

Course Syllabus

Advanced Statistical Methods for Psychology 830:400 Fall 2016

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Office Hours: W 6:30pm-7:30pm (or by appointment)

Lecture

Sections	Day & Time	First Meeting	Location
01	Mon. & Wed. 5:00pm – 6:20pm	09/07/16	ARC 108

Course Materials

Readings:

- Required Textbook: *OpenIntro Statistics. 3rd Ed.* (Diez, Barr, & Cetinkaya-Rundel, 2015) ISBN: 978-1943450039
This book can be downloaded as a [free PDF](#) or purchased as a paperback from amazon for less than \$10.
- Recommended Text: *Naked Statistics: Stripping the Dread from the Data* (Whelan, 2014) ISBN: 978-0393347777
- Additional readings will be posted on the course Sakai site.

Laptop PC (Window, Mac, or Linux): You will need a laptop pc with internet access to view course materials on the Sakai site, as well as to use the [R](#) and [RStudio](#) software required for lab exercises.

Software: This course makes extensive use of the R and RStudio software packages. In addition, I recommend that you get access to a basic spreadsheet program (e.g., *Excel* in MS Office, *Numbers* in iWork, *Calc* in OpenOffice). If you don't have one installed, *Google Sheets* should be accessible through any major web browser.

Course Goals

The main objective of this course is to teach you how to take raw behavioral science data, explore it, and present the results in a useful way. I will present a broad introduction to some of the fundamental tools and concepts of statistics for representing, visualizing, modeling, and interpreting data.

In comparison to Quantitative Methods (a prerequisite), this course will cover some more advanced techniques including exploratory data analysis, nonparametric methods, multiple regression, model fitting, and modern Monte Carlo and bootstrap resampling techniques. The main difference, however, is that this course will focus on cultivating an intuitive understanding for these techniques and how to apply them to practical problems and discouraging rote “plug and chug” computation and uncritical application of traditional NHST methods.

To that end, we will deal almost exclusively with real datasets gathered to answer scientific questions, and you will learn to use the popular, free (open source), and powerful software package 'R' to explore, visualize and analyze these data.

Above all, I intend the course is designed to be useful, and I hope that you find it to be one of the most useful courses of your undergraduate career. It is intended to be useful for students who want to go on to do graduate-level academic research as well as for students who want to go directly into public or private sector jobs involving data science or the collection, analysis, and presentation of data.

Course Requirements

Attendance & Participation: Attendance for this course is mandatory. The class will cover many conceptual issues that are not covered in the textbook. You will not be able to learn the material without attending lectures. If

extended time, reduced distractions) you will be responsible for setting up and scheduling your own accommodations for each exam. The request form can be found at <https://ods.rutgers.edu/my-accommodations/exam-request>.

Anticipated Course Schedule (*this will almost certainly change*)

Date	Topics	Assigned Readings
Wed. 9/7	<u>Course Orientation & Intro to R/ RStudio</u>	
Mon. 9/12	<u>Research Design & Data Analysis (EDA)</u>	Chapter 1
Wed. 9/14		
Mon. 9/19	<u>Probability</u>	Chapter 2
Wed. 9/21		
Mon. 9/26	<u>Random Variables and Distributions</u>	Chapter 3 (3.1, 3.2, & 3.4)
Wed. 9/28		
Mon. 10/3	<u>Foundations of Inference I: Estimation, Hypothesis Testing, & Power</u>	Chapter 4
Wed. 10/5		
Mon. 10/10	<u>Foundations of Inference II: Intro to the Bootstrap</u>	Posted Reading
Wed. 10/12		
Mon. 10/17	<u>Inference for Categorical Data (proportions)</u>	Chapter 6
Wed. 10/19		
Mon. 10/24	Catch up & Midterm Review	
Wed. 10/26	Midterm Exam	
Mon. 10/31	<u>Inference for Categorical Data (Chi Square)</u>	Chapter 6 Project Proposals Due
Wed. 11/2		
Mon. 11/7	<u>Correlation & Regression</u>	Chapter 7
Wed. 11/9		
Mon. 11/14	<u>Multiple Linear Regression</u>	Chapter 8
Wed. 11/16		
Mon. 11/21	<u>The Classics: review of t-tests and one-way ANOVA</u>	Chapter 5
Wed. 11/23		
Mon. 11/28	<u>Factorial & Repeated Measures ANOVAs</u>	Posted Reading
Mon. 12/5		
Wed. 12/7		
Mon. 12/12	Student Presentations	Project Reports Due
Wed. 12/14	Student Presentations & Final Review	
TBA	FINAL EXAM @ TBA Be sure to check http://finalexams.rutgers.edu/ for updates	

The schedule above is subject to change. Please check the Sakai site regularly for announcements, updates, and additional readings.