Course Information

Lecture Schedule: Tu-Th 9-10AM, 3108 Etcheverry Hall

Lab Schedule: W 1-3 (3-5, 5-7) PM, 345 Davis Hall

Catalog Description:

Application of the concepts and methods of probability theory and statistical inference to Civil & Environmental Engineering (CEE) problems and data; graphical data analysis and sampling; elements of set theory; elements of probability theory; random variables and expectation; simulation; statistical inference. Applications to a wide range of CEE problems involving real data will be developed, using both pre-existing and student-prepared MATLAB codes.

Prerequisites: E7, Math 1B (or concurrent enrollment). No credit will be given after taking Stat25.

Units: 3

Course Objective:

Introduce the student to the concepts and methods of probability theory and statistical inference by way of their application to CEE problems involving *real* data. Graphical and computational methods, using MATLAB, will be emphasized. The course also serves to introduce the student to a variety of CEE problems and data through their statistical/probabilistic analysis.

Required Textbook:

William Navidi, ***Statistics for Engineers and Scientists***, Fourth Edition, McGraw Hill (the 3rd edition is cheaper and could also work, but you will need to correlate the reading assignments with the 4th edition).

Course Websites:

On bCourses (https://bcourses.berkeley.edu/). Contains assignments, labs, solution sets, lecture notes, supplementary readings.

On Piazza (https://piazza.com/berkeley/spring2017/ce93/home). Hosts current discussions on material.

Homework:

Assignments will be given weekly. See bCourses for the assignments and due dates. Assignments are due Tuesday at the beginning of class. 20% is subtracted from the grade of any assignment turned in late, up to the following Thursday at the beginning of class. We will not accept assignments turned in after that time.

Labs:

Weekly two hour sessions where students are trained on statistical and probabilistic manipulation of data using computer software (MATLAB). Topics covered include histogram analysis, distribution fitting and plotting of all needed graphs. Lab assignments will be posted on bCourses. The assignments should be submitted electronically by the end of the lab section, but no later than 8 PM of same day.

Exams:

There will be two midterm exams and a final exam for this course, and multiple soft-quizzes. See the course schedule.

Grading:

Course grade: You can accumulate up to 110 points (for a maximum grade of 100).

This includes: 30pts for final exam, 30 pts for midterms, 25 pts for HW assignments and lab reports, 15 +10 bonus pts for soft quizzes (50% chance at any given class, starting January 24).

CE 93, Engineering Data Analysis Spring 2017

Instructors:

Name	Contact	Office	Office Hours
Prof. Yoram Rubin, Instructor	rubin@ce.berkeley.edu	627 Davis	Tue 10:30-11:30; Thu 10:30-11:30
Ms. Heather Savoy (PhD student, ENV), GSI	frystacka@berkeley.edu Note: GSI and instructor will monitor the course website on Piazza, including during weekends. So, please post your questions, for everyone's benefit.	305 Davis	Mon 2-4PM; Thu 3-4PM + Piazza

Course Schedule

Week (Date)	Topic	Reading Assignment	Homework Due Date	Lab Schedule
1 (1/17-1/20)	Introduction, course organization and objectives. Populations and samples. Types of data. Types of Experiments, Summary statistics: central tendency, dispersion, percentiles. Graphical summaries: histograms, cumulative frequency diagrams, box plots, scatter plots, correlations	N* 1.1- 1.3		
2 (1/23-1/27)	Probability: Experiments, sample space, events, algebra of events. Axioms of probability. Combinatorics.	N 2.1-2.2		Lab 1 Graphical Data Analysis
3 (1/30-2/3)	Conditional probability, total probability theorem, Bayes' formula. Independent events and the multiplication rule.	N 2.3	Set 1	Lab 2 Numerical Summaries of Data
4 (2/6-2/10)	Random variables. Probability distributions for discrete and continuous RV's: PMF, PDF, CDF. Mean and variance of an RV. Linear functions of RV's.	N 2.4-2.5	Set 2	Lab 3 Elements of Probability Theory
5 (2/13-2/17)	**Midterm this week on Thursday 2/16**		Set 3	Lab 4 Random Variables
6 (2/20-2/24)	Jointly distributed RVs. Marginal and conditional distributions. Correlation, covariance, and independence.	N 2.6	Set 4	
7 (2/27-3/3)	Special random variables: Bernoulli, binomial, Poisson, hypergeometric. Uniform, normal, exponential, gamma, Central limit theorem.	N 4.1-4.8	Set 5	Lab 5 Seismic Hazard Analysis I
8 (3/6-3/11)	Point estimation. Maximum likelihood.	N 4.9-4.12	Set 6	Lab 6 Distributions
9 (3/13-3/17)	Confidence intervals for means and proportions. Large sample and small sample cases. Confidence Interval for population differences and paired data	N 5.1-5.7	Set 7	Lab 7 Seismic Hazard Analysis II
10 (3/20-3/24)	**Midterm this week on Thursday 3/23**		Set 8	Lab 8 Parameter Estimation
11 (3/27-3/31)	Spring Break			
12 (4/3-4/7)	Hypothesis testing for means and proportions.	N 6.1-6.4	Set 9	Lab 9 Experiment with Random Walk
13 (4/10-4/14)	Hypothesis testing, simulations	N 6.5-6.11, 6.15	Set 10	Lab 10 Simulation
14 (4/17-4/21)	Correlation and simple linear regression.	N 7.1-7.4	Set 11	Lab 11 Hypothesis Testing
15 (4/24-4/28)	Multiple Regression and possibly more (TBD)	N 8.1-8.3	Set 12	

16 (5/1-5/5)	Recitation Week		Set 13	**Review**
Wednesday, 5/10. 11:30-2:30	**Final Exam**			

*N-William Navidi, Statistics for Engineers and Scientists, Fourth Edition