Course Information

Lecture Schedule: Tu-Th 9-10AM, GSPP 150

Lab Schedule: W 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 and geostatistics. 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 (MATLAB!), 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/fall2018/ce93/home), hosts current discussions on material. This link will guide you how to enroll our CEE93 class: http://support.piazza.com/customer/portal/articles/1646659-enroll-in-a-class. When posting questions on piazza, please locate your questions under the correct folders. For example, all questions about HW#1, please post under the folder of hw1.

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: 30pts for final exam, 15 points for each of the two midterms, 20 pts for HW assignments and lab reports, 20 pts for quizzes. Expect to have a quiz in every class (starting August 29). From N quizzes, N-2 will be used for grading.

Instructors:

Name	Contact	Office	Office Hours

Prof. Yoram Rubin, Instructor	rubin@ce.berkeley.edu	627 Davis	Tue, Thu 3-4PM and Piazza
Jiancong (Nigel) Chen, GSI	nigel_chen1993@berkeley.edu. Note: Questions on technical matters should be posted on Piazza (which allows anonymous posting). Personal emails should be limited to personal matters.	305 Davis	Mon 3:30 - 5PM Thu 12-1:30PM + Piazza

Course Schedule

Week (Date)	Topic	Reading Assignment	Homework Due Date	Lab Schedule
1 (8/22-8/24) First class on August 23	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 (8/27-8/31)	Probability: Experiments, sample space, events, algebra of events. Axioms of probability. Combinatorics.	N 2.1-2.2		Lab 1 Graphical Data Analysis
3 (9/3-9/7)	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 (9/10-9/14)	Random variables. Probability distributions for discrete and continuous RVs: PMF, PDF, CDF. Mean and variance of an RV. Linear functions of RVs.	N 2.4-2.5	Set 2	Lab 3 Elements of Probability Theory
5 (9/17-9/21)	Jointly distributed RVs. Marginal and conditional distributions. Correlation, covariance, and independence.		Set 3	Lab 4 Random Variables
6 (9/24-9/28)	**Midterm this week on Thursday 9/27**	N 2.6	Set 4	
7 (10/1-10/5)	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 (10/8-10/12)	Uniform, normal, exponential, gamma, Central limit theorem.	N 4.9-4.12	Set 6	Lab 6 Distributions
9 (10/15-10/19)	Point estimation, Method of Moments, Maximum Likelihood.	N 4.9-4.12, N 5.1-5.7	Set 7	
10 (10/22-10/26)	Confidence intervals for means and proportions. Large sample and small sample cases. Intro to hypothesis testing for means and proportions.	N 6.1-6.4	Set 8	Lab 7 Central Limit Theorem
11 (10/29-11/2)	Hypothesis testing, simulations	N 6.5-6.11, 6.15		Lab 8 Parameter Estimation
12 (11/5-11/9)	**Midterm this week on Thursday 11/8**		Set 9	
13 (11/12-11/16)	Geostatistics	TBA	Set 10	Lab 9 Hypothesis Testing
14 (11/19-11/23)	Geostatistics (Thanksgiving)	TBA	Set 11	
15 (11/26-11/30)	Review (November 30th is last day of instruction)		Set 12	Lab 10 Geostatistics
16 (12/3-12/7)	Recitation Week			
12/11 3pm tp 6pm	**Final Exam**			

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