

Schedule: *All times provided in Central Time and are not adjusted for Daylight Savings.*

MW 2:00pm–3:50pm via Zoom or asynchronously via PRAIRIELEARN; discussion F, see below for times and details.

Course websites:

- Class schedule, lecture slides, gradebook, written report deposit and links to everything else: compass2g.illinois.edu
- Synchronous lectures: illinois.zoom.us
- Live discussion sections, office hours and independent study room: gather.town.
Room password: *learningtobreakthings*
gather.town is only supported in Chrome or Firefox browsers.
- Online homework, asynchronous lectures and CBTF proctored quizzes: prairielearn.engr.illinois.edu
- Announcements, online Q&A and asynchronous discussion boards: campuswire.com

Scope: Statics and mechanics of materials concepts pertinent to the fields of materials science and engineering: force resultants; stresses and strains produced in elastic bodies; microscopic effects of different loading states (tension, compression, torsion, and bending) on deformable bodies; beam stresses and deflections; three-dimensional stresses and strains.

Objectives: Students will be able to (a) apply concepts of static equilibrium to determine internal loads due to external forces on structures; (b) compute internal states of stress due to loads; (c) determine the deformation of materials from states of stress; and (d) analyze a variety of two- and three-dimensional engineering problems.

Prerequisites: Math 241 (Calculus III), Physics 211 (Mechanics); credit or concurrent registration in Math 225 (Introductory Matrix Theory) or Math 415 (Applied Linear Algebra), MSE 201 (Phases and Phase Relations) and CS 101 (Introduction to Computing for Science and Engineering) or CS125 (Intro to Computer Science).

Instructor: Jessica Krogstad (jakrogst@illinois.edu; 168 MRL)

Teaching Assistants: Zoë Tucker (zoert2@illinois.edu), Dana Yun (danayun2@illinois.edu), Tiancheng Zhang (tz11@illinois.edu), Computational TA: Kisung Kang (kkang14@illinois.edu)

Office hours: Sunday 6–8pm, Monday 8–9am, Tuesday 5–7pm, Wednesday 8–9am, Thursday 5–7pm, Friday 12–1PM via gather.town

Discussion Sections: *You may only attend your registered section*

AD1, F 1:00–1:50pm, [Discussion Room 1](#) or [Discussion Room 2](#), Zoë Tucker & Dana Yun

AD2, F 2:00–2:50pm, [Discussion Room 1](#) or [Discussion Room 2](#), Zoë Tucker & Dana Yun

AD3, Th 7:00–8:00pm, [Discussion Room 1](#), Tiancheng Zhang & Zoë Tucker

Text: *Statics & Mechanics of Materials*, R. C. Hibbeler, 5th ed. (Pearson, 2017). If you prefer to purchase the electronic version of the book, you're more than welcome to do so. You'll need to register with pearson.com. Then enter the courseID: krogstad43813.

Alternative Text: *Statics and Mechanics of Materials: An Integrated Approach*, William F. Riley, Leroy D. Sturges, and Don H. Morris (Wiley 2002). Available at Engineering Reserves in Grainger.

Special accommodations: To obtain disability-related academic adjustments and/or auxiliary aids, students with disabilities must contact their lecturer and the Disability Resources and Educational Services (DRES, disability.illinois.edu) as soon as possible, and no later than Feb 8.

Course evaluation:

$$10\% \times (\text{Online Homework}) + 4\% \times (\text{Participation}) + 8\% \times (\text{Engineering Discussion}) + 8\% \times (\text{Engineering Reports}) + 70\% \times (\text{Quizzes / Final Exam}) = \text{Total}$$

Guidelines for correlation between numerical total score and the following final grades:

A+ (98–100)	B+ (88–90)	C+ (78–80)	D+ (68–70)	
A (94–97)	B (84–87)	C (74–77)	D (64–67)	F (0–60)
A– (91–93)	B– (81–83)	C– (71–73)	D– (61–63)	

PrairieLearn: Your online homework assignments and your computerized based quizzes will use the PrairieLearn online problem system. PrairieLearn can be accessed via prairielearn.engr.illinois.edu.

Online Homework (10%): Assignments on PrairieLearn.

- Online homework assignments are due on **Wednesdays at 11:59 pm**. Late submissions will be penalized by 50% for each day late.
- Homework assignments will operate in "game mode," where you can receive additional credit for repeatedly answering a question correctly. This is easier (and more fun) if you first solve the problem symbolically (see below).
- You can rework completed items after the due date. This work will not be saved and will not affect your grades.
- You will receive a grade for ALL assigned online homework problems. Your HW score will also appear on the COMPASS2G grade book.
- The online homework problems give explicit values and units to the relevant lengths, material properties, forces, etc., and therefore you should give your final answer with an explicit numerical value. Nevertheless, when solving a homework problem you should (to the utmost extent possible) assign symbols to all the relevant lengths, forces, material properties, etc., and then solve the problem symbolically. As a last step, you should substitute the value and units of each of the symbols in the symbolic formula. You are encouraged to solve all problems symbolically.
- This symbolic form of working out the problems will be used in the lectures, in written reports, worksheets and exams.
- You are encouraged to print out each homework problem (or sketch the schematic in a notebook) and derive your symbolic solution on this print out. Store these solutions for your future reference.
- You should come to office hours with the symbolic solution for your online assignment. We will be able to check your work better if you have that in hand.
- Solutions will not be posted.
- The "zeroth" online homework is optional, and due on *Wednesday Feb. 3*, but you are encouraged to complete this earlier if possible to allow time to focus on HW1. It will familiarize you with PrairieLearn, and includes questions regarding the syllabus, MatLab and vector math. You can earn up to 0.5 of extra points to be added to your final grade.
- The first online homework (HW1) is also due on *Wednesday Feb. 3* and covers the material of Chapter 3.
- If you need help accessing MatLab on your personal computer, follow this link to learn more about connecting to an EWS workstation remotely: engrit.illinois.edu/services/instructional-services/remote-connections-citrix

Lectures (4%): You may attend either the synchronous lecture via Zoom or view lectures asynchronously via PRAIRIELEARN.

- Your participation grade will be based on a combination of attendance and participation in in-class polling or based on your completion of embedded questions in PRAIRIELEARN.
- You may not receive credit for both formats of the same lecture. However, you're welcome to attend whichever form is most conducive to your schedule, work flow or time zone and may switch when needed without advanced notice.
- Note that credit for PRAIRIELEARN lectures is only available during the week that they are first posted. The lecture material will remain live on PRAIRIELEARN for the duration of the semester, but no additional credit may be gained (much like online homework assignments).
- Students participating in synchronous lectures are encouraged to prepare and maintain a clean background. This includes noise and other distractions that may be visible in your videofeed. Please keep video on when possible but especially in breakout rooms or during discussion sections; everyone seeing each other helps us all be engaged in learning. Although we understand there may be times and scenarios which are not comfortable or appropriate to share with the class.

Discussion Sections (8%): Prompt and regular attendance at your discussion section is required. You must attend only the discussion section in which you are enrolled. All discussion sections are synchronous and will be held on [gather.town](#). Attendance will be taken in the first 5 minutes of each class. Those joining the session after this will not be allowed to participate that week.

Engineering discussion sessions will consist of either a design or an analysis problem, which is a high-energy and efficient 50-minute learning experience. For each session, students will work in their group of three to four people. Discussion worksheets will be posted on COMPASS2G. Students should download, print and/or be able to interact with the worksheet before the start of each session. (You may just number a blank piece of paper if you do not have access to a printer or tablet). Completed worksheets must include the names of all of your teammates and must be uploaded to COMPASS2G no later than Friday at 11:59PM of the week that it was assigned (we suggest that you just upload it immediately after your session ends). These worksheets will not be graded for accuracy. Solutions to the worksheets will not be posted separately, but can be revisited and discussed during office hours.

There are two main goals for the engineering discussion:

- **Gain experience in team-work.** This skill is critical in all engineering disciplines, from large-scale industrial projects to academic research. To work productively in teams is a skill that must be learned just like math or physics, and regular practice is essential. Often you will have to work with people who you do not especially like, or who you find it difficult to work with. It is important to learn how to manage these situations so that the important work is still accomplished.
- **Apply engineering concepts to real-world problems.** Each discussion focuses on a real-world problem that you will have to use your engineering skills to solve, including the material from class and also knowledge from previous engineering, math, and science classes. You will also have to think like an engineer and understand when to make approximations, how to judge the appropriateness of different models, and which mathematics and physics is most useful for a given engineering problem.

We also hope that these engineering discussions will help you to meet your classmates, and we encourage you to get together outside of lectures and discussions to work collaboratively on homeworks and exam study. The [gather.town](#) space is available as an open study space to facilitate such collaboration at any time. Dedicated group study hours are noted above in the *Office hours* section.

Discussion sections start Friday Jan. 29.

Engineering Reports (8%): Each week a report must be submitted, consisting of a full write-up of a problem related to the group worksheet that was assigned in that week's engineering discussion. The report will be available online after discussion and must be submitted (via COMPASS2G) the following **Friday at 11:59pm**. The only format that will be accepted for report submission is a single, properly-ordered PDF, in portrait format; your name and discussion section must be printed legibly on the top of the first page. The TAs will grade the report. You may submit each report a maximum of two times; only the latest submission will be graded.

Engineering reports are assigned to practice the communication of engineering concepts in writing. They will be graded based on presentation, neatness, correct use of symbols, quality of drawings and diagrams, and clarity of explanation (80%). Reports should be neat and organized, hand-written or typed. Tables and graphical representations of results should be generated using some software program such as Excel, TecPlot, MatLab, etc., rather than being hand-drawn. Correct interpretation of the problem and correct final answers are important but not the focus (20%). *Late reports will not be accepted.* The first reports will be assigned Friday Feb. 5 during your discussion section, and due Friday Feb. 12. An example of a good report can be found on the class website. Point breakdown for the engineering report:

- 1: Correct interpretation of the problem
- 1: Correct final answer
- 2: Presentation quality
- 1: Clarity of explanation
- 2: Clear drawings and diagrams
- 2: Use of symbolic work
- 1: Use of units on numerical answers

Quizzes / Final Exam (70%): *Dates and policies:* There are regular quizzes roughly every two weeks. This course uses the College of Engineering Computer-Based Testing Facility service [CBTF Online](#) for its exams. The seven quizzes are scheduled from 7:00–7:50PM on Mondays **Feb. 8** (optional), **Feb. 22**, **Mar. 8**, **Mar. 22**, **Apr. 5**, **Apr. 19**, and **May. 3**. The final exam will take place during exam week (**May 7–14**). For each quiz, and for the final, you will be responsible for signing up for a time slot to take the quiz, checking in on time, being prepared with an appropriate set up for online proctoring and taking the quiz. Conflict exam times are available with approval. If you are unable to attend an exam then you must inform your professor by email at the earliest possible opportunity. For non-emergency absences this notification must be at least *one week in advance*. Exams are closed to all electronics (no calculators, no phones, etc), but Matlab and Mathematica will be available, and a formula sheet will be provided online. You will be able to sign up for your quizzes at [cbtf.engr.illinois.edu](#) and you can find more information, including the test center policies, at [cbtf.engr.illinois.edu/cbtf-online/students](#).

Content: The quizzes last fifty minutes, and will give you an immediate assessment and feedback on your understanding of the material since the previous quiz. As the material in the course is cumulative, the assessments assume that you understand previous material. The final exam is *optional*. It is cumulative over the entire course, and lasts three hours.

Total score: Your total score of 70% is calculated from your six quizzes as: $20\% \times (\text{highest quiz score}) + 10\% \times \sum (\text{remaining quiz scores})$. If you take the final exam and your score exceeds your *lowest quiz score*, the exam score will replace the lowest quiz in the total calculation; if your score exceeds your *lowest two quiz scores*, the exam score will replace your two lowest quizzes in the total calculation.

CBTF Policies:

- The policies of the CBTF are the policies of this course, and academic integrity infractions related to the CBTF are infractions in this course.
- If you have accommodations identified by the [Division of Rehabilitation-Education Services \(DRES\)](#) for exams, please email your Letter of Accommodations (LOA) to CBTF Manager Carleen Sacris at sacris1@illinois.edu before you make your first exam reservation.
- If you have any issue during an exam, please inform the proctor immediately. Work with the proctor to resolve the issue at the time before logging off.
- Review all instructions on the CBTF website before your first exam: cbtf.engr.illinois.edu/cbtf-online.

Canceled classes: There is no class on Wednesday, Feb. 17 or Mar. 24th according to the revised academic calendar. There will not be any discussion sections on Thursday, Mar. 25th or Friday Mar. 26 (Engineering Open House). Be aware that despite the canceled lectures, **online homework assignments are still due on those Wednesdays.**

Grade Reporting: All assessment scores are stored on the COMPASS2G website. Any errors in grade reporting appearing on COMPASS2G must be reported within 2 weeks of the due date of the assessment item or by the last day of class, whichever is earlier. If you have a missing grade for discussion section or a written report, contact the *first listed TA in your section*. If you have a missing grade from online homework, an exam, or participation, contact the instructor.

Expectations: To succeed in this class, you will need to

- read the chapter *before* coming to class, and formulate questions;
- participate in the class;
- make sure you understand the homework problems and solutions;
- seek out help when you have trouble.

Obtaining help: The main two ways to obtain help are online at campuswire.com or during office hours at gather.town. You can also speak with your professor briefly after lecture. Please do not send email directly to TAs or professors for routine help or absences. In cases of emergencies related to exams (e.g., illness) you should email your professor at the earliest possible opportunity.

Online Forum (Campuswire): This class uses Campuswire for all communication between the instructor and students. Campuswire is a FERPA compliant replacement for Piazza. Please visit campuswire.com to register with your @illinois.edu email address. You may need the *Join Class Code: 2265* the first time. If you desire, you can post anonymously on Campuswire or make a private post just to the instructors (this should be done rather than emailing the professor directly). You can also use the chat rooms feature on Campuswire study groups etc. *Note that Campuswire should be used to communicate with your instructors, rather than email.*

Office Hours (Study Hall): Held in gather.town, Sunday 6–8pm, Monday 8-9am, Tuesday 5-7pm, Wednesday 8-9am, Thursday 5–7pm, Friday 12-1PM. For two hours sessions, the first hour will be a time to meet up with fellow MSE206 students to work on homework and written reports together, and the second hour will be staffed by TAs. Office hours will start in week 2 (Feb 1). Do not ask TAs to work the homework problems before they are due; it is fine to ask specific questions on the details of your attempted solutions, or to work out problems that are similar to homework problems. You are welcome to use the gather.town classroom for group studying or collaboration beyond the scheduled office hours or study hall hours. All class policies, including academic integrity, harassment, discrimination policies still apply in this virtual classroom space (see below). Abuse of the virtual classroom space should be reported directly to the instructor

immediately (you are welcome to do so using the anonymous features in Campuswire).

Absences: Excused Absence Request Form: forms.illinois.edu/sec/8097747

- Excuses from assessments will only be given in the following circumstances:
 - Illness.
 - Personal crisis (e.g., car accident, required court appearance, death of a close relative).
 - Religious observance.
 - Required attendance at an official UIUC activity (e.g., varsity athletics, band concert).
- In all cases you must complete the online Excused Absence Request Form and upload a scan of the official written documentation explaining your absence.
- In cases (a) or (b) please provide some form of documentation via the online form within 2 weeks of the due date of the missed assessment, but no later than reading day (May 6). In cases of extended or unusual illness, late submission of excuse documentation will be considered. See [Student Assistance Center](#).
- In case (c) please notify the instructor by completing an Excused Absence Request form at least one week prior to the due date of the missed assessment.
- In case (d) an official letter from the designated university official must be submitted via the online form at least one week prior to the due date of the missed assessment.
- If you will not be able to take a quiz due to illness or any other reason, you must send email to your professor at the earliest possible opportunity. Excused exams will be replaced by a weighted average of the other exam scores at the end of semester.
- Notwithstanding the above, at the professor's discretion you may be required to make up any excused work or attend substitute instruction or assessment.

Academic Integrity, Harassment, and Discrimination: You are bound by the [University Honor Code](#) in this course. Any violation of the Honor Code will result in disciplinary action. In addition, harassment or discrimination of any kind will not be tolerated. Please report any concerns immediately to your professor. Every student is expected to review and abide by the Academic Integrity Policy: studentcode.illinois.edu/article1. Ignorance is not an excuse for any academic dishonesty. It is your responsibility to read this policy to avoid any misunderstanding. Do not hesitate to ask the instructor(s) if you are ever in doubt about what constitutes plagiarism, cheating, or any other breach of academic integrity.

Community of Care: As members of the Illinois community, we each have a responsibility to express care and concern for one another. If you come across a classmate whose behavior concerns you, whether in regards to their well-being or yours, we encourage you to refer this behavior to the [Student Assistance Center](#) (217-333-0050). Based on your report, the staff in the Student Assistance Center reaches out to students to make sure they have the support they need to be healthy and safe.

Further, we understand the impact that struggles with mental health can have on your experience at Illinois. Significant stress, strained relationships, anxiety, excessive worry, alcohol/drug problems, a loss of motivation, or problems with eating and/or sleeping can all interfere with optimal academic performance. We encourage all students to reach out to talk with someone, and we want to make sure you are aware that you can access mental health support at the [Counseling Center](#) or [McKinley Health Center](#). For mental health emergencies, you can call 911 or walk in to the Counseling Center, no appointment needed.

Anti-Racism and Inclusivity Statement:

The Grainger College of Engineering is committed to the creation of an anti-racist, inclusive community that welcomes diversity along a number of dimensions, including, but not limited to,

race, ethnicity and national origins, gender and gender identity, sexuality, disability status, class, age, or religious beliefs. The College recognizes that we are learning together in the midst of the Black Lives Matter movement, that Black, Hispanic, and Indigenous voices and contributions have largely either been excluded from, or not recognized in, science and engineering, and that both overt racism and micro-aggressions threaten the well-being of our students and our university community.

The effectiveness of this course is dependent upon each of us to create a safe and encouraging learning environment that allows for the open exchange of ideas while also ensuring equitable opportunities and respect for all of us. Everyone is expected to help establish and maintain an environment where students, staff, and faculty can contribute without fear of personal ridicule, or intolerant or offensive language. If you witness or experience racism, discrimination, micro-aggressions, or other offensive behavior, you are encouraged to bring this to the attention of the course director if you feel comfortable. You can also report these behaviors to the Bias Assessment and Response Team ([BART](#)). Based on your report, BART members will follow up and reach out to students to make sure they have the support they need to be healthy and safe. If the reported behavior also violates university policy, staff in the Office for Student Conflict Resolution may respond as well and will take appropriate action.

Sexual Misconduct Reporting Obligation: The University of Illinois is committed to combating sexual misconduct. Faculty and staff members are required to report any instances of sexual misconduct to the University's Title IX Office. In turn, an individual with the Title IX Office will provide information about rights and options, including accommodations, support services, the campus disciplinary process, and law enforcement options.

A list of the designated University employees who, as counselors, confidential advisors, and medical professionals, do not have this reporting responsibility and can maintain confidentiality, can be found here: wecare.illinois.edu.

Other information about resources and reporting is available here: wecare.illinois.edu.

Religious Observances: Illinois law requires the University to reasonably accommodate its students' religious beliefs, observances, and practices in regard to admissions, class attendance, and the scheduling of examinations and work requirements. You should examine the syllabus at the beginning of the semester for potential conflicts between course deadlines and any of your religious observances. If a conflict exists, you should notify your instructor of the conflict and follow the procedures outlined in the *Absences* section.

Family Educational Rights and Privacy Act (FERPA): Any student who has suppressed their directory information pursuant to Family Educational Rights and Privacy Act (FERPA) should self-identify to the instructor to ensure protection of the privacy of their attendance in this course. See registrar.illinois.edu for more information on FERPA.

Changes to syllabus: may occur as deemed necessary by the professor; they will be announced.

Calendar and Topics: Changes to schedule will be announced; see COMPASS2G calendar for specific reading assignment and to remain up to date.

	Quiz	Assignments		Reading Assignment	
		Available	Due	Chapter	Description
M Jan 25		HW0		1, 2	Forces as vectors
W Jan 27		HW1		3	(3.1–3.5) Force system resultants
F Jan 29					Intro recitation
M Feb 01				3	(3.6–3.8) Force system resultants
W Feb 03		HW2	HW0,1	4	(4.1–4.4) Rigid body equilibrium
F Feb 05		RP1			Engineering analysis 1
M Feb 08	0			4	(4.5–4.8) Rigid body equilibrium
W Feb 10		HW3	HW2	5	(5.1–5.3) Structural analysis
F Feb 12		RP2	RP1		Engineering analysis 2
M Feb 15				5	(5.4–5.5) Structural analysis
W Feb 17			HW3		— No Instruction —
F Feb 19		RP3	RP2		Engineering analysis 3
M Feb 22	1			6	(6.1–6.3) Center of gravity, moment of inertia
W Feb 24		HW4			(6.4–6.6)
F Feb 26		RP4	RP3		Engineering analysis 4
M Mar 01				7	(7.1–7.4) Stress and strain
W Mar 03		HW5	HW4		(7.5–7.9)
F Mar 05		RP5	RP4		Engineering analysis 5
M Mar 08	2			14	(14.1–14.5) Coordinate transformation
W Mar 10		HW6	HW5		(14.6–11)
F Mar 12		RP6	RP5		Engineering analysis 6
M Mar 15				8	(8.1–8.4, 14.9) Mechanical properties
W Mar 17		HW7	HW6		(8.5–8.7, 14.10)
F Mar 19		RP7	RP6		Engineering analysis 7
M Mar 22	3			9	(9.1–9.3) Axial Load
W Mar 24			HW7		— No Instruction —
F Mar 26		—		—	no discussion ENGINEERING OPEN HOUSE
M Mar 29				9	(9.4–9.6) Axial load
W Mar 31		HW8		10	(10.1–10.2) Torsion
F Apr 02		RP8	RP7		Engineering analysis 8
M Apr 05	4			10	(10.4–10.5) Torsion
W Apr 07		HW9	HW8	11	(11.1–11.4) Bending
F Apr 09		RP9	RP8		Engineering analysis 9
M Apr 12				11	(11.3–11.4) Bending
W Apr 14		HW10	HW9	12	(12.1–12.2) Transverse shear
F Apr 16		RP10	RP9		Engineering analysis 10
M Apr 19	5			12	(12.1–12.2) Transverse shear
W Apr 21		HW11	HW10	16	(16.1–16.2) Deflection of beams
F Apr 23		RP11	RP10		Engineering analysis 11
M Apr 26				16	(16.4–16.5) Deflection of beams
W Apr 28		HW12	HW11	13	(13.1–13.2) Combined loading
F Apr 30			RP11		Engineering analysis 12
M May 03	6			17	(17.1–17.3) Buckling of columns
W May 05			HW12		Review
F May 07	F	—		—	no discussion EXAM WEEK
M May 11	F				
F May 15	F				