UTD	**Course**	**STAT 6331.501 Statistical Inference I**
	Professor	Robert Serfling
	Term	Fall 2009
	Meetings	TR 7:00-8:15 p.m., ECSS 2.312

Professor's Contact Information

Office Phone	972-883-2361
Office Location	ECSN 3.902
Email Address	serfling@utdallas.edu
Website	www.utdallas.edu/~serfling – ***has a section for this course***
Office Hours	TR 11:30 a.m.- Noon and 5:00-5:30 pm, and by appointment.
Other Information	I check *email* much more regularly than my telephone. But please *do not* email me on WebCT.

General Course Information

Prerequisites	MATH 4301-2 (undergraduate mathematical analysis) or equivalent. STAT 5351 or equivalent. Strongly recommended: MATH 5301 or equivalent, either prior or concurrent. (NOTE. STAT 5352 and MATH 5302 are not required but are recommended.)
Course Description	This course provides an introduction to the concepts and theory underlying modern statistical science. Key topics are as follows. **Basic Foundations**. Probability Models. Conditional Probability. Random Variables and Vectors. Conditioning by Random Vectors. Transformations. Convergence. Convexity and Inequalities. Matrix Theory. **Basic Distribution Theory**. Gamma and Beta Distributions. Normal Samples and the Chi-square, F, and t Distributions. The Multivariate Normal Distribution. **Statistical Models, Goals, and Performance Criteria**. Models, Decision Theoretic Framework. Prediction. Sufficiency. Exponential Families. **Methods of Estimation**. Minimum Contrast Estimation. Sample Analogue and Maximum Likelihood Estimators. Algorithmic Issues. **Measures of Performance**. Bayes and Minimax Procedures. Unbiased Estimation. Risk Inequalities. Computational Issues. Robustness Issues. **Testing and Confidence Regions**. Neyman-Pearson Lemma. Most Powerful Tests. Most Accurate Confidence Bounds. Frequentist and Bayesian Formulations. Prediction Intervals. Likelihood Ratio Procedures. **Large Sample Approximations**. The Delta Method. Asymptotic Normality and Efficiency. Asymptotics for Vector Parameter Estimators. Large Sample Tests and Confidence Regions. Asymptotic Behavior of Posterior Distributions. **Inference in Multiparameter Models**. Gaussian Linear Models. Goodness-of-Fit in Multinomial Models. Generalized Linear Models. Semiparametric Inference.

Desired Learning Outcomes	The goal is a working knowledge of the most basic methods of mathematical statistics and an appreciation of statistical thinking in general. In particular, students should be able to: 1. Understand and apply the role of sufficiency in statistical inference. 2. Articulate key concepts in Bayesian, frequentist, and decision-theoretic approaches to estimation, hypothesis testing, and other decision problems. 3. Select and apply a suitable statistical inference procedure for given data under appropriate model assumptions.
Required Text	P. J. Bickel and K. A. Doksum, *Mathematical Statistics: Basic Ideas and Selected Topics*, Vol. I, 2nd ed., updated printing, 2007. Prentice Hall.
Other Materials	Various handouts will be provided and further readings suggested.

Syllabus
(subject to revision – except schedule for quizzes, tests, and final exam)

Day	*Text Sections and Schedule for Test and Final Exam*
R 8/20	*Review of Basic Probability* – §§ A.1-A.8
T, 8/25 **R, 8/27**	§§ A.9-A.13 §§ A.14-A.15
T, 9/1 **R, 9/3**	*Further Basic Foundations* – §§ B.9-B.10 §§ B.1-B.2
T, 9/8 **R, 9/10**	§B.3 §§ B.3-B.4
T, 9/15 **R, 9/17**	*Statistical Models, Goals, and Performance Criteria* – §§ 1.1-1.2 § 1.2
T, 9/22 **R. 9/24**	§§ 1.2-1.3 § 1.4
T, 9/29 **R, 10/1**	§§ 1.4-1.5 §§ 1.5
T, 10/6 **R, 10/8**	§1.6 §1.6
T, 10/13 **R, 10/15**	§1.6 **Midterm Test**
T, 10/20 **R, 10/22**	*Methods of Estimation* – §§ 2.1-2.2 § 2.2
T, 10/27 **R, 10/29**	§§ 2.2-2.4 *Comparison of Estimates; Optimality; Measures of Performance* – § 3.1
T, 11/3 **R, 11/5**	§§ 3.2-3.3 § 3.4
T, 11/10 **R, 11/12**	§ 3.4 *Testing and Confidence Regions: Basic Theory* – § 4.1
T, 11/17 **R, 11/19**	§ 4.2 § 4.3
T, 11/24	Handout: *Maximum Likelihood Estimation: General Parameter Space*
11/26-11/28	***Thanksgiving Holiday*** ☺
T, 12/1 **R, 12/3**	***"Mini-Symposium": Student Presentations***

Course Policies

Grading Criteria	The course grade will be based on *homework* (35%), a closed-book *midterm test* (30%), and *presentations* (35%). The course will conclude with preparation, under supervision of the instructor, of a 20-minute presentation to the class on an assigned research paper. The presentations will be given together as a ``mini-symposium".
Missed Exam or Late Homework	In the case of a missed midterm exam, a makeup exam (either written or oral) will be conducted if the absence is excused. Late homework is not accepted unless the lateness is excused for suitable reasons.
Student Conduct and Discipline	The University of Texas System and The University of Texas at Dallas have rules and regulations for the orderly and efficient conduct of university business. It is the responsibility of each student to be knowledgeable about those which govern student conduct and activities. General information on student conduct and discipline is contained in the UTD publication, *A to Z Guide*, provided to all registered students each academic year.
Academic Integrity	The faculty expects from students a high level of responsibility and academic honesty. Because the value of an academic degree depends upon the absolute integrity of the work done by the student, each student must demonstrate a high standard of individual honor in his or her scholastic work. Scholastic dishonesty includes, but is not limited to, statements, acts, or omissions that are related to the submission as one's own work of material that is not one's own. This may include cheating, plagiarism, collusion, and falsifying of academic records. Students suspected of academic dishonesty are subject to disciplinary proceedings.
Email and Technical Support	The University of Texas at Dallas encourages faculty to consider email from students official only if it originates from a UTD student account. This allows the university to maintain a high degree of confidence in the identity of all individuals corresponding and in the security of the transmitted information. UTD furnishes each student with a free email account, and the Department of Information Resources at UTD provides a method for students to forward their UTD email to other accounts. If you experience any problems with your UTD account you may send an email to: assist@utdallas.edu or call the UTD Computer Helpdesk at 972-883-2911.
Withdrawal	Deadlines for withdrawal from courses are published in each semester's course catalog. A faculty member cannot drop or withdraw a student. Rather, it is the student's responsibility to handle withdrawal procedures from any class. The proper paperwork and procedure must be used to avoid receiving a final grade of "F" in a course in which the student remained enrolled but did not participate.
Incomplete Grades	By university policy, incomplete grades are granted only in case of work unavoidably missed (and excused) and not already covered by the professor's policy on missed work, and only if at least 70% of the course work has been completed. The incomplete grade must be resolved within 8 weeks from the first day of the subsequent long semester. If the required work to complete the course is not submitted by the specified deadline, the incomplete grade becomes changed automatically to the grade of F.

Disability Services	Disability Services seeks to provide students with disabilities educational opportunities equivalent to those of their non-disabled peers. The Office of Disability Services is located in room 1.610 in the Student Union, and its hours are Monday-Thursday, 8:30 a.m. to 6:30 p.m. and Friday, 8:30 a.m. to 5:00 p.m. Essentially, the law requires colleges and universities to make reasonable adjustments necessary to eliminate discrimination on the basis of disability. For example, it may be necessary to remove classroom prohibitions against tape recorders or animals (in the case of dog guides) for students who are blind. Occasionally, an assignment requirement may be modified (for example, a research paper versus an oral presentation for a student who is hearing impaired). Classes including students with mobility impairments may have to be rescheduled in accessible facilities. The college or university may need to provide special services such as registration, note-taking, or mobility assistance. It is the student's responsibility to notify his or her professors of the need for such accommodations. Disability Services provides students with letters to present to faculty members.
Religious Holy Days	The University of Texas at Dallas excuses students from class or other r required activities for the purpose of travel to and observance of a religious holy day for a religion whose places of worship are exempt from property tax under Section 11.20, Tax Code, Texas Code Annotated. In the case of such an absence, the student is encouraged to notify the instructor as soon as possible, preferably in advance. Regarding missed assignments, quizzes, tests, or exams, the student excused for such a purpose will be covered by the professor's policy for missed or late work.
Copyright Notice	The copyright law of the United States (Title 17, United States Code) governs the making of photocopies or other reproductions of copyrighted materials, including music and software. Copying, displaying, reproducing, or distributing copyrighted works may infringe the copyright owner's rights and such infringement is subject to appropriate disciplinary action as well as criminal penalties provided by federal law. Usage of such material is only appropriate when that usage constitutes "fair use" under the Copyright Act. As a UT Dallas student, you are required to follow the institution's copyright policy (Policy Memorandum 84-I.3-46). For more information about the fair use exemption, see http://www.utsystem.edu/ogc/intellectualproperty/copypol2.htm