Course Syllabus

Jump to Today 🖠 Edit



ENGR 211 - Statics and Introduction to Engineering **Mechanics**

Class Meetings

See the summary of class meetings times for all sections here: Class Meetings by Section (https://sit.instructure.com/courses/76654/pages/class-meetings-by-section)

Course Description:

Fundamental concepts of statics including equivalent force systems, equilibrium of rigid bodies, and internal forces in trusses, frames, and machines; relationship of internal forces to stress and strain; impact of geometry and material properties on static failure modes. Axial loading and torsion. Students will explore and apply these concepts in the context of iterative design, analysis, and experimental testing in the associated Design Studio. Prerequisites: PEP 111

Learning Outcomes:

- 1. You can determine resultants of systems of forces and moments in two-dimensional systems and solve problems of equilibrium of particles.
- 2. You are able to draw a free-body diagram and identify all known and unknown external forces that act on the body.
- 3. You are able to calculate the internal loads in trusses, frames, and machines.
- 4. You are able to determine the deformation of a rod under axial loading.
- 5. You can determine internal loads in beams including shear and bending moment diagrams, maximum shear and maximum bending moment, and their role in engineering design.
- You can determine normal and shear stresses in a structural member subjected to axial loading, bending, and/or torsion and their role in engineering design.
- 7. You can perform simplified design calculations to determine the size, load, or material property required to meet a specified design criterion (e.g. maximum allowable stress).
- 8. You can conduct experiments, analyze data, and identify sources of error in discrepancies between the theoretical and experimental results.

Course Materials:

All lecture notes and assignments can be found on Canvas. There are **two Canvas shells** associated with this course:

- ENGR 211 Fall 2024 All Sections. This course shell contains all course materials and assignments that are common to all sections. All assessments and design studio projects can be found here.
- 2. **2024F ENGR-211-***XX*. This course shell contains instructor course materials specific to your section, e.g. lecture slides.

Other required materials for the course:

- Textbook. Statics & Mechanics of Materials, 6th ed.

 (https://www.pearson.com/en-us/subject-catalog/p/statics-and-mechanics-of-materials/P200000008861/9780138124069) / R.C. Hibbeler / Pearson, 2023 / ISBN-13: 9780138124069 (eText)
- Software. SolidWorks (2022-2023) and Microsoft Excel. All software is available on <u>Stevens</u>
 <u>AppSpace</u> (https://stevens.apporto.com/) (hosted by Apporto). Software is available for download also Windows OS required for SolidWorks.

Class Format:

Our lecture classes will be used to deliver content and work through practice problems. Design studios will feature hands-on experiments, computer-based assignments, and group-based project work time. Please bring your laptop to design studio each week.

Course Assessment:

Design Studio Projects	30%	(Projects @ 15%, Final Design Project @ 15%)
Study Sets (Homework)	5%	
Self Tests (Quizzes)	15%	
Exams (3 total)	30%	(3 exams @ 10% each)
Final Exam (cumulative)	20%	

Study Sets:

Study sets are homework problems that will be assigned each week, generally due on Mondays at 11:59 PM. These assignments are sets of study problems that are designed to help you learn the topics of the

week and give you the space to learn from your mistakes. Study sets are graded entirely on completion (not accuracy), so it is your responsibility to review the posted solutions to check your work. Make the effort to really understand the concepts behind the computations - and ask a lot of questions!

Solutions will be posted immediately following the deadline. For this reason, **no late homework will be accepted**.

Want extra practice? If you are having some difficulty doing the study problem exercises, consider doing the associated <u>fundamental problems</u> (<u>https://stevens0-</u>

<u>my.sharepoint.com/:f:/g/personal/mkwan_stevens_edu/EueKiCFJFtpOlgYifJsRIVgBLsrKHpr83PvqprBa7ZSd</u>'
<u>e=INkoJy)</u> as warm-ups first. These are simpler problems that are designed to help you build essential skills before doing more complex problems.

Self Tests:

Each week, you will complete two short quizzes on Canvas designed to help you assess your comprehension of the weekly topics, one quiz containing conceptual questions and another quiz containing a problem to solve. You will be allowed 5 attempts on each quiz. Your highest score will be counted. **Quizzes are due on Wednesdays by 11:59pm** (except for certain weeks as marked on the schedule).

We recommend that you complete the study set problems BEFORE attempting the associated self-test. You are expected to complete the quizzes **individually** (to test your OWN knowledge), **BUT** you are strongly encouraged to <u>review your notes</u> or <u>reach out to your instructor</u> **between attempts**, especially if you're not sure what is going wrong. After all, the self-tests are meant to help you learn and check your understanding.

Exams:

There will be 3 exams that are held in-person during the designated quiz period, **Mondays 5-6 PM**. Exam dates are noted on the course schedule. Room assignments are TBD.

Make-up exams will be given only for medical reasons or prior arrangement with the instructor.

Exam Policies:

You are expected to do your own individual work. All exams are closed book and closed notes, but an equation sheet will be provided for each exam. These equation sheets will be available on Canvas for review well before the exam.

You must show all work to receive full credit. This includes drawing complete and clear free-body diagrams when applicable.

Design Studio Projects:

You will gain hands-on experience with various types of loads and stresses in different physical systems through several design studio projects. You will also use engineering analysis tools, such as SolidWorks and Microsoft Excel. These projects are designed to be completed during the studio class time. **Design studios will begin Wednesday, September 4**th.

Final Design Project:

The design studio will culminate in a 6-week design project. You will work in teams to design, model and analyze a structure using the concepts learned and technical skills gained over the course of the semester. A final report and a final presentation will be submitted at the end of the semester. Further project details will be discussed in class.

Grading Scale (Updated 12/11/2024):

The **approximate** grading scale applied in this course is below:

92 : **A**, 89 : **A**-, 86 : **B**+, 82 : **B**, 78 : **B**-, 74 : **C**+, 70 : **C**, 65 : **C**-, 60 : **D**+, 55 : **D**

A small curve may be applied at the discretion of the instructor.

Late Policy:

Assignments should be submitted by the due date, as posted on Canvas. Late assignments will be subject to a late penalty of -10% per day. *Note:* This policy does NOT apply to study set assignments.

Extensions may be granted for students who cannot complete the assignment on time due to circumstances beyond their control. Proper documentation (e.g. doctor's note) should be submitted for extension requests.

If you are unable to attend class, please inform your instructor or TA. You are expected to make up any missed work due to your absence, including excused absences.

Course Schedule:

A tentative <u>course schedule</u> \Rightarrow (<u>https://stevens0-</u>

<u>my.sharepoint.com/:b:/g/personal/mkwan_stevens_edu/EYsT3OVK2IVDobMRF78hnFkB70yDbYXN2RL6rod4lg?e=NqBa34)</u> is posted on Canvas. Students will be notified of any changes.

Extra Guidance & Helpdesk Hours:

Have a question? Start a discussion on Canvas! You can also come to my office hours, or feel free to email me about any questions or concerns. Please include the course number (**ENGR 211**) in the email subject line. See **Contact Information** (https://sit.instructure.com/courses/76654/pages/contact-information).

Teaching Assistants (TAs) and Lab Assistants (LAs) will hold regular helpdesk hours in the evenings. See **Contact Information** (https://sit.instructure.com/courses/76654/pages/contact-information) for more information.

Academic Integrity:

Enrollment into the undergraduate class of Stevens Institute of Technology signifies a student's commitment to the Honor System. Accordingly, the provisions of the Stevens Honor System apply to all undergraduate students in coursework and Honor Board proceedings. It is the responsibility of each student to become acquainted with and to uphold the ideals set forth in the Honor System Constitution. More information about the Honor System including the constitution, bylaws, investigative procedures, and the penalty matrix can be found online at https://web.stevens.edu/honor.

(https://web.stevens.edu/honor).

The following pledge shall be written in full and signed by every student on all submitted work (including, but not limited to, homework, projects, lab reports, code, quizzes and exams) that is assigned by the course instructor. No work shall be graded unless the pledge is written in full and signed.

"I pledge my honor that I have abided by the Stevens Honor System."

Students who believe a violation of the Honor System has been committed should report it within ten business days of the suspected violation. Students have the option to remain anonymous and can report violations online at https://web.stevens.edu/honor (https://web.stevens.edu/honor).

Learning Accommodations:

Stevens Institute of Technology is dedicated to providing appropriate accommodations to students with documented disabilities. The Office of Disability Services (ODS) works with undergraduate and graduate students with learning disabilities, attention deficit-hyperactivity disorders, physical disabilities, sensory impairments, psychiatric disorders, and other such disabilities in order to help students achieve their academic and personal potential. They facilitate equal access to the educational programs and opportunities offered at Stevens and coordinate reasonable accommodations for eligible students. These services are designed to encourage independence and self-advocacy with support from the ODS staff. The ODS staff will facilitate the provision of accommodations on a case-by-case basis.

For more information about Disability Services and the process to receive accommodations, visit https://www.stevens.edu/student-diversity-and-inclusion/disability-services). If you have any questions please contact the Office of Disability Services at disabilityservices@stevens.edu (mailto:disabilityservices@stevens.edu) or by phone: 201.216.3748.

Disability Services Confidentiality Policy

Student Disability Files are kept separate from academic files and are stored in a secure location within the Office of Disability Services. The Family Educational Rights Privacy Act (FERPA, 20 U.S.C. 1232g; 34CFR, Part 99) regulates disclosure of disability documentation and records maintained by Stevens Disability Services. According to this act, prior written consent by the student is required before our Disability Services office may release disability documentation or records to anyone. An exception is made in unusual circumstances, such as the case of health and safety emergencies.

Inclusivity:

Stevens Institute of Technology believes that diversity and inclusiveness are essential to excellence in academic discourse and innovation. In this class, the perspective of people of all races, ethnicities, gender expressions and gender identities, religions, sexual orientations, disabilities, socioeconomic backgrounds, and nationalities will be respected and viewed as a resource and benefit throughout the semester. Suggestions to further diversify class materials and assignments are encouraged. If any course meetings conflict with your religious events, please do not hesitate to reach out to your instructor to make alternative arrangements.

You are expected to treat your instructor and all other participants in the course with courtesy and respect. Disrespectful conduct and harassing statements will not be tolerated and may result in disciplinary actions.

Name and Pronoun Usage

As this course includes group work and class discussion, it is vitally important for us to create an educational environment of inclusion and mutual respect. This includes the ability for all students to have their chosen gender pronoun(s) and chosen name affirmed. If the class roster does not align with your pronouns and/or name, please inform the instructor of the necessary changes.

Religious Holidays

Stevens is a diverse community that is committed to providing equitable educational opportunities and supporting students of all ethnicities and belief systems. Religious observance is an essential reflection of that rich diversity. Students will not be subject to any grade penalties for missing a class, examination, or any other course requirement due to religious observance. In addition, students will not be asked to choose between religious observance and academic work. Therefore, students should inform the

instructor at the beginning of the semester if a requirement for this course conflicts with religious observance so that accommodations can be made for students to observe religious practices and complete the requirements for the course.

Mental Health Resources

Part of being successful in the classroom involves a focus on your whole self, including your mental health. While you are at Stevens, there are many resources to promote and support mental health. The Office of Counseling and Psychological Services (CAPS) offers free and confidential services to all enrolled students who are struggling to cope with personal issues (e.g., difficulty adjusting to college or trouble managing stress) or psychological difficulties (e.g., anxiety and depression). Appointments can be made by phone (201-216-5177), online at https://stevensportal.pointnclick.com/confirm.aspx (https://stevensportal.pointnclick.com/confirm.aspx), or in person on the 2nd Floor of the Student Wellness Center.

Emergency Information

In the event of an urgent or emergent concern about your own safety or the safety of someone else in the Stevens community, please immediately call the Stevens Campus Police at 201-216-5105 or on their emergency line at 201-216-3911. These phone lines are staffed 24/7, year-round. For students who do not reside near the campus and require emergency support, please contact your local emergency response providers at 911 or via your local police precinct. Other 24/7 national resources for students dealing with mental health crises include the National Suicide Prevention Lifeline (1-800-273-8255) and the Crisis Text Line (text "Home" to 741-741). If you are concerned about the wellbeing of another Stevens student, and the matter is *not* urgent or time sensitive, please email the CARE Team at care@stevens.edu (mailto:care@stevens.edu). A member of the CARE Team will respond to your concern as soon as possible.

Course Summary:

Date	Details	Due
Mon Sep 9, 2024	Study Set #1 - Force Vectors (https://sit.instructure.com/courses/76654/assignments/515660)	y 11:59pm

Date	Details Du
Wed Sep 11, 2024	Self-Test #1B - Force Vectors - Problem Solving due by 11:59p
·	(https://sit.instructure.com/courses/76654/assignments/515697)
M 0 40 0004	Study Set #2 - Moment of a
Mon Sep 16, 2024	Force due by 11:59p (https://sit.instructure.com/courses/76654/assignments/515668)
	2. Moments of Forces -
	Individual Submission (https://sit.instructure.com/courses/76654/assignments/515671) (H - Xu)
	② 2. Moments of Forces -
	Individual Submission (https://sit.instructure.com/courses/76654/assignments/515671) (J - Fontaine) due by 11:59p
Wed Sep 18, 2024	Self-Test #1B - Force Vectors -
	<u>Problem Solving - RETAKE</u> due by 11:59p (https://sit.instructure.com/courses/76654/assignments/515698)
	Self-Test #2A - Moment of a
	Force - Conceptual due by 11:59p (https://sit.instructure.com/courses/76654/assignments/515699)
	Self-Test #2B - Moment of a
	Force - Problem Solving due by 11:59p (https://sit.instructure.com/courses/76654/assignments/515700)
Fri Sep 20, 2024	2. Moments of Forces -
	Individual Submission (https://sit.instructure.com/courses/76654/assignments/515671) (D - Sugino) due by 11:59p
	2. Moments of Forces -
	Individual Submission (https://sit.instructure.com/courses/76654/assignments/515671) (K - Shi)
	2. Moments of Forces -
	Individual Submission due by 11:59p (https://sit.instructure.com/courses/76654/assignments/515671) (E - Vallabh)

Date Details Due 2. Moments of Forces -**Individual Submission** due by 11:59pm (https://sit.instructure.com/courses/76654/assignments/515671) (M - Billapati) 2. Moments of Forces -**Individual Submission** due by 11:59pm (https://sit.instructure.com/courses/76654/assignments/515671) Mon Sep 23, 2024 Study Set #3 - Couples, **Equivalent Forces** due by 11:59pm (https://sit.instructure.com/courses/76654/assignments/515650) 1. SolidWorks Refresher -Wed Sep 25, 2024 **Individual Submission** due by 11:59pm (https://sit.instructure.com/courses/76654/assignments/515670) (H - Xu) 1. SolidWorks Refresher -**Individual Submission** due by 11:59pm (https://sit.instructure.com/courses/76654/assignments/515670) (J - Fontaine) Self-Test #2B - Moment of a Force - Problem Solving - RETAKE due by 11:59pm (https://sit.instructure.com/courses/76654/assignments/515701) 3. Mobile Project - Individual

Submission

(https://sit.instructure.com/courses/76654/assignments/515672) due by 11:59pm

due by 11:59pm

(H - Xu)

3. Mobile Project - Individual

Submission

(https://sit.instructure.com/courses/76654/assignments/515672)

(J - Fontaine)

Self-Test #3A - Couples,

<u>Equivalent Systems - Conceptual</u>

(https://sit.instructure.com/courses/76654/assignments/515702)

Self-Test #3B - Couples,

Equivalent Systems - Problem

Solving

(https://sit.instructure.com/courses/76654/assignments/515703)

Fri Sep 27, 2024

1. SolidWorks Refresher -

Individual Submission

(https://sit.instructure.com/courses/76654/assignments/515670) due by 11:59pm

(D - Sugino)

1. SolidWorks Refresher -

Individual Submission

due by 11:59pm

due by 11:59pm

(https://sit.instructure.com/courses/76654/assignments/515670)

(K - Shi)

1. SolidWorks Refresher -

Individual Submission

due by 11:59pm

(https://sit.instructure.com/courses/76654/assignments/515670)

(E - Vallabh)

1. SolidWorks Refresher -

Individual Submission

due by 11:59pm

(https://sit.instructure.com/courses/76654/assignments/515670)

(M - Billapati)

1. SolidWorks Refresher -

Individual Submission

(https://sit.instructure.com/courses/76654/assignments/515670)

(5 students)

3. Mobile Project - Individual

Submission

due by 11:59pm

(https://sit.instructure.com/courses/76654/assignments/515672)

(D - Sugino)

3. Mobile Project - Individual

Submission

due by 11:59pm

(https://sit.instructure.com/courses/76654/assignments/515672)

(K - Shi)

3. Mobile Project - Individual

Submission

due by 11:59pm

(https://sit.instructure.com/courses/76654/assignments/515672)

(E - Vallabh)

Date Details Due 3. Mobile Project - Individual **Submission** due by 11:59pm (https://sit.instructure.com/courses/76654/assignments/515672) (M - Billapati) □ 1. SolidWorks Refresher -**Individual Submission** Sun Sep 29, 2024 due by 11:59pm (https://sit.instructure.com/courses/76654/assignments/515670) (1 student) **Exam 1** due by 5pm (https://sit.instructure.com/courses/76654/assignments/515679) I炒 EXAM 1 due by 5pm (https://sit.instructure.com/courses/76654/assignments/537202) 3. Mobile Project - Individual **Submission** due by 11:59pm (https://sit.instructure.com/courses/76654/assignments/515672) (C - Acar) 3. Mobile Project - Individual **Submission** due by 11:59pm (https://sit.instructure.com/courses/76654/assignments/515672) (G - Vallabh) 3. Mobile Project - Individual Mon Sep 30, 2024 **Submission** due by 11:59pm (https://sit.instructure.com/courses/76654/assignments/515672) (B - Shi) 3. Mobile Project - Individual **Submission** due by 11:59pm (https://sit.instructure.com/courses/76654/assignments/515672) (F - Billapati) 3. Mobile Project - Individual **Submission** due by 11:59pm (https://sit.instructure.com/courses/76654/assignments/515672) (A - Acar) 1. SolidWorks Refresher -**Individual Submission** due by 11:59pm

(https://sit.instructure.com/courses/76654/assignments/515670)

Date	Details Due
	1. SolidWorks Refresher - Individual Submission (https://sit.instructure.com/courses/76654/assignments/515670) (2 students) due by 11:59pm
Tue Oct 1, 2024	3. Mobile Project - Individual Submission (https://sit.instructure.com/courses/76654/assignments/515672) (1 student)
	4. Supports and FBDs - Individual Submission (https://sit.instructure.com/courses/76654/assignments/515673) (H - Xu)
Wed Oct 2, 2024	4. Supports and FBDs - Individual Submission (https://sit.instructure.com/courses/76654/assignments/515673) (J - Fontaine) due by 11:59pm
	Study Set #4 - Free Body Diagrams due by 11:59pm (https://sit.instructure.com/courses/76654/assignments/515669)
Fri Oct 4, 2024	1. SolidWorks Refresher - Individual Submission (https://sit.instructure.com/courses/76654/assignments/515670) (3 students)
	4. Supports and FBDs - Individual Submission (https://sit.instructure.com/courses/76654/assignments/515673) (D - Sugino) due by 11:59pm
	4. Supports and FBDs - Individual Submission (https://sit.instructure.com/courses/76654/assignments/515673) (K - Shi)
	4. Supports and FBDs - Individual Submission (https://sit.instructure.com/courses/76654/assignments/515673) (E - Vallabh)
	4. Supports and FBDs - due by 11:59pm

(https://sit.instructure.com/courses/76654/assignments/515673)

(M - Billapati)

Self-Test #3B - Couples,

Equivalent Systems - Problem

Solving - RETAKE

due by 11:59pm

(https://sit.instructure.com/courses/76654/assignments/515704)

Self-Test #4 - Free Body

Diagrams - Conceptual

due by 11:59pm

(https://sit.instructure.com/courses/76654/assignments/515705)

3. Mobile Project - Individual

<u>Submission</u>

due by 11:59pm

(https://sit.instructure.com/courses/76654/assignments/515672) (5 students)

4. Supports and FBDs -

Individual Submission

due by 11:59pm

(https://sit.instructure.com/courses/76654/assignments/515673) (F - Billapati)

4. Supports and FBDs -

Individual Submission

due by 11:59pm

(https://sit.instructure.com/courses/76654/assignments/515673)

(A - Acar)

4. Supports and FBDs -

Individual Submission

due by 11:59pm

(https://sit.instructure.com/courses/76654/assignments/515673)

(B - Shi)

4. Supports and FBDs -

Individual Submission

due by 11:59pm

(https://sit.instructure.com/courses/76654/assignments/515673)

(C - Acar)

3 4. Supports and FBDs -

Individual Submission

due by 11:59pm

(https://sit.instructure.com/courses/76654/assignments/515673)

(G - Vallabh)

Study Set #5 - Equilibrium of

Rigid Bodies

due by 11:59pm

(https://sit.instructure.com/courses/76654/assignments/515652)

Mon Oct 7, 2024

Date Details Due 5. Gantry Project - Group **Submission** due by 11:59pm (https://sit.instructure.com/courses/76654/assignments/515675) (H - Xu) 5. Gantry Project - Group **Submission** due by 11:59pm (https://sit.instructure.com/courses/76654/assignments/515675) (J - Fontaine) 5. Gantry Project - Group Wed Oct 9, 2024 **Submission** due by 11:59pm (https://sit.instructure.com/courses/76654/assignments/515675) **6. Ethics Case Study - Group Submission -- NOT THIS ONE!** due by 11:59pm (https://sit.instructure.com/courses/76654/assignments/515674) Self-Test #5 - Rigid Body **Equilibrium - Problem Solving** due by 11:59pm (https://sit.instructure.com/courses/76654/assignments/515706) 5. Gantry Project - Group **Submission** due by 11:59pm (https://sit.instructure.com/courses/76654/assignments/515675) (Gantry Group 10) Thu Oct 10, 2024 5. Gantry Project - Group **Submission** due by 11:59pm (https://sit.instructure.com/courses/76654/assignments/515675) (Gantry Group 19) Fri Oct 11, 2024 **5. Gantry Project - Group** Submission due by 11:59pm (https://sit.instructure.com/courses/76654/assignments/515675)

(https://sit.instructure.com/courses//6654/assignments/5156/5) (E - Vallabh)

5. Gantry Project - Group

<u>Submission</u> due by 11:59pm (https://sit.instructure.com/courses/76654/assignments/515675)

(D - Sugino)

5. Gantry Project - Group

due by 11:59pm

Submission

(https://sit.instructure.com/courses/76654/assignments/515675)

Date Details Due (K - Shi) 5. Gantry Project - Group **Submission** due by 11:59pm (https://sit.instructure.com/courses/76654/assignments/515675) (M - Billapati) 5. Gantry Project - Group **Submission** Sat Oct 12, 2024 due by 11:59pm (https://sit.instructure.com/courses/76654/assignments/515675) (Gantry Group 64) 5. Gantry Project - Group **Submission** due by 11:59pm (https://sit.instructure.com/courses/76654/assignments/515675) (A - Acar) 5. Gantry Project - Group **Submission** due by 11:59pm (https://sit.instructure.com/courses/76654/assignments/515675) (B - Shi) **5. Gantry Project - Group Submission** Tue Oct 15, 2024 due by 11:59pm (https://sit.instructure.com/courses/76654/assignments/515675) (C - Acar) **5. Gantry Project - Group Submission** due by 11:59pm (https://sit.instructure.com/courses/76654/assignments/515675) (F - Billapati) **5. Gantry Project - Group Submission** due by 11:59pm (https://sit.instructure.com/courses/76654/assignments/515675) (G - Vallabh) Wed Oct 16, 2024 **6. Ethics Case Study - Group Submission - SUBMIT TO THIS** due by 11:59pm (https://sit.instructure.com/courses/76654/assignments/537411) (H - Xu) **6. Ethics Case Study - Group** due by 11:59pm **Submission - SUBMIT TO THIS** ONE!

(https://sit.instructure.com/courses/76654/assignments/537411)

Date Details Due (J - Fontaine)

Study Set #6 - More

Equilibrium, Dry Friction

due by 11:59pm

(https://sit.instructure.com/courses/76654/assignments/515663)

5. Gantry Project - Group

Submission

due by 11:59pm

(https://sit.instructure.com/courses/76654/assignments/515675) (Gantry Group 95)

Thu Oct 17, 2024

5. Gantry Project - Group

Submission

due by 11:59pm

due by 11:59pm

due by 11:59pm

(https://sit.instructure.com/courses/76654/assignments/515675)

(Gantry Group 88)

Fri Oct 18, 2024

6. Ethics Case Study - Group

Submission - SUBMIT TO THIS

ONE!

(https://sit.instructure.com/courses/76654/assignments/537411)

(D - Sugino)

6. Ethics Case Study - Group

Submission - SUBMIT TO THIS

ONE! due by 11:59pm

(https://sit.instructure.com/courses/76654/assignments/537411)

(E - Vallabh)

6. Ethics Case Study - Group

Submission - SUBMIT TO THIS

(https://sit.instructure.com/courses/76654/assignments/537411)

(K - Shi)

ONE!

6. Ethics Case Study - Group

Submission - SUBMIT TO THIS

ONE! due by 11:59pm

(https://sit.instructure.com/courses/76654/assignments/537411)

(M - Billapati)

Self-Test #5 - Rigid Body

Equilibrium - Problem Solving -

RETAKE due by 11:59pm

(https://sit.instructure.com/courses/76654/assignments/515707)

(Q5 retake)

Date	Details Due
	Self-Test #6 - Dry Friction - Conceptual due by 11:59pm (https://sit.instructure.com/courses/76654/assignments/515708)
Sat Oct 19, 2024	Self-Test #5 - Rigid Body Equilibrium - Problem Solving - RETAKE due by 11:59pm (https://sit.instructure.com/courses/76654/assignments/515707) (1 student)
Mon Oct 21, 2024	6. Ethics Case Study - Group Submission - SUBMIT TO THIS ONE! (https://sit.instructure.com/courses/76654/assignments/537411) (F - Billapati)
	6. Ethics Case Study - Group Submission - SUBMIT TO THIS ONE! (https://sit.instructure.com/courses/76654/assignments/537411) (C - Acar)
	6. Ethics Case Study - Group Submission - SUBMIT TO THIS ONE! (https://sit.instructure.com/courses/76654/assignments/537411) (A - Acar)
	6. Ethics Case Study - Group Submission - SUBMIT TO THIS ONE! (https://sit.instructure.com/courses/76654/assignments/537411) (B - Shi)
	6. Ethics Case Study - Group Submission - SUBMIT TO THIS ONE! (https://sit.instructure.com/courses/76654/assignments/537411) (G - Vallabh)

due by 11:59pm

Individual Submission

(https://sit.instructure.com/courses/76654/assignments/515676)

(H - Xu)

7. Truss Simulation and Build -

Individual Submission

due by 11:59pm

(https://sit.instructure.com/courses/76654/assignments/515676) (J - Fontaine)

7. Truss Simulation and Build -

Individual Submission

due by 11:59pm

(https://sit.instructure.com/courses/76654/assignments/515676)

Self-Test #7A - Trusses -

Conceptual

due by 11:59pm

(https://sit.instructure.com/courses/76654/assignments/515709)

Self-Test #7B - Trusses -

Problem Solving

due by 11:59pm

(https://sit.instructure.com/courses/76654/assignments/515710)

7. Truss Simulation and Build -

Individual Submission

due by 11:59pm

(https://sit.instructure.com/courses/76654/assignments/515676) (1 student)

Proposal Report

(https://sit.instructure.com/courses/76654/assignments/515688) due by 11:59pm (H - Xu)

Thu Oct 24, 2024

Proposal Report

(https://sit.instructure.com/courses/76654/assignments/515688) due by 11:59pm (J - Fontaine)

Self-Test #7B - Trusses -

Problem Solving

due by 11:59pm

(https://sit.instructure.com/courses/76654/assignments/515710) (1 student)

Fri Oct 25, 2024

7. Truss Simulation and Build -

Individual Submission

(https://sit.instructure.com/courses/76654/assignments/515676)

(E - Vallabh)



Individual Submission

due by 11:59pm (https://sit.instructure.com/courses/76654/assignments/515676)

(K - Shi)



7. Truss Simulation and Build -

Individual Submission

due by 11:59pm

(https://sit.instructure.com/courses/76654/assignments/515676)

(M - Billapati)



7. Truss Simulation and Build -

Individual Submission

due by 11:59pm (https://sit.instructure.com/courses/76654/assignments/515676)

(D - Sugino)



Proposal Report

(https://sit.instructure.com/courses/76654/assignments/515688) due by 11:59pm (D - Sugino)



Proposal Report

(https://sit.instructure.com/courses/76654/assignments/515688) due by 11:59pm (M - Billapati)

Sat Oct 26, 2024



Proposal Report

(https://sit.instructure.com/courses/76654/assignments/515688)due by 11:59pm (K - Shi)



Proposal Report

(https://sit.instructure.com/courses/76654/assignments/515688)due by 11:59pm (E - Vallabh)

Mon Oct 28, 2024



(https://sit.instructure.com/courses/76654/assignments/515680)

due by 5pm



Exam 2

(https://sit.instructure.com/courses/76654/assignments/536333)

due by 5pm



EXAM 2

(https://sit.instructure.com/courses/76654/assignments/540382)

due by 5pm

6. Ethics Case Study - Group

Submission - SUBMIT TO THIS

ONE! due by 11:59pm (https://sit instructure.com/courses/76654/assignments/537411)

(https://sit.instructure.com/courses/76654/assignments/537411) (1 student)

7. Truss Simulation and Build -

Individual Submission

(https://sit.instructure.com/courses/76654/assignments/515676)

(A - Acar)

7. Truss Simulation and Build -

Individual Submission

(https://sit.instructure.com/courses/76654/assignments/515676)

(B - Shi)

7. Truss Simulation and Build -

Individual Submission

(https://sit.instructure.com/courses/76654/assignments/515676) due by 11:59pm

(G - Vallabh)

7. Truss Simulation and Build -

Individual Submission

(https://sit.instructure.com/courses/76654/assignments/515676) due by 11:59pm

(C - Acar)

7. Truss Simulation and Build -

Individual Submission

(https://sit.instructure.com/courses/76654/assignments/515676)

(F - Billapati)

7. Truss Simulation and Build -

Individual Submission

(https://sit.instructure.com/courses/76654/assignments/515676) due by 11:59pm

(1 student)

Team Formation

(https://sit.instructure.com/courses/76654/assignments/515667)

due by 11:59pm

Tue Oct 29, 2024

ENGR 211 - Office Hours

(https://sit.instructure.com/calendar?

event id=362783&include contexts=course 76654)

5pm to 8pm

1. SolidWorks Refresher - Individual Submission

(https://sit.instructure.com/courses/76654/assignments/515670)

(2 students)

7. Truss Simulation and Build -

Individual Submission

due by 11:59pm

(https://sit.instructure.com/courses/76654/assignments/515676)

(2 students)

Proposal Report

(https://sit.instructure.com/courses/76654/assignments/515688)due by 11:59pm

(F - Billapati)

Proposal Report

(https://sit.instructure.com/courses/76654/assignments/515688)due by 11:59pm

(A - Acar)

Proposal Report

Proposal Report

(https://sit.instructure.com/courses/76654/assignments/515688) due by 11:59pm (B - Shi)

(https://sit.instructure.com/courses/76654/assignments/515688)due by 11:59pm

(C - Acar)

Proposal Report

(https://sit.instructure.com/courses/76654/assignments/515688) due by 11:59pm

(G - Vallabh)

Self-Test #7B - Trusses -

Problem Solving - RETAKE

due by 11:59pm

(https://sit.instructure.com/courses/76654/assignments/515711)

Wed Oct 30, 2024

Study Set #8 - Frames and

Machines due by 11:59pm

(https://sit.instructure.com/courses/76654/assignments/515654)

Self-Test #8 - Frames -

Conceptual due by 11:59pm

(https://sit.instructure.com/courses/76654/assignments/515712)

Study Set #9 - Internal

Loadings due by 11:59pm

(https://sit.instructure.com/courses/76654/assignments/515665)

Mon Nov 4, 2024

Fri Nov 1, 2024

	Due
Self-Test #9 - Frames - Problem Solving due by 1 (https://sit.instructure.com/courses/76654/assignments/515713)	1:59pm
Study Set #10 - Normal Stress and Normal Strain due by 1 (https://sit.instructure.com/courses/76654/assignments/515655)	1:59pm
Progress Report (https://sit.instructure.com/courses/76654/assignments/515687)due by 1 (H - Xu)	1:59pm
Progress Report (https://sit.instructure.com/courses/76654/assignments/515687)due by 1 (J - Fontaine)	1:59pm
Self-Test #10A - Normal Stress & Normal Strain - Conceptual (https://sit.instructure.com/courses/76654/assignments/515689)	1:59pm
Self-Test #10B - Normal Stress Normal Strain - Problem Solving due by 1 (https://sit.instructure.com/courses/76654/assignments/515690)	1:59pm
Self-Test #10A - Normal Stress & Normal Strain - Conceptual (https://sit.instructure.com/courses/76654/assignments/515689) (1 student)	1:59pm
Self-Test #10B - Normal Stress Normal Strain - Problem Solving (https://sit.instructure.com/courses/76654/assignments/515690) (1 student)	1:59pm
8. Tensile Test - Individual Submission (https://sit.instructure.com/courses/76654/assignments/515677) (D - Sugino)	1:59pm
8. Tensile Test - Individual Submission (https://sit.instructure.com/courses/76654/assignments/515677) (K - Shi)	1:59pm
	Problem Solving (https://sit.instructure.com/courses/76654/assignments/515713) \$\timessigned{\text{Progress Report}} \text{(https://sit.instructure.com/courses/76654/assignments/515687)} \text{due by 1} \text{(https://sit.instructure.com/courses/76654/assignments/515689)} \text{due by 1} \text{(https://sit.instructure.com/courses/76654/assignments/515690)} \text{due by 1} \text{(https://sit.instructure.com/courses/76654/assignments/515677)} \text{(https://sit.instructure.com/courses/76654/assignments/515677)} \text{(https://sit.instructure.com/courses/76654/assignments/515677)} \text{(https://sit.instructure.com/courses/76654/assignments/515677)} \text{(https://sit.instructure.com/courses/76654/assignments/515677)} \text{(https://sit.instructure.com/courses/76654/assignments/515677)} \text{(https://sit.instructure.com/courses/76654/assignments/515677)} (https://sit.instructure.com/courses/76654/assignments/5

3. Tensile Test - Individual

Submission

(https://sit.instructure.com/courses/76654/assignments/515677) due by 11:59pm

(E - Vallabh)

3. Tensile Test - Individual

Submission

due by 11:59pm

(https://sit.instructure.com/courses/76654/assignments/515677)

(M - Billapati)

8. Tensile Test - Individual

Submission

___due by 11:59pm

(https://sit.instructure.com/courses/76654/assignments/515677) (H - Xu)

8. Tensile Test - Individual

Submission

due by 11:59pm

(https://sit.instructure.com/courses/76654/assignments/515677) (J - Fontaine)

Progress Report

(<u>https://sit.instructure.com/courses/76654/assignments/515687</u>)due by 11:59pm (E - Vallabh)

Progress Report

(https://sit.instructure.com/courses/76654/assignments/515687) due by 11:59pm (M - Billapati)

Progress Report

(https://sit.instructure.com/courses/76654/assignments/515687) due by 11:59pm (D - Sugino)

Progress Report

(https://sit.instructure.com/courses/76654/assignments/515687)due by 11:59pm (K - Shi)

3. Tensile Test - Individual

Submission

__due by 11:59pm

(https://sit.instructure.com/courses/76654/assignments/515677) (6 students)

Sun Nov 17, 2024

Sat Nov 16, 2024

8. Tensile Test - Individual

Submission

(https://sit.instructure.com/courses/76654/assignments/515677) due by 11:59pm

(4 students)

Progress Report

(https://sit.instructure.com/courses/76654/assignments/515687) due by 11:59pm (Best Project Group 68)

Mon Nov 18, 2024

8. Tensile Test - Individual

Submission

due by 11:59pm

(https://sit.instructure.com/courses/76654/assignments/515677) (A - Acar)

Submission

_due by 11:59pm

(https://sit.instructure.com/courses/76654/assignments/515677)
(B - Shi)

3. Tensile Test - Individual

8. Tensile Test - Individual

Submission

due by 11:59pm

(<u>https://sit.instructure.com/courses/76654/assignments/515677)</u> (C - Acar)

3. Tensile Test - Individual

Submission

___due by 11:59pm

(https://sit.instructure.com/courses/76654/assignments/515677) (F - Billapati)

8. Tensile Test - Individual

Submission

due by 11:59pm

(https://sit.instructure.com/courses/76654/assignments/515677)

(G - Vallabh)

8. Tensile Test - Individual

Submission

__ due by 11:59pm

(https://sit.instructure.com/courses/76654/assignments/515677) (3 students)

Progress Report

(https://sit.instructure.com/courses/76654/assignments/515687) due by 11:59pm (F - Billapati)

Progress Report

(https://sit.instructure.com/courses/76654/assignments/515687) due by 11:59pm (A - Acar)

Progress Report

(https://sit.instructure.com/courses/76654/assignments/515687) due by 11:59pm (B - Shi)

Date	Details	Due
	Progress Report (https://sit.instructure.com/courses/76654/assignments/515687)due (C - Acar)	by 11:59pm
	Progress Report (https://sit.instructure.com/courses/76654/assignments/515687)due (G - Vallabh)	by 11:59pm
	Self-Test #9 - Frames - Problem Solving - RETAKE due (https://sit.instructure.com/courses/76654/assignments/515714)	by 11:59pm
	Study Set #11 - Shear Stress, Allowable Stress (https://sit.instructure.com/courses/76654/assignments/515666)	by 11:59pm
	8. Tensile Test - Individual Submission (https://sit.instructure.com/courses/76654/assignments/515677) (3 students)	by 11:59pm
Wed Nov 20, 2024	Self-Test #10B - Normal Stress & Normal Strain - Problem Solving - RETAKE (https://sit.instructure.com/courses/76654/assignments/515691)	by 11:59pm
	Self-Test #11 - Shear Stress & Allowable Stress - Conceptual (https://sit.instructure.com/courses/76654/assignments/515692)	by 11:59pm
Thu Nov 21, 2024	8. Tensile Test - Individual Submission (https://sit.instructure.com/courses/76654/assignments/515677) (3 students)	by 11:59pm
	Exam 3 (https://sit.instructure.com/courses/76654/assignments/515681)	due by 5pm
Mon Nov 25, 2024	Exam 3 (https://sit.instructure.com/courses/76654/assignments/536334)	due by 5pm
	EXAM 3 (https://sit.instructure.com/courses/76654/assignments/551751)	due by 5pm

Date	Details Due
M D 0 0004	Peer Assessment - Final Project Check-in #1 due by 11:59pm (https://sit.instructure.com/courses/76654/assignments/515656)
Mon Dec 2, 2024	Study Set #12 - Shear Force & Bending Moment Diagrams due by 11:59pm (https://sit.instructure.com/courses/76654/assignments/515649)
Wed Dec 4, 2024	Self-Test #12 - Shear Force & Bending Moment Diagrams - Conceptual (https://sit.instructure.com/courses/76654/assignments/515693)
	Final Presentation (https://sit.instructure.com/courses/76654/assignments/515684) due by 11:59pm (A - Acar)
	Final Presentation (https://sit.instructure.com/courses/76654/assignments/515684) due by 11:59pm (B - Shi)
Sun Dec 8, 2024	Final Presentation (https://sit.instructure.com/courses/76654/assignments/515684)due by 11:59pm (C - Acar)
	Final Presentation (https://sit.instructure.com/courses/76654/assignments/515684)due by 11:59pm (F - Billapati)
	Final Presentation (https://sit.instructure.com/courses/76654/assignments/515684) due by 11:59pm (G - Vallabh)
Tue Dec 10, 2024	Final Presentation (https://sit.instructure.com/courses/76654/assignments/515684) due by 11:59pm (H - Xu)
	Final Presentation (https://sit.instructure.com/courses/76654/assignments/515684)due by 11:59pm (J - Fontaine)

Final Presentation - Student

Evals - Sections A, C

(https://sit.instructure.com/courses/76654/assignments/551571) due by 11:59pm

(A - Acar)

Final Presentation - Student

Evals - Sections A, C

due by 11:59pm

(https://sit.instructure.com/courses/76654/assignments/551571)

Final Presentations - Student

Evals - Sections B, K

due by 11:59pm

(https://sit.instructure.com/courses/76654/assignments/553344)
(B - Shi)

Wed Dec 11, 2024

Study Set #13 - Bending Stress

due by 11:59pm

(https://sit.instructure.com/courses/76654/assignments/515659)

Final Presentation

(https://sit.instructure.com/courses/76654/assignments/515684) due by 11:59pm (E - Vallabh)

Final Presentation

(https://sit.instructure.com/courses/76654/assignments/515684) due by 11:59pm (M - Billapati)

Final Presentation

(https://sit.instructure.com/courses/76654/assignments/515684) due by 11:59pm (D - Sugino)

Thu Dec 12, 2024

Final Presentation

(https://sit.instructure.com/courses/76654/assignments/515684) due by 11:59pm (K - Shi)

Final Presentation - Student

Evals - Section F

due by 11:59pm

(https://sit.instructure.com/courses/76654/assignments/551683)

Final Presentation - Student

Evals - Section J

due by 11:59pm

(https://sit.instructure.com/courses/76654/assignments/551570)

Date	Details Due
	Final Presentation - Student Evals - Section D due by 11:59pm (https://sit.instructure.com/courses/76654/assignments/554130)
Fri Dec 13, 2024	Self-Test #13A - Bending Stress - Conceptual due by 11:59pm (https://sit.instructure.com/courses/76654/assignments/515694)
	Self-Test #13B - Bending Stress - Problem Solving due by 11:59pm (https://sit.instructure.com/courses/76654/assignments/515695)
	Final Presentation - Student Evals - Section M due by 11:59pm (https://sit.instructure.com/courses/76654/assignments/554544)
Sat Dec 14, 2024	Final Presentations - Student Evals - Sections B, K (https://sit.instructure.com/courses/76654/assignments/553344) (K - Shi)
	Final Presentation - Student Evals due by 11:59pm (https://sit.instructure.com/courses/76654/assignments/551042)
Mon Dec 16, 2024	EXTRA CREDIT: SolidWorks Stress Analysis - Individual Submission (Optional) (https://sit.instructure.com/courses/76654/assignments/515678)
	Final Report (https://sit.instructure.com/courses/76654/assignments/515686) due by 11:59pm
Tue Dec 17, 2024	Peer Assessment - Final Project Check-in #2 due by 11:59pm (https://sit.instructure.com/courses/76654/assignments/515664)
Thu Dec 19, 2024	Research Participation: Consent due by 11:59pm (https://sit.instructure.com/courses/76654/assignments/515653)
	Self-Test #13A - Bending due by 11:59pm Stress - Conceptual (https://sit.instructure.com/courses/76654/assignments/515694)

(1 student)

Self-Test #13B - Bending

Stress - Problem Solving

due by 11:59pm

(https://sit.instructure.com/courses/76654/assignments/515695) (1 student)

Statics Concept Inventory

Score

due by 11:59pm

(https://sit.instructure.com/courses/76654/assignments/556116)

Study Set #13 - Bending Stress

(https://sit.instructure.com/courses/76654/assignments/515659) due by 11:59pm (1 student)

Test on Statics Concepts -

Completion

due by 11:59pm

(https://sit.instructure.com/courses/76654/assignments/515715)

Test on Statics Concepts -

Instructions

due by 11:59pm

(https://sit.instructure.com/courses/76654/assignments/515658)

Fri Dec 20, 2024

Final Exam

due by 7pm

(https://sit.instructure.com/courses/76654/assignments/541582)

FINAL EXAM

(https://sit.instructure.com/courses/76654/assignments/557258)

due by 7pm

Final Exam - Remote Version

(https://sit.instructure.com/courses/76654/assignments/515683) due by 9:10pm (2 students)

Research Participation:

Consent

due by 11:59pm

(https://sit.instructure.com/courses/76654/assignments/515653)

(3 students)

Test on Statics Concepts -

Completion

__due by 11:59pm

(https://sit.instructure.com/courses/76654/assignments/515715)

(3 students)

due by 11:59pm

Date	Details Du					
	(https://sit.instructure.com/courses/76654/assignments/515658) (3 students)					
Tue Dec 24, 2024	Final Exam - Remote Version (https://sit.instructure.com/courses/76654/assignments/515683) due by 1:10p (1 student)					
Wed Jan 29, 2025	Self-Test #1A - Force Vectors - Conceptual (https://sit.instructure.com/courses/76654/assignments/515696)					
	Course Implementation Survey (https://sit.instructure.com/courses/76654/assignments/515657)					
	Final Exam (https://sit.instructure.com/courses/76654/assignments/515682)					
	Final Presentation - Student Evals - Sections E, G (https://sit.instructure.com/courses/76654/assignments/551572) (E - Vallabh)					
	Final Presentation - Student Evals - Sections E, G (https://sit.instructure.com/courses/76654/assignments/551572) (G - Vallabh)					
	Final Project - Grade Adjustment (https://sit.instructure.com/courses/76654/assignments/515685)					
	Make Up Design Studio - Follow up (https://sit.instructure.com/courses/76654/assignments/515648)					
	Make-Up Design Studio (https://sit.instructure.com/courses/76654/assignments/515651)					
	Review for Exam 1 (https://sit.instructure.com/courses/76654/assignments/515662)					

	2x 75-min Lecture			due Mondays	due Weds	110-min Design Studio	
Week	Lecture	Textbook	Class Problems	Study Set	Self Test	Design Studio	Exams (Mon. 5-6pm)
Week 1 9/3-9/6	Introduction, Force Vectors	2.1-2.4	1-1 to 1-4	SS #1 due: 9/9	ST 1A/1B due: 9/11	Software Setup / SolidWorks Refresher	
Week 2 9/9-9/13	Moment of a Force	3.1-3.4	2-1 to 2-4	SS #2 due: 9/16	ST 2A/2B due: 9/18	Moments of Forces	
Week 3 9/16-9/20	Couples, Equivalent Systems	3.6-3.9	3-1 to 3-6	SS #3 due: 9/23	ST 3A/3B due: 9/25	Mobile Project	
Week 4 9/23-9/27	Free Body Diagrams, Review for Exam 1	4.1-4.2	4-1 to 4-4	SS #4 due: 10/2	ST 4 due: 10/4	Supports and FBDs	
Week 5 9/30-10/4	Equilibrium of Rigid Bodies	4.3-4.4	4-5 to 4-10	SS #5 due: 10/7	ST 5 due: 10/9	Gantry Project	EXAM 1 (9/30)
Week 6 10/7-10/11	Dry Friction, Trusses	4.7-4.8	5-1 to 5-4	SS #6 due: 10/16	ST 6 due: 10/18	Ethics Case Study	
Week 7 10/15-10/18	Trusses, cont.	5.1-5.4	6-1 to 6-5	SS #7 due: 10/21	ST 7A/7B due: 10/23	Truss Simulation & Build	
Week 8 10/21-10/25	Frames and Machines, Review for Exam 2	5.5	7-1 to 7-3	SS #8 due: 10/30	ST 8 due: 11/1	Final Design Project [1]: Introduction & Concept Generation	
Week 9 10/28-11/1	Frames and Machines, cont. Internal Loadings	7.1-7.2	7-4 to 7-6 8-1 to 8-3	SS #9 due: 11/4	ST 9 due: 11/6	Final Design Project [2]: Preliminary Design and Initial Analysis	EXAM 2 (10/28)
Week 10 11/4-11/8	Stress and Strain (Normal) Mech Props of Materials	7.3-7.4, 7.7-7.8, 8.1-8.3	9-1 to 9-5	SS #10 due: 11/11	ST 10A/10B due: 11/13	PASCO Experiment: Tensile Test	
Week 11 11/11-11/15	Shear Stress Allowable Stress	7.5-7.6	10-1 to 10-6	SS #11 due: 11/18	ST 11 due: 11/20	** Project Work Time ** Stress Analysis in SolidWorks (extra credit)	
Week 12 11/18-11/22	Shear and Moment Diagrams, Review for Exam 3	11.1-11.2	12-1 to 12-3	SS #12 due: 12/2	ST 12 due: 12/4	Final Design Project [3]: Design Refinement and Detailed Analysis	
Week 13 11/25-11/26	Shear and Moment Diagrams, cont.	11.1-11.2	12-4 to 12-5				EXAM 3 (11/25)
	THANKSGIVING BREAK						
Week 14 12/2-12/6	Bending Stress Area Properties	11.3-11.4, 6.1-6.5	13-1 to 13-4	SS #13 due: 12/11	ST 13A/ 13B due: 12/13	Final Design Project [4]: Design Integration and Final Analysis	
Week 15 12/9-12/13	Bending Stress, cont. Review for Final	11.3-11.4	14-1 to 14-3		Final ST due: 12/20	PROJECT PRESENTATIONS	
Finals							FINAL EXAM (12/20)

Course	Assessn	nent -	F2024	

Design Studio	30%	(Projects @ 15%, Final Design Project @ 15%)
Study Sets (HW)	5%	
Self Tests (Quizzes)	15%	(Conceptual @ 5%, Problem Solving @ 10%)
Exams (3 total)	30%	(3 exams @ 10% each)
Final Exam (cumulative)	20%	