HPM 883
ANALYSIS OF CATEGORICAL DATA
(Credit Hours: 3)
Department of Health Policy and Management
School of Public Health

Spring 2019 Syllabus
Class Location: McGavran-Greenberg 2308
Meeting Times: MW 11:15-1:10**

Faculty:	**Marisa E. Domino, Ph.D.**	TA:	Rebecca Whitaker
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** course time is split among required class time (11:15-12:30) and the homework review session (12:30-1:10).

Course Overview

This course is an introduction to the analysis of categorical data using generalized linear models and maximum likelihood estimation (MLE). We will study statistical models in which the dependent variable is not continuous, including binary logit and probit models, multinomial logit, ordered logit and probit, tobit, two-part, and count models. This course examines how to choose the appropriate model, check the model specification, and interpret and present the results. We will use Stata software in the course for examples and assignments.

Learning Objectives and HPM Competencies

	Course Learning Objective	*Competencies*
1	**To estimate and interpret logit, probit, and other categorical data models**	• Select appropriate research designs and methodologies (quantitative and qualitative) for health services/health policy research
2	**To build appropriate models in an Maximum Likelihood, GLM or GEE framework**	
3	**To conduct and interpret specification tests**	• Understand and appropriately apply analytical strategies used in health

4	**To conduct original research using MLE, including being able to describe a data set, application of an MLE model, and the coherent, concise description of the results**	services/health policy research • Develop policy relevant hypotheses that fill a gap in the field that can be tested in a research project

Resources

Website

HPM 883 has its own website using Sakai software. (See http://sakai.unc.edu.) This syllabus is on the website.

Be sure to check that the email address Sakai has for you is correct. Click on the "My Workspace" tab in Sakai and then click on "Profile." If you need to change your email address, click on "Edit" under "Contact Information" and follow the directions. Note that you may need to change your email address in both Sakai and the On-Line Campus Directory.

Text

The course text is *Microeconometrics Using Stata, Revised Edition* by A. Colin Cameron and Pravin K. Trivedi (2010). This text and this course focus on applications of maximum likelihood techniques and therefore do not incorporate a rigorous theoretical presentation. I urge you to have as a reference an advanced econometrics or statistics book. Some possibilities are:
- Cameron, A.C. and P.K. Trivedi. 2005. *Microeconometrics: Methods and Applications*. New York: Cambridge University Press.
- Greene, W.H. Econometric Analysis. New Jersey: Prentice-Hall.
- Gujarati, D.N. 1995. Basic Econometrics. Third edition. New York: McGraw-Hill, Inc.
- Kennedy, P. A Guide to Econometrics. Cambridge: MIT Press.
- Wooldridge, J. Introductory Econometrics: A Modern Approach. New York: South-Western College Publishing.
- Wooldridge, J. 2002. Econometric Analysis of Cross Section and Panel Data. New York: Cambridge, MA: MIT Press.

Health Econometrics Using Stata by Deb, Norton, and Manning (2017) is also a useful resource.

For most units, **a Unit Guide** will be posted on Sakai. This guide will give you tips about the required reading, in terms of which sections to focus on, which to skip, and notes about particularly challenging sections. If no Unit Guide is posted, that indicates that all sections of the chapter should be read.

Additional readings from recent journal articles will be required for the course. I will provide you the citation for these readings and whenever possible will use readings available electronically.

As with previous HPM Methods courses (881-882), students should make sure they have access to the most recent copy of Stata. Manuals are available on line.

• **StataCorp. Stata Statistical Software: Release 15. College Station, TX: StataCorp LP.**

Stata 11-14 may be acceptable alternatives, although there are a few commands we will use that ma have appeared in versions after Stata 11. To the extent possible, I will give examples of both old and new syntax, when that has changed. Versions of Stata prior to Stata 11 do not use the same commands for calculating marginal effects and thus are not sufficient for this course. The virtual lab has Stata available for free to university affiliates but many students complain that this is not a reliable option, especially when accessing it from off-campus.

Web Sources

Among the many useful websites is that of the Medical Expenditure Panel Survey (MEPS) which may be used for class activities, assignments, and exams. This data is available for free from the Agency for Healthcare Research and Quality (AHRQ) through their web site (www.meps.ahrq.gov). The MEPS is a very comprehensive (and somewhat complicated) dataset which may be useful to students as they write papers even beyond this class. Because 881 is a pre-requisite for 883, I will assume students in 883 are familiar with the MEPS data.

Requirements and Expectations

Prerequisites:
HPM 881 and HPM 882 or equivalent graduate level courses are pre-requisites to HPM 883. It is the student's responsibility to know all the material from HPM881-882 if other acceptable pre-requisites have been taken, not every approved substitute has 100% overlap with these courses. Students who have not taken both HPM 881 and 882 must get the instructor's permission to take 883 and must agree to review topics from these two courses that may not have been covered in their substitute courses. Students must also have a solid foundation in Stata to take this course.

Weekly Assignments:

Readings should generally be completed **before** the class for which they are assigned.

- Unless otherwise indicated, assignments for the class are due on Wednesdays by the beginning of class. Assignments can be uploaded on Sakai but paper versions will also be accepted.

I reserve the right to select only a subset of questions from each problem set for grading, especially if a full-time TA is not available for this course. Questions on weekly assignments will be graded on a two-point scale:

2 = perfect answer

0 = incorrect or mostly incorrect
1 = somewhere in between

Although this system often seems to penalize partially correct answers unjustly, it saves scarce TA time and tends to work out well in the long run. The lowest score on a problem set (aside from the peer review) will be dropped from the final HW score.

Late Assignment Policy

Assignments and papers are due at the beginning of class on the relevant date. Late assignments will not be accepted, except in extreme circumstances with the approval of the instructor.

Course Format

This course combines lectures with team assignments. Team-based exercises will be conducted during the class period and do not require teams to meet outside of class time. Teams will be formed on the first day of class. Team assignments may be both *critical*, in terms of analyzing manuscripts, and *constructive*, in terms of developing estimates. Some team assignments may build on homework questions. Both team assignments and individual homework assignments are intended to give students further practice applying the course materials and experience working in a research team. Team participation will be evaluated by other team members and will constitute a small fraction of the final grade.

Weekly Problem Sessions

There will be a weekly problem session in which the teaching assistant will go over the assignments turned in during the prior week. This time will also be used for tutorials on topics that may need extra attention. Students should plan to be available during the scheduled problem session time. Students who scored lower than 80% on the prior HW assignment as well as those who could benefit from extra review should plan to attend the problem sessions. All students should be available during the problem session time, since it is during the scheduled time period for this course. This time slot may be used to make up any canceled classes due to weather events.

Evaluation Methods: *Grade Components*

The course grade will be a weighted average of performance in four areas: homework assignments, a midterm exam, a final exam, and an empirical paper. Homework assignments will include a mix of problems and Stata assignments. The empirical paper allows the students to demonstrate the skills learned throughout the semester. Students should start looking *now* for an interesting empirical question to answer and a data set that can be used to answer that question (the MEPS is strongly encouraged for this purpose). The course paper is a great opportunity for students to explore a data set or research question related to a potential dissertation topic. Many students in HPM 883 have gone on to publish their course papers. In addition, there will be a randomly assigned blind peer review of one of your colleague's empirical papers, which will carry the same weight as a homework assignment.

Grading:	Homework Assignments	20%
	Midterm exam	22.5%
	Final exam	22.5%
	Empirical paper	30%

Team Assignments   5%

Final grades: H 90% or higher
                P 70-90%
                L 60-70%
                F <60%

1. Exams

This course will have a midterm and a final exam, both of which will be taken individually (not in teams). The midterm will be scheduled during class time before spring break. The final exam will be cumulative. The final will occur during the scheduled time on the University's final exam schedule. Please make sure you know the dates of these exams; alternate dates will only be scheduled in cases of serious illness.

2. Homework problems

Homework assignments will be approximately weekly, with at least one assignment for most units of the course. Many homework questions are designed to have multiple correct answers. Answers to homework problems will be reviewed in the problem sessions and will not be posted.

Homework assignments should be submitted in Word format if at all possible, to facilitate comments by the TA and instructor. Sections of the Stata log should be included for many of the applied questions. Because Stata output is easiest to read in proportional fonts (such as Courier New), students should cut and paste from the Stata log into a Word document, then highlight the pasted section and change the font to Courier New (8 point may help shrink to fit to the word page limits, but decreasing the margins in Word to 0.5" may also help). Turning in the Stata do or log file is usually not appropriate as it does not provide the output or sufficient detail to answer most of the homework questions.

3. Empirical paper

Each student will write an empirical paper that will use at least one of the maximum likelihood techniques learned during the semester. Students should start looking *now* for an interesting empirical question to answer and a data set that can be used to answer that question (the MEPS is strongly encouraged for this purpose, but other data sources are allowed). Students have the responsibility to ensure that their paper and data are covered by the IRB. Further detail is provided below.

Each student is required to prepare a description of their proposed paper topic prior spring break. Each paper proposal should consist of a short document, which provides information on (1) the paper title and research question; (2) the conceptual model (briefly); (3) the data and sample to be used; (4) the dependent variable and type of model to be estimated; (5) the key independent variable and other important control variables.

Tentative: There are two sets of due dates on the course schedule. Students planning to write a paper based on a binary model should follow the Paper I proposal/paper due dates. Students planning to write a paper on any subsequent model should follow the Paper II proposal/paper due dates. There are at least two benefits to writing a paper on the Paper I due dates. First, you will have completed a major course deliverable before spring break, freeing up your time in the second half of the semester for studying for the final, comps, or other course deliverables. Second, I will allow students who received a paper grade of

less than 80% to turn in a revised version of their paper (using track changes in Word, so that I can focus on the new material) on the Paper II due date. The final grade for the paper will be the average of the two scores (e.g., a paper that receives a 70% for the initial submission and a 90% for the final submission will receive an 80% for the final paper grade). The option of submitting a revised paper will *not* be available to those who follow the Paper II due dates. Students have the option of which due dates to follow, but those who do not meet the Paper I proposal due date cannot turn in a paper on the Paper I due date.

After papers are completed, each student will be a randomly assigned to conduct a blind peer review of one of their colleague's empirical papers. The benefit of this peer review is two-fold: to provide a second set of comments to the paper author, and to give students a chance to show-off their skills in critically reviewing a paper using course techniques that may or may not be in their field. This peer review will be given the same weight as an individual homework assignment. Students will be assigned a paper to peer review based on the set of papers turned in for the same set of dates (i.e., students who turn in a paper on the Paper I date will receive another paper submitted at the same date).

4. Team Assignments

Team assignments are designed to provide an opportunity for students to practice the skills they have learned in the readings. Team assignments are intended to be completed *during* class; teams are not expected, and are strongly discouraged, to meet outside of class time.

Team Assignments will include a mix of written problems and computer assignments. Most team assignments will require minimal write-up by team members. The results of team assignments will be discussed in class and many activities will ask teams to comment on the results of other teams' work. To the extent that team assignments are not completed in a single class session, team members should not discuss assignment with members of other teams outside of class.

Cell Phones and Laptops

Turn off cell phones in class. Laptops may be used in class and for team assignments but not during exams. Please be considerate when using laptops, typing can be quite noisy and distracting to others in the classroom. Be ware of the temptation to jump into email, social media, and other distractions when a laptop or tablet is open, and consider taking notes on paper or with Wi-Fi off if this is a problem for you.
Communicating with your Professor and TA

Office hours are by far the best way to communicate with your course instructor and TA. We schedule this time to be free from other distractions and are available and ready to help with whatever questions or concerns you have about the class or material. Office hours are an under-used resource! Please visit us early in the semester, don't want until after the mid-term to start coming to office hours. These are available on a first-come-first-serve basis, no appointment necessary. If at all possible, you may want to hold office hour times on your schedule to prevent conflicts. Communicating by email is an acceptable alternative if you don't need an immediate response, and your question or comment can be addressed in a few lines of text. More difficult or lengthy questions should be discussed during office hours or in class. *Please allow us at least a full business day to respond to your email.*

Ethics Certification and IRB approval

Your paper for this course *may* require IRB review. Please read the IRB document on Student papers

carefully: http://research.unc.edu/files/2012/11/ccm3_036121.doc.

Your status may depend on whether you plan to use your course paper as an opportunity to conduct research which contributes to the knowledge base in health policy or services research and thus may seek out opportunities to publish your paper. It is up to each student to determine his or her status and act accordingly. Note that receiving IRB approval may take some time, so students should start this process several weeks before the research has actually begun. In order to submit to the IRB, you must have received an ethics certificate after successfully completing the CITI module. If you have not done so, please start this process immediately.

UNC Honor Code

The principles of academic honesty, integrity, and responsible citizenship govern the performance of all academic work and student conduct at the University as they have during the long life of this institution. Your acceptance of enrollment in the University presupposes a commitment to the principles embodied in the Code of Student Conduct and a respect for this most significant Carolina tradition. Your reward is in the practice of these principles.

Your participation in this course comes with the expectation that your work will be completed in full observance of the Honor Code. Academic dishonesty in any form is unacceptable, because any breach in academic integrity, however small, strikes destructively at the University's life and work.

If you have any questions about your responsibility or the responsibility of faculty members under the Honor Code, please consult with someone in either the Office of the Student Attorney General (966-4084) or the Office of the Dean of Students (966-4042).

Specific honor code guidelines for HPM 883 are as follows:

Students are allowed and encouraged to collaborate on class assignments unless instructed otherwise. Students should **not** consult any available homework answers from prior years, as some of the homework problems may remain the same from year to year. Students may work together **before** they begin the write-up of their homework assignments, but written homework answers **should not be shared** before grading is complete.

To emphasize the importance of integrity and intellectual property in the profession, you are required on each assignment to list those individuals with whom you collaborated, and attribute from whom you have borrowed any specific ideas (such as the approach used to solve a homework problem). Students are also reminded that they must at all times abide by the UNC Code of Student Conduct.

Exams from prior years without answer keys will be made available to use as practice exams. Students are welcome and encouraged to review their answers to practice exams with other members of the class at any time.

Course Evaluation

The Department of Health Policy and Management is participating in the Carolina Course Evaluation System (CES), the university's online course evaluation tool, enabled at the end of each semester. Your responses will be anonymous, with feedback provided in the aggregate; open-ended comments will be shared with instructors, but not identified with individual students. Your participation in CES is a course requirement, as providing constructive feedback is a professional expectation. Such feedback is critical to improving the quality of our courses, as well as providing input to the assessment of your instructors.

Valuing, Recognizing, and Encouraging Diversity

Promoting and valuing diversity in the classroom enriches learning and broadens everyone's perspectives. Inclusion and tolerance can lead to respect for others and their opinions and is critical to maximizing the learning that we expect in this program. This may challenge our own closely held ideas and personal comfort zones. The results, however, create a sense of community and promote excellence in the learning environment.

Diversity includes consideration of (1) the variety of life experiences others have had, and (2) factors related to "diversity of presence," including, *among others*, age, economic circumstances, ethnic identification, disability, gender, geographic origin, race, religion, sexual orientation, social position.

This class will follow principles of inclusion, respect, tolerance, and acceptance that support the values of diversity.

Disability Accommodation

UNC-CH supports all reasonable accommodations, including resources and services, for students with disabilities, chronic medical conditions, a temporary disability, or a pregnancy complication resulting in difficulties with accessing learning opportunities.
All accommodations are coordinated through the UNC Office of Accessibility Resources & Services (ARS), http://accessibility.unc.edu; phone 919-962-8300, email accessibility@unc.edu. Students must document/register their need for accommodations with ARS before accommodations can be implemented.