Math 312

Mathematical Statistics

Spring 2010

Who: Jim Bentley Office: 227 AHN (ext. 8621)
When: MWF 9:30–10:50
Where: AHN 215
Text: Ross, *Mathematical Statistics and Data Analysis, Third Edition*

GOALS: Math 312, *Mathematical Statistics*, is a calculus based introduction to statistics. The emphasis of the course will be on both a conceptual understanding of estimation and testing, and the mathematical theory that supports these topics. Whenever possible we will use real data in application of the topics. Mastery of the following topics should enable you to understand the assumptions made when using statistics in the real world and prepare you for further coursework in the field of statistics.

TOPICS:

1. Probability Review: Topics based upon your backgrounds

2. Statistics, Sufficiency, Completeness, and Likelihood

3. Estimation

    (a) Method of Moments (MOM)

    (b) Maximum Likelihood Estimation (MLE)

    (c) Least-Squares (LS)

    (d) Bootstrapping & Monte-Carlo Methods

    (e) Properties of Estimators

        i. Unbiasedness

        ii. Minimum Variance

        iii. Asymptotic Normality of MLE's

4. Testing

   (a) Null and Alternative Hypotheses

   (b) Type I and II Errors, α, β, and Power

   (c) Neyman-Pearson (Simple vs. Simple)

   (d) Likelihood Ratio

   (e) Properties of Tests

5. Other Topics as Time and Interests Permit

GRADING:

- 30% Homework: Work will not be accepted for credit once grading of the assignment has begun. Since answers for some of the problems are given in the back of the book, to gain credit you must support your answers by showing evidence of your thought process—your statistical reasoning. Use one side of the page and write legibly (in pencil unless you are perfect and never need to erase). Please order your answers sequentially and place them in a single column. If you use multiple pages, please staple them together. In short, put yourself in the grader's place and think about how you can make his life easier.

  Much of what we will do in this class will take more time than is available during an exam. Since your time is essentially "unlimited" outside of the classroom (yes, I know you have other classes), homework problems are a perfect place to see what you can do. Homework is thus an important part of the learning experience in this course. Please feel free to work together, but be sure to turn in your own version of the solution. If you choose to get help from others (including faculty), be sure that you fully understand whatever information they have given you. If you choose not to do the homework, or receive failing grades for those assignments you do turn in, the highest overall course score you can achieve is a 70% (or a C–). Historically, those individuals who did not earn a passing grade on their homework also earned low scores on their exams and thus failed the course. Please take the homework assignments seriously. . . I will.

- 40% Two midterms (Tentatively Wed. Feb. 10, and Wed. Mar. 17): Make up exams will only be given if you let the instructor know *in advance* that you will not be able to make the scheduled test. You must posses a reasonable excuse for your absence .)

- 30% Final (Wed., April 21, 12:00 noon)

OFFICE HOURS: MWF 8:30–9:30, 12:20–1:00 and TTh by appointment. These are times when I will be in, or near (*e.g.* in the student study area, computer lab, xerox machine), my office. I'll be around at other times, so if my door is open and nobody else is getting help, *turn your cell phone off* and come on in.

ATTENDANCE: You are encouraged to attend all class sessions. If you must miss a class, be sure to get notes from a classmate.

The last day to drop or change your grade status is Feb. 19. Spring Break is Feb. 27–Mar. 7. The last day of classes is Apr. 19.

CELL PHONE: Out of consideration for your classmates, please turn your cell phone off before entering our classroom. You may not be able to hear the vibration when your phone rings or the clicking as you send text messages, but many of your classmates and I can. By distracting me you are detracting from the quality of the experience that I can provide for everyone else in the room.

ACADEMIC HONESTY: Please familiarize yourself with the University's policy on academic honesty (see the Catalog). You are encouraged to work together. However, it is expected that the work you turn in on individual assignments and exams will be yours alone. If there is evidence that you have copied any part of your work, you will be subject to University disciplinary action for plagiarism (see the catalog).