

CE 423 Fall 2023
Civil Engineering Senior Design
Team and Text

Course Coordinator
Instructor

Prof. Sarath Jagupilla (Prof. J)
Office Hours: Fridays 3-4 PM
Email: sjagupil@stevens.edu

Facilitator

Liz O'Connell, ABS 107
Email: eoconne2@stevens.edu

Student Assistant

Fernando Morales
Email: fmorales@stevens.edu

Course Catalog Description:

Complete design sequence with a required capstone project spanning two semesters. The capstone design project will use the entire range of knowledge and skills acquired in earlier courses. The design experience will include exposure to engineering standards, professional ethics, environmental impacts, and economics. These aims will be accomplished by providing students with a real-life design experience and mentorship from practicing engineers.

LEARNING OBJECTIVES:

1. You develop the design using appropriate principles of engineering, materials, tools and software (ABET 1)
2. You are able to complete a complex design which incorporates and identifies all design criteria, relevant codes and principles of engineering (ABET 1)
3. The design alternatives developed consider the overall needs of the client with consideration to public health, safety, environmental and economic factors. (ABET 2)
4. You are able to assess the proposed design with respect to sustainability (ABET 2)
5. You are able to write a technical report and prepare professional quality presentations (ABET 3)
6. You are able to deliver presentations appropriate to the audience and task (ABET 3)
7. The design team incorporated a level of professionalism when working with the design consultant, group members and others involved in the project. (ABET 4)
8. You have acquired knowledge of the professional practices and ethical responsibilities related to the design (ABET 4)
9. You learned effective group management techniques, the aided in solving problems and making decisions relevant to the design (ABET 5)
10. You were able to take the lead in suggesting, soliciting and developing alternative designs and innovative approaches to the problem (ABET 5)
11. You learned to function as part of a team, to be accountable to others involved in the project and perform individual tasks in a timely manner (ABET 5)

12. You were able to analyze and interpret engineering design data/results, use engineering judgement to draw conclusions about the proposed design (ABET 6)
13. The design team utilized information from other courses within the engineering program (ABET 7)
14. The design process enabled you to understand the necessity to be familiar with design codes and standards (ABET 7)

This course prepares students for their transition into the real world of professional engineering. One focus of the course is the development of the necessary skills needed to work as part of a team. Most large engineering companies require professionals to work on teams comprised of fellow co-workers who bring in additional areas of expertise. For someone who has never been part of a team it can be a very difficult transition. A team member needs to share, understand and plan the project. They also need skills in leadership, organization, staffing, directing and controlling the process to meet the needs of the design.

FORMAT AND STRUCTURE:

Senior Design class is a framework for teams of students to complete a design project. Periodic presentations and written submissions will be required during the semester. These will detail findings, methods used, decisions made etc. The presentations and written reports will form the basis for the final design report that is due at the end of the semester. Teams are required to meet among themselves and with their project sponsors and faculty advisors, as required for their design (minimum requirements listed below). Site visits are required, and all costs associated with the site visits will be paid for by the CEOE department. Senior Design is integrated with the IDE 400, 401 & 402 Innovation and Entrepreneurship sequence that further guides the teams in identifying, describing, analyzing and presenting the potential entrepreneurial and/or business value of their design.

COURSE MATERIALS:

Relevant resources will be made available to the student teams and distributed on the course home page on Canvas. These will include many of the codes and standards your designs must adhere to. Examples include but are not limited to:

<https://www.state.nj.us/transportation/eng/documents/BSDM/pdf/2016DesignManualforBridgesandStructures20210729.pdf>

<https://www.fhwa.dot.gov/programadmin/standards.cfm>

https://www.njstormwater.org/bmp_manual2.htm

<https://www.nj.gov/dca/divisions/codes/offices/rsis.html>

<https://developersguide.njfuture.org>

Teams will consider the UN Sustainable Development Goals and the ASCE Envision Rating system while completing their designs.

<https://www.un.org/sustainabledevelopment/sustainable-development-goals/>

<https://sustainableinfrastructure.org/envision/use-envision/>

COURSE REQUIREMENTS:

Class/Team Meetings: Teams must meet at least twice a week (typically, every Tuesday and Thursday from 2:30 – 4:20 pm – in person or via Zoom). These meetings may include your sponsor and/or faculty advisor. Teams can meet outside of class time based on availability instead. Teams must review the previous week’s progress and plan next week’s activities with clear responsibilities and expected outcomes. Progress, issues and action items/assignments have to be captured in Meeting Minutes and must be submitted on canvas at the end of each week. (at least 1 page per meeting, 2 pages per week)

Design progress: Each team should keep track of their design progress using a dedicated “drive” which must be maintained on a regular basis. This will be where you record research findings, insights, ideas, sketches, and other thoughts relevant to the project. The drive should be organized and evolve with the design. The name of the drive must include your project name and academic year, 2023-24. Once the drive is set up, make sure to share it with Prof. Jagupilla, your advisor, sponsor, and Liz O’Connell.

Meetings with Sponsor and Advisor: Each team will schedule meetings with sponsors and advisors at mutually agreed frequencies (a minimum of 5 meetings each over the semester, a total of 10, are expected. If both sponsor and advisor are present at a meeting, you can count that as 2 meetings. However, even in this case, there must be a minimum of 8 meetings over the semester. At least, one of these meetings must be off-campus). During these meetings a brief presentation will be given by the team on their progress. Each team member must serve as Project Manager on a rotating basis (approximately 3 – 4 weeks per member). The Project Manager is responsible for coordinating the tasks to be completed, compiling the progress presentation, summary of the design progress and tracking all issues/concerns that arise, and submitting meeting minutes.

Sponsor/Advisor Relationship Management: You are expected to maintain a professional and courteous relationship with anyone that supports you throughout your project. Some components of a good relationship are – keeping appointments, commitments and deadlines, staying in regular communication about project progress as well as any issues which arise. Every meeting with a sponsor/advisor should be documented in the form of meeting minutes (which must be submitted on canvas).

Presentation Skills: Presentations are expected to be given in a professional and concise manner. This includes your appearance (business casual), your delivery, mannerisms, and interaction with the audience before, during and after the presentation. It also includes the general narrative/flow of your presentation and the design of the presentation material. The content itself will be graded as part of the Presentation grade. All presentations must be uploaded to Canvas as noted in the assignments. Rubrics for the presentations will be available on Canvas.

GRADING AND OTHER PROCEDURES:

Grades will be based on:

Assignments (20%+1%) –

- Team Name and Logo (4%) (Instructor) (Sept 12)
- Introductory Communications to Sponsor and Advisor (4%) (Instructor) (Sept 19)
- Codes and Standards (4%) (Instructor) (Sept 26)
- UN Sustainable Development Goals (4%) (Instructor) (October 3)
- Overall Interpersonal Skills (4%) (Instructor, Advisor, and Sponsor)

Register with NCEES and 67% attendance for guest lectures (+1%) (Instructor)

Professionalism – Team Meetings/Minutes & Dynamics (20%)

Minutes (10%) (10 submissions by December 5, approximately once a week)

Meeting sponsor and advisor the minimum number of times (5%) (December 5)

Teammate (5%) (Teammates) (December 5)

Midterm (30%) (Instructor, Sponsor, and Advisor) –

Midterm Video Presentation (15%) (October 20) 15 minutes

Midterm Report (15%) (October 20)

Final (30%) (Instructor, Sponsor, and Advisor) –

Final Presentation (15%) (December 8) 20 minutes

Final Report (15%) (December 8)

Email Policies:

All emails sent to your faculty advisors and your professional mentor should be written in a professional manner correctly formatted with a subject, appropriate greeting, body text and signature. Please take care to remember attachments and any other relevant information.

Emails must be sent from your Stevens email address.

File Naming Convention:

Each design team will have access to a drive on Canvas and may also choose to use a Google Drive or other type of drive.

Make sure to provide a link between the Canvas Drive and the other drive (this can be done with a file providing the link).

When naming your drive use the convention noted below: Project #X “Team Name” 2022-23

Any file you submit via Canvas must follow a similar naming convention: Project #X “Assignment Name” _Team Name or Your last name

Files which are submitted to Canvas without following the correct naming convention will be deleted and a grade of 0 recorded for the assignment.

Final Grade – A – 93 and above, A- - 89 – 92.99, B+ - 85 – 88.99, B – 81 – 84.99, B- - 77 – 80.99, C+ - 73 – 76.99, C – 69 – 72.99, C- - 65 – 68.99, D+ - 61 – 64.99, D – 57 – 60.99, Fail - <57

Please refer to the syllabus template for more general institute guidelines/policies.