Applied Regression Analysis (STAT 757) Course Syllabus

Instructor: Paul J. Hurtado (email: `phurtado (at unr.edu)`)   **Spring 2016**
Lectures: Tu Th, 1:00 - 2:15PM in **Room DMSC 106**.
Office: 220 DMSC.   **Phone:** 775-784-4655 or Math Office: 775-784-6773
Office Hours: As listed on the course website, or by appointment in 220 DMSC.

Text: *A Modern Approach to Regression with* R, by S. Sheather.
            Textbook website: http://www.stat.tamu.edu/~sheather/book/

Course Website: http://www.pauljhurtado.com/teaching/SP16/
            Students are responsible for checking Web Campus (`wcl.unr.edu`) and their email accounts,
            and are assumed to be aware of all information posted to these sources prior to each meeting.

Description: This course covers techniques and applications of regression analysis, including inference and model diagnostics. Primarily intended for graduate students outside of Mathematics & Statistics.

Course Pre-requisites: None. Background in probability, statistics, and computing would be beneficial.

Course content: This course is a practical introduction aimed at scientists. We will cover most of the material addressed in the textbook. This includes simple and multiple linear regression, least squares, model diagnostics and remedial measures, analysis of variance, model selection, and mixed models. Students will also learn to use the statistical software R (`www.r-project.org`). Time permitting, students will also get a brief introduction to more advanced topics that build on this material.

Course Objectives: Students will obtain a good foundation in using regression-based statistical models to analyze real data, applying those concepts to analyze real and simulated data in R, and will learn how to interpret and critically evaluate the results of those analyses.

Student Learning Outcomes: Upon successful course completion, a student will be able to:

- Demonstrate understanding of the concepts that underly modern methods of linear regression.
- Demonstrate familiarity with the assumption associated with different statistical models.
- Use the statistical methods covered in this course to analyze data in R.
- Critically evaluate the results of these analyses and apply remedial measures as needed.
- Interpret and discuss the results of those analyses in a broader scientific context.

General Rules: I (the instructor) come to class to help you learn, and I expect you will come to class to learn **and help others learn**. Everyone in class, myself included, is expected to be respectful to one another. Disruptions during class will not be well tolerated, and are to be kept to a minimum.

Homework: A subset of the assigned homework problems will be graded. Please write or type solutions legibly. I will give zero credit for problems I cannot easily read. Your solutions must show all relevant work, and be a clear explanation of your reasoning. The same applies to all written work submitted to the instructor. Supplementary electronic files (e.g. R scripts) are to be emailed to the instructor (as no more than 3 attachments, or if needed as a single zip file) using the naming convention: **SURNAME-HWX.ext**.

Exams: There will be two mid-terms, and no final exam.

Project: Each student will complete a project and submit a term paper at the end of the course. The instructor will help students identify a good topic, and will consult closely with them during the semester. Additionally students will also present their results to the rest of the class at the end of the semester.

Computing Resources: This course requires the use of statistical software. Students are assumed to have access to a computer with the free software R (www.r-project.org) or similar software (e.g., Python) installed. Students using R are strongly encouraged to use the front-end RStudio (www.rstudio.com).

Course Topics: Below is a tentative list topics for the course, and the order they will be covered. See the course website for a more detailed list of topics, and updated schedule.

1. Introduction to R and review basic statistical concepts
2. Simple Linear Regression (SLR)
3. Diagnostics and remedial measures for SLR
4. Multiple Linear Regression (MLR)
5. Diagnostics and Remedial Measures for MLR
6. Model and Variable Selection
7. Logistic Regression
8. Linear Models for time series analysis (Serially Correlated Errors)
9. Mixed Effects Models
10. Additional advanced topics (TBD)

Final Grades: Your grade for the course will be determined as follows: 30% Assignments & Quizzes, 40% Exams, 20% Project. The remaining 10% comes from the better of your *exams* grade and your *project* grade.

The grading scale that will be used may be curved, and the cutoffs will be no higher than the those given below (i.e., for a given final score, letter grades will be as follows, or better):

A	A-	B+	B	B-	C+	C	D	F
$\geq 90\%$	$\geq 87\%$	$\geq 85\%$	$\geq 82\%$	$\geq 77\%$	$\geq 73\%$	$\geq 67\%$	$\geq 60\%$	$60\% >$

Makeup, Late Policy: Late homework will not be graded. There will be no early or make-up exams. However, if you need to miss an exam due to participation in official university activities, you must make arrangements with the instructor at least two weeks prior to the exam in question.

Academic Dishonesty: Cheating, plagiarism or otherwise obtaining grades under false pretenses constitute academic dishonesty according to the Student Code of Conduct. Students are assumed to know what plagiarism is (for a definition, see wpacouncil.org/positions/WPAplagiarism.pdf) and how to avoid it. Academic dishonesty will not be tolerated and penalties can include canceling a student's enrollment without a grade or receiving an F for the course or assignment. For more details, see the UNR General Catalog.

Disability Services: Any student with a disability needing academic adjustments or accommodations is requested to speak with the Disability Resource Center (Thompson Building, Suite 101) and then me, as soon as possible, to arrange for appropriate accommodations.

Academic Success Services: A common habit among successful students is to seek help outside of the classroom. Your student fees cover use of the Math Center (784-4433 or www.unr.edu/mathcenter), Tutoring Center (784-6801 or www.unr.edu/tutoring-center), and University Writing Center (784-6030 or www.unr.edu/writing-center). These centers support your classroom learning; it is your responsibility to take advantage of their services.

Statement on Audio and Video Recording: Written permission of the instructor is required to video or audio recorded class lectures. In order to accommodate students with disabilities, some students may have been allowed to record class lectures and discussions. Therefore, your comments and actions during class may be recorded. Surreptitious or covert video-taping of class or unauthorized audio recording of class is prohibited by law and by Board of Regents policy.