EML 3005 - Introduction to Mechanical Design and Machine Elements

Class Periods: Online, Asynchronous, Zoom Lectures TBA

Location: Online, Canvas LMS

Academic Term: Spring 2026

Instructor:

Dr. Daniel Dickrell III

UF Email: djd3@ufl.edu

Note: ***Canvas Mail and UF Email are separate entities. UF Email (djd3@ufl.edu) is checked daily. If your communication is of high importance please use UF Email for official course correspondence. Canvas Mail is not actively monitored.***

Office Hours Location: https://ufl.zoom.us/my/dr.djd3

Time: Tuesday 8:30-10:30 AM

Phone: 352-392-1196

Student Learning Assistants (SLAs):

TBA

Course Description

EML 3005 Mechanical Engineering Design (1) - 3 Credits

Grading Scheme: Letter Grade

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

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

Engineering design is a process of devising a system, component, or process to meet desired needs and specifications within constraints. It is an iterative, creative, decision-making process in which the basic sciences, mathematics, and engineering sciences are applied to convert resources into solutions. Engineering design involves identifying opportunities, developing requirements, performing analysis and synthesis, generating multiple solutions, evaluating solutions against requirements, considering risks, and making trade- offs, for the purpose of obtaining a high-quality solution under the given circumstances.

Mechanical design is an essential part of mechanical engineering, focusing on the development and refinement of mechanical systems and components. In an introductory course, you will explore the fundamentals of designing various mechanisms, including gears, levers, and more complex components such as electric motors. The process integrates principles from mechanics and materials science with a focus on creativity and problem-solving. Key concepts include understanding the fatigue of materials and how this impacts the longevity and reliability of mechanical components. The primary goal in mechanical design is to create safe, efficient, and practical solutions, ensuring that the designs are technically sound and can be realistically manufactured.

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.

Materials and Supply Fees

n/a

Required Textbooks and Software

Title: SHIGLEY’S MECHANICAL ENGINEERING DESIGN

ISBN: 9780073398204

Author: BUDYNAS

Edition: 10th (or new 2020 11th edition is good too)

Copyright: 2015

Publisher: MCGRAW-HILL

Note: Avoid “International Edition” which only has SI units

Course Schedule

Check the Canvas calendar for real-time updates

Attendance Policy, Class Expectations, and Make-Up Policy

Online lectures will be given live and recorded for those who cannot make it. Regular attendance is expected of students that wish to do well.

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/Links to an external site.

Requests deviating from the above policies will not be granted unless verified by the Dean of Student's Office for validity and reason.

Important Dates

March 26th, 2026 *Exam 1 (8:20-10:20 PM, MCCC 0100)*

April 28th, 2026 *Exam 2 (TBA)*

Evaluation of Grades

Assignment	**Percentage of Final Grade**
Non-Exam Assignments (Quizzes, HW)	30%

Exams (I and II)	40%
Group Design Project	30%

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

As the assignment deadlines will be clearly posted on the course websites, late submissions past the deadline will not be accepted. There is no excuse for missed assignments, this is your responsibility to act like a professional student. Don't ask/beg for special treatment.

GRADE DISPUTES:
If a student feels that an exam or homework was graded unfairly, or if there is an error in the grading, it should be brought to the attention of the primary instructor within ***two weeks*** after the grades are posted for that assignment. Scores will not be reconsidered beyond the two-week period.

TA's and graders don't have authority to change grades unilaterally, so please don't ask them.

Relation to Program Outcomes (ABET)*:

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

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 (Medium)
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 (Medium)

*Coverage is given as high, medium, or low.

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/Links to an external site.. 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.

Academic Policies & Resources

To support consistent and accessible communication of university-wide student resources, instructors must include this link to academic policies and campus resources: https://go.ufl.edu/syllabuspolicies. Instructor-specific guidelines for courses must accommodate these policies.

Commitment to a Positive 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.

If you feel like your performance in class is being impacted, 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
- Pam Dickrell, Associate Dean of Student Affairs, 352-392-2177, pld@ufl.edu

On-Line Students Complaints*: https://distance.ufl.edu/state-authorization-status/#student-complaint*Links to an external site..