Engineering Design & Society
EGN 2020C
Class Periods: see section details.
Location: WERT 255
Academic Term: Spring 2024

Instructor: See section details

Peer Mentors & Mentoring Office Hours: See section details.

Course Description:

(Credits: 2) An introductory engineering course emphasizing the human-centered design process to address a societal challenge. Exploration of solid modeling, introductory programming, sensors, data acquisition, and 3D printing as maker tools for engineering prototyping. Teams will utilize multidisciplinary approaches, project management, written and oral communication skills in creating a societal-based design.

Course Pre-Requisites / Co-Requisites: None

General Education Objectives and Learning Outcomes:

This course is a Physical Sciences (P) subject area course in the UF General Education Program. Physical science courses provide instruction in the basic concepts, theories and terms of the scientific method in the context of the physical sciences. Courses focus on major scientific developments and their impacts on society, science and the environment, and the relevant processes that govern physical systems. Students will formulate empirically testable hypotheses derived from the study of physical processes, apply logical reasoning skills through scientific criticism and argument, and apply techniques of discovery and critical thinking to evaluate outcomes of experiments. These general education objectives will be accomplished through:

1. Evaluate and practice the scientific method in the human-centered design process.
2. Practice of the scientific method in laboratory activities teaching basic physical concepts related to solid modeling, 3D-printing, electronic circuits, sensors, actuators, and prototyping.
3. Practice of scientific method in a team prototype design and build: formulate hypothesis based plan, design, test, revise, and reflect upon a human-centered functional prototype in response to an open ended societal based engineering design challenge.
4. Document steps of scientific method applied to human-centered design in technical design reports.
5. Communicate outcomes of scientific method in design using written, pictorial, and oral communication in homework assignments, design reports, and design presentations.

At the end of this course students will be expected to have achieved the following learning outcomes in content, communication, and critical thinking.

Content:

Students identify, describe, and explain the basic concepts, theories and terminology of natural science and the scientific method; the major scientific discoveries and the impacts on society and the environment; and the relevant processes that govern biological and physical systems.

Students will learn about the use of the scientific method in the human-centered design process. Students will practice the scientific method in laboratory activities teaching basic physical concepts related to solid modeling, 3D printing, electronic circuits, sensors, actuators, and prototype creation. Various social and environmental aspects and impact of the human-centered design process will be discussed. Students will learn and practice the scientific method in multiple activities through both individual and team assignments. Students will fully execute the scientific method in design with a human-centered design challenge to design, create, build, test, and reflect upon the results of a functional product to serve societal needs. Achievement of this learning outcome will be assessed through the content specific portions of the 9 homework assignments, Quiz 2 (on related scientific terminology, sensors/actuators), a final design report, and a final design presentation.

Critical Thinking: Students formulate empirically-testable hypotheses derived from the study of physical processes or living things; apply logical reasoning skills effectively through scientific criticism and argument; and apply techniques of discovery and critical thinking effectively to solve scientific problems and to evaluate outcomes.

Students will practice the scientific method in laboratory activities teaching basic physical concepts related to solid modeling, 3D-printing, electronic circuits, sensors, actuators, and prototyping. Students will approach solution of open-ended scientific challenges using the scientific method to test their student formulated hypothesis through reasoning, planning, designing, testing, revisions, and reflection of effectiveness of a student created human-centered functional prototype in response to an open ended societal based engineering design challenge. Achievement of this learning outcome will be assessed through student write-ups in 8 of the Homework assignments about in-makerspace laboratory activities relating to both builds and portions of the human-centered design process. This will also be assessed in sections of the larger end of term Final Design Report and Final Design Presentation on their scientific approach to solving an opened-ended human-centered design challenge.

Communication: Students communicate scientific knowledge, thoughts, and reasoning clearly and effectively.

Students will utilize multiple forms of written, pictorial, physical object, simulation, oral, and team communication to reason through the scientific method and process of design. Methods include: design notebooks, engineering memos, laboratory write-ups, narrative descriptions, solid modeling software, 3D printing, electronics hardware use (sensors, actuators, microcontrollers), programming, flow charts, human-center user research, team discussions, design selection matrix, physical functional prototypes, design reports, and oral presentations.

Achievement of this learning outcome will be assessed through written communication portions of 8 Homework assignments, Peer Evaluation of team communication skills included in Homework 10, written communication in the final design report, and verbal, pictorial, and physical prototype demonstration communication during team final design presentation.

Course Goals:

- Understand the scientific method of and practice the human-centered design and prototype process for a societal based project.
- Learn techniques to solve open-ended engineering challenges with scientific method.
- Promote a culture of making through scientific method laboratory practice of solid modeling, circuits, programming, sensors, data acquisition, 3D printing, and other maker tools.

- Build teamwork and cooperative learning skills through participation in multidisciplinary teams and active engineering project management.
- Build skills in background research, & written, pictorial, and oral communication methods.
- Raise awareness of ethics, engineering design and the environment, and contemporary issues in engineering design process related to a global society.
- Introduce engineering students to the various engineering majors and their roles within society.
- Inform students of opportunities for experiential learning throughout the college of engineering and UF community.

Writing Expectations:

This course is not a WR or word count designated course. This section is to provide students a general feel of writing expectations. There are 10 homework assignments in the course, each assignment is generally 3-4 pages of work (some writing, some generation of figures/graphs/tables). The final team design report is typically a 20–25-page technical design report with a mix of writing and generation of figures/graphs/charts/tables. The final team design presentation is an 8-10 slide presentation highlighting technical pictorial and oral communication skills.

Materials and Supply Fees & Equipment Use Fees:

$31.84

Relation to Program Outcomes (ABET):

Outcome	Coverage*
1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	Low
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors	High
3. An ability to communicate effectively with a range of audiences	Low
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts	Medium
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives	High
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions	Low
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies	Low

Required Textbooks and Software:

1) Safety Glasses & Closed-Toed Shoes: You MUST always bring and wear your own eye protection in the makerspace classroom! You MUST always wear close-toed shoes in makerspace classroom. Absences due to non-admittance for safety glasses/shoes are not excused absences. If you wear reading glasses, those are fine as eye protection as long as you leave them on at all times. Any other safety glasses with clear lenses are acceptable. The UF bookstore carries safety glasses, or you can get them at Lowes/Home Depot, or online at Amazon. No brand is required.

2) ELEGOO Super Starter Kit: Each student should purchase their own ELEGOO Super Starter Kit. The kit is not sold in the UF Bookstore; you need to obtain it online: https://www.amazon.com/ELEGOO-Project-Tutorial-Controller-Projects/dp/B01D8KOZF4/ref=asc_df_B01D8KOZF4/?tag=hyprod-20&linkCode=df0&hvadid=309818716690&hvpos=&hvnetw=g&hvrand=15308211431975484787&hvpone=&hvptwo=&hvqmt=&hvdev=c&hvdvcmdl=&hvlocint=&hvlocphy=9011699&hvtargid=pla-406302474425&psc=1

You need this kit in-hand by the second week of class. This kit is awesome, if you ever wanted to get into Arduino or tinkering/inventing, it is very easy to use and once you get started, you can build and create all kinds of small electronic items!

3) Laptop You Bring to Class: Either a windows-based PC or Mac laptop – any model, but not a tablet/iPad. Will need to bring laptop to class regularly to use with Arduino and solid modeling software with any cables necessary to connect to a regular USB plug for the Arduino kit. Enough outlets are provided at each table for laptop charging for every student if needed.

Attendance Policy, Class Expectations, and Make-Up Policy:

Attendance for class meetings is expected. Failure in regular attendance may result in deductions to Peer Evaluation, Attendance Checks, & Participation portion of grade.

***In addition to deductions that might occur in your peer evaluations, and attendance checks, for participation, an additional 5-point deduction in your final grade will occur for each occurrence of missing more than one live class without a valid UF excuse. ***

Contact your instructor if you have an excused absence to work out a plan to make up the work.

Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies. Click here to read the university attendance policies: https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/.

Evaluation of Grades:

Homework: 50% (10 assignments @ 5 % each)

Surveys/Quizzes: 10% (2 surveys @ 2.5% each, attendance checks @ 5%)

Final Design Report: 25% (1 mini-design review @ 5%, rest of report @20%)

Final Design Presentation: 15% (1 presentation @ 15%)

TOTAL: 100%

Peer Evaluation Policy:

Final Design Report and/or Final Design Presentation Grades will be weighed by Peer Evaluations *** Up to a 2-letter grade deduction can occur on your Final Design Report/Presentation individually earned grade for those assignments based on student team Peer Evaluations ***

Late Assignment Policy:

Generally late assignments are not accepted for credit, assignments are due uploaded into Canvas by the due date/time posted (Do not leave uploads until the last minute, computer/internet issues are not a valid excuse for late assignments!) If an assignment is turned in anywhere from 1 minute late up to 3 days late a 10% deduction will be taken for being late before points are deducted for quality of work. Assignments 1 minute late up to 3 days late are marked 'late' automatically in Canvas and the 10% rule applies.

Assignments over 3 days late are not accepted for credit. Assignments automatically close 3 days after due date in Canvas, you will not be able to turn them in and will receive a 0.

Grading Policy:

The following is given as an example only.

Percent	Grade	Grade Points
93.4 - 100	A	4.00
90.0 - 93.3	A-	3.67
86.7 - 89.9	B+	3.33
83.4 - 86.6	B	3.00
80.0 - 83.3	B-	2.67
76.7 - 79.9	C+	2.33
73.4 - 76.6	C	2.00
70.0 - 73.3	C-	1.67
66.7 - 69.9	D+	1.33
63.4 - 66.6	D	1.00
60.0 - 63.3	D-	0.67
0 - 59.9	E	0.00

More information on UF grading policy may be found at:
https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx

Students Requiring Accommodations:

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center by visiting

https://disability.ufl.edu/students/get-started/. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

Course Evaluation:

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at https://gatorevals.aa.ufl.edu/students/. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via https://ufl.bluera.com/ufl/. Summaries of course evaluation results are available to students at https://gatorevals.aa.ufl.edu/public-results/.

In-Class Recording:

Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A "class lecture" is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session.

Publication without permission of the instructor is prohibited. To "publish" means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.

University Honesty Policy:

UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor Code

(https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

Commitment to a Safe and Inclusive Learning Environment:
The Herbert Wertheim College of Engineering values broad diversity within our community and is committed to individual and group empowerment, inclusion, and the elimination of discrimination. It is expected that every person in this class will treat one another with dignity and respect regardless of gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture.

If you feel like your performance in class is being impacted by discrimination or harassment of any kind, please contact your instructor or any of the following:
• Your academic advisor or Graduate Program Coordinator
• Robin Bielling, Director of Human Resources, 352-392-0903, rbielling@eng.ufl.edu
• Curtis Taylor, Associate Dean of Student Affairs, 352-392-2177, taylor@eng.ufl.edu
• Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943, nishida@eng.ufl.edu

Software Use:
All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

Student Privacy:
There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see: https://registrar.ufl.edu/ferpa.html

Campus Resources:

Health and Wellness

U Matter, We Care:
Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact umatter@ufl.edu so that the U Matter, We Care Team can reach out to the student in distress. A nighttime and weekend crisis counselor is available by phone at 352-392-1575. The U Matter, We Care Team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 9-1-1.

Counseling and Wellness Center: http://www.counseling.ufl.edu/cwc, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

Sexual Discrimination, Harassment, Assault, or Violence

If you or a friend has been subjected to sexual discrimination, sexual harassment, sexual assault, or violence contact the Office of Title IX Compliance, located at Yon Hall Room 427, 1908 Stadium Road, (352) 273-1094, title-ix@ufl.edu

Sexual Assault Recovery Services (SARS)
Student Health Care Center, 392-1161.

University Police Department at 392-1111 (or 9-1-1 for emergencies), or http://www.police.ufl.edu/.

Academic Resources

E-learning technical support, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu. https://lss.at.ufl.edu/help.shtml.

Career Resource Center, Reitz Union, 392-1601. Career assistance and counseling. https://www.crc.ufl.edu/.

Library Support, http://cms.uflib.ufl.edu/ask. Various ways to receive assistance with respect to using the libraries or finding resources.

Teaching Center, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring. https://teachingcenter.ufl.edu/.

Writing Studio, 302 Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers. https://writing.ufl.edu/writing-studio/.

Student Complaints Campus: https://care.dso.ufl.edu.

On-Line Students Complaints: http://www.distance.ufl.edu/student-complaint-process.