Advanced Regression Analysis
SOCI 867
Spring (Jan 18, 2022 – May 13, 2022)
Tuesday, Thursday 3:30 PM – 4:45 PM
Oldfather Hall 707
University of Nebraska-Lincoln

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Office Hours: Tuesday 1:00 PM – 2:00 PM, Wednesday 2:00 PM – 3:00 PM or by appointment
(office hours in person or via Zoom: https://unl.zoom.us/s/136239647)

Course Description
This is a graduate level course covering statistical models for limited dependent variables and their application to substantive questions in the social sciences. We will cover outcomes that are binary (smoke; not smoke), ordinal (Strongly Disagree; Disagree; Neutral; Agree; Strongly Agree), nominal (Married; Divorced; Never Married; Widowed) and count (number of children). Many of the variables that sociologists face will have one of these forms (or something similar). Unfortunately, when we have limited dependent variables, our standard OLS model is inappropriate, and can lead to incorrect inference and interpretation. This class will introduce a set of methods that are appropriate for modeling outcomes that are not continuous. Note that this class is designed to be practical. The mathematical treatment will be on the light side and we will focus on proper specification, interpretation and presentation.

Overall, there are three main objectives:
a) gain experience interpreting models appropriate for limited dependent variables
b) learn how to analyze limited dependent variables using Stata
c) apply models for limited dependent variables to a substantive case and write-up an original research project based on the results.

Prerequisites
I am assuming a working of knowledge of OLS but we will do a short review (just in case we forget something…). The class will make heavy use of Stata. I am assuming that you have had some experience with a statistical programming language (e.g., SAS), although I make no assumption that you have any experience with Stata.

Text and Software


Software: This class will use Stata. We will walk through Long and Freese, which offers detailed examples using Stata. Stata is available on the sociology cluster (soc-analyzer). You may use an alternative program (SAS, R, etc.) but the course will be conducted in Stata and you are on your own in terms of completing the homework.
**Format of the class**
The class will be a mix of lectures, discussion and labs. It is important that you read the material prior to class. You should come prepared with questions about things you are confused about. The hope is that you will understand *some* of the material beforehand, and then we can work through the more difficult parts together. The more you ask questions, the more likely you will be successful in this class. You are also expected to be an active participant during the labs, where we will learn how to apply the ideas presented in class to actual data. Note that the lectures are likely to bleed into the labs, as this is a very hands-on course, and we will learn by doing things in Stata and interpreting the results. For each major topic we will cover the following: a) the basic model and its rationale (When should we use the model? Why is it appropriate? What are the assumptions of the model?); b) how to interpret the results of the model (What do the parameters mean? How can we graphically depict the results? How can we get predicted values from the model?); c) hypothesis testing; d) diagnostic procedures (How can we test if the assumptions of the model are met? How do we know if there are model specification problems?).

You are expected to raise questions during class, talk to me during office hours, and in general, to let me know if there are any struggles with the material.

**Readings**
The main readings for each week will be a chapter in the Long and Freese book. I will also occasionally include additional readings to supplement the book. We will also go over substantive papers throughout the semester. The papers will be selected by the discussion leader for that day (see details below).

**Grading**

*General Participation (4%)*
Participation is a key requirement of this class. You need to come to class prepared, interested, and ready to discuss the material at-hand. You will be graded on general participation based on the following: did you come to class, engage in the material and ask/answer questions?

*Discussion Leader (5%)*
You will also be expected to take on a more active role in the class for a few days during the semester. For each major topic in the class (e.g., binary outcomes, ordinal outcomes, etc.) we will discuss empirical papers that employ the model in question. This will give us an opportunity to see how these models were used in published papers, examining exemplars of analysis and interpretation. We will discuss one or two empirical papers per major topic. Each student in the class will act as a discussion leader for one empirical paper. The discussion leader will choose for the class the paper they would like to discuss. The paper **must** employ the model/variable type that we are discussing that day. The discussion leader will choose the paper of interest and send it to everyone to read for that day (at least a day before class). Students are free to pick any paper they like, but are encouraged to pick an article in a ‘top’ sociology journal (either general or subfield). Students will have their day assigned early in the semester and this cannot be
changed later on unless there are extenuating circumstances. Each discussion leader should prepare for a 10 minute discussion about the paper, where the discussion leader should:

a) describe the model employed
b) examine the interpretation and presentation of the results (did they do a good job?; would you have done anything different?)

We will then open it up for a general discussion about the article. Note the emphasis is on the model and results here, rather than a description of theory, background, etc.

Class Presentation (15%)
Each student will also give a final presentation of their project at the end of class. Each student is expected to give a formal 15 minute presentation (plus answering questions). This will give an opportunity to present an early version of your work in a forgiving environment. Think of this as good practice for the real thing.

Homework: 36%
We will have 6 homework assignments during the class. The homework is designed to get you practice at working through Stata to answer substantive questions. You will have one week to complete each assignment. You will lose 10% of the grade for each day late. You will be graded based on completeness and general accuracy. Homework that are incomplete and/or show a lack of understanding will get lower marks. Note that you must complete these assignments on your own, as I need to gauge whether each student is grasping the material.

Project: 40% Total (30% for actual research paper; 10% for initial submission of proposal and pieces of project)
The main assignment in the course is a research paper, in which you perform an empirical analysis on real data and write up the results. You must employ (at least) one of the methods from this course in your paper. To be clear, it is insufficient to reuse a paper from another course that utilizes OLS to analyze a continuous variable. Your outcome of interest must be binary, nominal, count, ordinal, etc. The research paper must include: a short introduction with a substantive justification for the project; a description of the data and models; tables/figures describing the results; a summary of results; and a conclusion. You must also include your Stata syntax used to complete the project. Note that the paper does not require a lit review or theory section. I want you to focus on the data, methods, and results sections. The hope is that this will be a start to a publishable paper.

I leave it you to decide what question you want to answer, what data you would like to use, etc., but you must get my approval for the project before you begin. I can also help you find data and a research question if you are struggling on your own. One strong constraint you will face during this class is time. It is not a good idea to leave the project to the very last minute, hoping to get it all done in a mad rush. You should be working on the project throughout the entire semester. This means that you cannot pick a dataset that will only be available late in the semester (or even worse, after the semester is over). You need to plan ahead and make sure the data is available early enough to make the project feasible. With this in mind, you should have a usable dataset by
mid February. Note that you need to have descriptive statistics by Mar 1. You need to pick a different project if that is not possible.

You will be required to turn in initial results and pieces of the project as the semester moves along. This is designed to ensure that you are making sufficient progress. I am also requiring that you meet with me two times during the semester. This will ensure that you are making proper progress and that I am up to date on where the paper stands. It also gives me an opportunity to give you feedback face-to-face.

**Key Dates for Project**

Feb 17: Deadline for getting my approval for your proposed research project. This includes the core research question and the data you will use. After this date, I will take 1% off your final grade every day until you discuss your proposed project with me.

Mar 1: Descriptive statistics on key variables due

Mar 24: Draft of Introduction and Data Section

April 7: Deadline for meeting with me (a second time) to give an update of the project and to get feedback on initial drafts. After this date, I will take 1% off your final grade every day until you discuss your project with me.

April 19: Tables and figures showing results (must use a model discussed in this class)

May 3, 5: In-Class Presentation

May 10 at 10:30 PM: Final Paper Due.

**Course policies**

**Academic Misconduct (or Don’t Cheat):**

“The Student Code of Conduct applies in its entirety. It addresses various aspects of student conduct in- and outside the classroom. Academic honesty is essential to the existence and integrity of an academic institution. The responsibility for maintaining that integrity is shared by all members of the academic community. The University's Student Code of Conduct addresses academic dishonesty. Students who commit acts of academic dishonesty are subject to disciplinary action and are granted due process and the right to appeal any decision. Please visit [http://stuafs.unl.edu/ja/code/three.shtml](http://stuafs.unl.edu/ja/code/three.shtml), paying close attention to section 4.2. For additional information about plagiarism as a form of academic dishonesty subject to university regulations and the UNL Student Code of Conduct, please visit [http://www.unl.edu/gradstudies/current/integrity#plagiarism](http://www.unl.edu/gradstudies/current/integrity#plagiarism).”

**Services for Students with Disabilities**

“The University strives to make all learning experiences as accessible as possible. If you anticipate or experience barriers based on your disability (including mental health, chronic or
temporary medical conditions), please let me know immediately so that we can discuss options privately. To establish reasonable accommodations, I may request that you register with Services for Students with Disabilities (SSD). If you are eligible for services and register with their office, make arrangements with me as soon as possible to discuss your accommodations so they can be implemented in a timely manner. SSD contact information: 232 Canfield Admin. Bldg.; 402-472-3787."

If you need accommodations it is your responsibility to discuss this with me early on in the semester.

**Paper Policy**
The final paper must be turned in by May 10th at 10:30 PM. There will be no papers accepted after the fact unless there are extraordinary circumstances and the student has received permission from me to turn in the exam late. The final paper must be turned in via Canvas.

**Instructional Continuity**
If in-person classes are canceled, you will be notified of the instructional continuity plan for this class by Canvas.

**Course Schedule (subject to change depending on how quickly we move through the material and other extenuating circumstances)**

**Day 1: Introduction to the Class (T, Jan 18)**

**Day 2: OLS Review (Th, Jan 20)**
*Required Readings*
1. Chapter 7 in OpenIntro Textbook: Introduction to Linear Regression and Multiple Regression

**Day 3: OLS Review Continued (T, Jan 25)**
*Required Readings*
1. Part of Chapter 8 in OpenIntro Textbook: Multiple Regression

**Day 4: Stata Introduction (Th, Jan 27)**
*Required Readings*
1. Chapter 1 in Long and Freese

**Day 5: Stata Continued (T, Feb 1)**
*Required Readings*
1. Chapter 2 in Long and Freese

**Day 6: OLS in Stata (Th, Feb 3)**
*Required Readings*
Day 7: Binary Outcomes (T, Feb 8)

Required Readings

Day 8: Binary Outcomes Continued (Th, Feb 10)

*Assignment: HW 1 due

Required Readings
1. Chapter 5 in Long and Freese

Day 9: Binary Outcomes Continued (T, Feb 15)

Required Readings
1. Chapter 3-4 in Long and Freese

Day 10: Binary Outcomes: Prediction and Presentation (Th, Feb 17)

*Project due date: Deadline for getting my approval for your proposed research project

*Assignment: Discussion Leader #1 for binary outcomes

Required Readings
1. Chapter 6 in Long and Freese
2. Selected Article

Day 11: Binary Outcomes: Prediction and Presentation (T, Feb 22)

*Assignment: Discussion Leader #2 for binary outcomes

Required Readings
1. Chapter 6 in Long and Freese
2. Selected Article

Day 12: Binary Outcomes: Prediction and Presentation (Th, Feb 24)

*Assignment: HW 2 due

Required Readings

Day 13: Binary Outcomes: Advanced Topics (T, Mar 1)

*Project due date: Descriptive statistics on key variables due

Required Readings

Day 14: Binary Outcomes: Advanced Topics (Th, Mar 3)

Required Readings
Day 15: Ordinal Outcomes (T, Mar 8)

*Required Readings*


Day 16: Ordinal Outcomes (Th, Mar 10)

*Assignment: HW 3 due*

*Required Readings*

1. Chapter 7 in Long and Freese

Day 17: Spring Break (T, Mar 15)

Day 18: Spring Break (Th, Mar 17)

Day 19: Ordinal Outcomes (T, Mar 22)

*Assignment: Discussion Leader #1 for ordinal outcomes*

*Required Readings*

1. Selected Articles

Day 20: Ordinal Outcomes (Th, Mar 24)

*Project due date: Draft of introduction and data section*

*Required Readings*

1. Selected Articles

Day 21: Nominal Outcomes (T, Mar 29)

*Required Readings*

1. Chapter 8 in Long and Freese

Day 22: Nominal Outcomes (Th, Mar 31)

*Assignment: HW 4 due*

*Required Readings*

1. Chapter 8 in Long and Freese

Day 23: Nominal Outcomes (T, Apr 5)

*Assignment: Discussion Leader #1 for nominal outcomes*

Day 24: Nominal Outcomes (Th, Apr 7)

*Project due date: Deadline for meeting with me to give an update of the project*

*Assignment: Discussion Leader #2 for nominal outcomes*

*Required Readings*

Day 25: Count Models (T, Apr 12)

*Required Readings*

**Day 26:** Catch up day (if needed) (Th, Apr 14)
*Assignment: HW 5 due

**Day 27:** Count Models (T, Apr 19)
*Project due date: Tables and figures showing results

*Required Readings*
1. Chapter 9 in Long and Freese

**Day 28:** Count Models (Th, Apr 21)
*Assignment: Discussion Leader #1 for count outcomes

*Required Readings*
1. Selected Article

**Day 29:** Count Models (T, Apr 26)

**Day 30:** Catch up day (if needed) (Th, Apr 28)
*Assignment: HW 6 due

**Day 31:** In Class Presentations (T, May 3)

**Day 32:** In Class Presentations (Th, May 5)

May 10: Final Paper due at 10:30 PM (official exam data is May 9 but I am giving everyone another day)