Fall 2017 Stat 427/527: **Advanced Data Analysis I**

Instructor: Dr. James Degnan, `jamdeg@unm.edu`,

`http://www.math.unm.edu/~luyan/ADA117/ADA117.html`

Time and Location: 9:00am-9:50am MWF, DSH 141

Office hours: SMLC 342, MT 12:30pm-1:30pm or by appointment

Textbook: Lecture notes for Advanced Data Analysis 1, by Erik B. Erhardt, Edward J. Bedrick, and Ronald M. Schrader. Electronic version will be provided.

Reference: Dr. Erik Erhardt's website for teaching ADA1 in the past semesters

https://statacumen.com/teaching/ada1/

Prerequisites: Stat 145 and Stat 345.

Topics: Topics covered through the semester are: Introduction to R and Rstudio, Summarizing and Displaying Data, Estimation in One-Sample and Two-sample Problems, One-Way Analysis of Variance, Nonparametric Methods, Categorical Data Analysis, Correlation and Regression, Introduction to the Bootstrap, and Data Cleaning. These topics are mainly included in chapters 0-11.

At the end of the course, you should be able to

- Use statistical software, such as R, to read and manage data, create informative plots, report numerical summaries;

- Understand from a data story the goals of the study and apply the correct statistical procedure to analyze data;

- Discover relationships and make predictions through model development and selection;

- Explain the scientific aspects of a problem to nonscientists in a fashion that enhances understanding and decision making.

Computing

Rstudio will be used in this class. You can either use a classroom computer or your own laptop. Saving data: If you're using classroom computers, use Flashdrives or UNM's OneDrive (available in LoboMail) for saving files.

Grading: Homework Assignments will be given about every 2 weeks to make for about a total of about 7-8 assignments. Homework 50%, Midterm Exam 1, 25%; Midterm Exam 2, 25%. There is no final exam. Grading for graduate students and undergraduates will be separate.

	Stat 527	Stat 427
A	90%-100%	85%-100%
B	80%-89%	75%-84%
C	70%-79%	60%-74%
D	under 70%	under 60%

Disability statement

If you have a documented disability that will impact your work in this class, please contact me to discuss your needs. Youll also need to register with the Accessibility Resource Center in 2021 Mesa Vista Hall (building 56) across the courtyard east from the SUB.

Title IX statement

In an effort to meet obligations under Title IX, UNM faculty, Teaching Assistants, and Graduate Assistants are considered responsible employees by the Department of Education (see pg 15 - http://www2.ed.gov/about/offices/list/ocr/docs/qa-201404-title-ix.pdf). This designation requires that any report of gender discrimination which includes sexual harassment, sexual misconduct and sexual violence made to a faculty member, TA, or GA must be reported to the Title IX Coordinator at the Office of Equal Opportunity (oeo.unm.edu). For more information on the campus policy regarding sexual misconduct, see: https://policy.unm.edu/university-policies/2000/2740.html

Learning Outcomes

General outcomes:

1. Organize knowledge in graphs, tables, and code to support concise, comprehensible, and scientifically defensible written interpretations to produce knowledge within a reproducible research environment.

2. Distinguish a testable scientific hypothesis or data-supported interpretation from an opinion.

3. Understand from a data story the goals of the study and apply the correct statistical procedure.

4. Explain the scientific aspects of a problem to nonscientists in a fashion that enhances understanding and decision making.

   Topical outcomes:

5. Define parameters of interest and hypotheses in words and notation.

6. Summarize data visually, numerically, and descriptively and interpret the observed characteristics. Calculate and interpret numerical summaries such as mean, variance, five-number summary, confidence intervals, and p-values, and create visual summaries such as bar plots, scatter plots, and histograms.

7. Distinguish between statistical significance and scientific relevance.

8. Use statistical software, such as R, to read and manage data, create informative plots, report numerical summaries, and apply statistical models, by recommended programming practice including abstraction and documentation.

9. Understand the differences and limitations of controlled experiments and observational studies. Design experiments to infer causal treatment effects. Analyze observational data to infer associations between measured variables.

10. Identify and explain the statistical methods, assumptions, and limitations used in reported studies in scientific literature or popular media.

11. Evaluate and criticize published studies, the work of peers, and your own work and assess what was done well, what could be done better, and examine whether their conclusions are supported using statistical principles.

12. Make evidence-based decisions by constructing and deciding between testable hypotheses using appropriate data and methods.

13. Discover relationships and make predictions through model development and selection.