

Syllabus



ENGR 057: Statics and Dynamics

Summer/2022

Introduction

Learning about mechanics (forces and motion) is the base for many other interesting fields in engineering such as aerodynamics or hydraulics. Therefore, this course aims to have students learn the fundamental concepts of mechanics and their application in engineering. Some of the concepts covered are free-body diagrams, equilibrium of forces and moments, statics of structures, shear force and bending moment diagrams, kinematics and dynamics of a particle and systems of particles, and dynamics of rigid bodies.

Lecture location: <https://ucmerced.zoom.us/j/84403121743>

Discussions location: <https://ucmerced.zoom.us/j/81206230511>

Class and Discussions Format: Online

Lectures schedule (Synchronous Meetings): Tuesday and Thursday 11:15 am – 2:00 pm
[Add Lectures to calendar \(ics\)](#)

Discussions schedule (Synchronous Meeting): Friday 10:00 am – 11:50 am
[Add Discussions to calendar \(ics\)](#)

Course Prerequisites: Introductory Physics (PHYS 8 or equivalent) and Calculus (MATH 21 or equivalent)

The Instructors Team

Instructional Staff	Office Location	Contact Information (Email)
Instructor: Ingrid M. Padilla Espinosa (she/her/hers)	SRE 325	ipadillaespinosa@ucmerced.edu
Discussion Instructor: Karen Mohammadtabar (he/his/him)	SRE 316	kmohammadtabar@ucmerced.edu

Office Hours

Instructor office hours: Monday and Wednesday 11:00 am - 12:30 pm
<https://ucmerced.zoom.us/j/87443803920>
[Add office hours to calendar \(ics\)](#)

Discussions instructor office hours: TBD

If these hours do not work with your schedule, please let us know and we will try to work out a time to meet you. Don't hesitate to email us. Often, questions can be clarified quickly and without waiting for office hours. And if you are on campus and our office doors are open, just stop by, we would be thrilled to see you. Also, remember that the discussion instructor is a critical part of the instruction team, and he is here to support you.

My View of Teaching and Learning

I truly believe in your success as a student and future engineer. It is my role to be a facilitator of student learning rather than a transmitter of specific knowledge. It is your role to participate in active learning experiences, use all the resources available to you, and interact with the course content.

Equity, Diversity, and Inclusion Statement / Community Norms

An academic environment should embrace diversity and be free of discrimination based on people's beliefs, age, culture, ethnic origin, nationality, gender identities, race, learning abilities, or socioeconomic status. On the contrary, it should provide a safe nurturing environment where individualities are embraced, freedom is valued, and opinions are encouraged. As such, we need to have some agreed-upon norms of behavior for both synchronous and asynchronous communications. All students have a right to learn, and the instructor has a right to teach. Our agreements will help to maintain a productive learning environment that supports equity, diversity, and inclusion.

1. Be committed to [UC Merced's Principles of Community](#)
2. In all written or oral communications, exercise professionalism and cultural responsiveness.
3. Show respect for differing backgrounds, experiences, and opinions. One of the purposes of this class is to expand your mind and perspectives and to prepare you for a future in engineering. Maintain an open mind.
4. Be responsible for your decisions, actions, and the impact these actions have on others.
5. All students are invited to discuss any situation they perceive as harmful or threatening with the instructor, in class or during office hours.

Course Learning Outcomes

Upon completion of this course, you will be able to:

- Explain and demonstrate the role that analysis and modeling play in engineering design and engineering applications
- Construct free-body diagrams and calculate the reactions necessary to ensure static equilibrium
- Perform analysis of distributed loads
- Understand and calculate internal forces and moments in members
- Calculate centroids and moments of inertia
- Perform kinematic and dynamic analyses for particles and systems of particles
- Perform kinematic and dynamic analyses for rigid bodies
- Communicate about engineering systems using mathematical, verbal, and visual means
- Describe how mechanics analysis fits into the larger framework of professional engineering

Textbook R. Hibbeler; *Statics & Dynamics*. 14th edition. Pearson, 2016. (Not required)

Grading Information and Criteria

Quizzes (3 lowest grades are dropped)	10%
Homework assignments	25%
Partial exams (x2)	40%
Final exam	25%

Grading Scale

A+ = 99%-100%; **A** = 95%-99%; **A-** = 90%-95%; **B+** = 87%-90%,
B = 83%-87%; **B-** = 80%-83%; **C+** = 77%-80%; **C** = 73%-77%,
C- = 70%-73%; **D+** = 67%-70%; **D** = 63%-67%; **D-** = 60%-63%,
F = 0%-60%

Assignments

Problem sets (homework assignments) are due on roughly a weekly basis (due dates will be clearly indicated on the assignment). You are strongly encouraged to try the homework on your own first, but you can work together with other students (please make sure you are doing your part to understand the material, or you will likely have difficulties with the exams!). please submit your assignment in a professional and legible manner, showing the work process and not only the final answer. Supporting work generally includes a free body diagram, a list of assumptions, and calculations. Assignments must be hand-written and scanned or written (not typed) on an electronic device and submitted with an adequate format (pdf preferably).

Late or Missing Assignments

All assignments must be submitted in Canvas by the due date at midnight. We understand that life does not always happen as expected, if for any reason you submit your assignment after the due date, 5% will be deducted per day of late submission.

Grading Policy: You have 2-weeks to dispute grading on exams, homework, labs/discussions from the date the grade is posted on Cat Courses. Once that 2-week period has passed the grade cannot be change. All grade disputes must be brought to the instructor.

Discussion Board Activities

Each class is different. Sometimes we need help from one another to learn how to study for a test or complete an assignment. The discussion board in CatCourses is a great opportunity to engage with your fellow classmates and future colleagues. Use the board freely to post your questions and interact in a respectful and supportive manner. It helps you to gain a deeper conceptual understanding and helps us to identify areas of uncertainty. We support open dialogue and diversity of thought when we ask for clarity, more information, and considerations of alternative points of view.

Quizzes and Exams

Quizzes will be mainly multiple-choice or short numerical answers questions. They are designed based on the class concepts and should provide a quick assessment of your understanding of

the content of the previous class. The average time for the quizzes is 15 minutes and will be assigned at the beginning of each class. There will not be make up quizzes, but the three lowest grades will be dropped from the final grade.

Quizzes are given each class, absences for religious belief, observance, or practice will be accommodated as much as possible given reasonable notification of the need for an accommodation.

The course will have three exams. All examinations for this course will be closed book and will primarily consist of solving problems like those explained in class and solved in homework. The examinations will be designed to test knowledge of concepts and definitions important to an understanding of Statics and Dynamics, and problem-solving skills. Exams may not be missed for any reason except a medical emergency for which evidence has been presented to the instructor.

Grading Procedure and Feedback

Student learning will be monitored through quizzes and homework. Please use the course calendar to monitor when the assignments are due.

We will provide feedback on your assignments within the next 3 classes from the submission date. Due to the large enrollment in this class, we cannot provide detailed individual comments. We will assess the group performance and provide additional examples when needed.

Attendance/Participation Points

Attendance and participation are not graded, but it is encouraged for students' success. Show up to class "prepared" to learn and support the learning of others (which also means do not interfere or disrupt their learning).

Academic Integrity and Plagiarism

Academic honesty is taken very seriously at UC Merced. The [Academic Honesty Policy](#) and the [Code of Student Conduct](#) emphasize that students, faculty, and administration all share responsibility for maintaining a fair and honest academic environment. UC Merced is creating a strong tradition of upholding the student academic honesty policy and addressing suspected violations through the Report Form for Academic Misconduct and when appropriate the Office of Student Rights and Responsibilities (OSRR). Faculty and students both express confidence in the current process, which resolves almost all cases through informal meetings with students rather than formal hearings and emphasizes education in the discipline process. Faculty and OSRR strive to hold students accountable for violations but give them the opportunity to learn from their mistakes.

Plagiarism: Any time you use the research, ideas, images, analysis, language, etc. produced by another, you must cite that individual (give them credit). If you use the words of another author verbatim (word-for-word), you must indicate that by putting the words in quotation marks and noting the source.

As a student at UC Merced, you are expected to know when and how to cite and paraphrase correctly. If you do not, ask us for help. Submitting work that contains work "borrowed" from others and not properly cited is called "plagiarism" and is a violation of our Code of Academic Conduct.

Student Accessibility

University of California, Merced is committed to creating learning environments that are accessible to all. If you anticipate or experience physical or academic barriers based on a disability, please feel welcome to contact me privately so we can discuss options. In addition, please contact Student Accessibility Services (SAS) at (209) 228-6996 or access@ucmerced.edu as soon as possible to explore reasonable accommodations. All accommodations must have prior approval from Student Accessibility Services based on appropriate documentation. Notifications of a need of accommodations should be provided by the end of the third week of classes (July 7th).

If you anticipate or experience barriers due to pregnancy, temporary medical condition, or injury, please feel welcome to contact me so we can discuss options. You are encouraged to contact the Dean of Students for support and resources at (209) 228-3633 or <https://studentaffairs.ucmerced.edu/dean-students>.

Course Schedule

Lecture	Date	Subject	Homework Due date
1	21-Jun	Course overview; Newton's laws; General Principles; vectors and forces	
2	23-Jun	Equilibrium of a particle; free body diagram	
3	28-Jun	Moment of a force; moment of a couple; simplification of a force and couple system	HW 1 - Free body diagrams
4	30-Jun	Distributed loads; rigid bodies and free body diagram	
5	5-Jul	Equations of equilibrium; Statical determinacy - Review Exam 1	HW 2 - Moment of a force and distributed loads
	7-Jul	Exam (L1-L4)	
6	12-Jul	Mechanics of trusses	
7	14-Jul	Internal forces; Shear Force and bending moment diagrams	HW 3 - Statical determinacy - trusses
	19-Jul	Exam 2(L5-L7)	
8	21-Jul	Particle kinematics: rectilinear motion; curvilinear	HW4 - Shear Force and Bending Moment
9	26-Jul	Particle kinematics: dependent and relative motion; Force and acceleration; Newton 2nd law	
10	28-Jul	System of particles equation of motion; rectangular coordinates;	HW 5 - Kinematics 2D
11	2-Aug	Work and energy; impulse, moment, and impact	
12	4-Aug	Rigid body motion - Review	
	9-Aug	No class	HW 6 - Kinematics 3D
	11-Aug	Final Exam	

Subject to Change Policy

Only under special circumstances the information contained in the course syllabus, other than the grade and absence policies will be subject to change. If change is necessary, the instructor will provide you with reasonable advance notice and seek agreement of course members.

Basic needs

Any student who has difficulty affording groceries or accessing sufficient food or who lacks a safe and stable place to live is urged to contact the Dean of Students for support. Additional resources exist through the campus Basic Needs Office, located in KL 184F.