

CEE 304
Probability, Statistics, and Risk in Civil Engineering
Fall 2018

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Lectures: TR 5:45-7:00 pm Room: Kaufman Hall 225
Instructor Office Hours: M 1:00 - 3:00 pm, or by appointment

Course Description:

This course studies the fundamentals of statistics, probability, and risk analysis that are widely used in various fields of engineering. Emphasis will be placed on civil and environmental engineering systems. Specific areas of study include probability theory, statistics parameters, functions, variance, hypothesis testing, regression, and correlation analysis.

Learning Objectives:

- Define statistical analysis, permutations, and combinations in engineering analysis
- Construct dot plots, histograms, box and whisker plots and other common graphing tools
- Analyze data sets using commonly used distributions such as Bernoulli, Poisson, Normal, Binomial, and Central Limit theorem
- Develop confidence intervals for CEE statistical experiments
- Conduct hypothesis testing for direct application to CEE experiments
- Define risk and conduct risk analysis

Textbook:

Statistics for Engineers and Scientists, 4th Edition by William Navidi, McGraw Hill, 2015.

Additional References:

Ang, A. H.-S., and Tang, W.-H. (2007). *Probability Concepts in Engineering: Emphasis on Applications to Civil and Environmental Engineering*. John Wiley, New York, NY.

Course Communications:

Course materials will be available on Blackboard: www.blackboard.odu.edu
Allow up to 48 hours for response to emails.

Prerequisite: Junior standing or higher

Grading Policy:

Homework 10%, Quizzes 15%, Midterm Exam 35%, Final Exam 35%, Attendance/attitude 5%

Homework:

Homework will be assigned biweekly (on average) and will be due one week after assignment at the beginning of the class. Group work is accepted but blind copying is not allowed. Solutions will

be posted the day after the due date. Late homework will not be accepted unless there is a valid university excuse to request exception.

Quizzes:

Quizzes are taken on the homework due dates. They include a single problem from the homework assignments due on that date and will be graded by the TA/grader. Quizzes are closed book; books, notes, computers, or other resources may not be used during the quiz. Calculators are allowed.

Exams:

A mid-term exam and a final exam are scheduled. Each student may prepare notes on the front and back of a letter size paper for their own use. The sheet can only include formulas, not solved problems or examples, and will be turned in with your exam. Points will be deducted from the exam if these instructions are not followed. No resources other than a formula sheet and calculators can be used. Midterm exam will cover chapters 1-4 and the final exam will cover chapters 4-7. The final exam will not include topics covered in the midterm exam.

Absence:

Student attendance in the lectures is strongly encouraged. Presence in all the quizzes and exams are required. Students should have a valid university excuse for absence from the exams or quizzes. It is the student's responsibility to notify the instructor in advance and make appropriate arrangements.

Course Schedule:

Note: This schedule is tentative and may be changed due to conference travel or other incidents. The class will be notified in advance of possible changes.

Week	Lecture	Date	Topic	Reading
1	1	Aug. 28	Introduction, Sampling and Descriptive Statistics	1.1-1.2
	2	Aug. 30	Summary Statistics, Graphical Summaries	1.2-1.3
2	3	Sep. 4	Graphical Summaries, Counting Methods	1.3-2.1
	4	Sep. 6	Counting, Permutations, Combinations	2.2-2.3
3	5	Sep. 11	Permutations, Combinations	2.3
	6	Sep. 13	Conditional Probability & Bayes Theorem	2.4
4	7	Sep. 18	Random and Continuous Variables	2.4
	8	Sep. 20	Propagation of Error, Measurement Error	3.1-3.2
5	9	Sep. 25	Uncertainties in Measurements Instructor Travelling – Class will End on 6:30 pm	3.3
		Sep. 27	Instructor Travelling – No Class	
6		Oct. 2	Probability Distribution Functions	4.1
	10	Oct. 4	Binomial Distribution	4.2
7		Oct. 9	Fall Holiday-No Class	
	11	Oct. 11	Poisson & Hypergeometric Distributions	4.3
8	12	Oct. 16	Geometric, Normal, and Lognormal Distributions	4.4-4.6
	13	Oct. 18	Midterm Exam Review	
9	14	Oct. 23	Midterm Exam	
	15	Oct. 25	Exponential and Weibull Distributions	4.7-4.8

10	16	Oct. 30	Central Limit Theorem, Large Sample Confidence Intervals	4.11, 5.1
	17	Nov. 1	Small Sample Confidence Intervals	5.4
11	18	Nov. 6	Proportions & Hypothesis Testing	5.5-6.1
	19	Nov. 8	One-Tailed Hypothesis	6.1
12		Nov. 13	Instructor Travelling – No Class	
		Nov. 15	Two-Tailed Hypothesis – Mid-term 2 review	6.2
13	20	Nov. 20	Correlation and Linear Regression	7
		Nov. 22	Thanksgiving Holiday-No Class	
14	21	Nov. 27	Multivariate Regression	8
	22	Nov. 29	Decision Analysis (Time Permitting)	
15	23	Dec. 4	Statistics of Extremes (Time Permitting)	
	24	Dec. 6	Engineering Economics (Time Permitting)	
16	25	Dec. 8	Engineering Economics (Time Permitting)	
		Dec. 13	Final Exam (3:45-6:45 pm)	

Americans with Disabilities Act (ADA) Policy Statement

Old Dominion University is committed to ensuring equal access to all qualified students with disabilities in accordance with the Americans with Disabilities Act. The Office of Educational Accessibility (OEA) is the campus office that works with students who have disabilities to provide and/or arrange reasonable accommodations. If you experience a disability which will impact your ability to access any aspect of my class, please present me with an accommodation letter from OEA so that we can work together to ensure that appropriate accommodations are available to you. If you feel that you will experience barriers to your ability to learn and/or testing in my class but do not have an accommodation letter, please consider scheduling an appointment with OEA to determine if academic accommodations are necessary. The Office of Educational Accessibility is located at 1021 Student Success Center and their phone number is (757)683-4655. Additional information is available at the OEA website: <http://www.odu.edu/educationalaccessibility>