Mechanical Engineering Design 2

EML4501

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.

Class Periods and Location:

	Monday	Wednesday	Friday
Period 3 (9:35 AM - 10:25 AM)	WM 100 Williamson Hall	MAE-C-010 Senior Design Lab	WM 100 Williamson Hall
Period 7 (1:55 PM - 2:45 PM)	WEIM 1094 Weimer Hall	MAE-C-010 Senior Design Lab	WEIM 1094 Weimer Hall

Academic Term:

Fall 2023

Instructors:

Name: Dr. Umesh Persad
Email Address: upersad@ufl.edu
Office Phone Number: 352-392-6743
Office Hours: Tuesdays 10am-12pm or by appointment.

Teaching Assistant/Peer Mentor/Supervised Teaching Student:

Please contact through the Canvas website

1. **Learning Assistant:**
   Alessia Venturi - alessiaventuri@ufl.edu
2. **Learning Assistant:**
   Zoe Estberg - zoeestberg@ufl.edu
3. **Learning Assistant:**
   Juliette Dalessandro - dalessandroj@ufl.edu
4. **Learning Assistant:**
   Joseph Thomas Hill - joseph.hill@ufl.edu

Course Description
Integrated design and presentation of a mechanical system. Credits: 3

Course Pre-Requisites / Co-Requisites
Prereq: EGN 3353C and EML 2322L and EML 3005 and (EGM 3401 with a minimum grade of C).

Course Objectives
1. Solve engineering problems by applying STEM principles.
2. Apply appropriate engineering design methods to produce creative solutions that meet specified needs.
3. Communicate effectively with a range of audiences.
4. Function effectively on a creative, collaborative, and inclusive team that establishes goals, plans tasks, and meets objectives (learn by doing).

Materials and Supply Fees
Course Fee: $50.00

Relation to Program Outcomes (ABET):
Students who successfully complete this course demonstrate the following outcomes in the context of mechanical engineering design theory and application:

Outcome	Coverage*
1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	High
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	High
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	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:

1. The College
https://www.eng.ufl.edu/students/resources/computer-requirements/

2. The 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. **Multimedia Engineering Fluid Mechanics**
   C. C. Ngo and K. C. Gramol, University of Oklahoma Engineering Media Lab, 2019,
   Free OER Access: http://www.ecourses.ou.edu/cgi-bin/ebook.cgi?doc=&topic=fl

3. **Multimedia Engineering Mechanics of Materials**
   Kurt Gramoll, University of Oklahoma Engineering Media Lab, 2019
   Free OER Access: http://www.ecourses.ou.edu/cgi-bin/ebook.cgi?doc=&topic=me

4. **Multimedia Engineering Dynamics**
   Kurt Gramoll, University of Oklahoma Engineering Media Lab, 2019 Free OER Access:
   http://www.ecourses.ou.edu/cgi-bin/ebook.cgi?topic=dy

5. **Multimedia Engineering Thermodynamics**
   Kurt Gramoll and Meirong Huang, University of Oklahoma Engineering Media Lab, 2019,
   Free OER Access: http://www.ecourses.ou.edu/cgi-bin/ebook.cgi?doc=&topic=th

6. **A Heat Transfer Textbook**
   5th ed, J. H. Lienhard IV & J. H. Lienhard V, Phlogiston Press, Cambridge, MA, 2020. ISBN: 9780486837352,
   Free OER Access: https://ahtt.mit.edu/

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

Recommended Materials

1. **Product Design and Development 7th Edition**
   K. Ulrich, S. Eppinger and M. C. Yang, McGraw Hill, 2019
   ISBN-10:1260043657, ISBN-13: 978-1260043655

2. **The Mechanical Design Process 6th edition**
   D. G. Ullman 2017
   ISBN-10: 0999357808, ISBN-13: 978-0999357804

3. **Product Design: Techniques in Reverse Engineering and New Product Development**
   K. Otto and K. Wood, Pearson, 2000
   ISBN-10: 0130212717, ISBN-13: 978-0130212719

4. **Introduction to Mechanics of Materials**
   2nd Ed, Madhukar Vable, Expanding Educational Horizons, 2009
   Free OER Download: http://madhuvable.org/wp-content/uploads/2016/04/Entire%20Book%202018.pdf

5. **Shigley's Mechanical Engineering Design, 10th Ed.**
   R. G. Budynas and K. J. Nisbett, McGraw-Hill, 2015 ISBN: 9780073398204

6. **Materials Selection in Mechanical Design**
   5th Ed., Michael F. Ashby, Butterworth-Heinemann, 2016 ISBN: 0081005997

7. **Dimensioning for Interchangeable Manufacture**
   Earlwood T. Fortini, Industrial Press, 1967 ASIN: B0006BQNRC

8. **Machinery's Handbook, E. Oberg, 30th Edition (or later)**
   ISBN-13: 978-0831130916

9. **Roark's Formulas for Stress and Strain, 7th Edition**
   W. C. Young, R. G. Budynas, McGraw-Hill, 2002 ISBN 007072542X

10. **Good to Great: Why Some Companies Make the Leap and Others Don't**
    J. Collins, Harper Business, 2001, ISBN: 9780066620992

11. **Free Culture, L. Lessig, Penguin Books, 2005, ASIN: 0143034650**
    Free OER Download: https://www.researchgate.net/publication/28802969_Free_Culture

Course Schedule

Wk		Monday Classroom	Wednesday MAE-C-010 Lab	Friday Asynchronous (Lecture) and Group Meeting Time	Assignments
1	**1st Quarter**	-	Aug 23 **Course Introduction** **Team Formation**	Aug 25 **The Design Process and its Management** How to design a product?	
2		Aug 28 **Client Visit: Astro Restoration Project (ARP)**	Aug 30 **Design Studio**	Sep 1 **Need Finding and Benchmarking** How to understand user needs?	
3		Sep 4 -- *Holiday* --	Sep 6 **Design Studio**	Sep 8 **Requirements and Design Modelling** How to specify and model what the product must do?	
4		Sep 11 **Design Practice**	Sep 13 **Design Studio**	Sep 15 **Conceptual Design and Creativity Methods** How to come up with novel design concepts?	
5	**2nd Quarter**	Sep 18 **Design Practice**	Sep 20 **Design Studio**	Sep 22 **Concept Evaluation and Prototyping** How to choose the best design concept?	
6		Sep 25 **Design Practice**	Sep 27 **Design Studio**	Sep 29 **Design for X: People and Safety** How to design a product to be easy to use and safe?	* Concept Poster Due
7		Oct 2 **Design Practice**	Oct 4 **Design Studio**	Oct 6 **Design for X: Reliability** How to design a product to be reliable?	
8		Oct 9 **Review 1: Final Concept**	Oct 11 **Review 1: Final Concept**	Oct 13 **Design Analysis (Tom Singer, Northrop Grumman)** How to analyze your product to make sure it doesn't fail?	
9	**3rd Quarter**	Oct 16 **Design Practice**	Oct 18 **Mock Team Performance Review (TAs)**	Oct 20 **Materials and Manufacturing Processes Selection** How to select appropriate materials and manufacturing processes?	
10		Oct 23 **Design Practice**	Oct 25 **Design Studio**	Oct 27 **Geometric Dimensioning and Tolerancing (GD&T) and Costing** How to specify final dimensions and tolerances, and develop a cost model for the product?	
11		Oct 30 **Design Practice**	Nov 1 **Design Studio**	Nov 3 **Elevator Pitches (Julia Sander)** How to pitch your idea to others?	
12		Nov 6 **Review 2: Design Analysis**	Nov 8 **Review 2: Design Analysis**	Nov 10 **Special Topics: Generative Design**	
13	**4th Quarter**	Nov 13 **Design Studio**	Nov 15 **Design Studio**	Nov 17 -- Project Work --	
14		Nov 20 -- Thanksgiving Week --	Nov 22 -- Thanksgiving Week --	Nov 24 -- Thanksgiving Week --	
15		Nov 27 **Design Studio**	Nov 29 **Team Performance Review (TAs)**	Nov 1 -- Project Work --	
16		Dec 4 **Final Presentations**	Dec 6 **Final Presentations**	-	* Project Reports Due

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 and require appropriate documentation and advance communication with the instructor:
https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/

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

Policies on Clear Communication, "Ghosting", Free Riding, Sources of Truth, & Assignment Grade Disputes

1. Once students are assigned into groups, all emails to the EML4501 Teaching Team related to group business must clearly identify the group's number.

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 EML4501 regardless of points accumulated in the class.

4. Any student who accumulates two peer evaluations that are more than two standard deviations below the class mean 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 EML4501 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 EML4501 will be marked incorrect on graded assignments and assessments.

6. 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

This course has laboratory sessions. To ensure safety of all participants, appropriate attire, personal protective equipment (PPE), and right conduct 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

Assignment	Type	Percentage of Final Grade
1. Design Concept Poster	Individual	30%
2. Team Member Performance Review	Individual	5%
3. Project Presentation	Group	10%
4. Project Report	Group	50%
5. Pitch Video	Group	5%
TOTAL		**100%**

This course is graded. Grades are earned based on 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.

Explanation of Peer Evaluation:
Although working in groups, each student will receive an individualized grade commensurate with their effort invested in the project. With each group report submission, all group members submit peer feedback reflecting on their own contributions and the contributions their group members.

Peer evaluations are an important part of your (and your teammates') growth as engineers. Be honest when evaluating your teammates' performance on assignments. Giving overly positive peer evaluations will hurt your own grade! Moreover, evaluations submitted with every group member having perfect scores will be discarded as attempted grade inflation (see honor code section of the syllabus).

Grading Policy
The following is given as an example only.

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

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

Students Requiring Accommodations
Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center by visiting https://disability.ufl.edu/students/get-started/. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

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

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

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

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

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