Mechanical Engineering Design 3
EML4502

Last Updated 8/24/2022

Academic Term: Fall 2022

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:
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Teaching Assistant/Peer Mentor/Supervised Teaching Student:
Bios published online:
https://merge.mae.ufl.edu/about/people/eml4502-teaching-team/

- Alexander Lacerna, Course Program Manager, alacerna@ufl.edu
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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 Report]
2. Communicate effectively with a range of audiences [FDR & Final Oral Presentation]
3. Function effectively on a creating, collaborative, and inclusive team that establishes goals, plans tasks, and meet objectives [Peer Evaluation]
4. Acquire and apply new knowledge as needed using appropriate learning strategies [Milestones 1-4]

Materials and Supply Fees
Course Fee: $191.06 (Verified 8/24/2022)

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 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

1. 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]

2. 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

3. https://wokwi.com/ , browser based Internet of Things (IoT) simulation platform [free to use online]

4. Arduino IDE 1.8.19 (or later) coding software [free to download]: https://www.arduino.cc/en/software

5. SolidWorks 2022-2023 and SolidWorks PDM
   Available through UF. Installation instructions will be provided the first week of class.

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

Course Schedule
See course schedule excel sheet.

Attendance Policy, Class Expectations, and Make-Up Policy
It is extremely 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", Sources of Truth, and Assignment Grade Disputes
1. Once students are assigned into groups, all Emails 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 your files on PDM before the end of the semester so they can be used by future classes. Any group that fails to check in all PDM files will receive irrevocable D- grades in the course.

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. 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.

5. If an individual or group has as 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	0.0
Entry Skill Set Survey	Individual	0	0.0
3D Print a Test Widget	Individual	3	0.6
Circuit Schematic Activity	Individual	3	0.6
Milestone 1a	Group	40	8.0
Milestone 1b	Group	30	6.0
Milestone 2	Group	30	6.0
Milestone 3	Group	30	6.0
Milestone 4	Group	50	10.0
Performance Evaluation 1: Water	Group	10	2.0
Performance Evaluation 2: Overclock	Group	10	2.0
Performance Evaluation 3: Temperature Range	Group	10	2.0
Performance Evaluation 4: Chemical Corrosion	Group	10	2.0
Final Oral Presentation	Group	75	15.0
Final Project Abstract	Group	0	0.0
Final Oral Presentation Slides	Group	0	0.0
90-Second Elevator Pitch	Group	20	4.0
Final Design Report	Group	75	15.0
Exit Skill Set Survey	Individual	0	0.0
Exit Resume + Resume Worded Score	Individual	0	0.0
Weekly Goal Setting & Reflections (x14)	Group	54	10.8
Peer Evaluations (x5)	Individual	50	10.0
	Total	500	100.0

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 curse 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
- 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: 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 suppor*t*, 352-392-4357 (select option 2) or e-mail to 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

Updated 8/24/2022

Meeting #	Week #	Date	Day	Delivery Mode	Location	Instructor	Synchronous Content	Asynchronous Content	Deliverable Assigned	Assessment / Assignment Due
1	0	8/26/2022	F	In-Person	MAE-C-010	Traum/Lacerna	Lab Safety Navagating MS Teams Project Introductions Technology Readiness Levels Course/Student Expectations	Install SOLIDWORKS PDM	Entry Resume + Resume Worded Score Skill Set Survey Install SOLIDWORKS PDM Goal Setting & Reflection 1 Milestone 1: Conceptual Mechanical Design	
2	1	8/29/2022	M	In-Person	MAE-C-010	Niemi/Traum	House of Quality			Goal Setting & Reflection 1
L1	1	8/30/2022	T/R	In-Person	MAE-C-010	Lacerna	Introduction to 3D Printing DFM for 3D Printing Install Prusa Slicer 3D Print a Test Widget			
3	1	9/2/2022	F	In-Person	MAE-C-010	Niemi	Review of DML Review of Mech 2 Design Matrices Manufacturing Methods and DFM		Goal Setting & Reflection 2	3D Printed Test Widget Entry Resume + Resume Worded Score Entry Skill Set Survey
N/A	2	9/5/2022	M				**Holiday: Labor Day**			
L2	2	9/6/2022	T/R	In-Person	MAE-C-010		Button Debounce Activity Wire AC/DC Power Supply Control Stepper Motor with Limit Switches			Goal Setting & Reflection 2 (9/6)
4	2	9/9/2022	F	In-Person	MAE-C-010	Lacerna/Traum	Digital Control Basics: Pull-Up Resistors, Button Debounce, Noise Reduction, Stepper Motor Control Breadboards, Soldering, & Shrink Wrap		Goal Setting & Reflection 3	
5	3	9/12/2022	M	In-Person	MAE-C-010	All	Work Day			Goal Setting & Reflection 3
L3	3	9/13/2022	T/R	In-Person	MAE-C-010	All	Milestone 1 Presentations (Design Reviews) **Bring Marshmallows and Popcorn**		Milestone 2: Finalized Mechanical Design Peer Evaluation 1	Milestone 1: Conceptual Mechanical Design
6	3	9/16/2022	F	In-Person	MAE-C-010	All	Work Day		Goal Setting & Reflection 4	Peer Evaluation 1
7	4	9/19/2022	M	In-Person	MAE-C-010	Traum	Introduction to Arduino IDE Coding & Serial Terminal Connecting/Communicating with Microcomputers Libraries & 3rd Party Boards Reading Resistance Values			Goal Setting & Reflection 4
L4	4	9/20/2022	T/R	In-Person	MAE-C-010	All	Milestone 2 Presentations (Design Reviews) **Bring Marshmallows and Popcorn**			
8	4	9/23/2022	F	In-Person	MAE-C-010	Lacerna/???	Schematic Diagnosis Activity		Goal Setting & Reflection 5	Milestone 2: Finalized Mechanical Design
9	5	9/26/2022	M	In-Person	MAE-C-010	NONE	No Class - Showcase Week		Milestone 3: Theoretical Electrical/Software Design	Goal Setting & Reflection 5
L5	5	9/27/2022	T/R	In-Person	MAE-C-010	NONE			Peer Evaluation 2	
10	5	9/30/2022	F	In-Person	MAE-C-010	NONE			Goal Setting & Reflection 6	Peer Evaluation 2
11	6	10/3/2022	M	In-Person	MAE-C-010	Traum/Lacerna	User Interface (Apollo 13) Perf Boards/PCB Boards			Goal Setting & Reflection 6
L6	6	10/4/2022	T/R	In-Person	MAE-C-010	All				
12	6	10/7/2022	F	In-Person	MAE-C-010		Build Projects		Goal Setting & Reflection 7	
13	7	10/10/2022	M	In-Person	MAE-C-010		Build Projects			Goal Setting & Reflection 7
L7	7	10/11/2022	T/R	In-Person	MAE-C-010		Milestone 3 Presentations		Peer Evaluation 3 Milestone 4: Machine Report/Demonstration	Milestone 3: Theoretical Electrical/Software Design
14	7	10/14/2022	F	In-Person	MAE-C-010		Build Projects		Goal Setting & Reflection 8	Peer Evaluation 3
15	8	10/17/2022	M	In-Person	MAE-C-010		Build Projects			Goal Setting & Reflection 8
L8	8	10/18/2022	T/R	In-Person	MAE-C-010	All				
16	8	10/21/2022	F	In-Person	MAE-C-010		Build Projects		Goal Setting & Reflection 9	
17	9	10/24/2022	M	In-Person	MAE-C-010		Build Projects			Goal Setting & Reflection 9
L9	9	10/25/2022	T/R	In-Person	MAE-C-010	All	Milestone 4 Demonstration			Milestone 4: Machine Report/Demonstration
18	9	10/28/2022	F	In-Person	MAE-C-010		Build Projects		Goal Setting & Reflection 10	
19	10	10/31/2022	M	In-Person	MAE-C-010		Build Projects		Peer Evaluation 4 Final Design Report	Goal Setting & Reflection 10
L10	10	11/1/2022	T/R	In-Person	MAE-C-010	All	Performance Evaluation 1 Attempt		Performance Evaluation 1: Overclocking	Performance Evaluation 1: Overclocking
20	10	11/4/2022	F	In-Person	MAE-C-010		Revise Projects		Goal Setting & Reflection 11	Peer Evaluation 4
21	11	11/7/2022	M	In-Person	MAE-C-010		Revise Projects		Exit Resume + Resume Worded Score	Goal Setting & Reflection 11
L11	11	11/8/2022	T/R	In-Person	MAE-C-010	All	Performance Evaluation 2 Attempt		Goal Setting & Reflection 12 Performance Evaluation 2: Temperature Range	Performance Evaluation 2: Temperature Range
N/A	11	11/11/2022	F				**Holiday: Veterans Day**			
22	12	11/14/2022	M	In-Person	MAE-C-010		Revise/Rebuild Projects		Final Oral Presentation Slides 90-Second Elevator Pitch Project Abstract	Goal Setting & Reflection 12
L12	12	11/15/2022	T/R	In-Person	MAE-C-010	All	Performance Evaluation 3 Attempt		Performance Evaluation 3: Drop Test	Performance Evaluation 3: Drop Test
23	12	11/18/2022	F	In-Person	MAE-C-010		FDR Work Day			
24	13	11/21/2022	M	In-Person	MAE-C-010	All	**HOLIDAY THANKSGIVING**			
N/A	13	11/22/2022	T/R					Thanksgiving		
N/A	13	11/25/2022	F					Thanksgiving		
25	14	11/28/2022	M	In-Person	MAE-C-010		Performance Evaluation Retries	Final Presentations	Peer Evaluation 5 Course Evaluations	Goal Setting & Reflection 13 Project Abstract 90-Second Elevator Pitch
L13	14	11/29/2022	T/R	In-Person	MAE-C-010			Final Presentations		
26	14	12/2/2022	F	In-Person	MAE-C-010			Final Presentations		Peer Evaluation 5 Final Oral Presentation Slides Final Design Report Exit Skill Set Survey Exit Resume + Resume Worded Score
27	15	12/5/2022	M	In-Person	MAE-C-010		Lab Cleanup		Final Reflection 14	Final Oral Presentation (12/6-12/8)
28	15	12/6/2022	T/R	In-Person	MAE-C-010		Lab Cleanup			Course Evaluations Final Reflection 14
Reading Days	15	12/9/2022	F		MAE-C-010					
Finals Week	16	12/12/2022	M		MAE-C-010					
Finals Week	16	12/13/2022	T/R		MAE-C-010					
Finals Week	16	12/16/2022	F		MAE-C-010					