

MATH 561 – Statistical Computing and Design of Experiments Online Course Syllabus

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Office Hours: MWF 10-11, TR 8-11, or by appointment

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

Virtual Office Hours, Help, and Contact Info: Communication and support are crucial in an online course and so...My office hours are MWF 10-11, TR 8-11. 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 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 3.1.1, 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/>

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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)

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.

Exam schedule:

- **Exam #1**---Week 5
- **Exam #2**--- Week 10
- **Exam #3**--- Week 15
- **Final** --- Finals Week

Homework: will be assigned weekly.

ADA Statement: 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

Basic Tenets of Common Decency: “All students enrolled at the University shall follow the tenets of common decency and acceptable behavior conducive to a positive learning environment.” (Student’s Guide Handbook, Policies and Procedures, Conduct.) This means that rude and/or disruptive behavior will not be tolerated.

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Tutoring: Services up to the level of Calculus I provided by the Math Skill Center (Binnion Hall Room 328) with the following hours: M and W, 8am–8pm; T and R, 8am–6pm; and F 8am–3pm.

Tentative 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

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