## *PBAF 528b: Quantitative Methods II*

Thursday 9:30 to 12:20

108 Parrington Hall

#### Prof. Laura Evans

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Office Hours: Wednesday 9:30-11:30 and by appointment.

220 Parrington Hall

**Teaching Assistant: Ryan Bodanyi**

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Office Hours: Thursday 1-3 and by appointment.

411 Parrington Hall

Quiz Sections: Tuesday 9:30-10:20 or Tuesday 10:30- 11:20 in 108 Parrington Hall

Quiz section attendance is as important as attending lecture. In lecture, I will assume you are attending quiz section. Lectures will include content that will be harder to understand if you do not attend quiz section.

Course Website: https://catalyst.uw.edu/workspace/rbodanyi/29523/

**Course Description and Objectives**

This course is the second in a two-course sequence aimed at helping Evans School MPA students become informed users and critical consumers of research and statistical analyses. This course introduces the application of probability, hypothesis testing, and confidence intervals to multivariate models in the context of policy and management research. We strive to isolate and measure the effects of one factor (an independent variable – often the introduction of a policy) on an outcome (a dependent variable) while controlling any other factors. We begin with the linear regression model in its basic form and move on to modeling techniques. Along the way we will consider some of the limitations and potential problems associated with using regression models and alternative models. Students will develop a first-hand appreciation of these topics through in-class exercises and homework problems.

By the end of this course, you will:

* Understand how complex policy analysis can be conducted using multivariate regression analysis.
* Be aware of the conditions necessary to establish causal relationships on a given outcome, emphasizing the need to disentangle the effects of multiple factors.
* Select appropriate univariate, bivariate, or multivariate analytic techniques to answer a given policy or management question.
* Understand the mechanics, assumptions, and interpretation of regression models to policy or management questions, how to use regression models for both prediction and hypothesis testing, and the assumptions behind and possible "fixes" for problems with models.
* Learn how to read and analyze empirical studies
* Produce a useful multivariate empirical analysis for a non-statistician, including clear data presentation and the graphical display of data.
* Recognize how policy analysis, program evaluation, and performance measurement employ research methods and statistical techniques.
* Be exposed to nonlinear models and understand their purposes.

### **Readings**

Required Textbook:

Using Econometrics: A Practical Guide, by A.H. Studenmund, 6th Edition, Addison Wesley, 2011.

Other required readings will be available on electronic reserve.

The textbook is available at the University Bookstore for a reduced price.

### **Software**

Students in this course can use any statistical software that they choose. We will provide support for both STATA and SPSS. I use STATA in my own work, so I am far more familiar with its functions. I think it strikes a good balance between a format that is user-friendly and a format where you can be in the driver’s seat: having more options for manipulating data and running regressions, which can be useful for more extensive research projects.

If you are interested in buying your own copy of STATA, there is a discount for individual student licenses: <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 six homework sets, one in-class exam, one memo, and a final data analysis exam. The purpose of the first exam is to help diagnose your progress in learning the mechanics and interpretation of regression. The memo and the data analysis exam allows you to consolidate your learning about regression models, apply what you are learning to a policy context, and learn to communicate your results to a nontechnical audience.

Homework assignments are not graded. Rather, you will receive credit based on whether the homework is complete and submitted on time. Homework is due at the beginning of class.

Homework assignments (on time and complete for credit) 10% of final grade

In-Class Exam (April 26) 30% of final grade

Memo (May 24) 30% of final grade

Data Analysis Exam (take home, due June 5) 30% of final grade

##### Course Policy on Missed or Late Assignments

Answer keys for the problem sets will be available online after the assignments are due. If you will miss the class, make sure to leave your answers in my mailbox (208 Parrington) *before* class. Answers received during or 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 *before* the class.

**Some tips:**

* Do the readings beforeyou 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 to class and review section with questions. If you feel you do not understand something, ask questions in class or in the review session. Usually, you are not the only one who has a particular question.
* Attend class and review section 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 and work on problem sets together. Set a time to meet regularly. Seeing material from the perspectives of others will help you to better understand the material. You should hand in your own work after having reviewed your responses to the problems with your group.

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| **Month** | **Date** | **Topic** | **Reading** | **Due** |
| March | 29 | Introduction to Regression Analysis | Studenmund Ch. 1-2 |  |
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| April | 5 | Using Regression Analysis and Hypothesis Testing | Studenmund Ch. 3-5 | HW1 |
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| April | 12 | Multivariate Regression | Studenmund Ch. 6 | HW2 |
|  |  |  |  |  |
| April | 19 | Multivariate Regression (cont.) and review for Exam 1 |  | HW3 |
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| April | 26 | In-Class Exam |  |  |
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| May | 3 | Specification: Choosing a Functional Form | Studenmund Ch. 7 |  |
|  |  |  |  | HW4 |
| May | 10 | Multicollinearity, Serial Correlation, and Heteroskedasticity | Studenmund Ch. 8-10 |  |
|  |  |  |  | HW5 |
| May | 17 | Dummy Dependent Variables and Fixed Effects Models | Studenmund Ch. 13, 16.2 |  |
|  |  |  |  | HW6 |
| May | 24 | Research Design |  |  |
|  |  |  | Babbie (2001) pp.89-99; Berman (2002) Chapter 1; Ringquist (2005) | Memo |
| May | 31 | Multivariate Research Project and review | Studenmund Ch. 11.1-11.6 |  |
|  |  |  |  |  |
| June | 5 |  |  |  |
|  |  | Submit your Data Analysis Exam by email to Ryan and me by 5 pm.  *Send it by 4 pm if you want confirmation of its receipt. This option is strongly recommended.* | | Data Exam |
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