PBAF 529: Advanced Multivariate Analysis

Prof. Mark Long
209E Parrington Hall
Tel: (206) 543-3787 (email is a much better method to contact me).
E-mail: marklong@uw.edu
Class meets: Tuesday & Thursday, 3:30-4:50 in Mary Gates Hall 254
Office Hours: Monday 3:30-5 PM and by appointment.

Course Website: None. All materials will be emailed to you using the following course listserv: pbaf529a_au15@uw.edu. You are expected to check email daily and save course materials that are sent to you.

Course Description and Objectives
This elective course follows the two-course sequence required of Evans School MPA students (i.e., PBAF 527 & 528). This course prepares students for more advanced work with multivariate methods especially in understanding program evaluation and policy analysis. Students will: learn to use resources to teach yourself and peers about data and analysis; develop skills in assessing data qualities, research design, and appropriate application of multivariate analyses; and learn how to the use advanced multivariate methods for program evaluation and policy analysis.

Readings
All readings are listed below in the syllabus. There is no required textbook, but the following books may be helpful:
- Cameron and Trivedi, *Microeconometrics: Methods and Applications*
- Cameron and Trivedi, *Microeconometrics Using Stata*
- Angrist and Pischke, *Mostly Harmless Econometrics*
- Long, *Regression Models for Categorical and Limited Dependent Variables*
- Long & Freese, *Regression Models for Categorical Dependent Variables Using Stata*
- Studenmund, *Using Econometrics: A Practical Guide*

Software
We will use Stata for this course, which I will teach you how to use. Stata is available on the CSDE and Evans School servers. If you are interested in buying your own copy of STATA, individual student licenses for Stata/IC 14 cost $75 for 6 month or $198 for a perpetual license: [http://www.stata.com/order/new/edu/gradplan.html](http://www.stata.com/order/new/edu/gradplan.html).

Excel may also be useful for some of the assignments and for data manipulation.
**Grading and Requirements**

The course requirements include four homework sets, one in-class exam, and an independent research project which you will present to the class twice and write a short paper. The purpose of the in-class exam is to help diagnose your progress in learning the mechanics and interpretation of advanced methods. [*The in-class exam will be closed book, but you will be allowed to use 2 pages (4 sides) of notes.*]

Homework Assignments (on time and complete for full credit) 20% of final grade  
In-class Exam (November 12) 30% of final grade  
Presentation of Methods and Data (Nov 17, 19, or 24) 10% of final grade  
Presentation of Results (December 1, 3, 8, or 10) 10% of final grade  
Written Report (due December 15 at Midnight) 30% of final grade

**Course Policy on Missed or Late Assignments**

Answer keys for the problem sets will be distributed the day the assignments are due. If you will miss the class, make sure to email me your answers or leave your answers in my mailbox (208 Parrington) BEFORE class and email me, so that I know to pick it up. Answers received after class will not be reviewed or receive credit. If you cannot hand in the homework on time, I recommend that you complete it anyway so that you learn the material.

If an emergency prevents you from taking the exam, you must contact me by phone or by email and provide documentation. Generally an “emergency” means sickness or injury and does not mean a work commitment. If you know now that you cannot take the exam in-class on November 12th, talk with me now (i.e., on the first day of class).

**Tips to Do Well in Class**

- **Do the reading before you come to class.** Hearing the material after having read it will help things make sense to you. I plan class exercises and lecture with the assumption that you’ve done the reading.
- **Come with questions** to class. If you do not understand something, ask questions about it in class. Usually, you are not the only one who has the same question.
- **Attend class regularly** and keep up with your assignments.
- A good way of learning statistics is to **discuss the material with someone else**. To that end, I recommend you form a study group with whom you work on problem sets. Set a time regular time to meet. Ask questions among yourselves. Seeing material from the perspectives of others will help you better to formulate your understanding of the material. You should hand in your own work after having reviewed your responses to the problems with your group.
Schedule

October 1/6/8: Limited Dependent Variable Models
• Maximum likelihood Estimation
• Logit/Probit, Multinomial Logit, Conditional Logit, and Alternative-Specific Conditional Logit, and Ordered Logit/Probit.
• Count models
• Readings:
  o Cameron and Trivedi, Chapter 15, Sections 15.1-15.5 and 15.9. This reading will be emailed to you.
  o Stata Manual: mlogit, clogit, asclogit, ologit, poisson, nbreg

October 13/15: Multi-Level Data and Panel Data
• Note: I will have regular office on Monday October 12, 3:30-5 AND I will have extra office hours Friday, October 16th, 3:30-5.
• HW1 Due Tuesday
• How multi-level models relate to models with random and fixed effects, and how to choose among them
• Readings:
  o Mark C. Long (Forthcoming). Generating Hypotheses and Upper Bound Effect Sizes Using a Large Number of School Characteristics and Student Outcomes, Journal of Research on Educational Effectiveness. Read Section 2.1. This reading will be emailed to you.
  o Stata Manual: xt, xtsset, xttreg, me, and mixed (p. 1-16)

October 20/22: Multiple Imputation for Missing Data
• Note: I will not have regular office hours on Monday October 19 – rather, I will have extra office hours Friday, October 16th, 3:30-5.
• HW2 Due Tuesday
• Readings:
  o Read this FAQ page: http://www.stat.psu.edu/~jls/miaq.html
• Stata Manual: intro substantive, intro, mi set, mi impute, mi estimate
• http://www.ats.ucla.edu/stat/stata/seminars/missing_data/mi_in_stata_pt1.htm
• http://www.ats.ucla.edu/stat/stata/seminars/missing_data/mi_in_stata_pt2.htm

October 27/29: Program Evaluation Methods 1
• HW3 Due Tuesday
• Instrumental Variables
• Regression Discontinuity
• Readings:
  • Mark C. Long and Jordan Rooklyn, “Next: An Improved Method for Identifying Impacts in Regression Discontinuity Designs”, Working paper. This reading will be emailed to you.

November 3/5: Program Evaluation Methods 2
• HW4 Due Tuesday
• Difference-in-differences, Synthetic control
• Propensity Score Matching
• Readings:
  • Heinrich, Carolyn; Maffioli, Alessandro; Vázquez, Gonzalo (2010). A Primer for Applying Propensity-Score Matching.
November 10/12: Review and Exam
- Tuesday – Saturday this week, I will be at the APPAM conference in Miami, FL.
- Tuesday: Review Class
- Thursday: In-Class Exam

November 17/19/24: Presentations of Proposed Data and Methods
- Prepare a 5 minute presentation of research question(s), description of proposed method of analysis, and proposed data. The intent of this presentation is to get feedback on your proposal before you run regressions.

December 1/3/8/10: Presentations of Results
- Prepare a 7 minute presentation that focuses on results (but that also reminds us of your research question(s), method of analysis, and data). The intent of this presentation is to get feedback on your results after you run regressions, but before you finish writing your report.

December 15: Written reports are due at midnight.
- Each day late will receive a 0.2 point deduction (e.g., 5 days late would reduce your grade from a perfect 4.0 to a 3.0, or from a 3.4 to 2.4, etc.).
- Reports should be no longer than 4 written pages (single-spaced, 12 point font for text and footnotes). Pages for tables, figures, and references should be appended after the 4 pages of text.
- Reports should include: research question(s), description of method of analysis, description of data and descriptive statistics, and discussion of results.