Fairfield University
School of Engineering

Syllabus for: Machine Design, MEEG3311

Instructor: Prof. William Dornfeld

EMail: wdornfeld@fairfield.edu
Phone: 203.241.8705
Course Web Page:
http://www.faculty.fairfield.edu/wdornfeld/ME311/311Resources.html

Instructor Assistance: One Half Hour before or after every class, or by appointment

Lecture Hours: 6:30 to 9:00 PM Thursdays in 139 BNW

Class Requirements:

1) Completion of MEEG3308 (Strength of Materials) is a prerequisite for this course.
2) Assigned homework will be discussed at the following class session - students will present their solutions at the beginning of the session.
3) Oral and written reports will be required for the reverse-engineering projects.

Course Description:

Fundamentals of mechanical engineering design are applied to analyze, design, and/or select components typically used in the designs of complete mechanical systems. Part 1 of the course covers the design process and analysis of stress and deflection. Part 2 includes material properties and loadings (steady state and variable) as they relate to failure prevention. Responsible design (safety factors and ethics) will be addressed. Part 3 covers the procedures for design and analysis of common machine elements such as columns, cylinders, fasteners, and springs. In team "reverse engineering" (R-E) projects, students will apply the course topics to real hardware. Computer techniques including MSExcel will be emphasized.

Course Learning Goals	Bloom	ABET	Expected Outcomes
1. Students will learn to analyze the stress and strain aspects of machine components.	4	2	a. Ability to correctly analyze stress and deflection of loaded structures. b. Ability to select correct material strength properties.
2. Students will learn how to determine failure and fatigue in mechanical components and determine safety factors.	4	1, 5	a. Ability to understand and apply safety margins. b. Demonstrate ability in reverse engineering project.
3. Students will learn to support hand calculations by applying computer techniques to design analysis and to use the Web to obtain design information.	4	1, 2	a. Use computing tools to solve homework problems and in reverse engineering project.
4. Students will produce oral and written presentations and demonstrate functioning in team situations.	5	4, 7	a. Generate professional quality R-E project report and oral presentation. b. Demonstrate teamwork in R-E projects.

Bloom's Taxonomy levels: 4 = Analysis; 5 = Synthesis. ABET student outcomes:

ABET-1 an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
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.
ABET-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.
ABET-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.
ABET-7 an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Schedule:

Wk	Session	Topics	Reading (Before Class!)
1	7-Sep-23	Introduction - Fundamentals of the Design Process, Review of Stress, Units, Mohr's Circle	Chap. 1; Chap. 2 But Not 2.8.3, 2.11, & 2.17-2.18
2	14-Sep-23	Materials - Strength & Other Properties, Stresses & Strains, Power Transmission	Chap. 3 But Skim 3.3 & 3.7 - 3.8; Chap. 4
3	21-Sep-23	Review of Deflection, Strain Energy Methods	Chap. 5 But Not 5.3 & Skim 5.5-5.6.
4	28-Sep-23	Stress Concentration; Steady Loading - Failure Theories	Chap. 6.1-6.2, 6.6-6.8
5	5-Oct-23	Review; In-Class Exam	
6	12-Oct-23	Variable Loading - Fatigue, Modifying Factors; S-N Curves	Chap. 7.1-7.9
7	19-Oct-23	Fluctuating Fatigue; Impact	7.10 -7.10.1 (Except Complete Modified Goodman Diag.), 7.13-7.14
8	26-Oct-23	Review; Columns & Buckling	Chap. 9
9	2-Nov-23	Cylinders & Press Fits; Disks	Chap. 10 (Skim 10.2)
10	9-Nov-23	2nd In-Class Exam	
11	16-Nov-23	Power Screws; Bolted Joints	Chap. 16.1-16.4, Skim 16.5
12	23-Nov-23	NO CLASS - Thanksgiving Break	
13	30-Nov-23	Mechanical Springs – Stress & Deflection	Chap. 17.1-17.5, Skim 17.6-17.9
14	7-Dec-23	Reverse Engineering Presentations	Written Project Reports Due
15	14-Dec-23	Review; In-Class Exam	

Textbook: *Fundamentals of Machine Elements*, 3rd Edition, Hamrock, Jacobson, & Schmid, CRC Press, ISBN 9781439891322. Do NOT get any other edition. Only a paper version may be used during in-class exams – no e-books.

Attendance Policy: All students are expected to attend every scheduled class session and to turn in homework due each week. Students are responsible for acquiring notes and homework assignments from classmates in case of absence, and to notify the professor.

The course will be graded as follows:

Midterm Exams (2)	40%
Final Exam	30%
Rev. Engr. Reports (Oral & Written)	20%
Homework / Participation / Quizzes / Professionalism	10%

1. All students should review the Academic Honesty section of the Undergraduate Course Catalog to understand what conduct to avoid and what bad things happen when that conduct is not avoided.

2. Students who have arranged for special accommodations through the Office of Accessibility should present a letter from that Office confirming their need for special accommodations.

The seven characteristics of highly successful MEEG3311 students:

1. Complete textbook readings before class.
2. Complete all homework assignments each week.
3. Ask questions when something isn't clear (for class, homework, & exams).
4. Draw good sketches, show all steps, apply sanity checks to their work, and keep track of units.
5. Search the Web for tutorials and component information.
6. Be a team player in the Reverse Engineering projects and in-class activities.
7. Apply computer techniques to class material, but not instead of hand calculations.

Respect for Diversity: It is my intent that students from all diverse backgrounds and perspectives be well served by this course, that students' learning needs be addressed both in and out of class, and that the diversity that students bring to this class be viewed as a resource, strength and benefit. I will do my best to address and refer to all students according to their preferences and support classmates in doing so as well.