STAT/CSE 4340/EMIS 3340
Statistics for Engineers
January 2018

Instructor:
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Class meets January 8 – January 17, 2018 at SMU-in-Taos.

Overview

By the end of the semester, you should have a solid foundation and understanding of basic statistical concepts as they pertain to various areas of engineering and computer science. Various techniques to analyze statistical data will be introduced and discussed in detail. The necessary statistical theory to establish these techniques will also be presented, as this will lead to further understanding of the topics covered. These skills should aid you in becoming an informed and critical consumer of scientific literature, as well as help in your development in your own scientific endeavors.

Grading

Your semester grade will be determined as follows:

Assignments (10)	40%	One at the end of each class.
Quizzes	40%	During class time.
Final Exam	20%	On January 17th.
TOTAL	100%	--

- Disability Accommodations: Students needing academic accommodations for a disability must first be registered with Disability Accommodations & Success Strategies (DASS) to verify the disability and to establish eligibility for accommodations. Students may call 214-768-1470 or visit http://www.smu.edu/alec/dass.asp to begin the process. Once registered, students should then schedule an appointment with the professor to make appropriate arrangements. (See University Policy No. 2.4; an attachment describes the DASS procedures and relocated office.)

- Religious Observance: Religiously observant students wishing to be absent on holidays that require missing class should notify their professors in writing at the beginning of the semester, and should discuss with them, in advance, acceptable ways of making up any work missed because of the absence. (See University Policy No. 1.9.)

- Excused Absences for University Extracurricular Activities: Students participating in an officially sanctioned, scheduled University extracurricular activity should be given the opportunity to make up class assignments or other graded assignments missed as a result of their participation. It is the responsibility of the student to make arrangements with the instructor prior to any missed scheduled examination or other missed assignment for making up the work. (University Undergraduate Catalogue).

Learning objectives

After successful completion of the course, students should be able to

1. Calculate and interpret descriptive statistics from various populations.
2. Define and determine sample spaces, and calculate probabilities of various events.
3. Understand statistical independence and conditional probabilities.
4. Recognize several well-known discrete and continuous probability models and calculate corresponding probabilities.
5. Extend concepts to joint probability distributions and calculate correlation and covariance.
6. Understand the distribution of the sample mean and how this relates to the Central Limit Theorem.
7. Learn methodology of point estimation.
8. Calculate and interpret confidence intervals.
9. Conduct hypothesis tests and interpret results.

Learning outcomes

Students will be able to understand and apply the following: simple probability rules including conditional probability and Bayes theorem, main families of distributions such as normal, exponential, binomial, Poisson, basic statistical inference such as point estimation, confidence intervals and hypothesis tests.

Detailed outline of activities

Day 1: Introduction to probability. Sample spaces, probability rules, independence, conditional probability, Bayes Theorem. Assignment 1.

Day 2: Random variables and probability distributions, discrete distributions, continuous, joint distributions, basic rules of independence, conditional distributions etc. Assignment 2.

Day 3: Expectation and variance, effect of independence, covariance, correlation, Assignment 3.

Day 4: Discrete random variables, binomial, geometric, multinomial, Poisson. Assignment 4.

Day 5: Day dedicated to working on project in class.

Day 6: Continuous random variables, uniform, exponential, normal, gamma, chi-square. Assignment 5.

Day 7: Transformations of random variables. Assignment 6.

Day 8: Sampling distributions, especially *t* distribution, CLT, repeated sampling principle. Assignment 7.

Day 9: Point estimation. Method of moments, examples of normal, exponential, binomial, Poisson. Assignment 8.

Day 10: One and two sample confidence intervals, for means, proportions, motivated by CLT. Assignment 9.

Day 11: One and two sample hypothesis tests. Assignment 10.

Day 12: Review day.

Day 13: *Final exam*.

Readings

In addition to the required text, a "cheat sheet" with all relevant and important formulas relevant to the material being covered on a particular day will be handed out at the start of class. This should be your most valued resource when completing assignments. Notes prepared in class will be uploaded to Blackboard for your reference.

Assigned Textbook

There is no assigned textbook for this class. A useful (optional) resource is Devore, J. L. *Probability and Statistics for Engineers and the Sciences*, Ninth Edition. I will have a couple of copies with me that you are welcome to use.