Disability Files are kept separate from academic files and are stored in a secure location within the Office of Disability Services. The Family Educational Rights Privacy Act (FERPA, 20 U.S.C. 1232g; 34CFR, Part 99) regulates disclosure of disability documentation and records maintained by Stevens Disability Services. According to this act, prior written consent by the student is required before our Disability Services office may release disability documentation or records to anyone. An exception is made in unusual circumstances, such as the case of health and safety emergencies.

INCLUSIVITY

Inclusion Statement

Stevens Institute of Technology believes that diversity and inclusiveness are essential to excellence in academic discourse and innovation. In this class, the perspective of people of all races, ethnicities, gender expressions and gender identities, religions, sexual orientations, disabilities, socioeconomic backgrounds, and nationalities will be respected and viewed as a resource and benefit throughout the semester. Suggestions to further

diversify class materials and assignments are encouraged. If any course meetings conflict with your religious events, please do not hesitate to reach out to your instructor to make alternative arrangements.

You are expected to treat your instructor and all other participants in the course with courtesy and respect. Disrespectful conduct and harassing statements will not be tolerated and may result in disciplinary actions.

Name and Pronoun Usage

As this course includes group work and in-class discussion, it is vitally important for us to create an educational environment of inclusion and mutual respect. This includes the ability for all students to have their chosen gender pronoun(s) and chosen name affirmed. If the class roster does not align with your name and/or pronouns, please inform the instructor of the necessary changes.

Religious Holidays

Stevens is a diverse community that is committed to providing equitable educational opportunities and supporting students of all ethnicities and belief systems. Religious observance is an essential reflection of that rich diversity. Students will not be subject to any grade penalties for missing a class, examination, or any other course requirement due to religious observance. In addition, students will not be asked to choose between religious observance and academic work. Therefore, students should inform the instructor at the beginning of the semester if a requirement for this course conflicts with religious observance so that accommodations can be made for students to observe religious practices and complete the requirements for the course.

MENTAL HEALTH RESOURCES

Part of being successful in the classroom involves a focus on your whole self, including your mental health. While you are at Stevens, there are many resources to promote and support mental health. The Office of Counseling and Psychological Services (CAPS) offers free and confidential services to all enrolled students who are struggling to cope with personal issues (e.g., difficulty adjusting to college or trouble managing stress) or psychological difficulties (e.g., anxiety and depression). Appointments are can be made by phone (201-216-5177),

online at https://stevensportal.pointnclick.com/confirm.aspx, or in person on the 2nd Floor of the Student Wellness Center.

EMERGENCY INFORMATION

In the event of an urgent or emergent concern about the safety of yourself or someone else in the Stevens community, please immediately call the Stevens Campus Police at 201-216-5105 or on their emergency line at 201-216-3911. These phone lines are staffed 24/7, year round. For students who do not reside near the campus and require emergency support, please contact your local emergency response providers at 911 or via your local police precinct. Other 24/7 national resources for students dealing with mental health crises include the National Suicide Prevention Lifeline (1-800-273-8255) and the Crisis Text Line (text "Home" to 741-741). If you are concerned about the wellbeing of another Stevens student, and the matter is *not* urgent or time sensitive, please email the CARE Team at care@stevens.edu. A member of the CARE Team will respond to your concern as soon as possible.