

## **Mechanical Engineering Design I “Mech 1”**

EML 3005 Section 2153

**Class Periods:** M/W/F, Period 7, 1:55 PM - 2:45 PM

**Location:** LAR 0310

**Academic Term:** Fall 2024

### **Instructor:**

Alison C. Dunn

[alison@ufl.edu](mailto:alison@ufl.edu)

Office Phone Number: (352) 392-0039

Office Hours: Mondays & Wednesdays directly after class, Period 8 (3:00-3:50), NEB TA Room (tentative)

### **Learning Assistants:**

Please contact through the Canvas website

- Dylan Errigo, office hours and roles TBD
- Michael Milligan, office hours and roles TBD
- Adam Hamdan, office hours and roles TBD

### **Course Description**

3 credits. Design process, kinematics, gear trains, and standard mechanical components.

### **Course Pre-Requisites / Co-Requisites**

Prerequisite: COP 2271 and EML 2322L and EGM 3520 with a minimum grade of C and EGM 3401 with a minimum grade of C.

### **Course Objectives**

At the end of the course, students will be able to

- Understand the role of analysis in the mechanical engineering design process
- Be able to determine stresses in mechanical elements
- Be able to design elements to avoid failure from static and dynamic loading within some factor of safety
- Be able to design or select standard mechanical elements
- Have familiarity with the synthesis and analysis in mechanical design

### **Materials and Supply Fees**

None

### **Required Textbooks and Software/Access**

- Text: *Shigley’s Mechanical Engineering Design* by Budynas and Nisbett
- Versions: 10th Edition (2015) or 11th Edition (2020) are both ok, and in any format (eBook, paperback, hardback); avoid “international edition”
- Text Availability: UFAllAccess (<https://www.bsd.ufl.edu/allaccess>)
- Class website: <http://lss.at.ufl.edu> (e-learning on Canvas system)

### **Required Computer**

MAE student computing requirement: <https://mae.ufl.edu/students/undergraduate/computer-requirements/>

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

<b>Outcome</b>	<b>Coverage*</b>
a. Apply knowledge of mathematics, science, and engineering	high
b. Design and conduct experiments, as well as analyze and interpret data	
c. Design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	high
d. Function on multidisciplinary teams	
e. Identify, formulate, and solve engineering problems	high
f. Understand professional and ethical responsibilities	
g. Communicate effectively	medium
h. Understand the impact of engineering solutions in a global, economic, environmental, and societal context	
i. Recognize the need for and be able to engage in lifelong learning	
j. Understand contemporary issues	
k. Use the techniques, skills, and modern engineering tools necessary for engineering practice	high

\*Coverage is given as high, medium, or low. An empty box indicates that this outcome is not part of the course.

**Attendance Policy, Class Expectations, and Make-Up Policy**

The best way to succeed in this class is to attend all class sessions, including Fridays. On lecture days, attendance will be taken by the instructor. On discussion days, attendance will be evidenced by turning in a worksheet during class. You can miss up to 2 class sessions with no penalty and no requirement of documentation. Beyond that, you must contact Prof. Dunn by email regarding an excused absence reason as per university policies. Unexcused absences beyond the 2 free absences will cause a 0 for the participation grade for that class period.

Homework in the form of problem sets will be provided for practice, but no collection or grading of homework will be done.

If you will miss an in-class quiz, you must email the instructor ahead of the quiz time to schedule a makeup.

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/>

**Course Schedule (tentative, only dates of Quizzes and Final Exam are completely fixed)**

Week	Date	Day	Class No.	Topic	Assignment(s)
1	23-Aug	F	1	Introduction	Worksheet 1
2	26-Aug	M	2	Forces and Stresses Review (lecture)	Group Formation Survey
	28-Aug	W	3	Forces and Stresses Review	Worksheet 2
	30-Aug	F	4	Stress Concentrations and Dynamic Loading (lecture)	
3	2-Sep	M	n/a	UF closed, Labor Day	
	4-Sep	W	5	Stress Concentrations and Dynamic Loading	Worksheet 3
	6-Sep	F	6	Yield Criteria for Ductile & Brittle Materials (lecture)	
4	9-Sep	M	7	Yield Criteria for Ductile & Brittle Materials	Worksheet 4A
	11-Sep	W	8	Yield Criteria for Ductile & Brittle Materials	Worksheet 4B
	13-Sep	F	9	Quiz 1: Stresses, Stress Concentrations	
5	16-Sep	M	10	Fracture Mechanics (lecture)	
	18-Sep	W	11	Fracture Mechanics	Worksheet 5
	20-Sep	F	12	Fatigue and Fatigue-Life Methods (lecture)	
6	23-Sep	M	13	Fatigue and Fatigue-Life Methods	Worksheet 6
	25-Sep	W	14	Quiz 2: Yield Criteria and Fracture Mechanics	
	27-Sep	F	15	Endurance Limit and Modifying Factors (lecture)	
7	30-Sep	M	16	Endurance Limit and Modifying Factors	Worksheet 7A
	2-Oct	W	17	Endurance Limit and Modifying Factors	Worksheet 7B
	4-Oct	F	18	Shafts and Shaft Component Design (lecture)	
8	7-Oct	M	19	Shafts and Shaft Component Design	Worksheet 8
	9-Oct	W	20	Quiz 3: Fatigue	
	11-Oct	F	21	Design Project #1 Overview	
9	14-Oct	M	22	Design Project Work	Worksheet 9
	16-Oct	W	23	Mechanical Springs (lecture)	
	18-Oct	F	n/a	UF homecoming	
10	21-Oct	M	24	Mechanical Springs	Worksheet 10A
	23-Oct	W	25	Threaded Components (lecture)	Design Project #1 Report
	25-Oct	F	26	Threaded Components	Worksheet 10B
11	28-Oct	M	27	Quiz 4: Shafts and Mechanical Springs	
	30-Oct	W	28	Design Project #2 Overview	
	1-Nov	F	29	Spur gears (lecture)	
12	4-Nov	M	30	Spur gears	Worksheet 12A
	6-Nov	W	31	Spur gears	Worksheet 12B
	8-Nov	F	32	Design Project Work	Worksheet 12C
13	11-Nov	M	n/a	UF closed, Veterans Day holiday	
	13-Nov	W	33	Other gears (lecture)	
	15-Nov	F	34	Other gears	Worksheet 13
14	18-Nov	M	35	Quiz 5: Threaded Components and Spur Gears	
	20-Nov	W	36	Contact and Bearings (lecture)	
	22-Nov	F	37	Contact and Bearings	Worksheet 14
15	25-Nov	M	n/a	UF closed, Thanksgiving holiday	
16	2-Dec	M	38	Final Project Presentations	
	4-Dec	W	39	Final Project Presentations	
	12-Dec	R			

### **Evaluation of Grades**

<b>Assignment</b>	<b>Total Points</b>	<b>Percentage of Final Grade</b>
Participation: Pre-lecture quizzes (12)	100 each	12%
Participation: Attendance (32)	100 each	16%
Quizzes (5)	100 each	30%
Project 1	100	12%
Project 2	100	20%
Final Exam	100	10%
Total		100%

### **Grading Policy**

Grade Scale (tentative)

<b>Percent</b>	<b>Grade</b>	<b>Grade Points</b>
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 varied perspectives and lived experiences within our community and is committed to supporting the University’s core values, including the elimination of discrimination. It is expected that every person in this class will treat one another with dignity and respect regardless of race, creed, color, religion, age, disability, sex, sexual orientation, gender identity and expression, marital status, national origin, political opinions or affiliations, genetic information, and veteran status.

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](mailto:student-support-hr@eng.ufl.edu)
- Pam Dickrell, Associate Dean of Student Affairs, 352-392-2177, [pld@ufl.edu](mailto:pld@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://elearning.ufl.edu/>.

**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>.