MATH 561.01W – Regression Analysis
Online Course Syllabus

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Office Hours: MW 9:00-11:00 TR 4:00-5:00 or by appointment
Communication Response Time: within 24 hours during the workweek.

Note: This syllabus details the rules and procedures by which this course is to be conducted. You are responsible for reading this syllabus and knowing the contents – enrollment in this course constitutes an acknowledgement of this responsibility and implied consent to these rules and procedures.

Description: A computer oriented statistical methods course which involves concepts and techniques appropriate to design experimental research and the application of the following methods and techniques: methods of estimating parameters and testing hypotheses about them, analysis of variance, multiple regression methods, orthogonal comparisons, experimental designs with applications.

Prerequisites: MATH 401 or MATH 502 or equivalent.

Student Learning Outcomes: Upon successful completion of this course, students will:

- Choose the appropriate linear model for an experimental design.
- Fit linear models to data.
- Perform statistical inference for linear models.
- Perform diagnostics for a fitted model.
- Apply software to select, fit, perform inference with, and assess a model.

Virtual Office Hours, Help, and Contact Info: Communication and support are crucial in an online course and so...My office hours are MW 9:00-11:00 TR 4:00-5:00 or by appointment. I will be available in the YouSeeU-Virtual Classroom during my office hours, just join the meeting. You can also call my office phone 903-886-5947 during these times to reach me, without an appointment (or drop in if you are on campus). I may not be able to answer, but keep trying. We can speak by phone, or there are various applications like Skype, Adobe Connect, or Google+ that will allow us to meet virtually. I will be checking my email regularly. I will be sending emails and posting announcements when I need to communicate with all of you. Check your email regularly.

Texts: We'll be using online texts, papers, and my own notes. I will post these on the eCollege course site. Our main text will be Faraway (linked to below) but we will be using many others. To get you started:
- Faraway, J.J., "Practical Regression and ANOVA Using R". Available FREE at http://cran.r-project.org/doc/contrib/Faraway-PRA.pdf (Also get the 'faraway' package from CRAN). These notes are an early version of the book 'Linear Models with R' published in 2014.
- Fox, J., "Robust Regression". Available FREE in the Web Appendix to 'An R Companion to Applied Regression' at https://socialsciences.mcmaster.ca/jfox/Books/Companion/appendix.html

- Verzani, J., "simpleR: Using R for Introductory Statistics". Available FREE at http://cran.r-project.org/doc/contrib/Verzani-SimpleR.pdf
- Hojsgaard, S., "Introductory Linear Algebra with R". Available FREE at http://bendixcarstensen.com/APC/linalg-notes-BxC.pdf
- Other resources will be introduced as the course proceeds.

Software:
- R, latest version is 3.5.1 (with the typically absurd name 'Feather Spray'), though what we do should be version independent. More on R is written below.
- My screencasts will require the Adobe Flash Player to view, available for free at http://get.adobe.com/flashplayer/
- The screencasts can be downloaded and viewed standalone or can be viewed in your internet browser if the Flash Player plugin is enabled. To do so:
  o Chrome/Firefox/IE: http://www.thewindowsclub.com/enable-adobe-flash-player
  o Safari: https://helpx.adobe.com/flash-player/kb/enabling-flash-player-safari.html
- Your browser may already have the Flash Player enabled; click on the link for the screencast and see if it plays.

R – is a FREE and state of the art statistical computing environment. It is available for download at http://www.r-project.org/. There are R builds for Windows, Mac, and Linux/Unix operating systems. Instruction will be given for use in Windows but the builds for other OS's are very similar. I will provide you with screencasts and notes related to using R.

R Online resources: There are many, many, many resources online for help with R: wikis, blogs, project pages, etc. Sometimes getting help is as simple as a Google search on a particular topic, such as "R calculate mean". Here is a sampling that you may find useful:
- https://www.r-project.org/help.html - The R Project's own help resources
- https://www.r-bloggers.com/ - Great blog with articles on many topics
- http://www.statmethods.net/ -aka Quick-R, pretty basic, good for beginners
- https://www.youtube.com/results?search_query=r+software - many vids on YouTube, this is an example search
- http://blog.revolutionanalytics.com - blog on advanced topics from Revolution Analytics
- http://r-forge.r-project.org/ - advanced platform for developing, sharing packages, related software, and other projects
- http://www.rdatamining.com/ - advanced, oriented more towards data mining/analytics (hot area!)

Brightspace: I will try where possible to post .pdf files rather than, or in addition to, Office documents. You will need the Adobe Reader (http://www.adobe.com/) which is another free download. However, Mac users may have to access Office documents occasionally. There are packages available that enable Mac users to work with Office documents (Office for Mac and OpenOffice come to mind). Note the following:
- Ensure that your browser has JavaScript and Cookies enabled.
- For desktop systems, you must have Adobe Flash Player 10.1 or greater.
- The Brightspace Support features are now optimized for production environments when using the Google Chrome browser, Apple Safari browser, Microsoft Edge browser, Microsoft Internet Explorer browser, and Mozilla Firefox browsers.

Grading: on a standard 100% scale:
- **HW: 40%**
- **EXAMS: 20% each**

Exams: There are 3 exams. The exams constitute the work for that week (you will need the time). They will be assigned on a Friday and due the following Thursday evening. While you may discuss the homework assignments with your fellow students, you are not to discuss the exams with anyone but me.

Exam schedule:
- **Exam #1---**Week 5
- **Exam #2---** Week 10
- **Exam #3 ---** Finals Week

Homework: will be assigned and due weekly.

Technical Support:
- **Brightspace Access and Log in Information:** This course will be facilitated using Brightspace, the learning management system used by Texas A&M University-Commerce. To get started with the course, go to: http://www.tamuc.edu/myleo.aspx. You will need your CWID and password to log in to the course. If you do not know your CWID or have forgotten your password, contact Technology Services at 903.468.6000 or helpdesk@tamuc.edu.
- **TAMU-Commerce IT Help Desk:** If you need technical support with your computer, your account, or other resources under the purview of TAMUC, contact the TAMU-Commerce IT Help Desk at 903-468-6000 or helpdesk@tamuc.edu. You will also find answers to frequently asked questions concerning online courses at http://www.tamuc.edu/academics/onlineCourses/faqs.aspx
- **Brightspace:** help is available at https://community.brightspace.com/support/s/
- **Accessing Help from within Your Course:** Click on the 'More' tab on the upper right side of the screen inside the course and select an option from the menu.
- **myLeo Support:** Please email helpdesk@tamuc.edu or call at 903-468-6000. You may also access information at https://leo.tamuc.edu.

Feedback: Activities will be graded and returned to you, with solutions and my comments, within one week, usually less.

Students with 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 of their disabilities. If you have a disability requiring an accommodation, please contact:

Office of Student Disability Resources and Services
Texas A&M University-Commerce
Gee Library
Room 132
Phone (903) 886-5150 or (903) 886-5835
Fax (903) 468-8148
Email: StudentDisabilityServices@tamuc.edu

Accessibility: Texas A&M-Commerce University is committed to making every possible effort to ensure all electronic and information technology developed, procured, maintained, or used is accessible to individuals with disabilities. For more information visit the Center for Accessibility http://www.tamuc.edu/campuslife/campusservices/CITESupportCenter/accessibility/default.aspx or contact
Lydia Harkey, EIR Accessibility Officer
Lydia.Harkey@tamuc.edu
903-468-3029

Campus Concealed Carry: Texas Senate Bill - 11 (Government Code 411.2031, et al.) authorizes the carrying of a concealed handgun in Texas A&M University-Commerce buildings only by persons who have been issued and are in possession of a Texas License to Carry a Handgun. Qualified law enforcement officers or those who are otherwise authorized to carry a concealed handgun in the State of Texas are also permitted to do so. Pursuant to Penal Code (PC) 46.035 and A&M-Commerce Rule 34.06.02.R1, license holders may not carry a concealed handgun in restricted locations. For a list of locations, please refer to (http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/34SafetyOf EmployeesAndStudents/34.06.02.R1.pdf) and/or consult your event organizer). Pursuant to PC 46.035, the open carrying of handguns is prohibited on all A&M-Commerce campuses. Report violations to the University Police Department at 903-886-5868 or 9-1-1.

Student Conduct: All students enrolled at the University shall follow the tenets of common decency and acceptable behavior conducive to a positive learning environment. (See Code of Student Conduct from Student Guide Handbook). Students should also consult the Rules of Netiquette for more information regarding how to interact with students in an online forum:
http://www.albion.com/netiquette/corerules.html
Texas A&M University-Commerce will comply in the classroom, and in online courses, with all federal and state laws prohibiting discrimination and related retaliation on the basis of race, color, religion, sex, national origin, disability, age, genetic information or veteran status.

Class Schedule:

Week	Topics
1	Intro to R and statistics review
2	Linear algebra review, linear algebra with R
3	Regression model fitting, simple linear regression (SLR) Inference - Hypothesis testing and CIs for SLR, regression diagnostics
4	Multiple linear regression (MLR) – model fitting, variable selection, criterion-based model selection
5	**Exam #1**
6	Inference in MLR - Hypothesis testing and CIs, testing models and nested models, orthogonality in design matrix, identifiability, diagnostics
7	Transformations – Box-Cox, broken regression, polynomial regression, other variable transformations
8	Regression splines, robust and resistant regression
9	Collinearity/Data Reduction – principal components, partial least squares, ridge regression
10	**Exam #2**
11	One-way and two-way ANOVA/ANCOVA
12	Repeated measures
13	Fixed and random effects, mixed models
14	Generalized linear models – Poisson, logistic, negative binomial
15	Nonlinear regression

Exam #3: Finals Week