

# **Mechanical Engineering Design 1**

EML 3005 Section 5790

**Class Periods:** MWF, Period 7 (1:55 PM - 2:45 PM)

**Location:** MCCC 0100

**Academic Term:** Spring 2024

*It may become necessary to modify this syllabus during the semester.  
In this event, students will be notified and the revised syllabus will be posted on the course web site.*

## **Instructor:**

Name: Umesh Persad

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

Office Location: MAE-C Room 102

Office Phone Number: 352-392-9473

Office Hours: Mondays 3-4pm, Wednesdays 3-4pm (other times by appointment).

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

Name: Divya Dhananjayan

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

## **Course Description**

Design process, kinematics, gear trains and standard mechanical components. (3 Credit Hours)

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

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, the student should

- Understand how to design using the 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 synthesis and analysis in mechanical design.

## **Materials and Supply Fees**

N/A

**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	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	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	
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions	
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies	

\*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**

- Title: **Shigley'S Mechanical Engineering Design**  
Author: Budynas et al.  
Publication date and edition: 2020, 11<sup>th</sup> Edition  
ISBN: 9780073398211  
Note: Avoid "International Edition" which only has SI units.
- Software: **CAD and Simulation Software will be indicated by instructor**
- Required Computer: This is discussed on both the department and college websites:  
<https://www.eng.ufl.edu/students/resources/computer-requirements/>  
<https://mae.ufl.edu/academics/prospective/undergraduate/computer-requirements/>

Bottomline: **If you don't have a laptop, you need one.**

If you have one that works, feel free to discuss with the instructor whether it will suffice.

## Course Schedule

Wk	Monday	Wednesday	Friday Asynchronous (Canvas)
1	Jan 8 <b>Mechanical Engineering Design</b>	Jan 10 <b>Factors of Safety</b>	Jan 12 Canvas Videos and Exercises
2	Jan 15 -- Holiday --	Jan 17 <b>Materials</b>	Jan 19 Canvas Videos and Exercises
3	Jan 22 <b>Load and stress analysis</b>	Jan 24 <b>Load and stress analysis</b>	Jan 26 Canvas Videos and Exercises
4	Jan 29 <b>Deflection and stiffness</b>	Jan 31 <b>Deflection and stiffness</b>	Feb 2 Canvas Videos and Exercises
5	Feb 5 <b>Static Failure</b>	Feb 7 <b>Static Failure</b>	Feb 9 Canvas Videos and Exercises
6	Feb 12 <b>Fatigue Failure</b>	Feb 14 <b>Fatigue Failure</b>	Feb 16 Canvas Videos and Exercises
7	Feb 19 <b>Shafts</b>	Feb 21 <b>Shafts</b>	Feb 23 Canvas Videos and Exercises
8	Feb 26 <b>Screws and Fasteners (Non-permanent joints)</b>	Feb 28 <b>Screws and Fasteners (Non-permanent joints)</b>	Mar 1 Canvas Videos and Exercises
9	Mar 4 <b>Welding and Bonding (Permanent joints)</b>	Mar 6 <b>Welding and Bonding (Permanent joints)</b>	Mar 8 Canvas Videos and Exercises
10	Mar 11 -- Spring Break --	Mar 13 -- Spring Break --	Mar 15 -- Spring Break --
11	Mar 18 <b>Springs</b>	Mar 20 <b>Springs</b>	Mar 22 Canvas Videos and Exercises
12	Mar 25 <b>Bearings</b>	Mar 27 <b>Bearings</b>	Mar 29 Canvas Videos and Exercises
13	Apr 1 <b>Gears</b>	Apr 3 <b>Gears</b>	Apr 5 Canvas Videos and Exercises
14	Apr 8 <b>Gears</b>	Apr 10 <b>Gears</b>	Apr 12 Canvas Videos and Exercises
15	Apr 15 <b>Gears</b>	Apr 17 <b>Gears</b>	Apr 19 Canvas Videos and Exercises
16	Apr 22 -	Apr 24 -	

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

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/>

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

<b>Assignment</b>	<b>Percentage of Final Grade</b>
Quizzes and Exercises	40%
Design Case Study 1	30%
Design Case Study 2	30%

### ***Grading Policy***

The following is given as an example only.

<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 Graduate Program Coordinator
- HWCOE Human Resources, 352-392-0904, [student-support-hr@eng.ufl.edu](mailto:student-support-hr@eng.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/getting-help/>; <https://distance.ufl.edu/state-authorization-status/#student-complaint>.