

	Course	STAT 6390.501 Topics in Statistics
	Professor	Robert Serfling
	Term	Spring 2008
	Meetings	MW 5:30-6:45 p.m., CB1.122

Professor's Contact Information

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Office Hours	To be arranged – check website.
Other Information	I check <i>email</i> much more regularly than my telephone. But please <i>do not</i> email me on WebCT.

General Course Information

Prerequisite	STAT 6331 or equivalent.
Course Description	<p>This special topics course in statistics will treat <i>Outlier Identification and Handling in Statistical Applications</i>. Despite a long tradition, this topic is presenting new kinds of challenge in applications of statistical science to the complex data sets of modern society. The goal is to understand cutting-edge methods of outlier identification and handling. The course will start with the setting of univariate data and proceed to multivariate data and other types (e.g., images, curves, shapes, text, etc.), with an applications-oriented approach and a methodological and conceptual level similar to STAT 6331. The course will be useful to students working on applied problems in their jobs and to students working on or planning to work on dissertation projects in statistics or related fields. Key topics (subject to revision) are as follows.</p> <p>Introductory Overview on Outlier Detection. Key Issues. General Perspectives. Illustrative First Examples.</p> <p>Outlier Detection with Univariate Data. Skewness-Adjusted Boxplot. General Structures for Outlier Detectors. Performance Criteria: Masking and Swamping Breakdown Points, Influence Functions, Equivariance.</p> <p>Outlier Detection with Multivariate Data. Mahalanobis Distance Approach. Multivariate Quantile Functions. The Depth-Outlyingness-Quantile-Rank Paradigm. The Bagplot. General Structures.</p> <p>Outlier Detection with General Data. The Shape Fitting Context. The Fitting-Residuals Paradigm. The Data Mining Context. The Data Fusion Context. General Structures.</p> <p>Concluding Overview on Outlier Detection ☺</p>
Desired Learning Outcomes	<p>A working knowledge of methods, concepts and algorithmic issues in outlier identification and handling in statistical applications, including an:</p> <ol style="list-style-type: none"> 1. Formulation of outlier identification procedures in many contexts, 2. Performance evaluation of different outlier identification procedures, 3. Application to data in parametric and nonparametric settings.
Required Text	None.
Other Materials	A variety of source books and papers.

Syllabus (subject to revision)

<i>Day</i>	<i>Topics</i>
M 1/7 W 1/9	<i>Introductory Overview on Outlier Detection ☺</i> Key Issues. General Perspectives. Illustrative First Examples.
M 1/14 W 1/16 W 1/23 (M 1/21)	<i>Outlier Detection with Univariate Data</i> The Skewness-Adjusted Boxplot. General Structures for Outlier Detectors. Performance Criteria: Masking and Swamping Breakdown Points, Influence Functions, Equivariance. (M, 1/21 – <i>Martin Luther King Holiday</i> – University closed)
M 1/28 W 1/30 M 2/4 W 2/6 M 2/11 W 2/13	<i>Outlier Detection with Multivariate Data</i> Mahalanobis Distance Approach. Multivariate Quantile Functions. The Depth-Outlyingness-Quantile-Rank Paradigm. The Bagplot. General Structures.
M 2/18 W 2/20 M 2/25 W 2/27 M 3/3 W 3/5	<i>Student-Led Discussions of Selected Papers</i>
M-F 3/10-14	<i>Spring Break ☺</i>
M 3/17 W 3/19 M 3/24 W 3/26 M 3/31 W 4/2	<i>Outlier Detection with General Data</i> The Shape Fitting Context. The Fitting-Residuals Paradigm. The Data Mining Context. The Data Fusion Context. General Structures.
M 4/7 W 4/9 M 4/14 W 4/16 M 4/21 W 4/23	<i>Student-Led Discussions of Selected Papers</i>
M 4/28	<i>Concluding Overview on Outlier Detection ☺</i>

Course Policies

<p>Grading Criteria</p>	<p>The course grade will be based on <i>participation</i> and <i>performance</i> in <i>student-led presentations and discussions</i>. Each student will prepare a lead presentation on each of two assigned papers and also participate in the discussions of all of the papers. Students will receive advance copies of all papers and be expected to prepare not only their own presentations but also comments and input for all of the discussions. <i>Guidelines for effective preparation and discussion will be supplied.</i></p>
<p>Missed Student-Led Discussion</p>	<p>In the case of a missed participation in a student-led discussion, no penalty will be applied if the absence is excused. Otherwise, the score of 0 for that session will be imposed.</p>
<p>Student Conduct and Discipline</p>	<p>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, <i>A to Z Guide</i>, provided to all registered students each academic year.</p>
<p>Academic Integrity</p>	<p>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.</p>
<p>Email and Technical Support</p>	<p>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 email to assist@utdallas.edu or call the Helpdesk at 972-883-2911.</p>
<p>Withdrawal</p>	<p>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.</p>
<p>Incomplete Grades</p>	<p>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.</p>

<p>Disability Services</p>	<p>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 and Thursday, 8:30 a.m. to 6:30 p.m.; Tuesday and Wednesday, 8:30 a.m. to 7:30 p.m.; and Friday, 8:30 a.m. to 5:30 p.m.</p> <p>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.</p>
<p>Religious Holy Days</p>	<p>The University of Texas at Dallas excuses students from class or other 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.</p>
<p>Copyright Notice</p>	<p>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</p>