Mt. San Antonio College
ENGR 40 – Statics – CRN 22203
Course Syllabus – Fall 2024

Basic Course Information	
Days/Times/Location	Lecture: MW – 7:00 – 8:25 pm, Room 61-2311
Duration	August 26 – Dec 15 (16 weeks including finals)
Units	3; CSU/UC transferrable; Letter Grade Only;
Course Web Site	You will use Canvas for accessing announcements, lecture notes, homework solutions and for submitting assignments. To access Canvas, log into the Mt. SAC portal (http://inside.mtsac.edu) using your Mt. SAC username and password, then click the 'sign on to Mt. SAC Canvas' link in the eLearning Resources tab.
Instructor Information	
Professor	Tedd Wong
E-mail Address	twong76@mtsac.edu
Office Phone	909-274-4425
Office Location	61-2505
Office Hours	6:30 pm MW before class and 8:25 MW after class

Course Description

Vector approach to static equilibrium of rigid bodies, forces, couples in two and three- dimensional space. Application of equilibrium principles to trusses, frames, and machines. Calculation of center-of-mass and centroid. Friction, moment of inertia, distributed and concentrated loads. Forces in cables and beams. Fluid statics. Introduction to virtual work. PRE-REQUISITES: PHYS 4A and MATH 181 (Calc 2)

Required Materials

Engineering Mechanics: Statics, by R.C. Hibbeler, 15th ed. Homework will be from this edition. Standard note-taking supplies, a scientific calculator that is NCEES/SAT/ACT approved (e.g., TI-36, TI-84), a straight-edge. Quad rule pad (graph paper) for completing homework is highly recommended.

Student Learning Objectives

Students are required to:

- be able to draw free-body diagrams of rigid bodies.
- be able to apply equations of static equilibrium to two- and three- dimensional problems.
- be able to determine centroids by integration.
- be able to expand the usage of equations of static equilibrium to distributed loads and submerged areas.
- be able to determine internal forces in trusses, frames and machines.
- be able to analyze systems involving friction such as wedges, belts and screws.
- be able to use parallel-axis theorem to calculate moment of inertia of structural members.
- be able to apply principle of virtual work to solve equilibrium problems.

- be able to analyze a typical truss to determine the force in a truss member.
- be able to draw a free body diagram for a multi-force member and determine reactions.

Course Measurable Objectives Students will be able to:

- express forces in CVN and use them in solving statics problems.
- resolve forces into components in Cartesian and polar formats.
- determine resultant forces using the parallelogram law and vector addition.
- express force components along a line using position vectors and dot product.
- determine moments of forces by using cross products.
- simplify force and couple systems.
- simplify distributed load systems.
- solve problems with collinear, parallel, and concurrent forces.
- develop equations and solve for unknown forces for particles, rigid bodies, and truss and frame structures.
- determine and calculate reactions based on types of supports.
- determine the internal loadings in a member by using the method of sections.
- develop equations to describe the internal shear and moment throughout a member and plot the relationships.
- analyze the equilibrium of rigid bodies subjected to dry friction.
- determine the location of the center of gravity and centroid for a system of discrete particles and for a body of arbitrary shape.
- calculate the 2nd area moment of inertial using the parallel axis theorem for composite shapes.

Teaching Philosophy

My **AME** is to Advocate, Motivate, and Educate.

I will advocate for my profession in engineering and to help provide you access to that career by helping you obtain an engineering education. An engineering education is within all your abilities if you are willing to work hard and sometimes unreasonably hard.

I will always try to be approachable and accessible to you. You may ask me for help and advice in other subjects as well as for this class. I have a broad knowledge base of various engineering and scientific subjects. I love to discuss projects you are working on in other classes, your participation in extracurricular activities here at Mt Sac, such as the rocket or robotics team or if you are doing something cool at the MakerSpace.

My goal is to ensure you are prepared to be successful at the next level in your academic journey and eventually your career.

Course Expectations

You are expected to:

- Access Canvas daily for information, notes, and assignments for this course.
- Attend and participate in class by asking questions, answering questions, collaborating appropriately in all project and problem-solving activities.
- Take course notes, read, and view supplemental materials before class and after class, paying attention as you go until you understand everything that was presented in class, and can solve all the example problems.
- Complete all assignments and submit them by the due date.
- Get together with other students and come to office hours to clarify what is not clear and to work on additional problems.

- Complete your work on exams, homework, supplemental problems, and projects neatly and clearly. If I cannot read it, then I cannot grade it.
- Master understanding the material in this class. You understand the material when you can teach it to someone else.

Assignments

You will be assigned reading and homework from the course text. Homework sets are usually given on the first-class session of the week and are due one week later. Homework involves problem-solving, mathematical modeling, and design. Homework is expected to be completed neatly. Paraphrase the problem and given data before solving the problem. Solve and document each problem as if you are presenting it to someone who has limited knowledge of the subject. Imagine you are telling a problem-solving story. Homework will be completed on paper, scanned, and uploaded to a CANVAS assignment page. Get used to referencing any data source used. Ask your instructor, classmates, and supplemental instructors (SI) for feedback on your problem-solving approaches. Collaborating on homework is not only allowed but encouraged. Just submit your own work. The GUESS method is a good methodical approach to problem solving. Learn not only to solve problems but to solve them fast. When studying for an exam, time yourself. It is important to be fast but also accurate. **Since I grade homework for completion, I do not accept late homework.** Uploading the completed assignments before midnight is your responsibility. For example, if you have dial-up internet, take that into account. There will also be a group project due on the Friday of finals week.

Assessments

Midterms will occur every 2-3 weeks on the second-class meeting of the week. We will have time for review and questions during the first-class meeting of the week before each exam. In general, exams will consist of 5 to 6 questions to be completed in approximately 1 hour and 15 minutes. The questions will be like those from homework, and class and book examples. There will be a final exam on **MONDAY, DECEMBER 9th from 7:30 pm to 10:00 pm in room 61-2311.** You are responsible for tracking your grade. I will not respond to requests for scores after the end of the semester. Grading is simple. There are 1000 points possible. Get the percentage of points shown in the grading scale and that is your grade.

Grading Scale

Category	%	Grade %	Grade
Homework	10	90-100	A
Midterm 1	15	80-89	B
Midterm 2	15	70-79	C
Midterm 3	15	60-69	D
Project	20	59 <	F
Final	25		
Total	100		

Participation

As per the Mt SAC catalog and state law, attendance is mandatory in all classes. Active participation in the class is also necessary to learn the material and to develop your skill sets as a functioning member of a team. Remember that members of your team are counting on you. Be mindful that evidence of whether

you actively participate in the class will come from your feedback to questions posed during class and your active involvement in group assignments and projects. If you anticipate missing an exam, you must notify me 1 week in advance. I will set-up a make-up exam at the ASAC. Keep in mind the make-up exam maybe much harder than the regularly scheduled exam.

Student Equity and Accommodation

My interest is to promote student success and help you to be successful in my class. If you have a specific need that I can address to assist you to be successful in my class, please discuss it with me. If you have a disability, a medical condition or if you believe there is a factor in your life that might prevent you from doing your best, please see me privately to discuss your needs. Students with disabilities should check with Mt SAC ACCESS. The phone number is (909) 274-4290. If you find a feature of the course inaccessible to you, please contact me, Access, or the ADA/504 Compliance Officer at (909) 275-4225.

Academic Integrity

Cheating and plagiarism are considered a SERIOUS offense in this and all classes here at Mt SAC. It is important that you read and understand the Mt SAC Cheating and Plagiarism policy from the Catalog and let me know if there is anything that you do not understand regarding this policy. Collaboration is allowed and encouraged while copying is not. If you do not know the difference, please ask. If you are having difficulty in understanding the assignment or activity, it is your responsibility to get help from me, SI/ET, or your class members.

Dropping Students

I may drop a student if he or she is either not attending class regularly. Keep in mind that I can only drop a student within the allowed time for dropping a class and cannot drop a student after the last date to drop a class has passed. If you drop the class, you may not attend the rest of the class sessions.

- Refund Deadline: 06-Sep-2024
- Last Day to Drop Without a 'W': 8-SEP-2024
- Last Day to Drop With a 'W': 01-NOV-2024
- Last Day to Drop for No-Show: 06-SEP-2024
- Last Day to add class: 06-SEP-2024

Class Conduct

Due to the presence of computers, electrical cables, and other technical equipment in the classroom, only natural foods and water may be consumed in class away from the lab equipment. I would prefer you to bring water in a refillable bottle such as a *Hydro Flask*. Snacking in class is fine but make sure it is not a distraction. If you make a mess, clean it up. Please silence your cell phones and electronic devices during class. Please make all phone calls outside of the classroom. I am not against technology, but if your tech is a distraction, you will be asked to step outside of class. Do not perform personal hygiene in class. Students are responsible to protect, save and backup all evidence of their work. Treat everyone with respect and dignity. Be aware of your behavior and language that may be offensive to others. We all have diverse backgrounds and experiences, so while certain behaviors and language may be considered normal in your social circles, understand that you may be creating a “hostile” learning environment for some. Please bring to my attention if at any time you feel issues prevent you from being successful in this class.

Communication

I am available before and after class, by email in person. I respond faster to my Mt SAC email address, twong76@mtsac.edu than the **Inbox** in Canvas. Please do not

hesitate to ask for help. If needed, you may arrange a longer meeting with me. When emailing me, please be sure to include your name and the course number. For your and my protection, all email correspondence **must** be made between your Mt SAC student email address and my Mt SAC instructor email address.

It is the student's responsibility to stay up to date on class communications with team members, teachers, and teaching assistants, and with materials including assignment schedules, due dates, and deliverables. I use the announcement feature in CANVAS to disseminate information regarding the class. **Be sure to turn on "notifications" in CANVAS for announcements and emails.**

Lecture Sequence

Week	Lecture	Chapter	Topic	Homework	
Week 1	L1	Chapter 1	General Principles	In class.	HW0
	L2	Chapter 2.1	Scalars and Vectors	2-1, 2-6, 2-10, 2-15, 2-24, 2-28, 2-33, 2-37, 2-52, 2-54, 2-55, 2-59	HW1
		Chapter 2.2	Vector Operations		
		Chapter 2.3	Vector Addition of Forces		
		Chapter 2.4	Addition of Coplanar Forces		
Week 2	**Holiday**				
	L3	Chapter 2.5	Cartesian Vectors	2-63, 2-65, 2-67, 2-69, 2-74, 2-80, 2-88, 2-92, 2-97, 2-105, 2-119, 2-120	HW2
		Chapter 2.6	Addition of Cartesian Vectors		
		Chapter 2.7	Position Vectors		
		Chapter 2.8	Line Force Vectors		
		Chapter 2.9	Dot Product		
Week 3	L4	Chapter 3.1	Equilibrium of Particle	3-3, 3-6, 3-11, 3-12, 3-27, 3-28, 3-40, 3-46, 3-47, 3-57, 3-62, 3-64	HW3
		Chapter 3.2	FBD of Particle		
		Chapter 3.3	Coplanar Forces		
	L5	Chapter 3.4	3-D Force		
Week 4	**Midterm Review**				
	Midterm #1				
Week 5	L7	Chapter 4.1	Scalar Moments	4-1, 4-5, 4-12, 4-29, 4-39, 4-47, 4-48, 4-53, 4-55, 4-60, 4-68, 4-70	HW4
		Chapter 4.2	Principle of Moments		
		Chapter 4.3	Cross Product		
	L8	Chapter 4.4	Vector Moments About a Point-3D		
		Chapter 4.5	Vector Moments About an Axis-3D		
Week 6	L9	Chapter 4.6	Moment of a Couple	4-82, 4-88, 4-96, 4-106, 4-109, 4-117, 4-122, 4-132, 4-139, 4-144, 4-154, 4-160	HW5
		Chapter 4.7	Simplify Force and Couple – Force and Moment		

	L10	Chapter 4.8	Simplify Force and Couple – Force and Distance		
		Chapter 4.9	Distributed Loading – Force and Distance		
Week 7	L11	Chapter 5.1	Equilibrium of Rigid Body	5-11, 5-12, 5-13, 5-15, 5-23, 5-37, 5-41, 5-68, 5-71, 5-72, 5-78, 5-85	HW6
		Chapter 5.2	FBD of Rigid Body		
		Chapter 5.3	Equations of Equilibrium		
	L12	Chapter 5.4	2 and 3 Force Members		
		Chapter 5.5	FBD of Force Members		
		Chapter 5.6	Equations of Equilibrium		
		Chapter 5.7	Constraints and Determinacy		
Week 8	**Midterm Review**				
	Midterm #2				
Week 9	L13	Chapter 6.1	Trusses	6-2, 6-4, 6-8, 6-17, 6-19, 6-20, 6-28, 6-32, 6-34, 6-36, 6-42, 6-49	HW7
		Chapter 6.2	MOJ		
		Chapter 6.3	Zero Force Members		
	L14	Chapter 6.4	MOS		
Week 10	L15	Chapter 6.6	Frames and Machines	6-66, 6-70, 6-72, 6-76, 6-78, 6-81, 6-83, 6-84, 6-99, 6-102, 6-108	HW8
	L16	Chapter 6.6	Frames and Machines		
Week 11	**Midterm Review and Project Introduction**				
	Midterm #3				
Week 12	L17a	Chapter 7.1	Internal Loadings	7-1, 7-7, 7-9, 7-11, 7-51, 7-53, 7-59, 7-81, 7-84, 7-88, 7-92, 7-93	HW9
	L17b	Chapter 7.2	Shear and Moment Diagrams		
		Chapter 7.3	Distributed Loading, Shear and Moment		
Week 13	L18	Chapter 8.1	Dry Friction	8-1, 8-3, 8-26, 8-32, 8-42, 8-46, 8-50, 8-63, 8-86, 8-100	HW10
		Chapter 8.2	Dry Friction Problems		
	L19	Chapter 8.3	Wedges		
		Chapter 8.4	Screws		
		Chapter 8.5	Belts		
Week 14	**Project Build**				
	Project Demo				
Week 15	L20	Chapter 9.1	CG, CM, and Centroids	9-9, 9-11, 9-27, 9-61, 9-66, 9-67, 10-2, 10-29, 10-32, 10-35, 10-45, 10-52	HW11
		Chapter 9.2	Composite Bodies		
	L21	Chapter 10.1	Moment of Inertia		
		Chapter 10.2	Parallel-Axis Theorem		

		Chapter 10.4	Moment of Inertia for Composite Areas		
Week 16	**Final - TBD**				