

SYLLABUS

STATISTICS 630-600, 700, 720

Fall 2008

INSTRUCTOR: TBA

OFFICE HOURS:

OFFICE:

PHONE NUMBER:

FAX NUMBER:

E-MAIL ADDRESS:

TEXT: *Mathematical Statistics and Data Analysis, Third Edition,*
by John Rice

GRADERS: TBA

OFFICE HOURS:

OFFICE:

PHONE NUMBER:

E-MAIL ADDRESS:

PREREQUISITE: Successful completion of MATH 221, 251, or 253 (Calculus of Several Variables).

FOCUS OF COURSE: STAT 630 is intended for graduate students in various fields who require an introduction to mathematical statistics. We will introduce the basic probability theory including random variables and their distributions needed to develop statistical methodology. We will then introduce the theory of statistical inference from the likelihood point of view. In particular, we will cover maximum likelihood estimation, confidence intervals, and likelihood ratio tests. The R statistical software (available at <http://lib.stat.cmu.edu/R/>) will be used to illustrate concepts throughout the course.

GRADING POLICY

1. Examinations will be given in class on Friday, October 3, and Friday, November 14. The final examination will be held on Tuesday, December 10. Students enrolled in Section 600 will take the exams on campus at the scheduled class time. Students enrolled in Sections 700 and 720 will take the exams on these dates under the supervision of a proctor. Information concerning the proctors will be sent to these students by the end of the first week of class.

2. Homework will be assigned regularly, and it will be turned in and graded. You may discuss the homework problems with other students, but you should write up your solutions independently. Do not copy other students' solutions, solutions from previous years, or solutions from a solutions manual.
 3. If you are unable to take a test when scheduled because of illness, accident, or circumstances beyond your control, notify me by telephone before the exam is given. A make-up test will be scheduled as soon as possible.
 4. A grade of Incomplete (I) will be given only in the event that circumstances beyond your control were the cause of your missing class for an extended period. This grade is not to be given because you feel that you have too much other work or study or because you think that you will not earn an acceptable grade in the course.
 5. A course average from 90 to 100 will be an A, from 80 to 89 will be a B, etc. The course average will be determined from the two midterm exams, 25% each, homework, 10%, and the final exam, 40%.
- **ACADEMIC INTEGRITY STATEMENT:** "An Aggie does not lie, cheat, or steal or tolerate those who do." The Aggie Honor Council Rules and Procedures are available at <http://www.tamu.edu/aggiehonor>.
 - **STATEMENT ON PLAGIARISM:** As commonly defined, plagiarism consists of passing off as one's own ideas, words, writing, etc., which belong to another. In accordance with this definition, you are committing plagiarism if you copy the work of another person and turn it in as your own, even if you should have the permission of that person. Plagiarism is one of the worst academic sins, for the plagiarist destroys the trust among colleagues without which research cannot be safely communicated. If you have any questions regarding plagiarism, please consult the latest issue of the Texas A&M University Student Rules, under the section "Scholastic Dishonesty."
 - **STATEMENT ON DISABILITIES:** The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation for their disabilities. If you believe you have a disability requiring an accommodation, please contact the Office of Disability Services in Room B118 of Cain Hall. The phone number is 845-1637.

- **COPYRIGHT NOTICE:** The handouts used in this course are copyrighted. By “handouts,” I mean all materials generated for this class including syllabi, exams, in-class material, and computer examples. Because these materials are copyrighted, you do not have the right to copy the handouts, unless I expressly grant permission.

Instructions for Using the STAT 630 Website:

Since STAT 630 will be offered as a distance course, all students will have access to streaming videos of the lectures. All of the information for the course will be accessible on the distance course website. To access the website, you will need to register according to the instructions e-mailed to the students registered in the class.

After you have registered, take a look at the resources. The recorded lectures will be found under “Lectures”. Under “Files” you will find the lecture notes and examples that are used in the class.

STATISTICS 630—Tentative Syllabus

	Topic	Chapter
I.	Introduction to Probability	1
	A. Interpretation, experiments, sample space, events	
	B. Set theory, definition	
	C. Finite sample spaces, counting methods, combinatorial methods	
	D. Conditional probability, Bayes theorem	
	E. Independent events	
II.	Random Variables	2
	A. Discrete random variables	
	B. Continuous random variables	
	C. Important discrete and continuous distributions	
	D. Functions of a random variable	
III.	Joint Distributions	3
	A. Discrete random variables	
	B. Continuous random variables	
	C. Independent random variables	
	D. Marginal and conditional distributions	
	D. Functions of jointly distributed random variables	

Topic	Chapter
IV. Expected Values	4
A. Expectation and its properties	
B. Moments including mean and variance	
C. Covariance and correlation	
D. Conditional expectations	
E. Moment generating functions	
V. Limit Theorems	5
A. Law of large numbers	
B. Central limit theorem	
VI. Distributions Derived from the Normal Distribution	6
VII. Estimation of Parameters and Fitting of Distributions	8
A. Parameter estimation	
B. Properties of estimators—bias, variance, mean squared error	
C. Method of moments estimators	
D. Maximum likelihood estimation	
E. Large sample properties of maximum likelihood estimators	
F. Definition of confidence intervals	
G. Construction of confidence intervals using pivots	
H. Construction of approximate confidence intervals	
I. Bayesian inference	
J. Information inequality and efficiency of estimators	
VIII. Testing Hypotheses	9
A. Bayes approach to testing and the likelihood ration	
B. Basic concepts of hypothesis testing	
C. Neyman-Pearson approach to hypothesis testing	
D. Duality of confidence intervals and tests	
E. Generalized likelihood ratio tests	
F. Wald and score tests	
G. Applications of likelihood ratio tests	