Syllabus: EML 4500 – Design and Analysis of Machine Components
Spring semester 2026

Course Information

Course Number and Title: EML 4500 Design and Analysis of Machine Components

Credit Hours: 3

Academic Term: Spring 2026

Instructor Information

Instructor: Dr. Elisabeth Kames

Office Location: BARC 1178

Office Hours: M-T-W 11:00am – 12:00pm in BARC 1178 or by appointment. Microsoft Teams is also available, as requested.

Email: ekames@floridapoly.edu

Course Details

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:** Budynas, Nisbett (2020) *Shigley's Mechanical Engineering Design*. 11th edition. McGraw Hill **Equipment and Materials**: Canvas, calculator, FL Poly email.
  Note: Only use of the following calculator models as used on the Fundamentals of Engineering (FE) Exam are allowed.

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:

Students will be able to demonstrate the ability to do the following:

Course Learning Outcome	Learning Level	Program Learning Outcome (ABET, GenEd, Other)
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

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.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.

Course Policies

Attendance

Students in **face-to-face (this includes labs and C-courses)** courses 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). **Attendance is mandatory.** Exceptions to any attendance requirements may be made on a case-by-case basis.

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.

Homework/Deliverables

- LATE HOMEWORK WILL NOT BE ACCEPTED.
- ALL HOMEWORK AND PROJECT DELIVERABLES MUST BE TURNED IN **ON CANVAS ASSIGNMENTS TO EARN CREDIT**. IF THE ASSIGNMENT IS NOT POSTED IN CANVAS, A ZERO WILL BE RECORDED.

- Should you have extenuating circumstances, **CONTACT YOUR INSTRUCTOR**. Your instructor will work with you and others, as needed, in the university community to make the appropriate adjustments. They may, at their discretion, accept a 'past due' assignment, however, **YOU must email your instructor and ask them to open the Canvas assignment for you.** The instructor retains the right to ask for documentation of your 'extenuating circumstance' before they reopen the assignment. The Canvas Assignment will remain open for 24 hours, after the request has been accepted with a confirmation email from the instructor to the student. Late/makeup work *MAY* be excepted on a case-by-case basis.

In-Class Assignments

All in-class assignments are due by the end of the class period in which they are assigned. Students are NOT allowed to complete in-class assignments if they are not present in class the day that they are assigned. No make-up in-class assignments will be given for any reason.

Email Policy

Emails must be sent from your Florida Poly email account to the Florida Poly email address of the instructor (ekames@floridapoly.edu). Please allow up to 36 hours on weekdays for a response, after which you 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 "[EML 4500]" for a quicker response time. NO CANVAS Messages.

Assignment/Evaluation Methods

- **Homework: Homework will be assigned weekly and will be due in Canvas before class per the specified due date. Usually, you will have one week to complete the homework.** Be sure to check your Assignments in Canvas, and set your reminders as necessary, for the dates and times that correspond to the start of your class period.
    - Deliverables and due dates for the design project will be specified in handouts during class. Late or past due work will follow the same policies as homework.
    - All deliverables, other than when specified, will be 'individual' where everyone must submit their own work.
    - **Your instructor wants to work with you! Communication is key!**

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

Grading Scale

(See also University Grading Policy).

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

Percentages that fall between grades will be rounded up

Grades for will be posted to Canvas for reference only, and students should make sure they are recorded correctly. However, there is no guarantee that the percentages or projected grades provided there are correct. The instructor will calculate final percentages and will determine final grades regardless of Canvas calculations.

University Policies

Reasonable Accommodations

The University is committed to ensuring equal access to all educational opportunities. The University, through 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.

The Office of Disability Services (ODS):

DisabilityServices@floridapoly.edu

(863)874-8770

The Access Point

ODS Website: https://floridapoly.edu/student-affairs/health-wellness/disability-services.php

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. It is important for you to know that there are resources available if you or someone you know needs assistance. You may speak to your professor, but your professors have an obligation to report the incident to the Title IX Coordinator. It is an educational goal that you feel able to share information related to your life experiences in classroom discussions and in one-on-one meetings. However, it is requirement for university employees to share information with the Title IX Coordinator regarding disclosure. However, please know 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.

Academic Integrity

The faculty and administration take academic integrity very seriously. 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 an academic integrity hearing and sanctions against the accused student if found in violation. Sanctions range from receiving a zero on the exam or assignment, to expulsion from the university. Repeat offenders are subject to more severe sanctions and penalties. Do not compromise your integrity for a perceived short-term gain.

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 other than class lectures, 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****.*

Course Schedule

- **Tentative Schedule** (Subject to change)
  - **Changes in syllabus and assignment sheets may be modified as deemed appropriate. All changes will be announced in class.**

Week	Date	Day	Topic		
			Monday	**Wednesday**	**Friday**
1	2026.01.12	1	Class Introduction		
	2026.01.14	2		Introduction to DAMC	
	2026.01.16	3			Material Properties
2	2026.01.19	-	NO CLASS		
	2026.01.21	4		Material Properties	
	2026.01.23	5			Manufacturing
3	2026.01.26	6	Manufacturing		
	2026.01.28	7		Load & Stress Analysis	
	2026.01.30	8			Load & Stress Analysis
4	2026.02.02	9	Mohr's Circle		
	2026.02.04	10		3 Dimensional Stress	
	2026.02.06	11			Bending
5	2026.02.09	12	Defection and Stiffness		
	2026.02.11	13		Castigliano's Theorem	
	2026.02.13	14			Exam 1 Review
6	2026.02.16	15	Exam 1		
	2026.02.18	16		Static Loading Failure	
	2026.02.20	17			Static Loading Failure
7	2026.02.23	18	Variable Loading		
	2026.02.25	19		Variable Loading	
	2026.02.27	20			Variable Loading
8	2026.03.02	21	Endurance Parameters		
	2026.03.04	22		Endurance Parameters	
	2026.03.06	23			Shafts
9	2026.03.09	-	NO CLASS		
	2026.03.11	-		NO CLASS	
	2026.03.13	-			NO CLASS
10	2026.03.16	24	Exam 2 Review		
	2026.03.18	25		Exam 2	
	2026.03.20	26			Non-Permanent Joints
11	2026.03.23	27	Non-Permanent Joints		
	2026.03.25	28		Power Screws	
	2026.03.27	29			Permanent Joints
12	2026.03.30	30	Permanent Joints		
	2026.04.01	31		Mechanical Springs	
	2026.04.03	32			Mechanical Springs
13	2026.04.06	33	Roller Bearings		
	2026.04.08	34		Lubrication Bearings	
	2026.04.10	35			Gears Introduction
14	2026.04.13	36	Spur and Helical Gears		
	2026.04.15	37		Spur and Helical Gears	
	2026.04.17	38			Bevel and Worm Gears
15	2026.04.20	39	GD&T		
	2026.04.22	40		GD&T	
	2026.04.24	41			Project Presentations
16	2026.04.27	42	Review for Final		
	TBD		**Final Exam**		