

- Times:* Section AL1, 10:00-11:50AM, Tuesday & Thursday  
Section AL2, 3:00-4:50PM, Tuesday & Thursday
- Location:* 1302 Everitt Laboratory
- Instructor:* Brian Mercer, [bmercerc@illinois.edu](mailto:bmercerc@illinois.edu) (Section AL1)  
Ruoyu Sun, [ruoyus2@illinois.edu](mailto:ruoyus2@illinois.edu) (Section AL2)
- Assistants:* Kenta Hirashima, [kentah2@illinois.edu](mailto:kentah2@illinois.edu)  
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- Office Hours:* See course website for the latest office hours
- Text:* Fundamentals of Machine Component Design, Sixth Edition  
By R. C. Juvinall and K. M. Marshek, Wiley, New York 2006
- Websites:* Illinois Canvas Login Page - <https://canvas.illinois.edu/>  
PrairieLearn for homework - <https://www.prairielearn.org/>
- Operation:* Class sessions will be held in-person. Any changes to course operation will be communicated via announcements on the course website and/or in-person.
- Description:* Design and analysis of machinery for load-bearing and power transmission. Consideration of material failure modes, including yielding, fracture, and fatigue. Design and selection of machine elements: threaded fasteners, springs, bearings, gears, and friction drives.
- Objective:* Learn to design machine components that do not fail. The course has thus two components: 1) Study of failure modes, and 2) Design of various mechanical components, such as gears, threaded fasteners, and springs with optimum materials and geometry.

*Final Grade Calculation:*

- 10% - Participation: pre-lecture quizzes (2.5%) and in-class worksheets (7.5%)
- 10% - PrairieLearn Homework
- 10% - FEA Labs
- 30% - Quizzes (6 quizzes)
- 40% - Team Design Project (includes benchmarks and final deliverable)

The total score  $s$  corresponds to final grades as follows:

$97\% \leq s < 100\%$	A+	$93\% \leq s < 97\%$	A	$90\% \leq s < 93\%$	A-
$87\% \leq s < 90\%$	B+	$83\% \leq s < 87\%$	B	$80\% \leq s < 83\%$	B-
$77\% \leq s < 80\%$	C+	$73\% \leq s < 77\%$	C	$70\% \leq s < 73\%$	C-
$67\% \leq s < 70\%$	D+	$63\% \leq s < 67\%$	D	$60\% \leq s < 63\%$	D-

*Prerequisites:* Understanding of the materials covered in ME 330 (Materials and Processing) and ME 370 (Mechanical Design I) is expected to all students. Concepts in Statics (TAM 211),

Dynamics (TAM 212) and Introduction to Solid Mechanics (TAM 251) are assumed to have been mastered by each student.

*Teamwork:*

- Teamwork is an integral part of the course, as both in-class activities and the Final Design Project are completed in teams.
- The final design project is a team-based project. Teams will be formed of 4-5 students. Be a good teammate by being respectful and helpful, by showing up on time, by communicating needs and ideas clearly, by listening to and including others, by completing your tasks, and being proactive in contributing to the team goals. Make sure that your teammates are aware of your contributions! For team-related issues, please reach out to an instructor **early** so that timely guidance can be given. Instructors will solicit end-of-semester anonymous feedback from each team regarding performance and contributions of its individual members and reserve the right to modify an individual's project grade if there is evidence that they did not do their fair share of work on the project.

*Class attendance and participation:*

1. Before class, you must watch a pre-lecture video and complete an associated quiz which will prime you on the content that you will be engaging in during class time. The video and quiz are hosted on the Canvas course page. The quiz is graded based on performance.
2. During class, you will complete a worksheet with your project group (or self-formed groups before project groups are assigned). A **scribe** from the group should be established for each class session, to prepare a neat version of the group's collective responses; this will be the only version collected for grading, and the rest of the students may keep their worksheets. The worksheet will be graded for completion, with all group members receiving the same grade. Each member must complete the role of scribe at least twice during the semester, else 20% penalty to the final participation grade will be applied to the group.
3. You must be in attendance for the entire class period and be working and engaged with your groupmates to get full participation credit for in-class worksheets. If you miss class due to a reason that qualifies for formal excusal, you must fill out the Excused Absence Form on the course Canvas page and upload supporting documentation. The request for excusal should be filled out in advance when possible.
4. Endeavor to be on time for all class meetings. If you are more than 5 minutes late to the class meeting, you may lose participation credit for the day.

*Quizzes:*

1. Six written quizzes will be administered on paper, in class. The quiz schedule will be maintained on the course web site. A hand calculator (not your phone) is permissible and highly recommended.
2. Quiz make-ups are at the discretion of the instructor if the absence is excused as per the student code.

*Homework:*

1. PrairieLearn homework sets will be assigned roughly every 2 weeks. You may collaborate with other students to complete the homework sets if you wish. Homework problems are

not penalized for incorrect submissions; you have an unlimited number of attempts to get the correct answer for each problem. Once the due date has passed, there is a 48-hour late period where you can earn up to 80% credit, beyond that you cannot earn further credit on the homework set.

2. You will need a copy of the textbook to be able access some figures, tables, and charts to complete some homework questions.

*General Rules:*

1. No unexcused late assignments will be accepted.
2. Use **Canvas\Discussions** to communicate with instructors and TAs on course logistics, general conceptual questions, homework help, project help, etc.
3. Use **Canvas\Direct Messages** to communicate with instructors or TAs about administrative issues such as illness, quiz makeups, etc.
4. Use the **Excused Absence Form** on the course site to be excused from general class attendance and worksheets. You must provide documentation to verify the reason for your absence.
5. Academic dishonesty may result in a failing grade. Every student is expected to review and abide by the Academic Integrity Policy: <https://studentcode.illinois.edu/article1/part4/1-401/> . 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 or <http://odos.illinois.edu/community-ofcare/referral/>). 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 (<https://counselingcenter.illinois.edu/>) or McKinley Health Center (<https://mckinley.illinois.edu/>). For mental health emergencies, you can call 911 or walk in to the Counseling Center, no appointment needed.

*Students with Disabilities:* To insure that disability-related concerns are properly addressed from the beginning, students with disabilities who require assistance to participate in this class should contact Disability Resources and Educational Services (DRES) and see the instructor as soon as possible. DRES provides students with academic accommodations, access, and support services. To contact DRES you may visit 1207 S. Oak St., Champaign, call 333-4603 (V/TDD), or e-mail [disability@illinois.edu](mailto:disability@illinois.edu). <http://www.disability.illinois.edu/>.

*Disruptive Behavior:* Behavior that persistently or grossly interferes with classroom activities is considered disruptive behavior and may be subject to disciplinary action. Such behavior inhibits other students' ability to learn and an instructor's ability to teach. A student responsible for disruptive behavior may be required to leave class pending discussion and resolution of the problem and may be reported to the Office for Student Conflict Resolution for disciplinary action.

*Emergency Response Recommendations:* Emergency response recommendations can be found at the following website: <http://police.illinois.edu/emergency-preparedness/>. You are encouraged to review this website and the campus building floor plans website within the first 10 days of class. <http://police.illinois.edu/emergency-preparedness/building-emergency-action-plans/>.

*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 <http://registrar.illinois.edu/ferpa> for more information on FERPA.

*Religious Observances:* The Religious Observance Accommodation Request form is available at <http://odos.illinois.edu/community-of-care/resources/docs/Religious-ObservanceAccommodationRequest-Form.pdf>. Submit the form to the instructor and to the Office of the Dean of Students ([helpdean@illinois.edu](mailto:helpdean@illinois.edu)) by the end of the second week of the course; in the case of exams or assignments scheduled after this period, students should submit the form to the instructor and to the Office of the Dean of Students as soon as possible.

*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 and Disability Office. In turn, an individual with the Title IX and Disability 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/resources/students/#confidential](http://wecare.illinois.edu/resources/students/#confidential). Other information about resources and reporting is available here: [www.wecare.illinois.edu](http://www.wecare.illinois.edu)

*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) (<https://bart.illinois.edu/>). 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.