

# Mechanical Engineering Design 3 EML4502

*Last Updated 1/9/2023*

*Modifications to this syllabus may be required during the semester.  
Any changes to the syllabus will be posted on the course website and announced in class.*

**Academic Term:** Spring 2023

**Class Periods:** M: 4,5,8 (Lecture), T: 2-3,4-5,7-8,9-10 (Lab), R: 2-3,4-5,7-8,9-10 (Lab), F: 4,5,8 (Lecture)

**Location:** MAE-C 010

**Instructor:**

Matthew J. Traum, Ph.D.

Email: [mtraum@ufl.edu](mailto:mtraum@ufl.edu)

Office Hours: By appointment

Umesh D. Persad, Ph.D.

Email: [upersad@ufl.edu](mailto:upersad@ufl.edu)

Office Hours: By appointment



**Teaching Assistant/Peer Mentor/Supervised Teaching Student:**

Bios published online:

<https://merge.mae.ufl.edu/about/people/eml4502-teaching-team/>

- Alexander Lacerna, Instructional Fellow, Course Program Manager, & Webmaster, [alacerna@ufl.edu](mailto:alacerna@ufl.edu)
- Ria Fettig, Learning Assistant, [pendomr@ufl.edu](mailto:pendomr@ufl.edu)
- Ilan Zarin, Learning Assistant & Lead Machinist, [ilanzarin@ufl.edu](mailto:ilanzarin@ufl.edu)
- Kaiana Kibler, Learning Assistant & Machinist, [kaianakibler@ufl.edu](mailto:kaianakibler@ufl.edu)
- Nicholas Pech, Learning Assistant & Machinist, [nicholaspech@ufl.edu](mailto:nicholaspech@ufl.edu)
- Carl Wisniewski, Learning Assistant & Machinist, [c.wisniewski@ufl.edu](mailto:c.wisniewski@ufl.edu)

**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:**

EML4501

**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]
2. Communicate effectively with a range of audiences [Final Design Deck & Final Oral Presentation]
3. Function effectively on a creating, 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 [Milestones & Performance Evaluations]

**Materials and Supply Fees:**

Course Fee: \$191.06 (Verified 1/9/2023)

**Relation to Program Outcomes (ABET):**

<b>Outcome</b>	<b>Coverage*</b>
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 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	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 Computer:**

Students must have their own computer whose specifications meet or exceed the capabilities required by the College ( <https://www.eng.ufl.edu/students/resources/computer-requirements/> ) and MAE Department ( <https://mae.ufl.edu/academics/prospective/undergraduate/computer-requirements/> ).

**Required Textbooks and Software:**

- Engineering Capstone Design, M. J. Traum, S. R. Niemi, et al., University of Florida, 2020  
Free OER Download: <https://merge.mae.ufl.edu/outreach/textbook/> [Chapters posted when assigned]
- DC Electrical Circuit Analysis, A Practical Approach (Version 1.0.8), J. M Fiore, Mohawk Valley Community College, 2021  
ISBN13: 978-1654515478  
Free OER Access: <https://www2.mvcc.edu/users/faculty/jfiore/books/DCElectricalCircuitAnalysis.pdf>
- <https://wokwi.com/> , browser based Internet of Things (IoT) simulation platform [free to use online]
- Arduino IDE 1.8.19 (or later) coding software [free to download]: <https://www.arduino.cc/en/software>
- SolidWorks 2022-2023 and SolidWorks PDM  
*Available through UF. Installation instructions will be provided the first week of class.*
- AutoDesk Fusion 360 and AutoDesk EAGLE

Educational account freely available at: <https://knowledge.autodesk.com/support/fusion-360>

**Mechanical Engineering Design 3, EML4502**

© M. J. Traum & U. D. Persad, All Rights Reserved, Spring 2023

8. PrusaSlicer 3D printing slicer software [free to download]: [https://www.prusa3d.com/page/prusaslicer\\_424/](https://www.prusa3d.com/page/prusaslicer_424/) 2.4.2 or Later, Joseph Prusa

**Recommended Materials:**

1. Shigley's Mechanical Engineering Design, 10th Ed., R. G. Budynas and K. J. Nisbett, McGraw-Hill, 2015  
ISBN: 9780073398204
2. Materials Selection in Mechanical Design, 5th Ed., Michael F. Ashby, Butterworth-Heinemann, 2016  
ISBN: 0081005997
3. Machinery's Handbook, E. 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, 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


**Course Schedule:**

See course schedule excel sheet.

**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, & Assignment Grade Disputes:**

1. Once students are assigned into groups, all Emails and communications to the EML4502 Teaching Team related to group business must clearly identify the group's number. Each time any member of a group fails to identify the group by number in a communication to the Teaching Team, the group loses 1 point.
2. Check-in all CAD files on PDM before the semester's end so they can be used by future classes. Any group failing to check in all CAD files to PDM will receive irrevocable D- grades in the course. You must use the following PDM button to initiate check-in: . It is not enough to merely see files in your own PDM folder. To confirm they are checked in, ensure that another student enrolled in the class can also see your checked in files.
3. 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/PDM, will earn a failing grade in EML4502 regardless of points accumulated in the class.

4. On each peer evaluation, all twelve metrics will be scored on a 1-5 Likert scale. Any student who accumulates two peer evaluations with an aggregate score of 2/5 or lower on any three of more peer evaluation metrics will be considered a Free Rider and will receive a failing grade.

5. 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 is often 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.

6. 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.

7. The EML4502 MS Teams General Channel is shared by the whole class and the teaching Team for information propagation. 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.

8. Use of ChatGPT or similar essay writing AI's is prohibited in EML4502 and is defined as Cheating by the UF Honor Code, section (a)2, [https://regulations.ufl.edu/wp-content/uploads/2021/12/4-040\\_2021-12-06.pdf](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.”

Material suspected of being AI-generated will be vetted through the Open AI GPT-2 Output Detector. If this tool deems the material to be AI-generated, a 0 will be given on the suspected assignment.

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 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.

#### ***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, and in the adjoining kitchen area

#### 4. Emergencies

- Inform Teaching Team members immediately of injury or exposure.

#### **Evaluation of Grades:**

This course is graded. Grades are earned based on the following individual and group deliverables. Further descriptions will be given when assignments and assessments are announced in class. Additional resources supporting these assignments will be posted on the course Learning Management System as needed.

Assignment	Type	Points	%
Entry Resume + Resume Worded Score	Individual	0	0
Entry Skill Set Survey	Individual	0	0
3D Print a Test Widget	Group	6	1.2
Shaker Selection Assignment	Group	5	1
Milestone 1: Full Redesign	Group	65	13
Milestone 2: Functional Prototype	Group	20	4
Milestone 3: Full Machine Demonstration	Group	35	7
Performance Evaluation 1: IP-X5	Group	10	2
Performance Evaluation 2: OD/FI Integration	Group	25	5
Performance Evaluation 3: Extreme Capability	Group	65	13
Performance Evaluation 4: Drop Test	Group	20	4
<b>Final Oral Presentation</b>	Group	50	10
Final Project Abstract	Group	5	1
Final Oral Presentation Slides	Group	20	4
90-Second Elevator Pitch	Group	25	5
Final Design Report	Group	65	13
Exit Skill Set Survey	Individual	0	0
Lab Cleanup	Group	0	0
Exit Resume + Resume Worded Score	Individual	0	0
Weekly Goal Setting & Reflections (x12)	Group	24	4.8
Peer Evaluations (x6)	Individual	60	12
	<b>Total</b>	<b>500</b>	<b>100</b>

Any changes will be posted on the 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.

### ***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/process/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
- Jennifer Nappo, Director of Human Resources, 352-392-0904, [jpennacc@ufl.edu](mailto:jpennacc@ufl.edu)
- Curtis Taylor, Associate Dean of Student Affairs, 352-392-2177, [taylor@eng.ufl.edu](mailto:taylor@eng.ufl.edu)
- Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943, [nishida@eng.ufl.edu](mailto: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](mailto: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](mailto: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](mailto:Learning-support@ufl.edu).  
<https://lss.at.ufl.edu/help.shtml>.

**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/state-authorization-status/#student-complaint>.

**“Success is not final, failure is not fatal: it is the courage to continue that counts.”**

- Winston Churchill