

Mechanical Engineering Design 3 "Realization, Build, & Test [TRL4]"

EML4502 - Section 19375

Class Periods: Tuesdays & Thursdays, Period 2-3, 8:30 – 10:25am

Location: MAE-C-010

Academic Term: Fall 2025

Last Updated 8/17/2025

*EML4502 is a dynamic course. Modifications to this syllabus may be required during the semester.
Any changes to the syllabus will be posted on the course Canvas page & MS Teams site and announced in class.*

Instructor:

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Office Phone Number: (352) 294-6897

Office Hours: Thursdays, 10:40 – 11:59am, MAE-C-103; and by appointment



Teaching Assistant/Peer Mentor/Supervised Teaching Student:

Please contact through the course MS Teams Channel to arrange meetings

- Christopher Mauldin, igathmall@ufl.edu, Graduate Assistant – Teaching
- Eduardo Mora, moraarm.migueled@ufl.edu, Program Manager & Undergraduate Learning Assistant
- Kaylei Rodriguez, krodriguez4@ufl.edu, Manufacturing Specialist
- Carlos Rios, rioscarlos@ufl.edu, Grader & Graduate Learning Assistant
- Jackson Sammartino, j.sammartino@ufl.edu, Grader & Graduate Learning Assistant
- Elijah Baluyot, ecbaluyot@ufl.edu, Undergraduate Learning Assistant
- Adrian Costa, adriancosta@ufl.edu, Undergraduate Learning Assistant
- Sophia Sayre, sophiasayre@ufl.edu, Undergraduate Learning Assistant
- Brooks Silber, bsilber@ufl.edu, Undergraduate Learning Assistant

Course Description

Design and realization of a mechanical engineering system, component, or process subject to appropriate standards and constraints. Team Project. Credits: 3

Course Pre-Requisites / Co-Requisites

Prerequisite: EML 4501 or EAS 4700 or EAS 4710;

Corequisite: EML 4321

Course Objectives

1. 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 [Final Design Deck & Final Design Report]
2. Communicate effectively with a range of audiences [Final Design Deck & Final Oral Presentation]
3. Function effectively on a creative, collaborative, and inclusive team that establishes goals, plans tasks, and meet objectives [Peer Evaluations]
4. Acquire and apply new knowledge as needed using appropriate learning strategies [Performance Assessments]

Materials and Supply Fees

Course Material & Supply Fee: \$295.00 (Verified 5/13/2025)

Course Equipment Pool Fee: \$90.00 (Verified 5/13/2025)

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	Medium
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	High
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	Low
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative 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	Medium
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies	High

*Coverage is given as high, medium, or low. An empty box indicates that this outcome is not covered or assessed in the course.

Required Textbooks and Software

- Engineering Capstone Design, M. J. Traum, S. R. Niemi, J. Iklaas, et al., University of Florida, 2020
Free OER Download: <https://merge.mae.ufl.edu/outreach/textbook/> [Chapters posted when assigned]
- "Less Boring Lectures" YouTube channel, A. Rubiano [free to access]
<https://www.youtube.com/c/LessBoringLectures>
- DC Electrical Circuit Analysis, A Practical Approach (Version 1.0.12), J. M. Fiore, Mohawk Valley Community College, 2024
ISBN13: 978-1654515478
Free OER Access: <https://www2.mvcc.edu/users/faculty/jfiore/books/DCElectricalCircuitAnalysis.pdf>
- Technology Readiness Assessment Guide, U.S. Government Accountability Office, GAO-20-48G, January 2020
Free Access: <https://www.gao.gov/products/gao-20-48g>
- TopSpice Circuit Simulator – Demo (Version 10.40a or later), Penzar Development, 2025
Free Download: <https://penzar.com/topspice/topspice.htm>
- <https://wokwi.com/>, browser-based Internet of Things (IoT) simulation platform [free to use online]
- Arduino IDE 2.3.4 (or later) coding software [free to download]: <https://www.arduino.cc/en/software>
- AutoDesk Fusion
Educational account freely available at: <https://www.autodesk.com/support/technical/product/fusion>

9. Bambu Studio PrusaSlicer 3D printing slicer software [free to download]:
<https://bambulab.com/en/download/studio> , Version 02.02.00.85 or Later

Recommended Materials

1. Shigley's Mechanical Engineering Design, 11th Ed., K. J. Nisbett & R. G. Budynas, McGraw-Hill, 2020
ISBN: 9390219639
2. Materials Selection in Mechanical Design, 5th Ed., Michael F. Ashby, Butterworth-Heinemann, 2016
ISBN: 0081005997
3. Machinery's Handbook, Erik Oberg, 30th Edition (or later), ISBN-13: 978-0831130916
4. Roark's Formulas for Stress and Strain, 7th Edition, W. C. Young, R. G. Budynas, McGraw-Hill, 2002
ISBN 007072542X
5. Programming Arduino: Getting Started with Sketches, 2nd Ed., Simon Monk, McGraw Hill, 2016
ISBN-10: 1259641635
6. Dimensioning for Interchangeable Manufacture, Earlwood T. Fortini, Industrial Press. 1967
7. Product Design and Development, 7th Ed., S. Eppinger & K. Ulrich, McGraw Hill, 2019
8. Product Design: Techniques in Reverse Engineering and New Product Development, K. Otto & K. Wood, Pearson, 2001

Required Computer

Students must have their own computer whose specifications meet or exceed the capabilities recommended by the University (<https://it.ufl.edu/get-help/student-computer-recommendations/>), required by the College (<https://www.eng.ufl.edu/students/advising/fall-semester-checklist/computer-requirements/>), and required by the MAE Department (<https://mae.ufl.edu/academics/prospective/undergraduate/computer-requirements/>).

Important Dates

December 1-3, 2025: Final Oral Presentations (8am – 5pm, MAE-A-221: Each group reserves a 1-hour slot)

December 3, 2025: Final Design Report Deadline (due 11:59pm via Canvas)

December 3, 2025: Final Artifact Delivery Deadline (due 11:59pm, MAE-C-010)

Attendance Policy, Class Expectations, and Make-Up Policy

It is important to attend class regularly. If you miss a class, you are responsible for acquiring notes or other resources covered. The Teaching Team will endeavor to make all course materials available through the Learning Management System. However, some experiences cannot be replicated asynchronously. Students are held responsible for knowledge of all scheduling and policy announcements made in class. Excused absences must be consistent with university policies in the undergraduate catalog (<https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/>) and require appropriate documentation and advance communication with the instructor.

Policies on Clear Communication, "Ghosting", Free Riders, Sources of Truth, Essay Writing AI's, TurnItIn, Lab Use Priority, & Assignment Grade Disputes:

1. Individuals who fail to support their group or "ghost" the course as demonstrated by peer evaluation scores, group feedback/emails, and/or low participation tracked in Canvas/Teams/Fusion, will earn a failing grade in EML4502 regardless of points accumulated in the class.

2. On each peer evaluation (both 360-degree and CEO-led), all eight metrics will be scored on a 1-5 Likert scale. Any student who accumulates two peer evaluations with an aggregate score of 3/5 or lower on any two peer evaluation

metrics will be considered a Free Rider and will receive a failing grade in EML4502 regardless of points accumulated in the class.

3. Online platforms, notably GroupMe, provide venues for course discussion that exclude the instructor and EML4502 Teaching Team. Discussion platforms beyond UF-sanctioned Learning Management Systems will not be monitored or curated by the instructor. Thus, information propagated through these platforms can be incorrect. It is each student's responsibility to verify information obtained from these external discussion services with reputable reference sources or UF-affiliated subject matter experts. Erroneous information obtained from external discussion platforms used in EML4502 will be marked incorrect on graded assignments and assessments.

4. All team communication must occur through a UF-sanctioned MS Teams channel established for the group in the course. These channels will be monitored. If the Teaching Team deems that team communication is not occurring through MS Teams, a single written warning will be given. After the warning, teams still not communicating through MS Teams will fail the course.

5. The EML4502 MS Teams General Channel is shared by the whole class and the Teaching Team for information dissemination. Individuals or teams who post comments or files not relevant to EML4502 in the General Channel will be penalized one letter grade for each infraction.

6. Students taking this course consent to allowing all assignments to be submitted by the instructor on their behalf for textual similarity review to Turnitin.com via the Canvas learning management system for the detection of plagiarism and unattributed AI use. All submitted materials will be added as source documents in the Turnitin.com reference database solely for the purpose of detecting plagiarism of such papers. Use of the Turnitin.com service is subject to the Usage Policy posted on the Turnitin.com site.

7. Use of Generative AI is accepted and encouraged in EML4502 provided a) it occurs exclusively through UF's NaviGator Chat portal (<https://it.ufl.edu/ai/navigator-chat/>) and b) AI use is clearly identified and attributed. AI generated content created outside the UF NaviGator Chat platform and/or that is not clearly identified and attributed is cheating under the UF Honor Code, section (a)2, <https://regulations.ufl.edu/wp-content/uploads/2021/12/4-040-2021-12-06.pdf> :

“(a) Cheating. A Student shall not use or attempt to use unauthorized materials or resources in any academic activity for academic advantage or benefit. Cheating includes but is not limited to:

2. Using any materials or resources, through any medium, which the Faculty has not given express permission to use and that may confer an academic benefit to the Student.”

Unattributed material suspected of being AI-generated will be vetted through a detection algorithm. If this tool deems the material to be AI-generated, a 0 will be given on the suspected assignment.

8. EML4502 students receive priority access to and use of the MAE-C-010 design lab space from 8:30am to 6:00 pm Tuesdays through Fridays. Outside these hours, other users including UF MAE Design Teams have priority use of the space.

9. If an individual or group has an assignment grading dispute, the issue must first be addressed with the Teaching Team member who did the grading. If individuals/groups can show where grading errors occurred, Teaching Team members will correct grades accordingly. Only after communication with a Teaching Team member fails to resolve a grading dispute may the individual/group bring the dispute to an instructor.

Laboratory Safety:

EML4502 is a laboratory course. To ensure safety of all participants appropriate attire, personal protective equipment (PPE), and common-sense behavior are always required in the lab. Failure to follow lab safety rules will result in students' immediate removal from the lab and forfeiture of course points at the instructor's discretion.

1. Lab Attire

- No open-toed shoes are permitted in the lab.
- No shorts are permitted in the lab.

2. PPE

- Sanitizing supplies are available in the lab to wipe down desks prior to sitting and at the end of class if needed.
- Eye protection is required in the laboratory for proximity to hands-on activities.
- Respiratory protection is required in the laboratory for proximity to activities producing harmful fumes.
- Ear protection is required in the laboratory for proximity to activities 85 decibels or louder.

3. Behavior

- Disruptive or destructive behavior will not be tolerated.
- No food or drink is allowed in the machine shop, 3D print farm, or metrology areas of the lab.
- Food & drink are allowed at work desks, in conference rooms, at the coffee bar / kitchen area

4. Emergencies

- Inform Teaching Team members immediately of injury or exposure.

Evaluation of Grades

Assignment	Points	Percent
Individual Assignments		
Informed Consent Forms	2	0.2
Intellectual Property Agreements	2	0.2
Resume Assignments	6	0.6
Local Affinity Survey	1	0.1
Software Onboarding	5	0.5
Personal Goal Setting	10	1.0
Mid-Semester Goal Reflection	6	0.6
Personal Reflection	10	1.0
Labs & Quizzes		
3D-Printing Lab Report	5	0.5
3D-Printing Quiz	15	1.5
Electronic Motors Lab Report	5	0.5
Electronic Motors Quiz	15	1.5
DFM Quiz	15	1.5
Group Reports		
AI Driven Hedgehog Concept	15	1.5
Team Compact	10	1.0
Project Charter	35	3.5
Ideation Design Report (IDR)	50	5.0
Preliminary Design Report (PDR + CAD)	65	6.5
Design Review Memo (DRM)	25	2.5
Risk Assessment Report (RAR)	50	5.0
Final Design Report (FDR)	150	15.0
Final Group Deliverables		
Artifact Performance Assessment 1	50	5.0
Artifact Performance Assessment 2	50	5.0
Artifact Performance Assessment 3	50	5.0
Final Project Abstract	10	1.0
90-Second Elevator Pitch Video	25	2.5

Final Presentation	150	15.0
Final Presentation Slide Deck	1	0.1
Group Photos 1 & 2	2	0.2
Picture & Rendering of Final Project	2	0.2
Interactive 3D Model	2	0.2
Project Artifact Donation Form	5	0.5
Final CAD, Code, Artifact, & Cleanup	10	1.0
All Tools Returned / Restored	30	3.0
Planning, Attendance, & Peer Review		
Team Goal Setting Sheets	36	3.6
Peer Evaluations	80	8.0
Total	1000	100

See Policies on Clear Communication, "Ghosting", Free Riders, etc.

* Per Policy #1 Individuals who "ghost" as demonstrated by peer evaluation scores, etc. fail EML4502 regardless of points accumulated in the class.

† Per Policy #2, students accumulating two peer evaluations with an aggregate score of 3/5 or lower on any two of more peer evaluation metrics fail EML4502 regardless of points accumulated in the class.

Any changes in evaluation of grades will be posted on the course Canvas page & MS Teams site and announced in class.

Grading Policy

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>

Grade Definitions

A : Student demonstrated course mastery in all regards and with distinction.

A- : Student performed outstandingly in all regards and is exceptional.

B+ : Student performed with excellence in the course.

B : Student showed high command of course content.

B- : Student has done a commendable job with course content.

C+ : Student demonstrated ample grasp of course content.

C : Student demonstrated adequate grasp of course content.

C- : Student demonstrated fair grasp of course content.

D+ : Student met fair course expectations.

D : Student attained below average expectations.
D- : Student met minimal expectations to pass.
E : Student failed to meet minimal expectations to pass.

Academic Policies & Resources

To support consistent and accessible communication of university-wide student resources, instructors must include this link to academic policies and campus resources: <https://go.ufl.edu/syllabuspolices>. Instructor-specific guidelines for courses must accommodate these policies.

Course Evaluation

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online. Students can complete evaluations in three ways:

- 1) The email they receive from GatorEvals,
- 2) Their Canvas course menu under GatorEvals, or
- 3) The central portal at <https://my-ufl.bluera.com>

Guidance on how to provide constructive feedback is available at <https://gatorevals.ua.ufl.edu/students/>. Students will be notified when the evaluation period opens. Summaries of course evaluation results are available to students at <https://gatorevals.ua.ufl.edu/public-results/>.

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/process/student-conduct-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, students are obligated to report any condition that facilitates academic misconduct to appropriate personnel. Please refer questions or concerns to the course instructor.

Commitment to a Positive Learning Environment

The Herbert Wertheim College of Engineering values varied perspectives and lived experiences within our community and is committed to supporting the University's core values.

If you feel like your performance in class is being impacted, 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

"Don't let anyone rob you of your imagination, your creativity, or your curiosity."

--Mae Jemison

Course Schedule

Week #	Date	Day	Synchronous Content	Assignment Due
1	21-Aug	R/F	Course Introduction Entrepreneurship Journey by Guest Lecturer Ryan Mitchell (Space Beyond) Intellectual Property Brief by Guest Lecturer Dr. Rick Croley (UF Tech Transfer) HWCOE Entrepreneurship Resources Available Through IGNITE-SPARK	• IP & NDA Agreements • Entry Resume + AI Score • Informed Consent Forms • Local Affinity Survey • Personal Goal Setting • Software Onboarding
2	26-Aug	T/W	Technology Readiness Level Brief by Guest Lecturer Shawn Martin (US DoD) Team Principles, Customer Needs, Kano Model, Hedgehog Concept, Value Proposition Explain Team Goal Setting Assignment	
	28-Aug	R/F	Review of Design for Manufacturing (DFM) 3D-Printing Lecture/Lab	• Team Goal Setting 1 • Peer Evaluation A • AI Driven Hedgehog Concept Generation • Team Compact
3	2-Sep	T/W	Electric Motors Lecture/Lab	
	4-Sep	R/F	Branding (If Needed) CFO Onboarding (How to Buy Things) CPO Onboarding (Manufacturing Queue)	• Team Goal Setting 2 • DFM Quiz • 3D-Printing Quiz • 3D-Printing Lab Report • Project Charter
4	9-Sep	T/W	Work Day	• IDR
	11-Sep	R/F	Design Review 1 [First Group]	• Team Goal Setting 3 • Peer Evaluation 1 • Electric Motors Quiz • Electric Motors Lab Report
5	16-Sep	T/W	Design Review 1 [Middle Two Groups]	• CAD for PDR
	18-Sep	R/F	Design Review 1 [Last Two Groups]	• Team Goal Setting 4
6	23-Sep	T/W	Design Review 2 [First Two Groups]	
	25-Sep	R/F	Design Review 2 [Last Two Groups]	• Team Goal Setting 5 • Peer Evaluation B • PDR + CAD
7	30-Sep	T/W	No Class Career Showcase	
	2-Oct	R/F	No Class Career Showcase	
8	7-Oct	T/W	Risk Assessment & Protocol Design	
	9-Oct	R/F	Work Day [Last Day for MFG On-Demand Parts in Queue]	• Team Goal Setting 6 • Peer Evaluation 2 • DRM
9	14-Oct	T/W	Work Day	
	16-Oct	R/F	No Class Homecoming (Observed)	• RAR • Midsemester Reflection
10	21-Oct	T/W	Build/Test	
	23-Oct	R/F	Build/Test	• Team Goal Setting 7
11	28-Oct	T/W	Work Day	
	30-Oct	R/F	Build/Test	• Team Goal Setting 8 • Peer Evaluation C
12	4-Nov	T/W	Build/Test	
	6-Nov	R/F	Build/Test	• Team Goal Setting 9 • Performance Assessment 1
13	11-Nov	T/W	No Class Veterans Day (Observed)	
	13-Nov	R/F	Build/Test	• Team Goal Setting 10 • Peer Evaluation 3 • Performance Assessment 2
14	18-Nov	T/W	Build/Test	
	20-Nov	R/F	Build/Test	• Team Goal Setting 11 • Peer Evaluation D • Performance Assessment 3 • Exit Resume + AI Score • Project Abstract • 90-Second Elevator Pitch Video • Group Photo 1
15	25-Nov	T/W	No Class Thanksgiving Holiday	
	27-Nov	R/F	No Class Thanksgiving Holiday	
16	1-Dec	M	Final Presentations Lab Cleanup	
	2-Dec	T	Final Presentations Lab Cleanup	
	3-Dec	W	Final Presentations Lab Cleanup	• Team Goal Setting 12 • Peer Evaluation 4 • Personal Reflection • Final Product Picture • Final Product Rendering • Product Interactive 3D Model • Final Presentation • Final Slide Deck • Group Photo 2 • FDR • Artifact Donation Form • Code, CAD, Artifact, Lab Cleanup • All Tools Returned / Restored
17	7-Dec	M	No Class Final Exam Week	