FLORIDA POLYTECHNIC UNIVERSITY

Syllabus: EML 4500 – Design and Analysis of Machine Components

Spring 2026

Course Information

- **Course Number and Title**: EML 4500 Design and Analysis of Machine Components, Section 2
- **Credit Hours:** 3
- **Academic Term:** Spring 2026
- **Class Time and Location:** Mondays, Wednesdays, & Fridays, 02:00pm – 02:50pm, in IST 1067

Instructor Information

- **Instructor:** Dr. Apurva Patel
- **Office Location:** BARC 1176
- **Office Hours**:
  - **[***In-person @ BARC 1176***]** Mon & Fri: 9:00 – 10:30; Tue & Thu: 10:00 – 11:30
  - **[***Virtually on Teams***]** By appointment
- **Email address**: apurvapatel@floridapoly.edu

Course Delivery and Course Description

- **Delivery Mode**: The course will be taught on campus (IST 1067), and all students are expected to attend in person.
- **Course Website**: Canvas
- **Official Catalog Course Description**: Application of the principles of mechanics of materials in machine design. Topics include stress and deflection analysis of machine parts, variable loads, endurance limits, fasteners, bearings, power transmission, code consideration of pressure and vacuum vessels, and elements of design.
  - **Course Pre and/or Co-Requisites**: EGN 3331 Strength of Materials, MAP 2302 Differential Equations
  - **Communication/Computation Skills Requirement (6A-10.030)**: No
- **Required Texts and Materials:**
  - ***Textbook:*** Budynas, Nisbett (2020) *Shigley's Mechanical Engineering Design*. 11th edition. McGraw Hill.
    - You need not get the most recent edition, any edition will be fine.
  - ***Other Materials***: Canvas, Computer or Tablet, Microsoft Teams, Scientific or Engineering Calculator, Florida Poly Email Address.
  - ***Note***: Only calculator models approved for use on the Fundamentals of Engineering (FE) Exam will be allowed in this course.
    - Casio: All fx-115 and fx-991 models
    - Hewlett Packard: The HP 33s and HP 35s models, but no others
    - Texas Instruments: All TI-30X and TI-36X models

Course Objectives and Outcomes

- **Course Objectives**:
  - Understand loadings and forces on static and dynamic members.
  - Understand failure theories (constant or variable loading scenarios)
  - Apply failure theories in analysis and design of machine components.
  - Ability to design machine components including temporary and permanent joints, shafts, pressure vessels, bearings, and springs.

    - Students will demonstrate professional communication skills in written and oral reporting.
- **Course Learning Outcomes**:
  Students will be able to demonstrate the ability to do the following:
    - Illustrate knowledge of mathematics, science, and engineering to design and analyze machine components.
    - Design and/or evaluate a system, component, or process to meet desired needs withing realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
    - Practice the techniques, skills, and modern engineering tools necessary for engineering practice.
    - Demonstrate professional communication skills in written and oral reporting.
- **Alignment with Program Outcomes**

Course Learning Outcome	Learning Level (Bloom's/ABET Assessment Example)	Program Learning Outcome (ABET 1-7)
Illustrate knowledge of mathematics, science, and engineering to design and analyze machine components.	**Knowledge** – Ability to recall previously learned material **ABET Assessment** – Scores on midterm and final examinations	**ABET 1** – an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
Design and/or evaluate a system, component, or process to meet desired needs withing realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.	**Application** – Ability to use learned material in new situations. **ABET Assessment** – report of design project including documentation of global and societal considerations.	**ABET 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.
Practice the techniques, skills, and modern engineering tools necessary for engineering practice.	**Application** – Ability to use learned material in new situations. **ABET Assessment** – semester design of machinery project.	**ABET 1 & 2** – applied in 1 and 2
Demonstrate professional communication skills in written and oral reporting.	**Application** – Ability to use learned material in new situations. **ABET Assessment** – Final report and presentation.	**ABET 3**- an ability to communicate effectively with a range of audiences

Course Policies

Attendance

Students are expected "to attend all of their scheduled University classes and to satisfy all academic objectives as defined by the instructor" (University Policy, FPU-5.0010AP). It is the student's responsibility to give the instructor notice prior to any anticipated absence and within a reasonable period after an unanticipated absence, ordinarily by the next scheduled class meeting.

Participation

Students are expected to participate in the classroom experience. The use of earbuds/headphones during class is specifically not allowed and students who engage in this behavior may be asked to leave the class for the day (noting exceptions for authorized accommodations). In addition, students who routinely do not bring materials to class that are required for participation, will not be given credit for class attendance, and if this becomes a pattern of behavior, may be asked to leave the class for the day. Persistent problems with participation may result in a code of conduct referral.

Email Policy

Emails must be sent from your Florida Poly email account to the Florida Poly email address of the instructor (apurvapatel@floridapoly.edu). **The instructor will NOT respond to messages sent through Canvas.** Please allow up to 36 hours on weekdays for a response, after which a student may send a follow-up email. Emails must be composed in a professional manner with a greeting, signature, and in an organized fashion. Start the subject line with "[EML4500]" for a quicker response time.

Assignment/Evaluation Methods

The instructor reserves the right to adjust grading at the end of the semester. The following list provides more details about the assignments for the course:

- **Homework**: There will be a total of (tentative) 11 homework sets, worth 10% of your grade. Each homework set will be due about 1 week from when the homework set was assigned.
- **Quizzes**: There will be a total of (tentative) 10 quizzes, worth 10% of your grade. These quizzes are intended to test your understanding on the concepts rather than problem solving.
- **Exams**: There will be two midterms and one final exam. The midterm exams will be worth 20% each, while the final exam is worth 25% of the total grade. Each exam will be conceptually comprehensive, but the focus will be on the newer topics covered.
- **Projects:** A design project will be assigned in the second half of the semester. This is intended for students to demonstrate their ability to apply the concepts and problem solving skills in a context of their choosing. Details will be provided in class.

Grade Breakdown and Grading Scale

The contribution of each assessment category to your final grade is shown in Table 1. Grades for each assignment will be posted to Canvas, and students should make sure they are recorded correctly. Note that the percentages or projected grades provided through Canvas may not always be correct, and the student should consult the instructor if they are uncertain about their standing in the course. The instructor will calculate final percentages and will determine final grades regardless of Canvas calculations. This course will use the grading scale shown in Table 2. Scores will be rounded up to the nearest integer for the final grade.

Table 1: *Grade Breakdown*

Category	Contribution
Attendance	5%
Homework	10%
Quizzes	10%
Design Project	10%
Exams	40%
Final Exam	25%
Total	**100%**

Table 2: *Grading Scale*

Letter Grade	Score
A	93-100
A-	90-92
B+	86-89
B	83-85
B-	80-82
C+	76-79
C	70-75
D	60-69
F	0-59

Re-Grade Requests

A re-grade request can be made by a student that feels an exam was graded incorrectly. To complete the request, a student must submit a written explanation for why they believe an exam should be re-graded (up to 1 page written). The request must be made no later than 1 week after receiving a grade for the exam. A re-grade request consists of the instructor re-grading the ENTIRE exam.

Late Work/Make-up work

Homework assignments may be submitted up to two days late, with a 15% grade penalty per day. No make-up options will be provided for in-class quizzes, expect for documented health or university related circumstances. Make-up opportunities will only be granted for exams in exceptional circumstances and at the discretion of the professor. Students are expected to reach out to the instructor well in advance of an exam or provide a valid justification if doing so ahead of time is not possible.

University Policies

Reasonable Accommodations

The University is committed to ensuring equal access to all educational opportunities. The Office of Disability Services (ODS), facilitates reasonable accommodations for students with disabilities and documented eligibility. It is the student's responsibility to self-identify as a student with disabilities and register with ODS to request accommodations. If you have already registered with ODS, please ensure that you have requested an accommodation letter for this course through the ODS student portal, and communicate with your instructor about your approved accommodations as soon as possible. Arrangements for testing accommodations must be made in advance. Accommodations are not retroactive. If you are not registered with ODS but believe you have a temporary health condition or permanent disability requiring an accommodation, please contact ODS as soon as possible: DisabilityServices@floridapoly.edu; (863) 874-8770; www.floridapoly.edy/disability.

Accommodations for Religious Observances, Practices and Beliefs

The University will reasonably accommodate the religious observances, practices, and beliefs of individuals in regard to admissions, class attendance, and the scheduling of examinations and work assignments. (See University Policy.)

Title IX

Florida Polytechnic University is committed to ensuring a safe, productive learning environment on our campus that prohibits sex discrimination and sexual misconduct, including sexual harassment, sexual assault, dating violence, domestic violence and stalking. Resources are available if you or someone you know needs assistance. Any faculty or staff member you speak to is required to report the incident to the Title IX Coordinator. Please know, however, that your information will be kept private to the greatest extent possible. You will not be required to share your experience. If you want to speak to someone who is permitted to keep your disclosure confidential, please seek assistance from the Florida Polytechnic University Ombuds Office, BayCare's Student Assistance Program, 1-800-878-5470 and locally within the community at Peace River Center, 863-413-2707 (24-hour hotline) or 863-413-2708 to schedule an appointment. The Title IX Coordinator is available for any questions to discuss resources and options available.

Academic Integrity

Violations of academic integrity regulation include actions such as cheating, plagiarism, use of unauthorized resources (including but not limited to use of Artificial Intelligence tools), illegal use of intellectual property, and inappropriately aiding other students. Such actions undermine the central mission of the university and negatively impact the value of your Florida Poly degree. Suspected violations will be fully investigated, possibly resulting in sanctions up to and including expulsion from the university.

Recording Lectures

Students may, without prior notice, record video or audio of a class lecture for a class in which the student is enrolled for their own personal educational use. Recordings may not be used as a substitute for class participation or class attendance. Recordings may not be published or shared in any way, either intentionally or accidentally, without the written consent of the faculty member. Failure to adhere to these requirements is a violation of state law (subject to civil penalty) and the student code of conduct (subject to disciplinary action). *Recording class activities including, but not limited to, lab sessions, student presentations (whether individually or part of a group), class discussion (except when incidental to and incorporated within a class lecture), and invited guest speakers is* ***prohibited****.*

Academic Support Resources

- **Library**: Students can access the Florida Polytechnic University Library through the University website and Canvas, on and off campus. Students may direct questions to library@floridapoly.edu.
- **Tutoring and Learning Center**: The Tutoring and Learning Center (The TLC) provides tutoring to all Florida Poly students who may need additional academic support. The TLC is staffed by students who have excelled in the courses they tutor. They offer support by reviewing concepts and materials from class, clarifying points of confusion and providing assistance with learning strategies. While the focus of TLC is to provide support to students in freshman-level courses, upper-level courses are also tutored at the Center. The TLC is located in the IST Commons (second floor).

    - **Knack Tutoring**: Students looking for additional assistance outside of the classroom are advised to consider working with a peer tutor through Knack. Florida Polytechnic University has partnered with Knack to provide students with access to verified peer tutors who have previously aced this course. To view available tutors, visit floridapoly.joinknack.com and sign in with your student account.
- **Academic Success Coaches**: All students at Florida Poly are assigned an Academic Success Coach. Your Academic Success Coach can assist you with academic success strategies. Please visit the Student Success Center on the second floor of the IST building to meet with an Academic Success Coach.
- **Writing Center**: Located on the second floor of the IST (2059/2061), the Writing Center helps students to develop their writing and presentation skills. Consultations are available in person and virtually. For more detail, visit floridapoly.edu/writing center.

Tentative Course Schedule

The planned course schedule shown in Table 3 includes the sequence of lectures and the expected deadlines for assignments. Changes to the schedule will be communicated in class.

Table 3: *EGN 3321 Course Schedule for Spring 2026*

Week	Date	Day	Class	Lecture Topic	Deliverables
1	2026-Jan-12	Mon	1	Class Introduction	
	2026-Jan-14	Wed	2	Introduction to DAMC	
	2026-Jan-16	Fri	3	Material Properties	Intro Quiz
2	2026-Jan-19	Mon	-	NO CLASS	
	2026-Jan-21	Wed	4	Material Properties	
	2026-Jan-23	Fri	5	Manufacturing	Homework 1
3	2026-Jan-26	Mon	6	Manufacturing	Quiz 1
	2026-Jan-28	Wed	7	Load & Stress Analysis	
	2026-Jan-30	Fri	8	Load & Stress Analysis	Homework 2
4	2026-Feb-02	Mon	9	Mohr's Circle	Quiz 2
	2026-Feb-04	Wed	10	3-Dimensional Stress	
	2026-Feb-06	Fri	11	Bending	Homework 3
5	2026-Feb-09	Mon	12	Defection and Stiffness	Quiz 3
	2026-Feb-11	Wed	13	Castigliano's Theorem	
	2026-Feb-13	Fri	14	Exam 1 Review	Homework 4
6	2026-Feb-16	Mon	15	Exam 1	
	2026-Feb-18	Wed	16	Static Loading Failure	
	2026-Feb-20	Fri	17	Static Loading Failure	Quiz 4
7	2026-Feb-23	Mon	18	Variable Loading	
	2026-Feb-25	Wed	19	Variable Loading	
	2026-Feb-27	Fri	20	Variable Loading	Homework 5
8	2026-Mar-02	Mon	21	Endurance Parameters	Quiz 5
	2026-Mar-04	Wed	22	Endurance Parameters	
	2026-Mar-06	Fri	23	Shafts	Homework 6
9	Spring Break - No Classes				
10	2026-Mar-16	Mon	24	Exam 2 Review	
	2026-Mar-18	Wed	25	Exam 2	
	2026-Mar-20	Fri	26	Non-Permanent Joints	Quiz 6
11	2026-Mar-23	Mon	27	Non-Permanent Joints	
	2026-Mar-25	Wed	28	Power Screws	
	2026-Mar-27	Fri	29	Permanent Joints	Homework 7
12	2026-Mar-30	Mon	30	Permanent Joints	Quiz 7
	2026-Apr-01	Wed	31	Mechanical Springs	
	2026-Apr-03	Fri	32	Mechanical Springs	Homework 8
13	2026-Apr-06	Mon	33	Roller Bearings	Quiz 8
	2026-Apr-08	Wed	34	Lubrication Bearings	
	2026-Apr-10	Fri	35	Gears Introduction	Homework 9
14	2026-Apr-13	Mon	36	Spur and Helical Gears	Quiz 9
	2026-Apr-15	Wed	37	Spur and Helical Gears	
	2026-Apr-17	Fri	38	Bevel and Worm Gears	Homework 10
15	2026-Apr-20	Mon	39	GD&T	Quiz 10
	2026-Apr-22	Wed	40	GD&T	
	2026-Apr-24	Fri	41	Project Presentations	Homework 11
16	2026-Apr-27	Mon	42	Review for Final	
	TBD			Final Exam	