

IE 5318-001/002/003 / Spring 2012
Advanced Engineering Statistics

Professor: Victoria (Tory) Chen, 420J Woolf Hall.

Contact: E-mail vchen@uta.edu, Phone 817-272-2342, FAX 817-272-3406, electronic FAX 817-272-1461.

Classes: MWF 11:00–11:50PM in 404 Woolf Hall. **Office Hours:** Mon 3:30–4:30PM, Wed 4:00–5:30PM.

GTA: Zirun Zhang (zirun.zhang@mavs.uta.edu).

Required Text: *Applied Linear Statistical Models, Fifth Edition* by Michael H. Kutner, Christopher J. Nachtsheim, John Neter, William Li, 2004 (CD inside the cover);

Prerequisite: IE 3301 or IE 5317 or some introductory probability/statistics course.

OIT Course: It is recommended that students take the *free* two-hour SAS Introductory Short Course (see <http://www.uta.edu/oit/cs/training/index.php>).

Description: Applied linear regression analysis. In-depth study of one predictor followed by the matrix approach to multiple linear regression. Topics include prediction, residual analysis, and model selection.

Student Learning Objectives: At the end of this course, students should be able to: (1) understand fundamental concepts of linear regression, (2) perform a proper linear regression analysis on real data, and (3) interpret the analysis.

Exams: Both the midterm and final will be open book, open notes, and open calculator. Copies of the required text are not permitted and will be confiscated if brought to an exam. Please bring your UTA ID card to all exams. Students must sign an academic honesty statement on the exam. Report cheating to me.

Projects: There will be two projects, each consisting of two parts: the proposal and the full report. You may work in groups of two or three. For the proposal, your group must clearly state the problem of interest, describe the variables to be studied, reference the source of data, and present preliminary plots of the raw data to justify the applicability of SLR/MLR. Data may be collected by the group itself or may be obtained from outside sources (e.g., journals, internet). The proposal should be submitted via email to vchen@uta.edu. The full report should include data and complete analysis with good discussion. Both reports should be typewritten. Further description of the report requirements will be handed out in class. Copying (including from past students' reports) is not permitted.

Homework Policy: You may work in groups (including SAS work). However, you must write up your assignment separately, written in your own words, and with the necessary supporting computer output. Copying (including from past students' assignments) is not permitted.

Makeup Policy: A makeup test will be given if the student provides *legitimate written documentation* proving an illness or emergency. If necessary, I may request additional information to verify the validity of your documentation. If you cannot attend an exam, you should make every effort to contact me beforehand.

Regrading Policy: If you would like a test/project regraded, you must submit a written statement which clearly explains the reason you would like a regrade. Please note that the *entire* test/project will be regraded.

Attendance: Attendance will be taken at the beginning of class approximately 4 times during the semester. Students present will earn an attendance point. Each student's accumulated attendance points are added to the raw score of the final exam.

Academic Integrity: At UT Arlington, academic dishonesty is completely unacceptable and will not be tolerated in any form, including (but not limited to) "cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts" (UT System Regents' Rule 50101, Subsection 2.2). Suspected violations of academic integrity standards will be referred to the Office of Student Conduct. Violators will be disciplined in accordance with University policy, which may result in the students suspension or expulsion from the University.

Drop Policy: Students may drop or swap (adding and dropping a class concurrently) classes through self-service in MyMav from the beginning of the registration period through the late registration period. After the late registration period, students must see their academic advisor to drop a class or withdraw. Undeclared students must see an advisor in the University Advising Center. Drops can continue through a point two-thirds of the way through the term or session. It is the student's responsibility to officially withdraw if they do not plan to attend after registering. Students will not be automatically dropped for non-attendance. Repayment of certain types of financial aid administered through the University may be required as the result of dropping classes or withdrawing. For more information, contact the Office of Financial Aid and Scholarships (<http://www.uta.edu/ses/fao>).

Americans with Disabilities Act: The University of Texas at Arlington is on record as being committed to both the spirit and letter of all federal equal opportunity legislation, including the Americans with Disabilities Act (ADA). All instructors at UT Arlington are required by law to provide "reasonable accommodation" to students with disabilities, so as not to discriminate on the basis of that disability. Any student requiring an accommodation for this course must provide the instructor with official documentation in the form of a letter certified by the staff in the Office for Students with Disabilities, University Hall 102. Only those students who have officially documented a need for an accommodation will have their request honored. Information regarding diagnostic criteria and policies for obtaining disability-based academic accommodations can be found at www.uta.edu/disability or by calling the Office for Students with Disabilities at (817) 272-3364.

Student Support Services: UT Arlington provides a variety of resources and programs designed to help students develop academic skills, deal with personal situations, and better understand concepts and information related to their courses. Resources include tutoring, major-based learning centers, developmental education, advising and mentoring, personal counseling, and federally funded programs. For individualized referrals, students may contact the Maverick Resource Hotline by calling 817-272-6107, sending a message to resources@uta.edu, or visiting www.uta.edu/resources.

Electronic Communication: UT Arlington has adopted MavMail as its official means to communicate with students about important deadlines and events, as well as to transact university-related business regarding financial aid, tuition, grades, graduation, etc. All students are assigned a MavMail account and are responsible for checking the inbox regularly. There is no additional charge to students for using this account, which remains active even after graduation. Information about activating and using MavMail is available at <http://www.uta.edu/oit/cs/email/mavmail.php>.

Student Feedback Survey: At the end of each term, students enrolled in classes categorized as lecture, seminar, or laboratory will be asked to complete an online Student Feedback Survey (SFS) about the course and how it was taught. Instructions on how to access the SFS system will be sent directly to students through MavMail approximately 10 days before the end of the term. UT Arlington's effort to solicit, gather, tabulate, and publish student feedback data is required by state law; student participation in the SFS program is voluntary.

Final Review Week: A period of five class days prior to the first day of final examinations in the long sessions shall be designated as Final Review Week. The purpose of this week is to allow students sufficient time to prepare for final examinations. During this week, there shall be no scheduled activities, such as required field trips or performances; and no instructor shall assign any themes, research problems or exercises of similar scope that have a completion date during or following this week, *unless specified in the class syllabus*. During Final Review Week, an instructor shall not give any examinations constituting 10% or more of the final grade, except makeup tests and laboratory examinations. In addition, no instructor shall give any portion of the final examination during Final Review Week. During this week, classes are held as scheduled. In addition, instructors are not required to limit content to topics that have been previously covered; they may introduce new concepts as appropriate.

Incident Weather Policy: If the University is closed this class will not meet. Any scheduled assignments or examinations will be rescheduled to the next class period that the class meets. You can get information by dialing 817-272-8821 or 972-601-2049.

Grading (tentative):

- 5% each 2 Homework Assignments (SLR, MLR): Last assignment is due Friday, April 27th.
- 20% Midterm in class Monday, March 5th.
- 20% SLR Project: proposal due Monday, February 20th,
report due Monday, March 26th.
- 25% MLR Project: proposal due Monday, April 2nd,
report due Wednesday, May 2nd.
- 25% Final: Monday, May 7th, 11:00AM–1:30PM.

Course Outline (tentative): Chapters based on Kutner et al. (2004)

- 0. Statistics Review
 - 0.1 Descriptive Statistics and Data
 - 0.2 Basic Probability
 - 0.3 Normal Distribution
 - 0.4 Inferential Statistics
- 1. Simple Linear Regression (SLR)
 - 1.1 The Simple Linear Regression Model: 1.1–1.5
 - 1.2 Fitting the Regression Line: 1.6–1.8
 - 1.3 Inferences on β_0 and β_1 : 2.1–2.3
 - 1.4 Inferences on the Regression Line: 2.4, 2.6
 - 1.5 Prediction Intervals: 2.5
 - 1.6 The Analysis of Variance Table: 2.7–2.8
 - 1.7 Correlation: 2.9
 - 1.8 Residual Analysis: 3.2–3.8
 - 1.9 Transformations and Nonparametric Regression: 3.9–3.10
- 2. Multiple Linear Regression (MLR)
 - 2.1 The Multiple Linear Regression Model: 6.1
 - 2.2 Matrix Approach to Multiple Linear Regression: 6.2 (refer to Ch. 5)
 - 2.3 Fitting the Regression Model: 6.3–6.4
 - 2.4 Analysis of Variance: 6.5
 - 2.5 Inferences and Prediction: 6.6–6.7, 6.9
 - 2.6 Model Adequacy: 6.8
 - 2.7 Building the Regression Model – Part I: 7.1–7.3, 7.5–7.6, 8.1–8.2
 - 2.8 Building the Regression Model – Part II: 9.1–9.6, 10.1–10.6
 - 2.9 Building the Regression Model – Part III: Ch. 11

Distance Education Policies: A distance student is defined as a student enrolled in the distance section of an IE course. The section numbers for distance sections are typically “002” or “003.”

1. Distance students are required to communicate with the faculty before the second class period. This “first contact” helps ensure that the distance student is not left behind at the beginning of the semester. Students are encouraged to do this before class begins each semester. You are responsible for contacting the instructor via e-mail to comply with the requirements for taking the course through the Internet.
2. Exams must be taken within 24 hours of the regularly scheduled exam. Students who live within 50 miles of campus must come to campus to take all exams. Students should make every effort to take exams on campus during the regularly scheduled time. If this is not possible, alternate exam times will be scheduled. Students living more than 50 miles from campus may take the exam with an approved proctor. Students will be responsible for identifying a proctor. Proctors must be approved by the faculty at least two weeks before the first exam. The proctor should be associated with the testing facility of a community college, a library, a university or a professional testing center, such as a Sylvan Learning Center. Students are responsible for any fees charged by the testing facility.
3. Distance students are expected to complete all of the regular requirements for a class. This includes submission of homework assignments within 24 hours of the in-class students. To facilitate this, the faculty will establish homework due dates that provide enough time for the distance student to view the material on the WEB page and to complete the assignment. In most cases, homework may be submitted electronically. Laboratory assignments are handled on a class-by-class basis. The faculty will actively try to accommodate the distance student. However, in some cases, the DFW Metroplex distance student will be required to come to campus to complete a laboratory assignment. The student should communicate with the faculty before enrolling in a course to understand the laboratory requirement.
4. The distance student is expected to have the minimum level of technology required to receive the distance programs. The minimum recommended technologies are given below.
 - Processor operating at 400 MHz or higher.
 - DSL/cable modem Internet connection capable of 256 kbps sustained data rate.
 - Video Software - A free RealPlayer is available from www.real.com. There is a version of RealPlayer for the Mac, and a few Linux/Unix boxes, but we do not provide support for those platforms.
 - Web Browser - Our courses are designed to use Microsoft Internet Explorer 5.0 or better. Many of the necessary features will NOT operate with Netscape, Mozilla, or other browsers.

If you plan to watch the streaming video courses from your office, be sure that there will not be any firewall issues prohibiting the access of the video player. You will want to investigate your company’s equipment and policies before committing to this distance education option.