

ENGINEERING DESIGN EXPLORATION

Fall 2021

Meeting Space: Trexler 273

Instructor: Dana Hargrove

Email: dhargrove@roanoke.edu

Time: T 2:50 pm – 4:50 pm

Office Location: Trexler 270J

Office Hours: 12:30 pm – 2:00 pm W

Course Overview: This course is an introduction to the process of engineering design with an exploratory “hands-on” approach. The focus of the course is experiential learning while supported by instruction and guided activities that highlight the underlying concepts in engineering design. Team work is heavily emphasized in this course as students will organize around one of the following creative ideas; compete, serve, build, or share.

Learning Outcomes: Upon completion of this course, successful students will

- apply effectively and efficiently the design process in order to produce a pre-selected, community-oriented project
- effectively communicate the design process through technical writing and technical presentations
- Interact with the larger community in a tangible and technical manner

Prerequisites: ENGS 191 and 192

NOTE: Please do not underestimate the half-credit designation of the course. A significant amount of time to succeed in ENGS 200 will be spent OUTSIDE of class hours. It is with this emphasis that you should read the “½” designation. You will be required to pursue your project goals and your collaboration with equivalent intent to a normal classroom environment.

Course Materials:

Book: Dym, Clive L. *Cornerstone Engineering Design*. Wiley & Sons Canada, Limited, John, 2013.

Attendance: Attendance will be taken at the beginning of every class meeting. If you arrive late it is your responsibility to make sure you are not marked absent in my grade book. Your fourth and each additional absence will result in a 2-point reduction in your final course grade. Please do not contact me with excuses about absences. You get three freebies so that I do not have to distinguish between excused and unexcused absences. College athletes will be afforded wiggle room; please come see me immediately if you are an athlete. If you should have an emergency that requires you to miss a large chunk of the course, please notify me ASAP.

Masks: The College has issued a mask mandate for the start of the semester that requires masks to be worn in indoor common spaces such as our classroom. You must wear a mask in this class. If you arrive without a mask, you will not be allowed to stay and may lose credit for attendance or in-class work. The Bookstore sells masks if you need to make a quick purchase. If the mandate is extended, you will be required to continue to wear a mask.

COVID Illness: If you have a temperature of 100.4 or higher or other COVID symptoms, don't come to class. Call Health Services IMMEDIATELY. Do not come to class or

go to any public area on campus. In order for your absence to be excused, you must give Health Services permission to notify me that you have consulted them about COVID symptoms. If Health Services informs you that you should isolate and not attend class for multiple days, inform me so that we can make a plan to keep you current in the course. All absences caused by consultation with Health Services about coronavirus symptoms or isolation ordered by Health Services will be excused but you will need to do the work and graded assignments even if we extend a deadline for you.

Academic Integrity: Policies of academic integrity are enforced in all aspects of this course. It is the responsibility of the student to strictly adhere to the policies of Academic Integrity of Roanoke College.

Plagiarism and cheating are **unacceptable** and also violate RC policies. Being aware of others' such violations and not reporting it is also considered a contributing aspect of cheating.

"Academic Integrity" page on the RC website—

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

Included in this page is an explanation of how violations of the College's academic integrity policy are handled.

Grading:

Grades: Standard letter grades (A–F) are assigned according to the following scale for this course: "A"(91–100), "B"(81–90), "C"(71 - 80), "D" (60–70), "F"(< 60).

20% In-Class Assignments and MCSP Colloquium Series

25% Client Interaction

25% Periodic Design Assessment (Design Notebook)

25% Final Project Presentation (Team) and Report (Individual)

5% Lab Safety

Expectation: Students are expected to put in a minimum of 6 hours/week of work in order to successfully complete this course. It is also expected that you will offer consistent and honest feedback about the amount of work you and your team members contribute.

Late Work Policy: There will be a 10% deduction for late work after one day. Work turned in after one day will receive a maximum of 50% for your late work that has been turned in, and after one week you will not be able to receive any credit for that work, as it will receive zero points.

For a medical or other emergency, I will need timely notice via email and a face-to-face discussion (after the situation is handled) with corroboratory evidence provided by you.

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

Guided Activities: Students will be required to complete a series of guided activities, in-class, introducing and emphasizing various elements of design process and engineering concepts. Cooperative learning groups and computer-assisted activities will facilitate the design process. Participation in class discussions is an important aspect of understanding and applying the engineering principles to an efficient design process.

Design Problems and Assessment: Students in this course will be grouped into teams. Teams will respond to a scope of work provided by a designated client. These design projects will be assessed at different stages/ phases (bi-weekly) by the instructor to ensure adequate progress of the project, both from individual and group perspectives. The assessment will be based on whether the students

- have applied appropriate engineering and science concepts for the proposed solution;
- conducted feasibility studies and performed appropriate cost/benefit analysis
- followed and incorporated necessary safety guidelines
- completed and documented adequate testing of their design

Technical Writing: Since effective communication of their design and development process is an important skill set required of all aspiring engineers, development of technical writing and technical presentations will be emphasized throughout the course. A design report will be required to detail the design and decision-making process which led to the final outcome. The expected length for this report is approximately 10 – 20 pages, depending on the number of figures and/or diagrams.

Final Presentation and Showcase Event: Students are required to present their work to the class and faculty in the program. Their final presentations will be reviewed by the faculty and their peers. The final presentation will account for 25% of the total grade, which includes in-class and community showcasing. Additionally, students are required to observe and provide feedback to their peers. This can be at the campus wide research/show-case evening, or local/regional/ national engineering design competitions, or technical conferences or at local schools'/ museum's STEM night events.

Lab Safety: One mark of good engineering design, and of a good engineer, is safety. This includes clean-up and planning for maintaining safe environments. Students are required to incorporate all safety protocols reviewed in this course. Failure to follow safety measures, either during the design process or implementation and testing process, will result in the reduction of overall points for the project.

MCSP Colloquium Series: You are encouraged to attend at least 2 of the several talks as a part of the MCSP colloquia this semester. Write a ½ page paper on your reflections of the talk. The reflection papers are due within one week of the talk. MCSP credits will be factored in while determining the final grade. This particularly helps students who are on the cusp of a letter grade.

Class Disruption: All students are entitled to a professional learning environment. Students should not act in a manner which will distract and disrupt the class learning experience. Such practices will not be tolerated. Cell-phones or any other electronic communication/entertainment devices, except for tablets/laptops used for taking notes, must be either turned off or silenced at all times during the lecture period.

Philosophy: My teaching philosophy is not to make you memorize equations but rather help you understand the fundamental principles. I am willing to work with you, if you need extra help. Please talk to me if you have any problems understanding the material. Ask questions; get your doubts cleared without procrastination. Feel free to stop by my office. I believe that questions and clarifications are best addressed in person rather than via emails and phone. I would urge you to take full advantage of my office hours to get your questions answered.

Class Schedule: *Note - this table is subject to change.*

Dates		Topic	Chapter
September	7	Introduction to Engineering Design and Ethics	1, 2, 17
	14	Effective Communication and Detailing Customer Requirements	3, 4, 11
	21	Defining the Problem and Potential Solutions	5, 6
	28	Team Presentations and Design Selection Conceptual Design	7, 8
October	5	Engineering Economics	13
	12	Project Management	15, 16
	19	Fall Break, No Class	
	26	Design, Testing, and Construction	
November	2		
	9		
	16		
	23		
30			
December	7	Final Project Testing and Presentation Rehearsal	

Final Exam: Thursday, December 16th from 2:00pm – 5:00pm