

EML3005-5790(13664) - Me Design 1

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ME Design 1

EML3005

Class Periods: MWF 5th period: 11:45a to 12:35p

Location: Weil 270

Academic Term: Spring 2020

Instructor: W. Gregory Sawyer

wgsawyer@ufl.edu

Office: MAEB-328

TA: Axton Isaly

axtonisaly1013@ufl.edu

Office Hours: 10:00AM-11:30AM Tuesday/Thursday

Office Hours Location: MAEB-310 Conference Room

Course Description

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

Evaluation of Grades

Homework (~6 sets)	10%
Exam 1	25%
Exam 2	25%
Exam 3	25%
Final Project	15%

Course Schedule (Overview)

7 February:	Exam 1 - in class
20 March:	Exam 2 - in class
22 April:	Report Due: Project Slide Review - in class
30 April:	Exam 3: Exam Group B (10:00 AM - 12:00 PM)

Course Schedule by Day

6 January	Design and Factors of Safety
8 January	Dimensioning and Tolerancing

10 January	Uncertainty and Reliability
13 January	Stress versus Strain
15 January	Metals
17 January	Plastics
20 January	<i>Martin Luther King Jr. Day</i>
22 January	Material Selection
24 January	Torsion & Pressure Vessels
27 January	Cantilever Beams, Springs, Energy
29 January	Kinematics: Closure Equations & Cams
31 January	Planar Kinematics
3 February	Scotch Yoke/ Slider Crank
5 February	Machine Dynamics

7 February First Exam

10 February	History of Failure, Stress Concentrations
12 February	Dislocations and Tresca
14 February	Stress in 3-dimensions
17 February	Strain Energy
19 February	Distortion Energy
21 February	Brittle Failure
24 February	History of Fatigue
26 February	High Cycle Fatigue
28 February	Mean Stress Models
2 March	<i>UF Spring Break</i>
4 March	<i>UF Spring Break</i>
6 March	<i>UF Spring Break</i>

9 March	Cumulative Damage Models
11 March	Fatigue Example Problems
13 March	Low Cycle Fatigue
16 March	Bearings and Bushings
18 March	Bearing Life Models

20 March Second Exam

23 March	Corrosion and Electrochemistry
25 March	Types of Corrosion
27 March	Hertzian Contacts
30 March	Overview of Gears
1 April	Gear Train and Force Analysis
3 April	Belts and Flexible Systems
6 April	Rivets and Threaded Fasteners
8 April	Bolted Connections
10 April	Snap Fits
13 April	Design with Welds
15 April	Welding Failure Modes

17 April Gaskets, Seals, Basic Hydraulics
20 April Wear of Materials

22 April Final Project Slides and Report

30 April Exam 3 (Final Exam Block B 10AM - 12PM)

Course Pre-Requisites / Co-Requisites

Pre-Req: COP 2271, EML2322L and EGM 3520 with 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 the synthesis and analysis in mechanical design.

Professional Component (ABET):

This course prepares graduates to learn how to design a mechanical component to meet certain requirements.

Relation to Program Outcomes (ABET):

Outcome	Coverage*
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	medium
d. Function on multidisciplinary teams	
e. Identify, formulate, and solve engineering problems	medium

- 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.

Required Textbooks and Software

Book:

Title: SHIGLEY’S MECHANICAL ENGINEERING DESIGN

Software:

Title: Solidworks (2017 – 2018)

Note: Student Access in this course is provided by department

Attendance Policy, Class Expectations, and Make-Up Policy

Regular class attendance is expected, although not explicitly included in the grade evaluation. Late homework is not accepted. Late project submission is not accepted. Makeup exams are only allowed for students with extreme, documented circumstances. Students must contact the instructor as soon as possible to provide documentation and request a make-up exam. Note: club sport activities are not excused absences, personal vacations are not excused absences, job interviews are not excused absences.

Excused absences must be consistent with university policies in the undergraduate catalog (<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx> (Links to an external site.)) and require appropriate documentation.

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> (Links to an external site.)

Students Requiring Accommodations

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, <https://www.dso.ufl.edu/drc>) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

Course Evaluation

Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at <https://evaluations.ufl.edu/evals> ([Links to an external site.](#)). Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at <https://evaluations.ufl.edu/results/> ([Links to an external site.](#)).

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://www.dso.ufl.edu/sccr/process/student-conduct-honor-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.

A student who violates the honor code will receive an E for the course, if it's the student's first honor code violation. Any collaboration on a quiz or an exam is a violation. Collaboration outside of exams can be done on a conceptual basis in general terms. (What was your thought process? What steps did you take to do this problem?) Details such as answers should not be shared. Do & understand your own work. Start, maintain, and finish your own computer file, softcopy, or handwritten hardcopy. Copying someone else's work and submitting it as your own work will be reported as an honor code violation. Helping someone do the same is also an honor code violation. Some homework assignments might be individualized on a student-by-student basis. If two students submit the same individualized homework, this will be reported as an honor code violation. Helping someone do the same is also an honor code violation. Note that Solid Works files will also be cross-referenced, so do not share Solid Works files.

Software Use and Copyrighted Material

All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use and the use of copyrighted material. 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: <http://registrar.ufl.edu/catalog0910/policies/regulationferpa.html> (Links to an external site.)

Campus Resources:

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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: <http://www.counseling.ufl.edu/cwc> (Links to an external site.), and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

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/> (Links to an external site.).

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Academic Resources

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E-learning technical support, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu. <https://lss.at.ufl.edu/help.shtml> (Links to an external site.).

Career Resource Center, Reitz Union, 392-1601. Career assistance and counseling. <https://www.crc.ufl.edu/> (Links to an external site.).

Library Support, <http://cms.uflib.ufl.edu/ask> (Links to an external site.). 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/> (Links to an external site.).

Writing Studio, 302 Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers. <https://writing.ufl.edu/writing-studio/> (Links to an external site.).

Student Complaints

Campus: https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf (Links to an external site.).

On-Line Students Complaints: <http://www.distance.ufl.edu/student-complaint-process> (Links to an external site.).

Course Summary:

Date	Details		
Wed Jan 22, 2020	Assignment	HW1	due by 11:59pm
Fri Jan 31, 2020	Assignment	HW2	due by 11:59pm
Fri Feb 7, 2020	Calendar Event	First Exam	12am
Fri Feb 28, 2020	Assignment	HW3	due by 11:59pm
Fri Mar 20, 2020	Calendar Event	Second Exam	12am
Wed Apr 22, 2020	Calendar Event	Project Presentations	12am
Thu Apr 23, 2020	Assignment	Design Project	due by 11:59pm
Fri Apr 24, 2020	Calendar Event	Reading Day	12am
Thu Apr 30, 2020	Calendar Event	Third Exam	10am to 12pm