

Abilene Approval Chart for Curriculum Changes

A = Approve I = Information Item R = Respond In Writing

Course Number: ENGR 223

ENGR 223 (Statics and Mechanics of Materials) will be a 4 hour course combining most of the coursework from ENGR 220 (Statics) and ENGR 332 (Mechanics of Materials). There is a lot of overlap in the current curriculum of the two courses, so there should be little lost in the transition.

	Campus-Level Academic Review ¹	Chair	Faculty	Student	Faculty	Student	Faculty
	Change to a Course Include signatures from all chairs/program directors for cross-listed courses. ¹						
1.	Title (description unchanged)	A	A	A	I	I	I
2.	Description (not affecting content)	A	A	A	I	I	I
3.	Course term(s)	A	I	A	I	I	I
4.	Content (change of course outcomes)	A	A	A	I	I	A
5.	Number of credit hours	A	A	A	A	A	A
6.	Course number within the hundred	A	A	I	I	I	I
7.	Course number beyond the hundred	A	A	A	A	A	A
8.	Prerequisites	A	A	A	I	I	I
9.	Course restriction (e.g., majors only, junior standing)	A	A	A	A	A	A
10.	Level change (U to G or G to U)	A	A	A	A	A	A
11.	Cross list course	A	A	A	A	A	A
12.	Department of record	A	A	A	A	A	A
13.	Open or close a course	A	A	A	A	A	A
	Change to a Degree Plan						
14.	Educational Program — Revise	A	A	A	A	A	A
15.	Educational Program — Adopt/revise admission requirements	A	A	A	A	A	A
16.	GPA — Revise program-required GPA	A	A	A	A	A	A
17.	Minor — Revise	A	A	A	A	A	A

		U	U	U	U	U	U	U	U	U
	Full Review									
	Change to Catalog Information (for Campus)									
18.	General requirements for Bachelor's and Associate Degrees	-	-	-	-	A	A	A	A	I
19.	Policies governing academic probation and suspension	-	-	-	-	A	A	A	A	I
20.	Requirements for graduating with honors	-	-	-	-	A	A	A	A	I
	Change to a Degree Plan									
21.	Educational Program — Add or Discontinue ^{2 3}	A	A	A	A	A	A	A	A	I
22.	Educational Program — Discontinue (Provost-proposed)	R	-	R	A	A	A	A	A	I
23.	Minor — Add or Discontinue	A	A	A	A	A	A	-	A	I
24.	Minor — Discontinue (Provost-proposed)	R	-	R	A	A	A	-	A	I
25.	Degree — Add or Discontinue	A	A	A	A	A	A	A	A	I
26.	Degree — Discontinue (Provost-proposed)	R	-	R	A	A	A	A	A	I

	Change to General Education Requirements for Undergraduates (System)	U	U	U	U	U	U	U	U	U
27.	Change course outcomes of an included course	A	A	A	A	A	A	-	A	I
28.	Add or drop a required course from the General Education Requirements	A	-	A	-	A	A	A	A	I
29.	Add or drop a course from a menu within the General Education Requirements	A	-	A	-	A	A	-	A	I
30.	Comprehensive revision of General Education Requirements	-	-	-	-	A	A	A	A	I

Abilene New Course Application

You may delete the preceding instructional pages before submitting application.

Course ID (<i>Subject Code and Number</i>)	ENGR 223
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1. Systems and Catalog Information Complete each item.

A	Course Developer	Robert Brown
B	Course Instructor	Sam Hurley
C	Course Title	Statics and Mechanics of Materials
D	Course Abbreviation for Banner if title is more than 30 characters	Statics and Mech. of Mat.
E	College	OSE - Onstead Science and Engineering
F	Department or School	PHYS - Engineering & Physics
G	Number of Credit Hours	4
G1	Number of Lecture Contact Hours	4
G2	Number of Lab Contact Hours	0
H	Is the course for a fixed or variable number of credit hours?	Fixed If variable, explain rationale:
I	Is the course repeatable for additional credit?	No
J	Maximum total number of credit hours a student can earn for this course	4
K	Course Schedule Type	<u>Lecture (LEC)</u> See Schedule Type definitions in the Reference section.

L	Number of Faculty Workload Hours	4
M	Grading Mode	<u>Standard</u>
N	Maximum Enrollment	30
O	Catalog Description (50 words or less)	A study of composition and resolution of forces, equilibrium of force systems, forces acting on and in trusses and frames, and the internal effects of stresses and strains on solid bodies subjected to external loading.
P	List any prerequisites (course/s, test scores, class standing, major, etc.)	PHYS 220 (or simultaneous enrollment) and MATH 185.
Q	List any corequisites (these <i>must</i> be taken at the same time; note that a single requirement cannot be both a prerequisite <i>and</i> a corequisite)	
R	If the course is cross-listed, specify the subject code and course number of the other course	
S	Does this course require any additional student course fees?	<u>No</u> If yes, attach a completed course fee form .
T1	Will the course be offered in fall terms?	<u>Yes, every year</u>
T2	Will the course be offered in spring terms?	<u>Yes, every year</u>
T3	Will the course be offered in summer terms?	<u>No</u>
U	First semester this course will be offered under new Course ID. <i>May not be earlier than the coming fall semester.</i>	Fall 2025

V	Is this course required for a program(s)?	<u>Yes</u> If yes, submit a separate completed curriculum proposal to change the program(s).
W	Should the addition of this course be retroactively applied to the degree plan it supports? <i>This is rare, and rationale should explain compelling extenuating circumstances.</i>	<u>No</u> If yes, provide rationale:
X	Has this course been offered as a Special Topics course? <i>New courses are not required to be taught as Special Topics courses prior to approval.</i>	<u>No</u> If yes, provide course ID, term, and enrollment:
Y	List any courses in which the content overlaps the proposed course. (Course ID and Name). <i>Attach a statement from the instructor/dept chair of the existing course justifying the new offering.</i>	ENGR 220 (Statics) and ENGR 332 (Mechanics of Materials). This will be a combination of the two courses, allowing for expansion of upper-level offerings.

2. Curriculum

- A. Explain any effects of this course on any degree plans. If the addition of the course alters program requirements, submit a separate [Approval Chart for Curriculum Change](#) to update the program.

Change to MECH Curriculum

ENGR 220 and ENGR 332 removed from ME curriculum (-6 hours)

ENGR 223 added to ME curriculum (+4 hours)

ENGR 321 (Materials and Manufacturing Lab) added to ME curriculum (+1 hour)

9 hours of upper level MECH electives -> 12 hours of upper level electives (+3 hours)

New number of elective hours: 0

Change to CIVE Curriculum

ENGR 220 and ENGR 332 removed from CE curriculum (-6 hours)

ENGR 223 added to CE curriculum (+4 hours)

Each student must complete 14 (previously 12) additional hours of upper-level CIVE or ENGR courses.

New number of elective hours: 0

Change to Gen. ENGR Curriculum

ENGR 220 and ENGR 332 removed from GE curriculum (-6 hours)
ENGR 223 added to GE curriculum (+4 hours)

Each student must complete 14 (previously 12) additional hours of upper-level CIVE or ENGR courses .

New number of elective hours: 0-2

Change to Engineering Science Minor Curriculum

ENGR 221 removed from ENGS curriculum (-4 hours)
ENGR 223 added to ENGS curriculum (+4 hours)

B. Justify the addition of this course to the current curriculum, explaining the gap it meets.
This will compress two classes with a good deal of overlap into one, allowing for more depth and breadth in upper level courses.

This combination is taught at other universities, including:

- Ohio State University
- Penn State (Called Statics and Strength of Materials)
- Cornell (Called Statics and Strength of Solids)

The purpose of the combination is to add more opportunity for depth in the new programs, allowing for an additional elective course.

3. Course Design

A. Audience and Course Goal

1. Describe the intended audience, including prerequisite skills.
This course will be taught to all Civil Engineering, Mechanical Engineering, and General Engineering majors, while also serving the Engineering Science Minor.
2. State the overarching course goal(s) in performance terms.
Students completing this course will be able to solve problems involving force equilibrium, including particles, rigid bodies, and structural components (beams and trusses).

B. Student Learning Outcomes and Measurements

	Student Learning Outcome	Measurement
1	Students effectively use Free Body Diagrams to solve problems.	Homework, Exams
2	Students use principles of static equilibrium to determine forces in external supports	Homework, Exams

3	Students analyze trusses using both method of joints and method of sections	Homework, Exams, Bridge Project
4	Students calculate inertial and geometric properties of solid bodies	Homework, Exams
5	Students calculate locations and magnitudes of maximum stress to predict failure of beams	Homework, Exams, Bridge Project
6	Students analyze stress states, determining principal stresses and evaluating von Mises yield criteria.	Homework, Exams

C. Text and Resources

Statics and Mechanics of Materials, 6th edition by Hibbeler. ISBN-13: 9780138124069

4. Supporting Documentation

Required of all applications	
1	Approval Chart for Curriculum Changes
2	Syllabus — Attach the syllabus for the course based upon the anticipated first-semester offering.
4	Library — Submit new course application and syllabus to the Library dean's office. Attach the Library's memo.
Attach if applicable	
5	Content Overlap — Include one document for each course you listed in Section 1Y. Attach statement from instructor/dept chair of existing course justifying the new offering.
6	Departmental Resources — List the resources that support the course and are available only through the department, if applicable. Attach the list of the holdings and the location(s).
7	Resources — List resources (other than library or departmental resources) that are needed to support this course (computers, lab equipment, other technology, etc.). Attach a complete list of all items and indicate possible sources or estimated cost of each. List the sources of any needed funds.

8	Expenses — List additional expenses needed to implement this course (full-time or part-time faculty, graduate or lab assistants, student employees, travel, special student costs, room renovation, storage facility, etc.). Attach a complete list of all items, the estimated cost of each and the source of the funds.
9	Justification — Attach any documents to which you refer in Section 2B.

Updated 8/19/2024

Statics and Mechanics of Materials (ENGR 223)

Fall 2025 - TR 1:30-2:50, F 12:00-12:50 - BEN 119 - 4 Credit Hours

Instructor: Professor Robert Brown

Email: robert.b@acu.edu

Office: OSC 123C

Phone: (918) 260-9772 (cell)

Office Hours: TR 8:30-11:00 AM, R 3:00-5:00 PM (or by appointment)

Text: *Statics and Mechanics of Materials*, 6th Edition. R.C. Hibbeler.

ISBN-13: 9780137964895

Course Catalog Description: A study of composition and resolution of forces, equilibrium of force systems, forces acting on and in trusses and frames, and the internal effects of stresses and strains on solid bodies subjected to external loading.

Prerequisites: MATH 185, credit for or concurrent enrollment in PHYS 220

Course Learning Outcomes

	Student Learning Outcome	Measurement
1	Students effectively use Free Body Diagrams to solve problems.	Homework, Exams
2	Students use principles of static equilibrium to determine forces in external supports	Homework, Exams
3	Students analyze trusses using both method of joints and method of sections	Homework, Exams, Bridge Project
4	Students calculate inertial and geometric properties of solid bodies	Homework, Exams
5	Students calculate locations and magnitudes of maximum stress to predict failure of beams	Homework, Exams, Bridge Project
6	Students analyze stress states, determining principal stresses and evaluating von Mises yield criteria.	Homework, Exams

Grading:

Homework (Completion)	5%
Weekly Quizzes	15%
Exams (four, 10% each)	40%
Project	20%
Final Exam	20%

Grade scale:

89.5% and above:	A
79.5% to 89.4%:	B
69.5% to 79.4%:	C
59.5% to 69.4%:	D
Below 59.5%:	F

Homework and Quizzes: Homework will be graded purely on a completion basis. If you have put forth a good faith effort (actual work is shown, even if the answer is wrong or the approach is slightly off), you will get full credit.

On every Friday without an exam there will be a quiz. The quiz will be pulled directly from either the homework or the examples in the chapter, with only numbers changed. You can make up to half of your missed points on the homework quizzes by submitting corrections. Corrections on the quizzes will be due one week after the quiz.

Exams: There will be four Exams for the course and one comprehensive Final Exam.

Exam 1 - Foundational Principles of Statics and Particle Equilibrium

Exam 2 - Rigid Body Equilibrium, Simple Structural Analysis and Internal Forces

Exam 3 - Stress and Strain, Location and Magnitude of Maximum Stress, Euler-Bernoulli Beam Theory

Exam 4 - Stress and Strain Transformation, Design and Deflection of Beams and Shafts

Final Exam - select material from the four previous exams.

Final Exam Date: Wednesday, Dec. 13, 2025 at 12:00 PM – 1:45 PM

Grading Policy: My goal in grading is to assess how well you know the material. I will assign full points only if **both** the final answer and work are correct. If either one is incorrect, the entire problem will be counted wrong.

Corrections: Since the overall goal of the course is learning and not testing, corrections will be allowed on exams. However, to be eligible for test corrections, you must have completed and submitted the homework and homework quizzes for the chapters covered on the exam **before** the day of the exam.

Project: The project in the course will include hand calculations, some form of computer program or analysis (Maple, Excel, SolidWorks or Google Colab), and a written report. These

will be graded based on completeness of the project, creativity of your solution, and grammar and organization of the final report.

Attendance: A large component of this class is performed during class time. If you miss class, you will need to work with your professor and/or team to reschedule a time to cover the material you missed in class or project work. Also, you may be withdrawn from the course if you miss more than 6 classes.

Schedule (tentative, check Canvas for most up-to-date schedule)

Week	Chapter	Topic	Due
1	1-3	Vector Review	Quiz 1
2	4	Particle Equilibrium	Quiz 2
3	4	Rigid Body Equilibrium	Exam 1
4	5	Structural Analysis	Quiz 3
5	6	Centroid, Moment of Inertia	Quiz 4
6	7	Stress and Strain	Quiz 5
7	8	Mechanical Properties	Exam 2
8	9, 10	Axial Load and Torsion	Quiz 6
9	N/A	Bridge Project	Bridge Project Analysis
10	11	Bending	Quiz 7
11	12	Transverse Shear	Quiz 8
12	13	Combined Loading	Exam 3
13	14	Stress and Strain Transformation	Quiz 9
14	15	Design of Beams and Shafts	Quiz 10
15	16	Deflection of Beams and Shafts	Exam 4
Finals		Final Exam	

Classroom Policies:

Students are expected to be in class on time and participate by taking notes, asking questions, and working through problems during class time. A subset of those problems will be worked out in small groups on whiteboards in the class. No specific grade is tied to attendance; however, quizzes and exams which are missed due to unexcused absences will require tokens to retake. Homework is due in class, and late work is not accepted.

Learning Objectives Addressed in this Course:

Students should develop an ability to apply formulas and techniques to problems in particle dynamics, vibrations, and rigid body motion accurately and consistently. This is assessed through weekly quizzes and/or exams. (See ABET SO 1)

Title IX Policy:

At ACU, we strive to comply with all applicable legal requirements prohibiting, preventing, and responding to sexual misconduct against any member of the ACU community. The full Title IX policy and process can be found at <https://acu.edu/human-resources/title-ix-and-sexual-misconduct-information/>.

Academic Integrity Policy:

Academic integrity is demonstrated by behavior that honors the learning environment, regardless of setting, context, location or modality. ACU's Academic Integrity Policy can be found at <https://acu.edu/office-of-the-provost/academic-policies/>.

Students or groups of students are expected to submit work that is their own.

Academic integrity is defined as academic work completed as assigned for each class by the individual or group responsible for the work. Violations of academic integrity and other forms of cheating involve the intention to deceive, mislead, or misrepresent and therefore, are a form of lying. Such actions are contrary to behavioral norms that flow from the nature of God.

Academic misconduct includes, but is not limited to, the following: 1) Failing to give credit to sources used in a work in an attempt to present the work as one's own, 2) Submitting papers or projects obtained from another source (e.g., research service or club paper file) as one's own, 3) Falsifying information orally or in writing, and 4) Receiving, giving, or using unauthorized aid on an examination or quiz. Academic misconduct may result in, but is not limited to, a zero on the assignment and/or an F in the course. Additionally, the department chair, Dean of the College of Arts and Sciences, and the Dean of Student Life will be notified. See the full university policy, including how to appeal a decision, by following this link: <http://www.acu.edu/academics/provost/policies/index.html>.

Using Chegg or Other Online Homework Help Services

While there are many websites claiming to offer study aids to students, those websites could cause students to find themselves in violation of academic conduct guidelines. These websites include (but are not limited to) Chegg, Coursicle, Quizlet, and Course Hero.

ACU Engineering and Physics does not endorse the use of these products **in an unethical manner**, which could lead to a violation of the [ACU Academic Integrity Policy](#). Sites such as these encourage students to upload course materials, such as test questions, individual assignments, and examples of graded material. These materials are the intellectual property of instructors, the university, or publishers and may not be distributed without prior authorization. Students who engage in such activity could be found in violation of academic conduct standards and could face course and/or University penalties, **as well as copyright infringement prosecution**.

If you have any questions about whether you are using a service ethically, bring your questions to me, and I will be happy to talk.

University ADA Compliance Statement

Abilene Christian University is dedicated to removing barriers and opening access for students with disabilities in compliance with ADA and Section 504 of the Rehabilitation Act. The Alpha Scholars Program facilitates disability accommodations in cooperation with instructors. In order to receive accommodations, you must be registered with Alpha Scholars Program, and you must complete a specific request for each class in which you need accommodations. If you have a documented disability and wish to discuss academic accommodations, please call our office directly at 325-674-2667.

The mission of ACU: to educate students for Christian service and leadership throughout the world.

The mission of the Onstead College of Science and Engineering: To be announced.

The mission of the Engineering and Physics Department:

The ACU engineering program strongly supports the university's mission of educating students for Christian service and leadership throughout the world. In support of this mission, ACU engineering graduates will attain:

- A deep and broad understanding of engineering principles and practices as evidenced by professional employment, continued professional development and graduate study in engineering or other professional fields.
- An extensive knowledge of the innovative design processes unique to engineering professionals, as demonstrated by using critical thinking skills in contribution to scientific and technical literature, patents and intellectual property, professional societies, and creative designs.
- A thorough understanding of Christian service and leadership as shown in commitments to professionalism, ethics, and service and leadership within the engineering profession, church and society.

Christian Perspective

As a Christian engineer, I believe you can best glorify God by excelling in your chosen profession, and doing so morally and ethically. The foundation of this excellence is technical proficiency, without which moral and ethical concerns cannot be addressed. This course is intended to provide you with technical skills required for a moral and ethical engineer.



Oct. 17, 2024

Dr. Robert Brown
Associate Professor,
Department of Engineering and Physics
Onstead Science Center (OSC) 123C
(325) 674-6540
rlb16c@acu.edu

Re: Statistics and Mechanics of Materials (ENGR 223)

Dear Dr. Brown,

Thank you for submitting Statistics and Mechanics of Materials (ENGR 223) to us for review. I have reviewed it based on the ACU Syllabus Guidelines. I found the syllabus to meet all aspects of the checklist.

Please note that this letter is intended as a reference, which will be read by the department chair and council members, who may also have questions or comments of their own. If you have any questions, please feel free to let me know.

Sincerely,

A handwritten signature in black ink, appearing to read "Scott E. Hamm", followed by a long horizontal line.

Dr. Scott E. Hamm,
Assistant Director, Adams Center

ABILENE CHRISTIAN UNIVERSITY

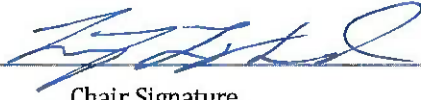
LIBRARY

M E M O R A N D U M

DATE: January 1, 2025
TO: Dr. Robert Brown
FROM: Mark McCallon, Associate Dean for Library Services
RE: New Course Proposal, ENGR 223 – Statics and Mechanics of Materials

The library has examined the course application and syllabus and can support the proposed course. Please contact Mark McCallon, Librarian Liaison for the Department of Engineering and Physics, if additional resources are needed for the course. Thank you for letting us review the course application and syllabus.

Department/School(s)



10/30/24

Chair Signature

Date

Chair/Program Director Signature

Date

College Academic Council(s)



2/3/2025

Chair Signature

Date

Chair Signature

Date

Dean(s)



2/3/2025

Signature

Date

Signature

Date

Teacher Education Council

Signature

Date

**Campus Academic Council:
Abilene Undergraduate or Abilene Graduate**

Signature

Date

Provost

Signature

Date

University General Education Council

Signature

Date

University Faculty

Abilene Faculty Senate Chair signature

Date

Dallas Faculty Council Chair signature

Date

Senior Vice President for Academic Affairs

Signature

Date

President

Signature

Date