

ENGS 211: Statics & Materials Testing Fall 2025

Lecture

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Office Hours: M 10:00-11:30, W 12:30-2:00, or by appointment

Lab

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Office Hours: MWF 9:00-10:30, or by appointment

Prerequisites: PHYS 201

Course Materials:

Required Books:

- Moore, J et al. Mechanics Map Digital Textbook. [https://eng.libretexts.org/Bookshelves/Mechanical_Engineering/Mechanics_Map_\(Moore_et_al.\)](https://eng.libretexts.org/Bookshelves/Mechanical_Engineering/Mechanics_Map_(Moore_et_al.))
- Lord. Strength of Materials. <https://engineeringmechanicsoer.github.io/StrengthBook/>

Required Materials:

- FE Approved Scientific Calculator: <https://www.prepfe.com/fe-exams/resources/calculators>
- Engineering Paper: <https://www.amazon.com/engineering-paper/s?k=engineering+paper>

Course Overview: A detailed study of vector forces and space, scalar mass and time, including the following concepts from an engineering structures perspective: equilibrium, free-body diagrams, moments, couples, distributed forces, centroids, moments of inertia, analysis of two-force and multi-force members, and quantitative analysis of stress, strain, and modulus values.

Course Format: This course will use a flipped classroom. You will be expected to review recorded lectures and other content on an assigned topic prior to each class meeting. In-class, we will do things like address misunderstandings and questions you have, review homework, and practice applying the content introduced prior to class. Your preparation ahead of class time and engagement in class are essential for your success in the course.

Learning Outcomes: Upon completion of this course, successful students will be able to:

1. Present all work in a professional manner
2. Draw a free body diagram of an object
3. Formulate and solve the equations of equilibrium
4. Apply static concepts to trusses, frames and machines
5. Draw and interpret axial force, torsion, shear, and moment diagrams
6. Calculate average normal, shear and bearing stresses on sections and connectors
7. Calculate normal and shear strain associated with simply object deformations
8. Calculate stresses for axial, torsion, and beam bending on simple structural elements

9. Work collaboratively as a member of a team
10. Develop and conduct experiments to quantify material properties

Attendance: Class attendance is a very important aspect of your success in this course. You are expected to attend every class and are accountable for missed content and assignments. I take attendance at the beginning of class. If you are late, it is your responsibility to make sure you are not marked absent. Attendance is factored into your grade. If you plan to miss a class, communicate with me in advance. It is your responsibility to make up for the work that you missed.

Grading: Grades for this course will be determined homework, in-class work, lab, and exams as shown below. Letter grades will be assigned using the scale below.

Category	Proportion
Homework	15%
In-class work, participation, and quizzes	10%
Lab	30%
Unit Exams (3x)	30%
Final Exam	15%

Points	Grade	Points	Grade
<60	F	77-79	C+
60-62	D-	80-82	B-
63-66	D	83-86	B
67-69	D+	87-89	B+
70-72	C-	90-92	A-
73-76	C	≥93	A

Homework: There will be at least one homework set each week (often every day), consisting of problems from the lectures given during the week. The homework sets will be given in class. Homework is due at the beginning of class on the assigned due date. See the late work policy below for more details.

Homework Assistance: Homework is assigned to provide you with additional structured practice solving the types of problems that you will encounter on exams. If you get stuck on a problem, you should get help learning to solve the problem prior to the due date so that you will be better prepared for the next exam. Copying an answer from another student, a generative artificial intelligence platform (e.g., ChatGPT), or another source may help you get the right answer on the homework but will not help you to learn the material. The homework should be used to help you learn the content so you will be prepared exams which make up 45% of your grade in the class.

In-Class Problems and Participation: You will also be required to complete problems assigned in class. Participation in class discussions is also an important aspect of learning the material.

Participation: What it means to “participate” in ENGS 211 includes the following: demonstrating familiarity with video lectures reviewed prior to class, active engagement in class (e.g., asking/answering questions, working on practice problems), and taking responsibility for your own learning (office hours, etc.).

Quizzes: Quizzes will be assigned periodically throughout the term. They will be conducted in class, typically at the beginning, and cover material from the most recent week or chapter. Quizzes may be unannounced.

Late Work: For late homework assignments, 10% will be deducted each day it is late. Assignments will not be accepted after exams. Homework is meant to help you learn and retain course content when we cover it, so you will be prepared for the next exam, without the need to “cram.” Homework needs to be completed on time to achieve this objective.

Exams: There will be three unit exams during the semester. Each exam will cover the material listed on the syllabus or as informed by me in class. See the class schedule for dates.

Final Exam: Yes, there will be a final exam at the end, and it is cumulative. It is an in-class exam scheduled for 2:00 to 5:00 pm on Tuesday December 6th.

Make-up Exams: Make-up exams will only be allowed if you communicate your need to reschedule the exam with me in advance or in the event of an emergency (supporting documentation required).

Electronic Devices in Lecture: Cell phones, computers, and tablets should be put away during class time, except at the direction of the instructor. In the past, I have noticed several students reviewing lecture videos during class while they should have been working on practice problems. Lecture videos must be reviewed before class so you are ready to work on practice problems. Take hand written notes while reviewing lecture video before class, for use on practice problems.

Expectation: Students are expected to put in a minimum of 12 hours/ week of work in order to successfully complete this course.

Academic Integrity: You are expected to follow the integrity policy detailed in the handbook Academic Integrity at Roanoke College (https://www.roanoke.edu/inside/az_index/academic_affairs/academic_integrity). Additionally, if you are ever uncertain as to how the College’s policy pertains to any assignment or exam in this course, please ask me for clarification. You may work with classmates on homework problems but the work you turn in must be your own work (i.e., not copied off a classmate’s assignment). Exams will be completed independently, without any assistance from other students.

Class Disruption: All students are entitled to a professional learning environment. Students should not act in a manner which will distract and disrupt the class learning experience. Such practices will not be tolerated.

Subject Tutoring, located on the lower level of Fintel Library (Room 5), is open 4-9 PM, Sunday-Thursday. Subject Tutors are highly trained, current students who offer free, one-on-one (and small group) tutorials in over 80 courses taught at Roanoke College, including: Business, Economics, Mathematics, INQ 240, Modern Languages, Lab Sciences, and Social Sciences. Check out all available subjects and schedule 30- or 60-minute appointments at www.roanoke.edu/tutoring. If you have a question, feel free to stop by, or contact us at subject_tutoring@roanoke.edu or 540-375-2590. See you soon!

Accessible Education Services (AES) is located on the first floor of the Bank Building. AES provides reasonable accommodations to students with documented disabilities. To register for services, students must self-identify to AES, complete the registration process, and provide current documentation of a disability along with recommendations from the qualified specialist. Please contact Dustin Persinger, Assistant Director of Academic Services for Accessible Education, at 540-375-2248 or by e-mail at aes@roanoke.edu to schedule an appointment. If you have registered with AES in the past and would like to receive academic accommodations for this semester, please contact Dustin Persinger at your earliest convenience to schedule an appointment and/or obtain your accommodation letter for the current semester. The testing center, also located on the first floor of the Bank Building, can be reached at 540-375-2247.

Student Health & Counseling Services supports students through in-person health appointments, in-person counseling, 24/7 telehealth (TimelyCare), Therapy Assistance Online, as well as resources related to general wellness, LGBTQ+, sexual assault, substance abuse, and suicide prevention. Unmet health needs can negatively impact your performance in this course. Student Health & Counseling Services can help. Please see <https://www.roanoke.edu/shcs> for more information and to access services.

Class Schedule: Refer to the table below

Lab Policies:

Lab policies may differ from lecture policies and can vary by instructor. The following rules apply to this specific **lab section**. Unless stated otherwise, all lecture policies remain in effect. Please direct all lab-related questions to Dr. Raj Vuddandam.

- **Lab Schedule:** A tentative schedule of lab activities is listed below. For up-to-date information, students are required to use the LMS tool - Inquire, which can be accessed here with Roanoke college's student login credentials - <https://inquire.roanoke.edu/>

Date	Tentative Activities	Project/Assignments (weighted Score)
26-Aug	No Class	
2-Sep	Software - 2D Line Modeling	
9-Sep	Software - 3D Line Modeling	
16-Sep	Software - Truss Analysis	Lab Assignment 1 - Modeling
23-Sep	Manila Paper Bridge: A Truss Design Project	<i>Project is Assigned</i>
30-Sep	Handson - Introduction to Material testing, Young's modulus	Lab Assignment 2-Truss Analysis
7-Oct	Handson - Experimental analysis on Truss elements (Tensile, Compression testing)	
14-Oct	No Class - Fall Break (Oct 11-19)	
21-Oct	Software - Axial, Shear, Bending Moment Diagrams	Lab Assignment 3 - Tensile, Compression test
28-Oct	Software - Axial, Shear, Bending Moment Diagrams	<i>Preliminary Design Report (PDR) due</i>
4-Nov	Handson - Bending Test - Three point, four-point bending.	
11-Nov	<ul style="list-style-type: none">• Handson - Shear Test,• PDR Discussion - review & feedback	Lab Assignment 4 - ALD, SFD, BMD
18-Nov	Catch up/Project help	Lab Assignment 5 - Shear, Bending test
25-Nov	Catch up/Project help	
2-Dec	Design Competition - Truss Design Project	<ul style="list-style-type: none">• <i>Final Design Report (FDR) due</i>• <i>Design Competition</i>

- **Grading of Lab Activities:** The lab component is worth 30% of the final. Students must earn a minimum of 18% to pass the lab portion. Failing to meet the 18% minimum lab score out of 30% would result in failing grade for the entire course. The grade distribution for lab activities is as follows:

Activities	Grading %
Lab Attendance, Class Participation	5%
Lab Handouts/Assignments (Individual)	10%
Lab Design Project (Team)	15%
Total	30%

- **Grading of Lab Project:** Design project, design competition details, as well as corresponding grading rubrics to evaluate the individual and team performance for the project will be posted on Inquire.
- **Electronic Usage:** The use of cell phones, computers, and tablets is prohibited during class unless explicitly permitted by the instructor for specific activities.