

ENGS 490: Design Capstone I
Fall 2024

Meeting Space: Trexler 273	Office: TREX 266A
Instructor: Cobb & Sarker	Office hours: M/F 1:00-2:00, W 10:00-11:00, or by appointment
Email: cobb@roanoke.edu , sarker@roanoke.edu	Time: TuTh 1:10-4:10
Course Site: Roanoke College	

Pre-/Co-requisites: ENGS 200, 211 OR 220, two additional 200-level or above ENGS courses, OR program coordinator approval

Course Description:

Building on principles and practice of engineering design and problem solving, this course will be centered on a hands-on development of a team-based design project. In the first semester, this course initiates the process through informed design solutions and lean startup activities. At a quasi-professional level, the modeling, prototyping, and visual representations of their design serve as the final deliverable.

Learning Outcomes: In this capstone engineering design course, students can choose their projects from one of the engineering challenges in health, safety, various human or public facilities/conveniences, or environmental fields. Upon completion of this course, successful students will be able to

- Apply effective design strategies to develop a project in through brainstorming, collaboration in a team setting
- Analyze and assess specification requirements of system and subsystems, and alternatives
- Generate qualitative data to define value proposition of the project
- Apply measures of performance through quantitative data analysis, system characterization and design of quality tests
- Build a working model/low-mid fidelity prototype of their final product with a budget conscious approach that may include creative and innovative design solutions such as repurposing, recycling and/or reusing materials and technologies
- Implement project management skills, and communication skills through presentations, discussions, interaction with clients
- Develop an entrepreneurial mind set to come up with creative and innovative design solutions to make a pitch to their client base and customer segment

Critical Success Factors:

Please note that your success will depend on your use of resources and time wisely. You need to be pro-active in planning, strategizing and executing your strategy. This also involves anticipating “Murphy’s law” (things will always go wrong, aka. whatever can happen, will happen) and discussing your concerns and brainstorming solutions with your instructor and your peers. You will also be required to set up a Google Docs collaboration space and share it with the instructor, and, keep it up-to-date. You will be expected to use the tools you have learned over the last three years to successfully complete your projects. If you need help, you must learn to ask right away, rather than waiting. The department will provide some funds to help with the development of the prototype. If additional funds are required for the project, the instructor will work with the team to determine ways to obtain extra funding, such as through donated materials or monies from interested stakeholders and clients.

Expectation: The participation expectation in ENGS 490 includes the following: completion of assignments, listening (and responding) to lectures about project development, attentive attendance, engagement in question and answer, working on possible in-class problems, reflective write-up for one extracurricular lecture or presentations, and working respectfully within a team-based environment. Students are expected to put in a minimum of 12 hours/week of work in order to successfully complete this course.

Course Landscape: This project based design course will primarily be taught and conducted in studio/maker-space format. This means that most classes will resemble a “lab” where you are working with your teammates to advance your project in some way, while the instructor serves as a guide, as well as a “chief questioner,” both to your team and also to the class as a whole. As illustrated on the course schedule at the end of the syllabus, and on an additional as-needed basis, portions of class will include in-class discussions of design work, best practices in project development, and product testing. These “classroom sessions” could also include interviews and discussions with engineering professionals from the field. There are little substitutes for interacting with professionals. Occasional out-of-class readings and assignments will facilitate your personal growth as an aspiring engineering.

Attendance: This course will have a few team-based deadlines that are interspersed within the 14 weeks of the semester, while the overall goal of the course is to present your design proposal for the second semester. You are expected to be in every class, because missing class means not only you fall behind, but your team members also suffer. If you must miss a class (for legal excuses – court, hospital, police, etc.), you are expected to notify your teammates and me at the earliest possible time. Late arrivals (beyond 10 minutes) will constitute an absence. After two unexcused absences, you will receive a warning and your advisor will be notified; after a third, you will be dropped from the course with a grade of DF.

Grading Rubric: Periodic observations, review of the designs and interim presentations will be all be important pieces of the grading scheme for the course in addition to the final display and demonstration of the developed prototypes. Presentations and peer-evaluations will be graded using rubrics developed based on materials from *Classroom Assessment Techniques: A Handbook for College Teachers (Second Edition)*, Thomas A. and Cross Angelo 1993 Jossey-Bass Publishers San Francisco.

Instructor Observations & Peer Evaluations	20%
Project Quality (Team-based Grades)	30%
Presentation Quality	20%
Participation & Attendance	5%
Assignments (In- / Out-class)	25%

Points	Grade	Points	Grade
<60	F	76-79	C+
60-62	D-	80-82	B-
63-65	D	83-85	B
66-69	D+	86-89	B+
70-72	C-	90-94	A-
73-75	C	≥95	A

Instructor Observations: There will be rubric observations on a consistent basis throughout the semester (see Outline for Internal Design Review and Proposition of Project). These less-formal but important presentations will be graded for progress and clarity.

Project Quality (Team-based Grades): During these design reviews there will be clear evaluation for individual contribution within the team projects. There will also be cross-evaluation of projects by the students from other teams. It is imperative that your contribution must be demonstrative and on-going.

Presentation Quality: The culmination of the semester is a presentation of the prototype and/or model of the design implementation. This will be carried out at a showcase with poster and/or presentation, depending on the best suitable format. Every team member is expected to be in attendance.

Participation & Attendance: This refers primarily to your individual contribution to class sessions, whether it is listening attentively or participating in discussion.

Assignments: During the class sessions, there will be periodic assignments. These will resemble homework and/or classwork that you expect in other courses.

Course-specific Policies:

1. **Late Work:** Missing deadlines will cost 10% deduction in credit (unless there is an excused absence and you have discussed it with me). Each subsequent deadline that is missed will garner an additional deduction of 10% per class period. A failing grade is achieved when the total deductions exceed 60% in the weekly grade during the first semester. A student who fails the first semester will not be allowed to register for the following course in the second semester.
2. **During your design project,** you will be responsible to your teammates as well, and must perform well as a team member. You will be evaluated as a team member by your teacher and your peers. There is no forgiveness for incomplete work or projects. The team will be held responsible to complete the project; show respect to your teammates by giving your best effort and not excuses.

Make-up Assignments: Make-up assignments (excused delays) will only be allowed as a result of a discussion with me beforehand or a note related to the emergency (death, hospitalization, misdemeanor, etc.) signed by a governing official (medical doctor, parent, law enforcer, etc.).

Collaboration/Group Work: One stark distinctive of 21st century science and engineering is the degree of collaboration within the community. As a part of this class, time will be spent in group collaboration in/outside of class. We will spend some time discussing the difference between “collaboration” and “plagiarism.” Plagiarism exists when someone takes personal credit for another’s creative (usually written) work, which includes your classmates. Collaboration relies on the individual strengths and contributions of each group member to produce a deeper level of understanding. Two practical indicators where you may be flirting with plagiarism: 1) you are not thinking for yourself while completing assigned work; 2) you are not properly recognizing others for their contribution (including your own classmates). Please consult your instructor if this is unclear and/or you have questions.

Academic Integrity: Maintaining academic integrity is a mutual responsibility for all of us. I will be respectful of your time and make sure I am available during my office hours and will communicate with you in a timely manner. I expect the same in terms of your timeliness, honesty and sustained effort. Plagiarism and cheating are unacceptable and also violate RC policies. Refer to the “Academic Integrity” page on the RC website. Included here is an explanation of how violations of the College’s academic integrity policy are handled.

https://www.roanoke.edu/inside/a-z_index/academic_integrity

The Writing Center @ Roanoke College, located on the Lower Level of Fintel Library, offers tutorials focused on writing projects and oral presentations for students working in any field. Writers and presenters at all levels of competence may visit the Writing Center at any point in their process—including brainstorming, drafting, organizing, editing, or polishing presentation skills—to talk with trained peer tutors in informal, one-on-one sessions. The Writing Center is open Sunday through Thursday from 4 to 9 pm. Simply stop in, or schedule an appointment by going to www.roanoke.edu/writingcenter, where our staff members and workshops are also posted. Questions? Email writingcenter@roanoke.edu or call 375-4949. Like our Facebook page for hours and event updates!