IE 5318-001/002/003 / Fall 2016
Applied Regression Analysis

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 11:00–11:50AM in 404 Woolf Hall. **Office Hours:** MW 4:00–5:00PM, F 1:00–2:00PM
GTA: TBD. **GTA Office Hours:** TBD.

Required Text: *Applied Linear Statistical Models, Fifth Edition* by Michael H. Kutner, Christopher J. Nachtsheim, John Neter, William Li, 2004; OR *Applied Linear Regression Models, Fourth Edition* by Michael H. Kutner, Christopher J. Nachtsheim, and John Neter, 2004.

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

Description: An in-depth study of one predictor variable followed by the matrix approach to multiple linear regression. Topics include estimation, prediction, analysis of variance, residual analysis, transformations, multicollinearity, model selection, weighted least squares, ridge regression, robust regression.

Student Learning Outcomes: 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. Any form of copying (including from past students' reports) will be reported to the university.

Homework Policy: You may discuss in groups (including SAS work). However, you must write up your assignment separately, written in your own words, with your own calculations and the necessary supporting computer output. Any form of copying (including from past assignments) will be reported to the university.

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: At The University of Texas (UT) at Arlington, taking attendance is not required. Rather, each faculty member is free to develop his or her own methods of evaluating students academic performance, which includes establishing course-specific policies on attendance. As the instructor of this section, attendance will be taken approximately 4 times during the semester. Students present for attendance will earn an attendance point. Each student's accumulated attendance points are added to the raw score of the final exam.

Expectations for Out-of-Class Study: Beyond the time required to attend each class meeting, students enrolled in this course should expect to spend at least an additional 9 hours per week of their own time in course-related activities, including reviewing lecture content, reading required materials, completing assignments, etc.

Grade Grievances: Any appeal of a grade in this course must follow the procedures and deadlines for grade-related grievances as published in the current University Catalog.

Academic Integrity: All students enrolled at UT Arlington are expected to adhere to the Honor Code:

I pledge, on my honor, to uphold UT Arlington's tradition of academic integrity, a tradition that values hard work and honest effort in the pursuit of academic excellence. I promise that I will submit only work that I personally create or contribute to group collaborations, and I will appropriately reference any work from other sources. I will follow the highest standards of integrity and uphold the spirit of the Honor Code.

UT Arlington faculty members may employ the Honor Code as they see fit in their courses, including (but not limited to) having students acknowledge the honor code as part of an examination or requiring students to incorporate the honor code into any work submitted. Per UT System *Regents' Rule* 50101, Section 2.2, suspected violations of university's standards for academic integrity (including the Honor Code) will be referred to the Office of Student Conduct. Violators will be disciplined in accordance with University policy, which may result in the student's 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://wweb.uta.edu/ses/fao).

Disability Accommodations: UT 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)*, *The Americans with Disabilities Amendments Act (ADAAA)*, and *Section 504 of the Rehabilitation Act*. All instructors at UT Arlington are required by law to provide "reasonable accommodations" to students with disabilities, so as not to discriminate on the basis of disability. 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 **The Office for Students with Disabilities (OSD)**, www.uta.edu/disability or by calling 817-272-3364. Students are responsible for providing the instructor with official notification in the form of a letter certified by OSD. Students experiencing a range of conditions (Physical, Learning, Chronic Health, Mental Health, and Sensory) that may cause diminished academic performance or other barriers to learning may seek services and/or accommodations by contacting OSD or **Counseling & Psychological Services (CAPS)**, www.uta.edu/caps/, 817-272-3671.

Non-Discrimination Policy: The University of Texas at Arlington does not discriminate on the basis of race, color, national origin, religion, age, gender, sexual orientation, disabilities, genetic information, and/or veteran status in its educational programs or activities it operates. For more information, visit uta.edu/eos.

Title IX Policy: The University of Texas at Arlington ("University") is committed to maintaining a learning and working environment that is free from discrimination based on sex in accordance with Title IX of the Higher Education Amendments of 1972 (Title IX), which prohibits discrimination on the basis of sex in educational programs or activities; Title VII of the Civil Rights Act of 1964 (Title VII), which prohibits sex discrimination in employment; and the Campus Sexual Violence Elimination Act (SaVE Act). Sexual misconduct is a form of sex discrimination and will not be tolerated. For information regarding Title IX, visit www.uta.edu/titleIX or contact Ms. Jean Hood, Vice President and Title IX Coordinator at (817) 272-7091 or jmhood@uta.edu.

IDEAS Center (2nd fl. LIBR): This center offers free tutoring to all students with a focus on transfer students, sophomores, veterans and others undergoing a transition to UT Arlington. To schedule an appointment with a peer tutor or mentor email IDEAS@uta.edu or call (817) 272-6593.

English Writing Center (411LIBR): The Writing Center Offers free tutoring in 20-, 40-, or 60-minute face-to-face and online sessions to all UTA students on any phase of their UTA coursework. Our hours are 9 am to 8 pm Mon.-Thurs., 9 am-3 pm Fri. and Noon-6 pm Sat. and Sun. Register and make appointments online at http://uta.mywconline.com. Classroom Visits, workshops, and specialized services for graduate students are also available. Please see www.uta.edu/owl for detailed information on all our programs and services.

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.

Campus Carry: Effective August 1, 2016, the Campus Carry law (Senate Bill 11) allows those licensed individuals to carry a concealed handgun in buildings on public university campuses, except in locations the University establishes as prohibited. Under the new law, openly carrying handguns is not allowed on college campuses. For more information, visit www.uta.edu/news/info/campus-carry/.

Student Feedback Survey: At the end of each term, students enrolled in classes categorized as "lecture," "seminar," or "laboratory shall be directed to complete an online Student Feedback Survey (SFS). Instructions on how to access the SFS for this course will be sent directly to each student through MavMail approximately 10 days before the end of the term. Each students feedback enters the SFS database anonymously and is aggregated with that of other students enrolled in the course. UT Arlingtons effort to solicit, gather, tabulate, and publish student feedback is required by state law; students are strongly urged to participate. For more information, visit http://www.uta.edu/sfs.

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.

Emergency Exit Procedures: Should we experience an emergency event that requires us to vacate the building, students should exit the room and move toward the nearest exit, which is located to the left upon exiting the classroom. When exiting the building during an emergency, one should never take an elevator but should use the stairwells. Faculty members and instructional staff will assist students in selecting the safest route for evacuation and will make arrangements to assist handicapped individuals.

Grading (tentative):

5% each	2 Homework Assignments (SLR, MLR): Last assignment is due Monday, November 28th.
20%	Midterm on SLR in class Friday, October 14th.
20%	SLR Project: proposal due Wednesday, September 28th, report due Monday, October 24th.
25%	MLR Project: proposal due Wednesday, November 9th, report due Wednesday, December 7th.
25%	Final on MLR in classroom Wednesday, December 14th, 11:00AM–1:30PM.

Letter grades correspond to the following score system:
A = 90–100; B = 80–89; C = 70–79; D = 60–69; F = below 60.

Course Schedule: Chapter sections listed below are from Kutner et al. (2004). Approximate number of lectures is given in parentheses. Class time will also be used to cover homework solutions, practice exam questions, conduct the midterm, and go over midterm solutions.

0. Statistics Review: Descriptive Statistics and Data, Basic Probability, Normal Distribution, Inferential Statistics (4 lectures)

1. Simple Linear Regression (SLR)
   - 1.1 The Simple Linear Regression Model: 1.1–1.5 (1.5 lectures)
   - 1.2 Fitting the Regression Line: 1.6–1.8 (1 lecture)
   - 1.3 Inferences on β_0 and β_1: 2.1–2.3 (1 lecture)
   - 1.4 Inferences on the Regression Line: 2.4, 2.6 (0.5 lecture)
   - 1.5 Prediction Intervals: 2.5 (0.5 lecture)
   - 1.6 The Analysis of Variance Table: 2.7–2.8 (1 lecture)
   - 1.7 Correlation: 2.9 (0.5 lecture)
   - 1.8 Residual Analysis: 3.2–3.8 (1.5 lectures)
   - 1.9 Transformations and Nonparametric Regression: 3.9–3.10 (1 lecture)

2. Multiple Linear Regression (MLR)
   - 2.1 The Multiple Linear Regression Model: 6.1 (1 lecture)
   - 2.2 Matrix Approach to Multiple Linear Regression: 6.2, refer to Ch. 5 (0.5 lecture)
   - 2.3 Fitting the Regression Model: 6.3–6.4 (0.5 lecture)
   - 2.4 Analysis of Variance: 6.5 (1 lecture)
   - 2.5 Inferences and Prediction: 6.6–6.7, 6.9 (1.5 lectures)
   - 2.6 Model Adequacy: 6.8 (1 lecture)
   - 2.7 Building the Regression Model – Part I: 7.1–7.3, 7.5–7.6, 8.1–8.2 (6 lectures)
   - 2.8 Building the Regression Model – Part II: 9.1–9.6, 10.1–10.6 (6 lectures)
   - 2.9 Building the Regression Model – Part III: Ch. 11 (4 lectures)

Emergency Phone Numbers: In case of an on-campus emergency, call the UT Arlington Police Department at **817-272-3003** (non-campus phone), **2-3003** (campus phone). You may also dial 911.