

ME002 - Introduction to Mechanical Engineering (4 units)

Spring 2022

Description	Lecture, 3 hours; discussion, 1 hour. An introduction to the field of mechanical engineering. Topics include the mechanical engineering profession; machine components; forces in structures and fluids; materials and stresses; thermal and energy systems; machine motion; and machine design.				
Prerequisites	MATH005, MATH008B, or MATH009A. <i>It is your responsibility to ensure that you have satisfied the prerequisites. Students who have not satisfied the prerequisites will receive an “F” for the final course grade.</i>				
Instructor	Professor Sundararajan V E-mail: vsundar@engr.ucr.edu		Office: Bourns A317 Office Hours: TBA (Please see Canvas)		
Schedule	TAs:	Crystal Mariano <cmari010@ucr.edu>			
	Lectures	Section 001	TR	9:30 – 10:50 a.m. WCH 138	
	Discussions	Section 021	M	12:00:12:50 pm	SPR 2355
		Section 022	M	1 :00-1:50 pm	SPR 2355
Motivation	You will gain an understanding of how the subjects that you will study in the mechanical engineering major fit into the discipline of mechanical engineering. The course provides you with exposure to the topics they will encounter in the remainder of the curriculum. Students will gain an appreciation of the role of these topics in the practice of mechanical engineering as a profession as well as its interaction with broader societal, economic and environmental concerns.				
Course Topics	The Mechanical Engineering Profession, Problem solving skills and a sense of engineering quantities, Forces in structures and machines, Materials and stresses, Fluids engineering, Thermal and energy systems, Motion and power transmission.				
Objectives	Upon completion of this course, students should be able to:				
	<ul style="list-style-type: none">• Discuss the subjects that comprise the discipline of mechanical engineering.• Convert engineering quantities from one system of units to another, use correct significant digits, and recognize dimensional consistency in engineering equations.• Use the concepts of statics, define and calculate stress, and solve simple quantitative mechanics problems.• Solve problems involving forces in fluids, differentiate between laminar and turbulent flow, and carry out simple calculations to compute lift and drag forces on objects.• Apply the concepts of work, power, and energy; Solve simple quantitative problems involving energy transfer and energy conservation.• Perform calculations associated with rotational motion, and understand the behavior of several basic machine components.				

These course objectives are in compliance with Educational Objectives of the Department of Mechanical Engineering for the degree Bachelor of Science in Mechanical Engineering.

Recommended Texts

Halpern A., Beginning Physics I (Schaum's outlines)

Knight, Randall., **Physics for Scientists and Engineers: A Strategic Approach with Modern Physics**

[https://phys.libretexts.org/Bookshelves/University_Physics/Book%3A_University_Physics_\(OpenStax\)/Book%3A_University_Physics_I_-_Mechanics_Sound_Oscillations_and_Waves_\(OpenStax\)](https://phys.libretexts.org/Bookshelves/University_Physics/Book%3A_University_Physics_(OpenStax)/Book%3A_University_Physics_I_-_Mechanics_Sound_Oscillations_and_Waves_(OpenStax))

Jonathan Wickert, *An Introduction to Mechanical Engineering*, 3rd Edition, Cengage Learning, 2013, ISBN-10: 1111576807, ISBN-13: 9781111576806.

Website <http://www.elearn.ucr.edu>

Evaluation Methods

Preclass assignments: Short assessments will be posted on Canvas to be completed before class. These are due before class.

Problem Sets: Weekly reading and problem sets will be posted on Canvas. Completing the problem sets is vital to understanding the material and developing problem-solving skills. Scan your homeworks and upload them to Canvas using the link provided. Homeworks are graded based on completion.

Class Participation: This class will use PollAnyWhere to encourage and to evaluate class participation. You will be asked to respond to questions in each class period. You must receive 80% or above in order to get full credit for class participation. If you get below 80%, then your class participation grade will be appropriately adjusted. Discussion sections may also use clickers and short quizzes.

Reflections and Surveys: There will be reflection assignments during the quarter. These are meant to enable you to reflect upon your goals, studying habits, learning styles, learning outcomes and your progress in the class. These assignments are meant to provide with tools of self-awareness and self-criticism – to help you identify what works for you and what doesn't, what interests you and what doesn't.

Projects: There will be group assignments based on practical problems and scenarios. You can work in groups of 3 students to complete them.

Quizzes: There will be weekly quizzes (with some possible exceptions) which are given in discussion. Each quiz will be similar to the most recently submitted homework assignment. To do well on the quizzes, it is essential that you master the homework. There will be no makeup quizzes. Quizzes are closed-book, closed notes.

Exams: There will be one midterm exam and one comprehensive final exam. All exams will be closed-book and closed-notes. There will be no makeup exams except under very compelling circumstances discussed with the instructor prior to the exam. Makeup exams may be oral.

Grading

Course grades will be based on the following percentages:

Problem Sets	5%
Preclass assignments	8%
Participation	8%
Surveys	4%
Weekly quizzes	10%
Projects	10%
Midterm Exam I	20%
Final Exam	35%

The final scores will be assigned letter grades according to the following scheme:

100% – 96%	A+	70% – 66%	C
96% – 90%	A	66% – 62%	C-
90% – 86%	A-	62% – 58%	D+
86% – 82%	B+	58% – 54%	D
82% – 78%	B	54% – 50%	D-
78% – 74%	B-	50% – 0%	F
74% – 70%	C+		

The instructor reserves the right to adjust grades to students' advantage.

Exams

Midterm	Thursday, May 5, 2022
Comprehensive Final Exam	Friday, June 10, 11:30 - 2:30 pm

Accommodations: UC Riverside is committed to providing equal access to learning opportunities to students with documented disabilities. To ensure access to this class, and your program, please contact the Student Disability Resource Center (SDRC) to engage in a confidential conversation about the process for requesting accommodations in the classroom. More information can be found on <https://sdrc.ucr.edu/contact-us>. If you are a student registered with the SDRC, please ensure you request your quarterly accommodations through rability.ucr.edu

Class Ethics and Expectations

- Attendance in lectures and discussions is expected.
- Do not arrive to class late or leave early.
- Students are encouraged to ask questions and actively participate in class sessions. This will help the entire class in understanding the material.
- Cell phones, laptops, mp3 players and other such devices are not to be used during class or discussion periods for non-class related purposes. Switch cell phones to silent or turn them off before entering the classroom.
- If you miss a lecture, please ask a classmate for notes, not the instructor or TAs.
- All assignments and course announcements will be posted on the course Canvas website. Check this website and your email several times per day.
- No late or makeup assignments will be allowed under any circumstances.
- Makeup quizzes will not be offered.
- There will be no makeup exams except under very compelling circumstances discussed with the instructor prior to the exam. Makeup exams may be oral.
- If you believe there is an error in the grading of an exam or assignment, return the item along with a concise written explanation to the instructor within one week of your initial

receipt of that item. Changes will not be considered after one week. TAs will not be able to make grade changes.

- Although you are encouraged to work with a study group, you should submit your own work.
- Cell phones, mp3 players, and all other electronic devices, except for scientific calculators, must be turned off and stored in a book bag during quizzes and exams. Cell phones may not be used as calculators. **It will be considered cheating if an electronic device other than a calculator is accessible or used for any reason during a quiz or exam. Cell phones used during a quiz or exam will be confiscated.**
- Any incident of academic dishonesty, including plagiarism and cheating, will be handled according to University guidelines. Copying work from solution manuals, “course bibles,” or any other source is considered cheating. See <http://library.ucr.edu/?view=help/plagiarism2.html> and <http://conduct.ucr.edu/> for guidance.

Research Consent

Basic information: Included in your syllabus information regarding consent to participate in educational research. I’m working with other engineering faculty to investigate effective ways to teach college engineering courses. We hope to use the data we gather to improve engineering courses for future students. In order to do this, we would like to be able to analyze class data from students taking our courses. We need permission to use your data in our analyses.

Anonymous data: Your data will be anonymized – meaning your name will never be associated with your data – by a collaborator at another institution before any analysis occurs.

Consent info: Consenting to allow your data to be analyzed does not change anything about your experience in the course, and does not require any additional work other than signing the consent form online. If you agree to be in this study, your anonymous data from this class including grades, homework and exam submissions, and survey responses will be included in the analysis to determine the effectiveness of the pedagogical techniques used in this course compared to other similar courses.

How to consent: To consent to allow us to use your data, you should first read through the full consent form for complete information. You should then go to the website provided to fill out a short form. The form will go to a collaborator at another institution and your professor will not be informed whether or not you consented to allow your data to be used. [If instructor is part of research team: Your instructor will not have any access to student data until after the end of the term, and s/he will only have access to deidentified data]