Sociology 613
Seminar in Multiple Regression and Path Analysis
(Advanced Graduate Statistics)
Fall 2019

**Professor Orestes "Pat" Hastings** (pat.hastings@colostate.edu)
Office hours: Monday/Wednesday 2-3:15pm and by appointment in Clark B248. Anytime my office door is open, you are welcome to stop by.

Lecture: Monday/Wednesday 3:30-5:15pm in Clark B252
Course Website: https://colostate.instructure.com/courses/88291

Due dates and other details of the syllabus will most likely change over the semester. Changes will be announced in class, and an updated syllabus will always be on the course website.
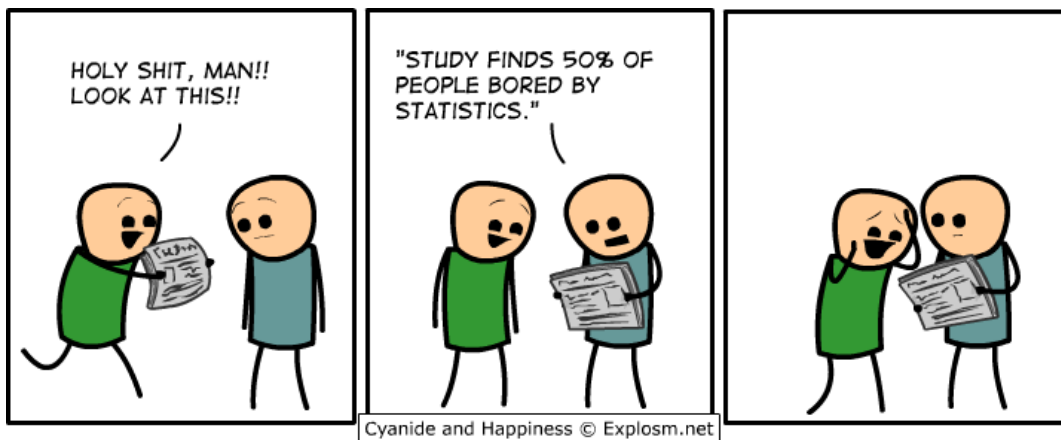
Overview
This course is designed to help graduate students advance their ability to read, evaluate, conduct, and publish sociological research using quantitative methods. We will discuss the most commonly used statistical methods and most commonly encountered statistical issues by sociologists. Specific topics will include: regression, causal inference, path analysis, mediation, moderation, model fit and selection, the general linear model, categorical models, logistic regression, missing data techniques, and methods for panel and multi-level data analysis. The main focus will be on using the methods, and less focus will be on the mathematical details. Throughout the course, students will use statistical software to put their skills into practice, and they will write a quantitative paper to answer to answer a sociologically-relevant research question.

Learning Goals
- Be able to identify the appropriate statistical methods and models given a specific type of data and research question.
- Be able to interpret the results of various statistical models and discuss their relevance for testing hypotheses, answering research questions, and evaluating competing theories.
- Gain expertise with a statistical software package to conduct statistical analyses.
- Know how to effectively read, review, and write a quantitative paper.
- Build a strong statistical foundation in order to be able to learn new advanced statistical methods as needed.

Prerequisites, or, What You Should Already Know
A prerequisite for this course is a graduate-level statistics course, such as Soc 511. You should be familiar with the basics of probability, statistical inference, significant tests, correlation, and regression, as well as the use a statistical software package. I recognize students' previous training (and retention of it) may vary widely, and we will adjust the course as necessary. If your background in statistics and methods is not very strong, you can still do very well in this course, but you should expect to put in some extra work at the beginning. If you are unsure about your preparedness for this course, talk to me.

Evaluation
Your grade will be assigned using the standard letter +/- system based on:
- Course assignments (56%)
- A Research paper (44%)

Course assignments (7 x 8% = 56%)
There will be 8 assignments, most of which will involve both paper-based and software-based components. I will drop your lowest score and your grade will be the average of the best 7 assignments. I strongly encourage you to work with other students in the class, however, you must each turn in your own assignment. Unless stated otherwise, assignments will be due in class or before class begins on the Wednesday to which they are assigned (see Course Schedule). Stata assignments should be emailed to me before class, and you should include your last name in both the file name and at the top of your do file.

Research paper (44%)
Each student will write a final paper that uses statistical methods from this course to answer a theoretically motivated research question of your choosing. The analysis you conduct should include a regression analysis (unless you discuss with me and we agree otherwise) using data that can effectively address for your research question. You will write about your findings in the form of a typical published sociology journal article. More details will be provided throughout the semester. There will be four parts to this paper to be turned in:
- draft introduction/proposal, due 10/14 (8%)
- draft of the data and methods section, due 10/28 (8%)
- draft set of tables and figures displaying the results, due 12/2 (8%)
- the final paper due, 12/18 (20%)

Textbook
There is one required book:

> Agresti, Alan. 2018. *Statistical Methods for the Social Sciences* (5th edition). Pearson (ISBN: 9780134507101)

Many students have had success buying the paperback Global International Edition, which is exactly the same, but cheaper. If you are unsure you have the right edition, just check with me. Other readings for the class will be posted on the course website.

Statistical Computing
I will teach the course using Stata (www.stata.com). Stata is flexible, powerful, relatively user-friendly, and commonly used by social scientists. It has a large and diverse user community with many user-written commands that keep Stata continually up to data with new developments. You will need to use Stata for most assignments and for your final paper. We will be doing Stata live in class, so it's in your best interest to **get a copy on your own laptop which you bring to class**. A 6-month license can be acquired for as little as $48. Stata also exists on various computer labs in the department and around the campus. If you have prior experience with R and would like to use it, talk with me.

How can I do well?
Since this is a statistics course, it will be different from the typical sociology course. Here is some advice:
- Most of the material is cumulative, so it is **absolutely essential that you keep up with the course material**. If you find yourself falling behind, ask for help!
- Being good at statistics requires thinking through how to solve problems. Statistics cannot be learned simply by reading a book or listening to a lecture. You should not expect to really understand the material until after you have completed the relevant assignments.
- Learning to do statistics and use statistical software is in many ways like learning a language. The best way to learn is to practice, over, and, over. This is why the assignments are a critical part of the course. **You should feel like you have mastered the course assignments, not simply completed them. You are strongly encouraged to do the assignments with others.**
- **Please ask questions if you do not understand something**. If it is unclear to you, it is probably unclear to other students as well. If it doesn't make sense in lecture, it will probably not make sense later when you are staring at your notes and trying to do the course assignments.

Other Important Matters
In-Class Decorum
Please come to class on time and be ready to engage the material we are covering in class. Laptops should ONLY be used for class purposes in class. Cell phones are not to be used during class. Colorado State University has stated five Principles of the Community: inclusion, integrity, respect, service and social justice (http://diversity.colostate.edu/principles-of-community/). Your conduct in this class should adhere to these to help us generate an open, tolerant, and respectful learning environment that we can all flourish in.

Office hours
I encourage you to take advantage of my office hours. I am happy to discuss the course and assignments, your research interests, or anything else you would find useful. Email me if you would like to meet and the stated times for office hours do not work for you. Or stop by if my door is open.

Academic Integrity
The course will adhere to the Academic Integrity Policy of the Colorado State University General Catalog (http://catalog.colostate.edu/general-catalog/policies/students-responsibilities/) and the Student Conduct Code (https://tilt.colostate.edu/integrity/knowTheCode/). At a minimum, violations will result in a grading penalty in this course and a report to the Office of Student Resolution Center. Do your own work. Don't cheat.

Resources for Disabled Students
If you have a diagnosed learning or physical disability, which may require special accommodations, please talk to me at the beginning of the semester. The university's Resources for Disabled Students (http://rds.colostate.edu/) can also help facilitate your individual needs. I will work with you and the RDS to make sure that any individual needs are appropriately accommodated.

Support
Any student who may be the victim of sexual harassment, sexual misconduct, relationship violence, stalking or retaliation is encouraged to report to CSU through one or more of the following resources:
• Emergency Response 911
• Deputy Title IX Coordinator/Office of Support and Safety Assessment (970) 491-1350
• Colorado State University Police Department (non-emergency) (970) 491-6425

For counseling support and assistance, please see the CSU Health Network, which includes a variety of counseling services that can be accessed at: http://health.colostate.edu/
And, the Sexual Assault Victim Assistance Team is a confidential student resource that does not have a reporting requirement and that can be of great help to students who have experienced sexual assault. The web address is http://www.wgac.colostate.edu/need-help-support.

Need Help? CSU is a community that cares for you. If you are struggling with drugs or alcohol and/or experiencing depression, anxiety, overwhelming stress or thoughts of hurting yourself or others please know there is help available. Counseling Services has trained professionals who can help. Contact 970-491-6053 or go to http://health.colostate.edu. If you are concerned about a friend or peer, tell someone by calling 970-491-1350 to discuss your concerns with a professional who can discreetly connect the distressed individual with the proper resources (http://supportandsafety.colostate.edu/tellsomeone). Rams take care of Rams. Reach out and ask for help if you or someone you know is having a difficult time.

COURSE OUTLINE

Please note, this is a tentative schedule. If (and when) there are changes to this schedule, you will receive adequate notice. All substantive topics below will be simultaneously covered in Stata. The numbers in parentheses roughly correspond to the relevant chapter of the Agresti textbook. Other readings will be assigned throughout the semester.

#	Date	Substantive topics	Due
1	9/30, 10/2	• Introduction to course • Statistics review: Sampling, distributions, descriptive vs inferential statistics, statistical significance (1-8) • Stata review: do files, basic commands, survey weights	
2	10/7, 10/9	• Linear and multiple regression basics, correlation (9-10, 11.1) • Estimation and Interpretation of Regression Models (11, 13)	Assignment 1
3	10/14, 10/16	• Causality, DAGs, Mediation, Path analysis (10) • Interaction terms, Moderation (10.3, 11.4)	Assignment 2 Paper: Intro/outline
4	10/21, 10/23	• More with variables: Standardized Coefficients, Logged variables, Polynomials (11.7, 14.5-6) • Comparing Regression Models, Model selection, Goodness of Fit statistics (11.5, 14.1)	Assignment 3
5	10/28, 10/30	• Writing the paper, showing your results • Stata programming, Making tables and figures • Replication	Assignment 4 Paper: Data & Methods
6	11/4, 11/6	• Regression assumptions and diagnostics (14.2-3) • General Linear Model, Poisson and Negative Binomial Regression (14.4)	Assignment 5
7	11/11, 11/13	• Logistic regression, ordered logit, multinomial logit (15)	Assignment 6
8	11/18, 11/20	• More on logistic regression. • Missing data issues, multiple imputation (16.1)	Assignment 7
	11/25	• FALL BREAK!	
9	12/2, 12/4	• Panel data and fixed effects models • Multi-level data, random effects, HLM (16.2)	Paper: Tables & Figures
10	12/9, 12/11	• Potential topics depending on time and interest:, Latent variables, Factor analysis, Difference-in-difference, regression discontinuity, bootstrapping, ???	Assignment 8
	12/18	Research paper due via email by midnight	Paper: Final paper