Mechanical Engineering Design 1
EML 3005, Fall 2020
4th Period, MWF, Zoom
8th Period, MWF, Zoom

Instructor: Dr. Andrés Rubiano, MAE-B 307, Email: ssjandres@ufl.edu
Office hours: M, W, F 11:30 AM – 12:50 PM, 3:00 PM – 4:00 PM
Teaching Assistant: Tiffany Saballos - Email: tiffanys29@ufl.edu F: 1:00 PM – 3:00 PM

Course Structure:

Before EVERY class meeting, students are to:
- <u>study</u> the one 8-12-minute lecture main video (1-hour worth of lecture content).
- watch the two or three 1-4-minute "additional examples videos" for each lecture topic.
- solve the two or three textbook-style exercises homework assignment.

Students are to attend all classes, with camera on. Attendance will be taken, and participation will be noted.

Class meeting times will be used to:
- answer specific questions about lecture videos, example videos, and homework (in that order).
- work on design specific problems (breakout rooms).
- take in-class pop-quizzes.

Course Assignments

Homework: There is one homework assignment for every day of class (2-3 textbook-style problems, similar to the video example solutions). Homework assignments will not be graded, but they are essential to properly prepare for class, quizzes, and exams.

Quizzes: Approximately 20 quizzes total; mostly 5-15-minute pop quizzes. Quiz time will appear limited and quiz problems, challenging, if homework assignments are not completed.

Project: Four-person group project posted Monday, Sept. 28th, 2020. Project updates will be requested randomly and without previous notice between the date of posting and the final submission date, Nov. 23rd, 2020.

Exams: There will be 3 [cumulative] night exams.
Exam Schedule: Sept 28th, Nov. 9th, and Dec. 9th.

Grading: Quizzes (25%), Exams (60%), Project (15%).

Course Content and Schedule:

Date		Day	Content	
August	31	M	Axial Loading Review	
September	2	W	Torsion Review	
September	4	F	Pure Bending and Deflection Review	
September	7	M	Holiday	
September	9	W	Pure Bending and Deflection Combined Example	
September	11	F	Shear and First Moment About Neutral Axis Review	
September	14	M	Mohr's Circle Review	

September	16	W	Brittle Failure Theories - Fracture Criteria	
September	18	F	Ductile Failure Theories - Yield Criteria	
September	21	M	Design Factor and Uncertainty	
September	23	W	Tolerance Stack Ups	
September	25	F	Castigliano's Theorem	
September	28	M	**EXAM 1** - Project Assignment Posted	
September	30	W	Fracture Toughness	
October	2	F	Crack Propagation	
October	5	M	Fatigue SN Diagrams	
October	7	W	Marin Factors	
October	9	F	Fatigue Stress Concentration	
October	12	M	Fatigue Failure Criteria	
October	14	W	Shaft Design	
October	16	F	Power Screws	
October	19	M	Screw Thread Stress	
October	21	W	Fastener and Member Stiffness	
October	23	F	Bolt Tension	
October	26	M	Proof Strength and Factors of Safety	
October	28	W	Spring Stress and Spring Constant	
October	30	F	Shearing Yield Strength and Presetting	
November	2	M	Springs Fatigue - Zimmerli	
November	4	W	Spring Design Restrictions	
November	6	F	Extension Springs	
November	9	M	**EXAM 2**	
November	11	W	Holiday	
November	13	F	Gear Relations and Nomenclature	
November	16	M	Gear Trains and Planetary Gears	
November	18	W	Spur Gear Forces	
November	20	F	Helical, Bevel, and Worm Gear Forces	
November	23	M	Bending Stress at the Teeth	
November	25	W	Thanksgiving	
November	27	F	Thanksgiving	
November	30	M	Pitting - Surface Compressive Stress	
December	2	W	Bearing Radial Forces	
December	4	F	Bearing Axial Forces	
December	7	M	Bearing Design	
December	9	W	**EXAM 3**	

Other Course Information

Textbook
Title: SHIGLEY'S MECHANICAL ENGINEERING DESIGN
ISBN-13: 978-1260407648
ISBN-10: 1260407640Author: BUDYNAS
Edition: 11TH
Copyright: 2020
Publisher: MCGRAW-HILL

Grading Scale: The final grade will be calculated by the following table.

Table 1. Grading Table. *%GE = Percent Grade Earned.*

Percentage Range	Grade Point
$93.33 \leq \%GE < 100.00 \Longrightarrow$ A	4.00
$90.00 \leq \%GE < 93.33 \Longrightarrow$ A-	3.67
$86.67 \leq \%GE < 90.00 \Longrightarrow$ B+	3.33
$83.33 \leq \%GE < 86.67 \Longrightarrow$ B	3.00
$80.00 \leq \%GE < 83.33 \Longrightarrow$ B-	2.67
$76.67 \leq \%GE < 80.00 \Longrightarrow$ C+	2.33
$73.33 \leq \%GE < 76.67 \Longrightarrow$ C	2.00
$70.00 \leq \%GE < 73.33 \Longrightarrow$ C-	1.67
$66.67 \leq \%GE < 70.00 \Longrightarrow$ D+	1.33
$63.33 \leq \%GE < 66.67 \Longrightarrow$ D	1.00
$60.00 \leq \%GE < 63.33 \Longrightarrow$ D-	0.67
$00.00 \leq \%GE < 60.00 \Longrightarrow$ E	0.00

Relation to Program Outcomes (ABET):

Outcome	Coverage*
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	Low
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

Grade Corrections:
Corrections of grades should be submitted to instructor within 5 business days of the grade posting in writing with a concise statement of why you believe there has been an error. Note that the instructor has the final determination in the grade assigned. If a grade change is determined, it may result in a lower or higher grade.

Academic honesty
All students admitted to the University of Florida have signed a statement of academic honesty committing themselves to be honest in all academic work and understanding that failure to comply with this commitment will result in disciplinary action. This statement is a reminder to uphold your obligation as a student at the University of Florida and to be honest in all work submitted and exams taken in this class and all others.

Accommodation for Students with Disabilities
Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, https://www.dso.ufl.edu/drc) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

Course Evaluation
Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at https://evaluations.ufl.edu/evals. Evaluations are typically open during the last two or three

weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at https://evaluations.ufl.edu/results/.

Health and Wellness
- U Matter, We Care: If you or a friend is in distress, please contact umatter@ufl.edu or 352 392-1575 so that a team member can reach out to the student.
- Counseling and Wellness Center: http://www.counseling.ufl.edu/cwc, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.
- Sexual Assault Recovery Services (SARS), Student Health Care Center, 392-1161.
- University Police Department at 392-1111 (or 9-1-1 for emergencies), or http://www.police.ufl.edu/.

Software Use
All faculty, staff and student of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

Student Privacy
There are federal laws protecting your privacy regarding grades earned in courses and on individual assignments. For more information, please see: http://registrar.ufl.edu/catalog0910/policies/regulationferpa.html

Commitment to a Safe and Inclusive Learning Environment
The Herbert Wertheim College of Engineering values broad diversity within our community and is committed to individual and group empowerment, inclusion, and the elimination of discrimination. It is expected that every person in this class will treat one another with dignity and respect regardless of gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture.

If you feel like your performance in class is being impacted by discrimination or harassment of any kind, please contact your instructor or any of the following:
• Your academic advisor or Graduate Program Coordinator
• Robin Bielling, Director of Human Resources, 352-392-0903, rbielling@eng.ufl.edu
• Curtis Taylor, Associate Dean of Student Affairs, 352-392-2177, taylor@eng.ufl.edu
• Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943, nishida@eng.ufl.edu