MATH 561.01W – Statistical Computing and Design of Experiments
Online Course Syllabus

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Office Hours: MTWR 9 am-11 am or by appointment
Communication Response Time: within 24 hours

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 MTWR 9-11. You can 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. I will also be available by appointment. 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 monitor the 'Virtual Office' threaded discussions tool linked to under 'Course Home' on the eCollege coursesite. You will be able to create and edit these discussions so that you can perhaps help each other if I am not available, though I will monitor these. 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)
- Fox, J., "Robust Regression". Available FREE at http://cran.r-project.org/doc/contrib/Fox-Companion/appendix-robust-regression.pdf

- Verzani, J., "simpleR: Using R for Introductory Statistics". Available FREE at http://cran.r-project.org/doc/contrib/Verzani-SimpleR.pdf
- Hojsgaard, S., "Introduction to Linear Algebra with R". Available FREE at http://bendixcarstensen.com/APC/linalg-notes-BxC.pdf

Software:

- R, latest version is 3.3.1 (with the typically absurd name 'Bug in Your Hair'), though what we do should be version independent.
- 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:
  - Chrome/Firefox/IE: http://www.thewindowsclub.com/enable-adobe-flash-player
  - 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.

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:

- http://www.statmethods.net/ (Quick-R, pretty basic)
- http://www.statmethods.net/ (pretty basic)
- https://www.youtube.com/results?search_query=r+software (many vids on YouTube, an example search)
- http://blog.revolutionanalytics.com (advanced)
- http://r-forge.r-project.org/ (advanced)

LearningStudio/eCollege: 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).

Grading: on a standard 100% scale:

- **HW: 30%**
- **EXAMS: 15% each**
- **FINAL: 25%**

Exams: There are 3 exams and a cumulative final. The exams constitute the work for that week (you will need the time). They will be assigned on a Monday and due the following Sunday 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---** Week 15
- **Final ---** Finals Week

Homework: will be assigned and due weekly.

Technical Support:

- **R:** Direct support is VERY limited. There are many resources on the internet, as mentioned. Some resources can be found at https://www.r-project.org/help.html, and you can ask me.
- **Pearson LearningStudio Access and Log in Information:** This course will be facilitated using Pearson LearningStudio, 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. It is strongly recommended that you perform a "Browser Test" prior to the start of your course. To launch a browser test, login to Pearson LearningStudio, click on the 'myCourses' tab, and then select the "Browser Test" link under Support Services.
- **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
- **LearningStudio (Pearson LearningStudio) Technical Concerns:** Please contact the LearningStudio HelpDesk, available 24 hours a day, seven days a week by calling (toll-free) 1-866-656-5511 or 720-931-3847 (direct), or through the Online Chat by clicking on the "Tech Support" tab within your LearningStudio course.
- **Accessing Help from within Your Course:** Click on the 'Tech Support' icon on the upper left side of the screen inside the course. You will then be able to get assistance via online chat, email or by phone by calling the Help Desk number.
- **myLeo Support:** Your myLeo email address is required to send and receive all student correspondence. Please email helpdesk@tamuc.edu or call us at 903-468- 6000 with any questions about setting up your myLeo email account. 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.

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/34SafetyOfEmployeesAndStudents/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 Stat Review
2	Linear Algebra review, linear algebra with R
3	Regression model fitting
4	Inference - Hypothesis testing and CIs for SLR, regression diagnostics
5	**Exam #1**
6	Nuts and bolts of MLR fitting Variable Selection –backward elimination, forward selection, stepwise regression, criterion-based model selection Inference - Hypothesis testing and CIs, testing models and nested models, orthogonality in design matrix, identifiability, diagnostics
7	Transformations – Box-Cox, broken regression, polynomial regression, regression splines, robust and resistant regression
8	Collinearity/Data Reduction – principal components, partial least squares, ridge regression
9	One-way and two-way ANOVA/ANCOVA, factorial designs, balanced and unbalanced designs
10	**Exam #2**
11	ANOVA – block designs, Latin squares, complete and incomplete block designs, balanced incomplete designs
12	ANOVA – nested versus crossed factors, hierarchical designs, split plot, repeated measures, fixed and random effects, mixed models
13	More – repeated measures, fixed and random effects, mixed models
14	More – generalized linear models, nonlinear regression, logistic regression
15	**Exam #3**

Final Exam: Finals Week