

**MATH 444****Statistical Methods****Autumn 2006**

Instructor: Brian Steele  
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Time: Mon, Wed, Fri, 9:10-10:00 AM (Section 1)  
Mon, Wed, Fri, 10:10-11:00 AM (Section 2)

Room: Math 211

Textbook: An Introduction to Statistical Methods and Data Analysis, 5th Ed., R.L. Ott and M. Longnecker

Office Hours: Mon., 3-4 PM, Thurs. 3-4 PM, Fri., 2-3 PM, and by appointment.

Grading: Homework: 20%  
Exams (3): 60%  
Final: 20%

Prerequisites: One year of college mathematics including MATH 117. A previous course in probability is useful (not required), though no background in statistics is assumed. Some formal instruction in probability is critical.

Homework will be assigned at the beginning of class every Friday, to be handed in at the beginning of class the following Friday. **NO LATE HOMEWORK WILL BE ACCEPTED FOR ANY REASON**, and the lowest homework grade will be dropped. Homework is not only a fairly substantial portion of your grade, but is vital to your success in this class. Working with other students on homework is allowed and even encouraged, so long as you hand in your own work, and do not simply copy someone else's work.

Exams will be cumulative and closed book. If you cannot make it to an exam, you must let me know before the exam is given. No make-up exams will be given without a documentable reason for missing the exam.

In accordance with the University Final Exam Schedule, the date and time for the Section 1 Final Exam is Tuesday, Dec. 12, 8-10 AM, and the date and time for Section 2 is Wednesday, Dec. 13, 8-10 AM. The final will emphasize material from the last month of class.

Course Material and Objectives: This course is an introduction to statistical methods for analyzing data. It is intended for students in disciplines outside of mathematics who are seeking statistical tools for data analysis. After some experimental design issues and an introduction to graphical and numerical methods of exploratory data analysis, the course will focus on probability distributions, relationships between variables, statistical inference through estimation, hypothesis testing, and confidence intervals, categorical data, and linear regression. Throughout the most of course, the software package SPSS will be used to carry out statistical techniques. Instruction on the use of SPSS can be obtained in Math 447.

Math 447, Computer Data Analysis, is a 1 credit companion course (strongly recommended, but not mandatory). Math 447 provides instruction in the operation of SPSS, and help in solving homework problems from Math 444. When Chapter 4 (probability) is being covered, the Math 447 class time will be spent on homework problems.

Additional Course Information: The last day to add or drop this course (with refund), or change grading option to audit is September 18. The last day to add or drop this course (no refund) or change the grading option (except to audit) is October 9. After October 9 and until December 8 can only be accomplished by a petition *approved* by all granting authorities.

## Tentative Outline of Topics<sup>1</sup>

Week	Day	Section	Topic
1	8/28	1	Introduction to Statistics
	8/30	2.1,2.2	Surveys
	9/1	2.3,2.4	Scientific and Observational Studies
	9/4		Holiday
2	9/6	3.3	Exploratory Data Analysis, Graphical Data Summaries
	9/8	3.3	Graphical Data Summaries
3	9/11	3.4	Sample Mean, Median, Trimmed Mean
	9/13	3.5	Sample Variance and Standard Deviation
	9/15	3.6	IQR, Percentiles, 5-Number Summary, Boxplots, Outliers
4	9/18	3.6	Examples
	9/20	3.7	Relationships Among Variables
	9/22		Exam I
5	9/25	4.1,4.2	Set Theory, Venn Diagrams
	9/27	4.3	Probability Laws
	9/29	4.4	Conditional Probability, Independence, Bayes Formula
6	10/2	4.6,4.7	Random Variables and Probability Distributions
	10/4	4.8	Binomial Distribution
	10/6	4.9,4.10	Continuous Distributions, Normal Distributions
7	10/9	4.10,4.11	Normal Distributions, Random Sampling
	10/11	4.12	Sampling Distribution for $\bar{y}$ , Central Limit Theorem for $\bar{y}$
	10/13	4.13	Normal Approximation to the Binomial
8	10/16		Exam II
	10/18	5.1,5.2	Introduction to Statistical Inference, Estimation of $\mu$
	10/20	5.2,5.3	Confidence Interval for $\mu$ , Sample Size Determination
9	10/23	5.4	Significance Testing for $\mu$
	10/25	5.5	Type I Errors
	10/27	5.5	Type II Errors
10	10/30	5.6	Significance Level of a Test
	11/1	5.7	One-sample $t$ -Procedures
	11/3	5.8	Inferences About the Median
11	11/6		Holiday
	11/8		Exam III
	11/10	6.1	Inferences About $\mu_1 = \mu_2$
13	11/13	6.1	Case Study
	11/15	6.2	Independent Samples
	11/17	6.3,6.4	Wilcoxon Rank Sum Test, Paired Samples
	11/20	6.5	Wilcoxon Signed-Rank Test
	11/22		Holiday
	11/24		Holiday
14	11/27	6.6	Sample Size Determination
	11/29	10.1	Categorical Data, Case Study
	12/1	10.2	Inferences About $\pi$
15	12/1	10.3,10.3	Inferences About $\pi_1, \pi_2, \dots, \pi_k$
	12/4	10.4	Contingency Tables and Tests
	12/6		Review

<sup>1</sup>Some variation from this schedule should be expected