

CE 2251: Probability and Statistics in Civil Engineering

MWF 2:30 – 3:20 Castleman Room 212

Instructor: Dr. Christine Kirchhoff
Email: christine.kirchhoff@uconn.edu
Office Hours: M/W/F, 3:30 – 4:00pm or email for appointment
Office: CAST 309

TA: Tasnim Zaman
Email: Tasnim.Zaman@uconn.edu
Office Hours: TBD
Office: Bronwell 319

UTA: Ryan Palzere
Email: ryan.palzere@uconn.edu

Communication:

When using email to communicate with your TA, UTA or Instructor, put CE2251 in the subject of the email.

Emails sent during normal business hours (8am-5pm M-F) will receive a response the same or the following business day. There may be a delay in response from your instructor to emails sent outside of normal business hours (before 8am or after 5pm M-F or on weekends).

Do not use HuskyCT to communicate with your instructor or TA!

Course Prerequisite:

Recommended preparation: MATH 1122 or 1132 (or approved substitution) – generally it is required that the student have a background in calculus.

Course Objective:

The objective of the course is to introduce concepts and approaches from the field of probability and statistics that can be applied to the analysis of problems in civil engineering.

Course Outcomes:

Students are expected to be able to do the following at the successful completion of the course:

1. Quantitatively and qualitatively describe data from experiments
2. Identify random variables for a given experiment and properties of random variables including mean, variance, and probability of events
3. Select appropriate distributions to represent the population being analyzed in an experiment
4. Identify appropriate statistics for summarizing data from experiments; subsequently estimate confidence intervals, and test hypothesis
5. Estimate relationships between dependent and independent variables and interpret results

Textbook:

Navidi, W. *Statistics for Engineers and Scientists*, 4th Edition, McGraw-Hill. A copy is on reserve in the library. In addition, the UCONN Bookstore has new and used copies: <https://tinyurl.com/8207-F19-CE-3251-001>

Other course materials:

We use HuskyCT a lot in this class. All course materials (pdf of lecture slides, video lectures, homework assignments, quizzes, etc.) can be found on HuskyCT. The syllabus and course schedule indicate when information will be available. If you have questions or can't find something, please let your instructor know!

Course Format:

This is a hybrid/blended course. This design takes advantage of new ways of teaching and today's technology to enhance student learning. Course content is delivered via:

- 1) in-class lectures and activities - typically meet in class Mondays and Fridays
- 2) online video lectures - typically on Wednesdays.

Grading:

Your grade in the course will be based on homework, three exams, and a comprehensive final as follows:

Components	Weight
Homework	15%
Exam 1	20%
Exam 2	20%
Exam 3	20%
Final Exam	25%
Total	100%

Homework:

- Homework is essential for practicing statistics! You will get credit for effort, completeness, and correctness.
- **To earn credit you must:**
 - Write your name on your homework!
 - Identify each problem clearly
 - Solve each problem in the order they were assigned
 - Write neatly; if your work is illegible, unclear or difficult to read, you will get a zero!
 - Include, when appropriate, graphs, tables, etc.
 - Submit homework via Husky CT by the due date. Due dates are listed in the syllabus course schedule.
- **You will get a ZERO if:**
 - You copy someone's homework, copy from CHEGG, or otherwise cheat. See *Academic Integrity*.
 - We can't read your work (See above)
 - You submit your homework late or forget to submit your homework.
- **No homework make-ups. No exceptions.** Solutions posted immediately after the due date.
- **I will drop your lowest homework grade!**

Exams

- There will be three exams during the course and a comprehensive final exam.
- No makeup exams will be offered without prior arrangement with the instructor.

Final Exam

Students must adhere to University regulations regarding final exams. **University Final Exam Policy:** In accordance with UConn policy, students are required to be available for their final exam and/or complete any assessment during the time stated. If you have a conflict with this time you must obtain official permission to schedule a make-up exam with the Office of Student Support and Advocacy (OSSA). If permission is granted, OSSA will notify the instructor. You may not reschedule the exam for superfluous reasons (e.g., previously purchased tickets or reservations, graduations, social events, misreading the schedule, oversleeping, etc.).

Class Conduct

- This course is fast-paced and cumulative! Keep current with the course content—do not fall behind or if you do, catch up quickly!
- Attend classes, view the online course content, prepare for class, participate in classroom exercises and discussions, and **ask questions! Please do not be shy!!**
- Disruptive or disrespectful behavior of any kind will not be tolerated. Any disruptive or disrespectful behavior will be reported to the Assistant Dean for Undergraduate Education for further disciplinary action.
- Use of personal electronic devices including computers, cellphones and tablets in class for purposes not related to the class is distracting to you and your colleagues. Research shows that use of personal electronic devices for non-academic purposes during class **LOWERS** your grade (Carter et al. 2016; Duncan et al. 2012; Ravissa et al. 2017)!

Academic Integrity

Students will be held to the standards laid out in the *The Student Code* --

<https://community.uconn.edu/wp-content/uploads/sites/523/2016/06/1819-The-Student-Code.pdf>

Students with Disabilities

Students with disabilities who believe they need accommodations in this class should contact the Center for Students with Disabilities located in Wilbur Cross, Room 204 as soon as possible to better ensure that such accommodations are implemented in a timely fashion. Staff can be reached by phone: 860-486-2020, Video Phone: 860-553-3243 or email: csd@uconn.edu or via the Contact Us page on their website, csd.uconn.edu.

Class Schedule

Abbreviations

L = **in-class** Lecture

V = **on-line** Video lecture (Husky CT)

R/P = Review & Practice

QUIZ = **online** Quiz (HuskyCT)

HW = Homework (assignment and submission HuskyCT)

Week	Class	Date	Topic	Textbook Section(s)	HW Open	HW Due Date
1	1	8/26	L: Introduce course & review syllabus & HuskyCT L: Sampling & Summary Statistics Intro	1.1 - 1.2	HW#1 (1.1-1.3)	
1	2	8/28	V: Summary Statistics V: Graphical Summaries	1.2 - 1.3		
1	3	8/30	<i>No Class</i>			
2		9/2	<i>Labor Day - No Class</i>			
2	4	9/4	V: Probability: Basic Ideas & Counting Methods	2.1 - 2.2	HW#2 (2.1-2.5)	
2	5	9/6	L: Conditional Probability & Independence	2.3		HW #1 DUE
3	6	9/9	L: Random Variables	2.4		
3	7	9/11	V: Continuous Random Variables V: Linear Combination of Random Variables	2.5		
3	8	9/13	L: Propagation of Error	3.1-3.2	HW#3 (3.1-3.2, 4.1-4.3)	HW#2 DUE
4	9	9/16	L: Intro Discrete Distributions and Bernoulli Distribution	4.1		
4	10	9/18	V: Binomial Distribution	4.2		
4	11	9/20	L: Poisson Distribution	4.3		
5	12	9/23	R/P: Review for exam & practice			HW#3 DUE
5	13	9/25	EXAM 1 (Ch. 1 - 4.3)			
5	14	9/27	L: Intro Continuous Distributions and Normal Distribution	4.5	HW#4 (4.5-4.9)	
6	15	9/30	L: Lognormal & Exponential	4.6 - 4.7		
6	16	10/2	V: Principles of Point Estimation	4.9		
6	17	10/4	L: Central Limit Theorem	4.11		HW#4 DUE
7	18	10/7	L: Intro Confidence Intervals and Confidence Interval for Population Mean	5.1	HW#5 (4.11-5.5)	
7	19	10/9	V: Confidence Intervals for Population Proportion V: The Student's T-distribution	5.2 - 5.3		
7	20	10/11	L: Small-sample Confidence Intervals for Population Mean	5.3		

Week	Class	Date	Topic	Textbook Section(s)	HW Open	HW Due Date
8	21	10/14	L: Confidence Intervals for Difference between Means and Proportions	5.4-5.5		
8	22	10/16	R/P: Review for exam & practice			HW#5 DUE
8	23	10/18	EXAM 2 (N: Ch. 4.5-5.5)			
9	24	10/21	L: Hypothesis Testing Fundamentals & Population Mean	6.1 - 6.2	HW#6 (6.1-6.4)	
9	25	10/23	V: Hypothesis Testing for Population Proportion V: Small Sample Hypothesis Testing Population Mean	6.3 - 6.4		
9	26	10/25	L: Hypothesis Testing - Difference btwn Means	6.5	HW#7 (6.5 - 6.7)	HW#6 DUE
10	27	10/28	L: Hypothesis Testing - Difference btwn Proportions	6.6		
10	28	10/30	V: Small-sample Hypothesis Testing - Difference btwn Means	6.7		
10	29	11/1	R/P: Review & practice Hypothesis Testing			HW#7 DUE
11	30	11/4	L: Hypothesis Testing - Paired Data	6.8	HW#8 (6.8, 6.10, 6.11)	
11	31	11/6	V: F-test for equality of Variance V: Chi-Square Test	6.10, 6.11		
11	32	11/8	R/P: Review for exam & practice			HW#8 DUE
12	33	11/11	EXAM 3 (N: Ch. 6.1-6.11)			
12	34	11/13	V: Correlation	7.1	HW#9 (7.1-7.4)	
12	35	11/15	L: Intro Linear Regression L: Uncertainties in Least Square Coefficients	7.2-7.3		
13	36	11/18	L: Confidence Interval for Slope, Confidence vs. Prediction	7.3		
13	37	11/20	V: Checking Assumptions and Transforming Data	7.4		
13	38	11/22	L: Multiple Linear Regression	8.1	HW#10 (8.1-8.3)	HW#9 DUE
14		11/25-29	Thanksgiving Break - No Class			
15	39	12/2	L: Multiple Linear Regression: Confounding & Collinearity	8.2		
15	40	12/4	L: Model Selection	8.3		
15	41	12/6	R/P: Review for final exam & practice			HW#10 DUE
		TBD	**FINAL EXAM - Cumulative			