Sample Syllabus

ME 360 Mechanical Design - Fall 2024 - Section 001

Lecture Schedule: MWF 09:05 – 09:55, Health & Human Development Building 350
Instructor: Dr. Gregory Banyay, gregory.banyay@psu.edu, (814) 863-4129.
Office Hour: Fri 08:00 – 09:00, Reber 135.
Teaching Assistant: Ajay Kushwaha, **Office Hour**: Tuesday 10:00 – 11:00, 1st Floor Reber
Text: Machine Design, Norton, 6th edition
Enrollment Requirements: Students must be in the ME_BS major. Prerequisites: CMPSC 200, EMCH 213

Introduction:
This course is required for all mechanical engineering students, and is taken in the junior year. It is an introduction to analysis and design of mechanical components. It helps provide practical insight into theory provided by prerequisites in engineering mechanics and materials science. Students initially perform yielding and fatigue failure predictions for general structural elements and then focus on specific mechanical components such as gears, fluid film bearing, rolling element bearings, screws, shafts and springs. Use and interpretation of finite element analyses (FEA) are also introduced. The overall goals are for students to learn to make basic design decisions regarding the suitability of different materials in mechanical components (e.g. steel versus aluminum); and to make basic design decisions regarding the suitability of different components in a mechanical system (e.g. ball bearings versus fluid film bearings).

Objectives:
Upon completion of this course, students should be able to:
1. Apply concepts and methods learned in Statics (EMech 211), Strengths of Materials (EMech 213) and Engineering Materials (EMech 315) to the analysis and design of mechanical components.
2. Perform static and fatigue failure predictions for structural mechanical elements that can be used for design.
3. Analyze and specify different mechanical components such as shaft, gears, bearing, screws, and springs.
4. Make basic design decisions regarding the suitability of different materials in mechanical components, e.g. steel vs. aluminum.
5. Make basic design decisions regarding the suitability of different components in a mechanical system, e.g. ball bearings vs. fluid film bearings.
6. Recognize ethical issues in engineering design and practice and make informed judgements, considering the impact of engineering solutions in global, economic, and social contexts.

Tentative Schedule	Week	Starting Monday	Topic	Reading	Assignment
	1	Aug. 26	Introduction	Ch 1	
	2	8/29	Materials Selection	Ch 2	Homework 1
	3	9/5	Kinematics	Ch 3	
	4	9/12	Load Determination	Ch 3	Homework 2
	5	9/19	Stress, Strain, Deflection	Ch 4	Homework 3
	6	9/26	Stress, Strain, Deflection	Ch 4	Homework 4
	7	10/3	Static Failure	Ch 5	Homework 5
	8	10/10	Fatigue Failure	Ch 6	
	9	10/17	Fatigue & Surface Failure	Ch 6,7	Homework 6
	10	10/24	Engineering Simulation	Ch 8	Homework 7
	11	10/31	Shafts, keys, couplings (1)	Ch 10	
	12	11/7	Bearings, lubrication (1)	Ch 11	Homework 8
	13	11/14	Gears (1)	Ch 12,13	Homework 9
	14	11/21	Thanksgiving Holiday - No Classes		
	15	11/28	Springs (1)	Ch 14	
	16	12/5	Screws and Fasteners (1)	Ch 15	Homework 10

Notes:
1. Indicated subjects addressed to greater or less depth depending on demonstrated successful understanding of preceding chapters, and details of project.

Grading Policy:
Project-related Assignment: 20% Homework quizzes: 10% each (option to drop lowest two) Total: 100%
< 60% = F, 60%-65% = D, 65%-70% = C, 70%-75% = C+, 75%-80%= B-, 80%-85% = B, 85%-90% = B+, 90%-95% = A-, 95%-100% = A.

• Group discussions on HWs are encouraged. However, directly sharing your work is not allowed. Solutions borrowed or copied from other students will be reported as Academic Integrity violations.
• HW quizzes will be assigned and graded through CANVAS, using resources from Pearson, often including PDF submission. For late submission, 20% grade per day will be reduced.
• Discussion of project work will happen in-person. Project details will evolve as the semester progresses.
• Any issues regarding grades, including missing grades, must be resolved within a week of homework due date or graded exam return date.

Teaching Mode: In person

Supplementary Materials:
Video lectures http://media.pearsoncmg.com/ph/esm/ecs_norton_mechdesign_5/videonotes.html
Advanced topics:
ME 461 Finite Elements in Engineering
ME 480 Mechanism Design and Analysis
ME 440W-443W Senior Capstone Project

Academic Integrity:
Academic integrity is the pursuit of scholarly activity in an open, honest and responsible manner. Academic integrity is a basic guiding principle for all academic activity at The Pennsylvania State University, and all members of the University community are expected to act in accordance with this principle.
Penn State University Academic Administrative Policies and Procedures Manual
G-9: ACADEMIC INTEGRITY https://undergrad.psu.edu/aappm/G-9-academic-integrity.html

I will be frank: design, in particular, is an activity highly dependent upon your integrity. We will read about numerous historical examples where even seemingly small lapses of ethical behavior or good judgment have caused major disasters. We all make mistakes; to err is human. However, we will not tolerate *unethical* behavior any more in this course than one can expect in real-world work. You can repeat this course. There are no do-overs in the real world.

Disability Access:
Penn State welcomes students with disabilities into the University's educational programs. Every Penn State campus has an office for students with disabilities. The Student Disability Resources Web site provides contact information for every Penn State campus: http://equity.psu.edu/student-disability-resources/disability-coordinator. For further information, please visit the Student Disability Resources Web site: http://equity.psu.edu/student-disability-resources.
In order to receive consideration for reasonable accommodations, you must contact the appropriate disability services office at the campus where you are officially enrolled, participate in an intake interview, and provide documentation: http://equity.psu.edu/student-disability-resources/applying-for-services. If the documentation supports your request for reasonable accommodations, your campus's disability services office will provide you with an accommodation letter. Please share this letter with your instructors and discuss the accommodations with them as early in your courses as possible. You must follow this process for every semester that you request accommodations.

Counseling & Psychological Services (CAPS):
CAPS can help students resolve personal concerns that may interfere with their academic progress, social development, and satisfaction at Penn State. Some of the more common concerns include anxiety, depression, difficulties in relationships (friends, roommates, or family); sexual identity; lack of motivation or difficulty relaxing, concentrating or studying; eating disorders; sexual assault and sexual abuse recovery; and uncertainties about personal values and beliefs.
You can contact CAPS by calling the Main CAPS number/Appointment Scheduling: 814-863-0395 (Please call between the hours of 8am and 5pm, Monday-Friday to schedule an appointment) or visit us at our office location, 5th Floor Student Health Center.

Educational Equity/Report Bias:
Penn State takes great pride to foster a diverse and inclusive environment for students, faculty, and staff. Acts of intolerance, discrimination, or harassment due to age, ancestry, color, disability, gender, gender identity, national origin, race, religious belief, or veteran status are not tolerated and can be reported through Educational Equity via the Report Bias webpage (http://equity.psu.edu/reportbias/).

Lay aside preconceived notions of "DEI", or derivations thereof from popular culture. Embrace the diversity amongst us. Treat one another in equitable ways. Include one another in the struggle towards excellence.

Professionalism:
I mean two things by this. First, this course is structured to encourage successful completion of a Fundamentals of Engineering (FE) exam, eventually leading to Professional Engineering licensure, for those who so desire. Second, please treat this class as a functioning professional – treat others with respect, give advance notice to fellow students and teachers when warranted if situations arise.

Communications:

I sincerely desire to know each of you. Our class size may render that prohibitive, however. Therefore, please communicate with me in the following ways, in order:

1. Primary: office hours.
2. Secondary: discussion board feature of canvas (i.e., as many of your fellow students will have similar questions)
3. Least preferred: e-mail, if used please include "ME 360" in the subject line