



EGN 2020C

Engineering Design and Society

Summer 2025

Department of Engineering Education, University of Florida

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Class Times (Room):

Section EED2: M/W 11:00 AM - 1:45 PM (WERT 355)
Section EED3: T/R 9:30 AM - 12:15 PM (WERT 355)

Office Hours

- **In-person:** Ask me before/after class
- **Virtually:** For short questions [send me a message via Canvas](#) between 1 pm to 5 pm.
- Zoom sessions and other times available by appointment

Peer Mentors:
[TBD](#)

❖ COURSE DESCRIPTION

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, and written and oral communication skills in creating a societal-based design.

Course Pre-Requisites / Co-Requisites
[None](#)

❖ COURSE OBJECTIVES

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 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 the outcomes of experiments.

[These general education objectives will be accomplished through the following:](#)

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 a 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 methods applied to human-centered design in technical design reports.
5. Communicate outcomes of the scientific method in design using written, pictorial, and oral communication in assignment 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:

Learning Outcomes:

- 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 methods.
- Promote a culture of making through scientific method laboratory practice of solid modeling, circuits, programming, sensors, data acquisition, 3D printing, and other maker-inspired 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, the environment, and contemporary issues in the 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 the UF community.

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 the 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 assignments, quizzes (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 the 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 the 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 the assignments about in-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 open-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 but are not limited to 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 assignments, peer evaluation of team communication skills, written communication in the final design report, and verbal, pictorial, and physical prototype demonstration communication during team's final design presentation.

Writing Expectations

This course is not a WR, or word count designated course. This section is to provide students with a general feel of writing expectations. The assignments in the course are generally 3-4 pages long requiring some writing and generation of figures/graphs/tables. The final team design report is typically a 20+ page technical design report with a mix of writing and generation of figures/graphs/charts/tables. The final team design presentation is a 5-10 slide presentation highlighting technical pictorial and oral communication skills.

✦ RECOMMENDED AND REQUIRED MATERIALS

Materials and Supply Fees & Equipment Use Fees

\$31.84

Required Course Materials

1) Safety Glasses & Closed-Toed Shoes: You **MUST bring and wear** your own eye protection at all times in the makerspace-inspired 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 if 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/HomeDepot, or online at Amazon.

No particular brand is required, but here is an example of an inexpensive pair for your

reference: https://www.amazon.com/Radians-MR0110ID-Lightweight-Glasses-Distortion/dp/B000GULTI6/ref=sr_1_15?dchild=1&keywords=safety+glasses&qid=1620659628&sr=8-15 (Links to an external site.)

2) Arduino Starter Kit - English Official Kit With 170 Page Book: Each student should purchase their own Arduino Starter Kit. The kit is not sold in the UF Bookstore; you need to obtain online:

[Amazon.com: ELEGOO UNO Project Super Starter Kit with Tutorial and UNO R3 Compatible with Arduino IDE : Electronics](https://www.amazon.com/ELEGOO-UNO-Project-Super-Starter-Kit/dp/B07V331874/ref=sr_1_1?dchild=1&keywords=arduino+starter+kit&qid=1620659628&sr=8-15)

You only need one kit, so order from one place or the other, just remember you need it in hand by the end of the first week of class! This kit is very easy to use and once you get started, you can build and create all kinds of small electronic items!

3) A Laptop you can bring to class regularly (PC or Mac works, but NO iPads). Must be capable of connecting to USB connector for Arduino starter kits and running Onshape/Arduino IDE. Almost all PC or Mac laptops are fine but cannot be an iPad/Tablet.

Relation to Program Outcomes (ABET):

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

✦ COURSE POLICIES

Attendance Policy, Class Expectations, and Make-Up Policy

Attendance for class meetings is expected. Failure in regular attendance may result in deductions to the Peer Evaluation & Participation portion of the grade. *****In addition to deductions that might occur in your peer evaluations for participation, a half-letter grade deduction in your final grade will occur for each time you miss more than one in-person 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.

Excused absences must be consistent with university policies in the undergraduate catalog (<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx> (Links to an external site.) (Links to an external site.)) and require appropriate documentation.

Evaluation of Grades

Assignments: 50%

Survey/Quizzes: 10%

Final Design Report: 25%

Final Design Presentation: 15%

TOTAL: 100%

Please note that while the assignments and other course deliverables are provided in a point system in Canvas, these are representative of a cumulative percentage of your grade per category described above (assignments, survey/quizzes, etc.).

Gen-AI:

With the advent of Gen-AI tools such as ChatGPT and others, it may be tempting to want to rely on these tools for context, grammar, and content. While I cannot stop you from engaging in said activities, I ask that you use these tools in a limited manner and in a small capacity for the sole purpose of fact-checking, identifying inaccuracies, or inspiring ideas. One of the caveats of this course is that you are both an engineer-in-training and a student. This means that your unique experiences are just as important as the process of communicating these processes and experiences. If you submit an assignment, project, discussion board, or any other course material, please be transparent about what you used Gen-AI for. Document with evidence of its use (e.g., screenshots with timestamps, highlighted content generated from Gen-AI). Furthermore, you will need to include in said course material the reason why you used Gen-AI tools and how you abided by the code of conduct and instructor guidelines. In the same manner, if as an instructor I use these tools, I will be transparent with you on its purpose and show you proper documentation as well.

Peer Evaluation Policy:

The Final Design Report is due right after the Final Design Presentation. However, grades for these two deliverables will be weighted and potentially deducted based upon Peer Evaluations. *****Up to a two-letter grade deduction can occur on your Final Design Report/Presentation based on student team Peer Evaluations ***** As such, it is strongly recommended that if you need to identify strategies to work with your team that you contact the instructor and/or peer mentors as soon as possible.

Course Schedule and Important Dates: Note that any changes to the topics covered will be announced on the Canvas page.

	Sections/Dates		
WK	EED2	EED3	Topic
1	30-Jun	1-Jul	Getting Started; Syllabus and Course Expectations; The Design Process
	2-Jul	3-Jul	Introduction to Engineering Notetaking and Career Functions
2	7-Jul	8-Jul	Solid Modeling, 3-D Visualization with Onshape
	9-Jul	10-Jul	Active Manufacturing, 3D Printing, Engineering Sensor & Microcontroller
3	14-Jul	15-Jul	Sensors, Actuators, and Microcontrollers, Programming in Microcontroller Environment
	16-Jul	16-Jul	Team Communication, Project Management, *Request for Projects
4	21-Jul	22-Jul	Design Constraints, Ethics in Design, Active Project Build with Faculty and Peer Mentors
	23-Jul	24-Jul	Design Constraints via Decision Matrix and Parallel Prototyping; Engineering Design Reports, Active Project Build
5	28-Jul	29-Jul	Ethics and Human-Centered Considerations; Global Environment and Contemporary Issues, Active Project Build
	30-Jul	31-Jul	Engineering Design Reporting and Verbal Communication; Elevator Pitch
6	4-Aug	5-Aug	Open Build (Projects)
	6-Aug	7-Aug	Final Presentations and Peer Assessments

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 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, assignments 1 minute late up to 3 days late are marked 'late' automatically in Canvas and the 10% rule applies).

More information on UF grading policy may be found at:

<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

INSTITUTIONAL POLICIES

Students Requiring Accommodations

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, <https://www.dso.ufl.edu/drc/>) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure 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.ua.ufl.edu/students/> (Links to an external site.). 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.bluer.com/ufl/> (Links to an external site.). Summaries of course evaluation results are available to students at <https://gatorevals.ua.ufl.edu/public-results/> (Links to an external site.)

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

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/> (Links to an external site.)) 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 Undergraduate Coordinator
- HWCoe Human Resources, 352-392-0904, student-support-hr@eng.ufl.edu
- Pam Dickrell, Associate Dean of Student Affairs, 352-392-2177, pld@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> (Links to an external site.)

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:

<https://counseling.ufl.edu>, 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> (Links to an external site.).

Career Connections Center, Reitz Union, 392-1601. Career assistance and counseling <https://career.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://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/>; <https://care.dso.ufl.edu>.

On-Line Students Complaints: <https://distance.ufl.edu/getting-help/>; <https://distance.ufl.edu/state-authorization-status/#student-complaint>.