

CEE 202: Engineering Risk and Uncertainty

Spring 2025

Basic Course Information

- Credits: 3
- Meeting Time and Location: 12:30–13:50 on Tuesdays and Thursdays
- Important Links:
 - [PrairieLearn](#)
 - [CampusWire](#)
 - [Canvas](#)

Basic Instructor Information

- Instructor: [Prof. Christopher Tessum](#)
- Office 3213 Newmark Civil Engineering Laboratory
- Teaching Assistants
 - Qurat ul ain Fatima
 - Lin Guo
 - Xiao Ran
- Office Hours: Posted on Canvas

Description of the Course

This course includes basic probabilistic concepts and statistical analysis methods, which constitute key background that helps CEEs obtain information from data, assess risk, evaluate uncertainty, test scientific hypotheses and build certain types of mathematical models.

After completing this course, you will be able to

1. Use probability, probability models and statistics in the engineering problem-solving process.
2. Describe how natural or experimental variability affects the data collected and used for making engineering decisions.
3. Use probability distribution functions for describing data resulting from an experiment.
4. Calculate probabilities given probability distribution functions.
5. Calculate statistical summaries of data.
6. Make graphs and interpret information in graphs.
7. Derive general conclusions based on collected data, using scientifically developed, tested and accepted methods.
8. Build and evaluate a simple linear model using collected data.
9. Articulate your work, interpretations and conclusions in writing.
10. Assess and improve your teamwork and interpersonal communication skills.

Prerequisites

- [Math 241](#)
- [Computer Science 101](#)

Course Structure

This course is structured as a series of modules, with each module containing recorded lectures, readings, and pre-class quizzes to be completed before each class meeting. Class meetings will be in-person and will focus on hands-on application of the material that was covered in recorded lectures and readings through the use of in-class worksheets. The in-class worksheets will be completed in groups and will be graded. The course will also include exams taken in [CBTF](#) and a semester-long group project.

CBTF

- This course uses the Grainger College of Engineering's Computer-Based Testing Facility for its exams.
- 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) (<http://www.disability.illinois.edu/>) for exams, please submit your Letter of Accommodations (LOA) through the CBTF website (<https://cbtf.illinois.edu/students/dres>) as soon as possible. It can take up to five days for your LOA to be processed and if you make a reservation before your LOA has been processed, your reservation will not include your testing accommodations and you will be required to reschedule. This must be done each semester you use the CBTF.
- If you have any issue during an exam, inform the proctor immediately. Work with the proctor to resolve the issue at the time before logging off. If you do not inform a proctor of a problem during the test, then you forfeit all rights to addressing the problem you experienced during your exam.
- Take the CBTF Orientation (<https://go.illinois.edu/student-orientation>) (10 minutes) and review all instructions on the CBTF website (<https://cbtf.illinois.edu/students>) before your first exam.

Assessment

- Grades will be based on several types of assessments:
 - Pre-lecture quizzes: 5% of final grade
 - In-class worksheets: 5%
 - Homeworks: 10%
 - Team Project: 25%:
 - 10% for project selection and description,
 - 10% for variable visualization,

- and 80% for final report.
- Exams: 55%
 - 4 exams, so 13.75% for each exam
 - Your lowest exam score will be dropped if your overall worksheet score is greater than 85% (no rounding) at the end of the semester.
- Grade cutpoints:

<u>Grade</u>	<u>A+</u>	<u>A</u>	<u>A-</u>	<u>B+</u>	<u>B</u>	<u>B-</u>	<u>C+</u>	<u>C</u>	<u>C-</u>	<u>D+</u>	<u>D</u>	<u>D-</u>	<u>F</u>
<u>Cutpoint</u>	>97	>93	>89	>85	>81	>77	>73	>69	>65	>61	>57	>50	<50

- Peer evaluation: For each group project deliverable, there will be a poll (appearing as an email from “catme.info”) asking you to rate the contributions of your team members. We will use these evaluations to adjust the grades of individual team members as necessary.
- All assessments (except the peer evaluation surveys) will be conducted through PrairieLearn or CBTF. PrairieLearn assessments are due at the dates and times listed on PrairieLearn, and you will receive emails from CBTF to help you make appointments for taking exams. In general, pre-lecture assessments are due before class, in-class worksheets are due at the end of class, homeworks are due on Tuesdays before class, and project deliverables are due on some Thursdays before class.

Absence Policy

Occasionally you may need to miss class owing to illness, conference travel, family emergencies, or other reasons. If the absence is deemed to be for a worthy reason, it can be considered an excused absence. For excused absences, you will still have to complete the worksheet for that day’s class to get credit for it, but we will give you an extended deadline to complete it at a convenient time.

To receive an excused absence, once you know you will be missing class, use the “Post to Instructors and Tas” option on CampusWire to send us message letting us know how long (if you know). It will work best if you also provide some documentation, e.g. test result, conference registration, etc. If we agree that your request meets the criteria for an excused absence, we will give you an extended deadline for the worksheet.

Learning Resources

- Students are expected to bring a laptop to class, and have use of one and an internet connection for homeworks and pre-class activities.
- There is no required textbook, but the course roughly follows the material in *Montgomery & Runger, Applied Statistics and Probability for Engineers*

Policies

Inclusive Environment

The effectiveness of this course is dependent upon the creation of an encouraging and safe classroom environment. Exclusionary, offensive or harmful speech (such as racism, sexism, homophobia, transphobia, etc.) will not be tolerated and is in some cases subject to University harassment procedures. We are all responsible for creating a positive and safe environment that allows all students equal respect and comfort. I expect each of you to help establish and maintain an environment where you and your peers can contribute without fear of 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.

Accommodations

To obtain disability-related academic adjustments and/or auxiliary aids, students should contact both the instructor and the Disability Resources and Educational Services (DRES) as soon as possible. You can contact DRES at 1207 S. Oak Street, Champaign, (217) 333-1970, or via email at disability@illinois.edu.

Participation

Active participation in the online learning environment is vital to your success in this course. Depending on your course, you may be asked to engage in online discussions and other interactive learning environments that invite your active participation and involvement with other students and your instructor.

Student Commitment

By registering for this course, you commit to self-motivated study, participation in online course activities, and timely submission of all assignments. Furthermore, you commit to accessing the course website and checking email at least four days per week (daily for 4-week courses).

The University guidelines for course credit hours are posted [here](#). In summary, students in a 3-credit class are expected spend at least 6 hours per week working outside of class times on readings, assigned lectures, assignments, projects, and test preparation.

It is my goal for this class to follow these guidelines so let me know if you think it does not (keeping in mind that the guidelines are for the *minimum* effort requirements).

Deadlines

If you are unable to meet a particular deadline, it is your responsibility to make prior arrangements with the instructor for that given week. Late work is not accepted without an arrangement with the instructor.

Regrades

Requests for regrading homeworks, quizzes, mini-projects, and project deliverables must be submitted in writing within one week of receiving the initial grade, and must include a written explanation of the reason for the regrade request.

Instructor Responses

Instructor Feedback Turnaround Time

Questions posted to CampusWire generally will be answered within 24 hours. Questions may be answered on weekends or university holidays but this should not be expected.

Assignments submitted online will generally be reviewed and graded by the course instructor within 5 business days. Project deliverables will generally be graded within 10 business days.

Contacting the instructor

For the fastest response response, the best way to contact the instructor is by attending office hours or posting questions to the CampusWire.

The instructor will not respond to phone calls and may not respond to emails. If you must send an email, include a subject line that identifies the course number and nature of your question. Please don't be offended if you are asked to repost your question on CampusWire to allow the instructional team to efficiently answer all questions.

Academic Integrity

Academic dishonesty will not be tolerated. Examples of academic dishonesty include the following:

- Cheating
- Fabrication
- Facilitating infractions of academic integrity
- Plagiarism
- Bribes, favors, and threats
- Academic interference
- Examination by proxy
- Grade tampering
- Non-original works

Should an incident arise in which a student is thought to have violated academic integrity, the student will be processed under the disciplinary policy set forth in the Illinois Academic

Integrity Policy. If you do not understand relevant definitions of academic infractions, contact your instructor for an explanation within the first week of class.

Giving and receiving advice on projects and homework assignments is acceptable and encouraged. However, it is expected that help be given in general terms and in the form of natural language sentences (for example, English) rather than in the form of mathematical equations, algorithms, computer code, or anything else that could be copied and pasted into the recipient's answer. Similarly, students are allowed to consult the Internet (including StackOverflow etc.), but copying and pasting code from the Internet and submitting it for the class is not acceptable. The work that each student submits is expected to be their own, written with their own hand or typed on their own keyboard. For group work, work can be submitted by a single member but must include substantial contributions of all group members. Please contact the instructor to discuss instances of non-contributing group members.

Note regarding AI: Norms and practices related to the use of AI in academic settings are not well defined, and the capabilities of such systems are rapidly evolving. As such, the use of AI in this course will be allowed or disallowed on a case-by-case basis, at the discretion of the instructor, but in general we will treat AI assistance similarly to assistance from another classmate as described above—using it to get general suggestions is okay but using it to get specific answers is not. Using AI to generate a written report is especially not okay. Please contact me if you are considering using AI for a particular assignment.

Copyright

Student Content

Participants in University of Illinois courses retain copyright of all assignments and posts they complete; however, all materials may be used for educational purposes within the given course. In group projects, only the portion of the work completed by a particular individual is copyrighted by that individual. The University of Illinois may request that students' materials be shared with future courses, but such sharing will only be done with the students' consent. The information that students submit during a course may, however, be used for the purposes of administrative data collection and research. No personal information is retained without the students' consent.

Non-student Content

Everything on this site and within University of Illinois courses is copyrighted. The copyrights of all non-student work are owned by the University of Illinois Board of Trustees, except in approved cases where the original creator retains copyright of the material. Copyrights to external links are owned by or are the responsibility of those external sites. Students are free to view and print material from this site so long as

- The material is used for informational purposes only.
- The material is used for noncommercial purposes only.
- Copies of any material include the respective copyright notice.

- These materials may not be mirrored or reproduced on non-University of Illinois websites without the express written permission of the University of Illinois Board of Trustees. To request permission, please contact the academic unit for the program.

Student Behavior

Student Conduct

Students are expected to behave in accordance with the penal and civil statutes of all applicable local, state, and federal governments, with the rules and regulations of the Board of Regents, with university regulations and administrative rules, and with the UIUC student code.

For more information about the student code and handbook, see the CITL course policies page. In particular, please pay attention to the section on academic integrity:

<https://studentcode.illinois.edu/article1/part4>.

Netiquette

In any social interaction, certain rules of etiquette are expected and contribute to more enjoyable and productive communication. The following are tips for interacting online via email or discussion board messages, adapted from guidelines originally compiled by Chuq Von Rospach and Gene Spafford (1995):

- Remember that the person receiving your message is someone like you, deserving and appreciating courtesy and respect.
- Be brief; succinct, thoughtful messages have the greatest effect.
- Your messages reflect on you personally; take time to make sure that you are proud of their form and content.
- Use descriptive subject headings in your emails.
- Think about your audience and the relevance of your messages.
- Be careful when you use humor and sarcasm; absent the voice inflections and body language that aid face-to-face communication, internet messages are easy to misinterpret.
- When making follow-up comments, summarize the parts of the message to which you are responding.
- Avoid repeating what has already been said; needless repetition is ineffective communication.
- Cite appropriate references whenever using someone else's ideas, thoughts, or words.

Communications

Daily Contact

Your daily contact should be in class, in office hours, or on CampusWire.

Course Questions

Questions pertaining to the course should be posted on CampusWire. You can get to this forum from the course home page. Posting questions here allows everyone to benefit from the answers. If you have a question, someone else is probably wondering the same thing. Anyone submitting a question via email will be directed to resubmit the question to the CampusWire. Also, participants should not hesitate to answer questions posed by peers if they know the answers and the instructor has not yet responded. This not only expedites the process but also encourages peer interaction and support.

Personal and Grade-Related Questions

Questions of a personal nature can be sent as a direct message on CampusWire.

Emergencies

If you have an emergency that will keep you from participating in the course, please notify your instructor on CampusWire or using email. Provide callback information in your message (if necessary). You should also notify your program director of any emergencies.

Sexual Misconduct Policy and Reporting

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 in the Confidential Resources section. Other information about resources and reporting is available at wecare.illinois.edu.

Student Wellness Resources

The University of Illinois strives to promote student success through the support of student psychological and emotional well-being. Please take advantage of the resources listed on the Student Affairs website.

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 this 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 the instructor of the conflict and follow the procedure at <https://odos.illinois.edu/community-of-care/resources/students/religious-observances/> to request appropriate accommodations. This should be done in the first two weeks of classes.

Schedule

- Week 1
 - 1/21: WS0: Class Introduction
 - 1/23: WS1: Introduction to R
- Week 2
 - Homework 1 due
 - 1/28: WS2: Sample space, events, set theory
 - 1/30: WS3: Probabilities of equally likely events; counting
- Week 3
 - Homework 2 due
 - 2/4: WS4: Conditional probability, Total probability, Bayes' theorem
 - 2/6: WS4R: R data tables
- Week 4
 - Homework 3 due
 - 2/11: WS5: Random variables, Probability distributions
 - 2/13: Exam 1 review (optional)
 - **2/14–2/17: Exam 1**
 - Covers Worksheets 1–4R, Homeworks 1–3, and related concepts
- Week 5
 - Homework 4 due
 - 2/18: WS6: Joint pdf, Marginal pdf, Conditional pdf
 - 2/20: WS7: Mathematical expectation
- Week 6
 - Homework 5 due
 - 2/25: WS8: Discrete distributions I
 - 2/27: WS9: Discrete distributions II
- Week 7
 - Homework 6 due
 - 3/4: WS10: Continuous distributions I
 - 3/6: Exam 2 review (optional)
 - **3/7–3/10: Exam 2**
 - Covers Worksheets 5–9, Homeworks 4–6, and related concepts
- Week 8
 - Homework 7 due
 - 3/11: WS11: Continuous distributions II
 - 3/13: WS12: Sampling distributions
- Week 9
 - Spring Break
- Week 10
 - Homework 8 due
 - 3/25: WS13: Central Limit Theorem
 - 3/27: WS14: Graphs
- Week 11

- Homework 9 due
- 4/1: WS15: Statistical estimation: Confidence intervals I
- 4/3: Exam 3 review (optional)
- 4/4–4/7: Exam 3
 - Covers Worksheets 10–14, Homeworks 7–9, and related concepts
- Week 12
 - 4/8: WS16: Statistical estimation - Confidence Intervals II
 - 4/11: WS17: Statistical estimation - Hypothesis testing I
- Week 13
 - 4/15: WS18: Statistical estimation - Hypothesis testing II
 - 4/17: WS19: Statistical estimation - Hypothesis testing III - Power - GoodnessOfFit
- Week 14
 - Homework 10 due
 - 4/22: WS20: Simple Linear Regression I
 - 4/24: WS21: Simple Linear Regression II
- Week 15
 - Homework 11 due
 - 4/29: WS22: Error propagation
 - 5/1: Exam 4 review (optional)
 - **5/2–5/5: Exam 4**
 - Covers Worksheets 15–19, Homeworks 10–11, and related concepts
- Week 16
 - 5/6: Project work time (optional)