CPE 423-A: Engineering Design VII
School of Engineering and Science
2021 Fall

Meeting Time:	Tuesday and Thursday 2:30 PM to 4:20 PM
Classroom Location:	Gateway South GS122
Instructor:	Kevin Lu
Contact Information:	Burchard B210, kevin.lu@stevens.edu
Office Hours:	Tuesday and Thursday 9:00 AM to 12:00 PM
Text Book:	*Engineering by Design* by Gerard Voland
Course Web Address:	https://sites.google.com/view/ece423
Prerequisite(s):	CPE 322 Engineering Design VI
Corequisite(s):	IDE 400 Senior Innovation I (Project Planning) IDE 401 Senior Innovation II (Value Proposition)
Cross-listed with:	None

COURSE DESCRIPTION

Senior Design course. The development of design skills and engineering judgment, based upon previous and current course and laboratory experience, is accomplished by participation in a design project. Projects are selected in areas of current interest such as communication and control systems, signal processing, and hardware and software design for computer based systems. To be taken during the student's last fall 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

OUTCOMES

Program Outcome 1: (*Complex Problem Solving*)

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

Program Outcome 2: (*Design*)

2.1 The student will complete a design that incorporates and identifies all design criteria, relevant codes, standards and includes technical drawings and specifications.

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

2.3 (Design assessment) The student will investigate several design alternatives before choosing one for their design project by the end of the Fall semester. Their selection of the final approach to be pursued during the Spring semester will demonstrate that they have considered system performance design trade-offs, design features, as well the practicality of their approach and non-technical issues.

2.4 The student will be able to assess the impact of the design in a global, economic, environmental and societal context.

Program Outcome 3: (*Communications*)

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

3.2 The student will be able to deliver presentations appropriate to audience and task.

3.5 The student will be able to write a technical report and prepare professional quality presentations of the design in a clear and concise manner.

Program Outcome 4: (*Ethical and Professional Conduct*)

4.1 The student will acquire knowledge of the professional practices and ethical responsibilities related to design.

Program Outcome 5: (*Teaming and Leadership*)

3.3 The student will be able to take the lead in suggesting, soliciting, and developing alternative designs and approaches to the problem.

3.4 The student will learn to function as an effective part of a multidisciplinary team, be accountable to others involved in the project, perform individual tasks and resolve conflicts diplomatically and professionally.

5.1 (Teamwork) 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 (Leadership) 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*)

1.2 The student will be able to test the design and/or prototype using appropriate materials, systems and software.

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 MATERIALS

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

GRADING PROCEDURES

Grades will be based on:

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

COURSE SCHEDULE

2021-08-31 Senior Design Overview
2021-09-02
2021-09-07
2021-09-09
2021-09-14
2021-09-16
2021-09-21
2021-09-23 Courtney Walsh, Research & Instructional Services Librarian, *Research Guides*
2021-09-28
2021-09-30 Milestone 1: Customers, Needs, Requirements, Needs-Requirements Mapping
2021-10-05
2021-10-07
2021-10-12 No Class (Monday Class Schedule)
2021-10-14
2021-10-19
2021-10-21
2021-10-26
2021-10-28
2021-11-02
2021-11-04
2021-11-09
2021-11-11
2021-11-16
2021-11-18 Milestone 2: Project Plan, Concepts, Concept Selection, Analysis and Testing Plan
2021-11-23
2021-11-25 No Class (Thanksgiving Recess)
2021-11-30
2021-12-02
2021-12-07
2021-12-09

ACADEMIC INTEGRITY

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 (Links to an external site.). 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/ (Links to an external site.)

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

LEARNING 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.

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.

For more information about Disability Services and the process to receive accommodations, visit https://www.stevens.edu/office-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.

INCLUSIVITY

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.

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.