

PS 686: REGRESSION ANALYSIS

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Class Room: 102 Caldwell Laboratory

Class Time: M W 1:30-3:18pm

My Office Hours: M 4-5 pm

My Office: 2084 Derby

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T.A.: Amanda Yates (akyates@gmail.com)

This course introduces political science graduate students to statistical data analysis. Its focus is the linear regression model, but, time permitting, it will examine also some commonly used non-linear models (*e.g.* logit/probit). I assume familiarity with material covered in the Math Camp and PS685.

Textbooks

There is no standard text for courses on regression analysis. All have strengths and limitations and, unfortunately, all are expensive. I suggest buying two or three texts at different levels so that you can triangulate between them. What isn't clear in one text is hopefully clearer in another.

Texts you might consider buying are:

WG W. Greene. 2002. *Econometric Analysis*, 5th ed. Prentice Hall. ISBN: 0130661899.

JW J. Wooldridge. 2002. *Introductory Econometrics: A Modern Approach*. South-Western College Publishing. ISBN: 0324113641.

JK J. Kmenta. 1997. *Elements of Econometrics*, 2nd ed. University of Michigan Press. ISBN: 0472108867.

HJ E. Hanushek and J. Jackson. 1977. *Statistical Methods for Social Scientists*. Academic Press. ISBN: 0123243505.

DG1 D. Gujarati. 2002. *Basic Econometrics*, 4th ed. McGraw Hill Irwin. ISBN: 0072478527.

DG2 D. Gujarati. 2005. *Essentials of Econometrics*, 3rd ed. McGraw-Hill Irwin. ISBN: 0073135941.

PK P. Kennedy. 2003. *A Guide to Econometrics*. MIT Press. ISBN: 026261183X.

CA C. Achen. 1982. *Interpreting and Using Regression Analysis*. Sage Publications. ISBN: 0803919158.

For Math help:

AC A. Chiang. 2004. *Fundamental Methods of Mathematical Economics*, 4th ed. McGraw-Hill/Irwin. ISBN: 0070109109.

SB C. Simon & L. Blume. 1994. *Math for Economists*. W.W. Norton & Co. ISBN: 0393957330.

KR D. Kleppner & N. Ramsey. 1985. *Quick Calculus: A Self-Teaching Guide*, 2nd ed. Wiley. ISBN: 0471827223.

Finally, we will use *STATA* in this course. You can find good help guides for *STATA* on-line. For example, see Svend Juul, Introduction to Stata 8, which is available at <http://www.biostat.au.dk/teaching/software/STATA/Stata8.pdf>. I have also ordered Philip H. Pollock III's *A Stata Companion to Political Analysis* (CQ Press, 2007) for you if you are interested.

Course Requirements

The course will meet twice a week for an hour and a half each time. Attendance is recommended. If you have any problems with material covered in class, begin by discussing your questions with Amanda during her office hours. If, subsequently, you think I could be of further help, come by my office hours. Having problems is not a sign of ignorance or stupidity. For most of you this will be your first introduction to statistical analysis and this will be understandably hard. Your job is to work as hard as possible and to seek help when you realize that your hard work isn't doing the trick on its own. If you let your ego get in the way of asking for help, you will regret it.

You will have a problem set on an almost weekly basis. These will be handed out in class and due a week later.

A comprehensive in-class final examination will be administered at the time designated by the University Registrar.

Finally, there is a paper requirement. Your assignment is to replicate a published political science article that interests you and which uses statistical methodology comparable to or more sophisticated than the material covered in this course. Obtain the data from the author if possible. Replicate the published results as nearly as possible. If you can't replicate them, try to find out why. Then extend the analysis by (a) suggesting a more appropriate functional form for the statistical model and re-estimating, (b) identifying potential omitted variables and reconducting the analysis, (c) locating possible selection bias or measurement error and fixing it, (d) extending the data or using a different data set to test the theory, or (e) any other idea you have. Please see Amanda or me if you have any questions or difficulty regarding your chosen project.

Your overall grade will be determined as follows:

H Homeworks: 50%

P Replication Paper: 25%

F Final exam: 25%

Homework assignments submitted past their due date will be penalized one letter grade for each day they are late. No alternative date or time for the final exam will be offered. (Note: This last point does not apply to students with documented disabilities. Please see note on that policy below.)

Academic Honesty

(Adapted from Brian Pollins' 686 syllabus).

All of the work you do in this course is expected to be your own. Absolutely no cheating or plagiarism (using someone else's words or ideas without proper citation) will be tolerated. Any cases of cheating or plagiarism will be reported to the university committee on academic misconduct and handled according to university policy.

Students may work together on homework assignments. But each must prepare their own final copy for submission. Please show all work progressing toward the solution, and highlight your final answer to each problem. In other words, it is fine with me if you are stuck on a problem, and ask a fellow student to explain a point that will help you get over that obstacle. However, I do not allow one student to take another by the hand through many steps of a problem, effectively solving the problem for them. It is fine with me if two students compare answers to a problem in order to check their work. When their answers do not match, it is fine with me if they discuss the process by which they arrived at their answer, in order to discover who is wrong. I do not allow one student to copy the solution to a problem from another student, whatever the reason. Nor do I allow two or more students to divide up the work on any problem or problem set and share their results with each other. Any and all work you submit with your name on it must be entirely your own work. If any part of this policy is not clear to you, consult with me.

Students with Disabilities

Students who feel they need an accommodation based on the impact of a disability should contact me privately to discuss their specific needs. Please contact the Office of Disability Services at 614-292-3307 in Room 150 Pomerene Hall to coordinate reasonable accommodations.

SCHEDULE

The suggested readings from the various sources you might have bought are indicated below. Those marked in **bold** will form the basis of my lectures:

WEEK ONE

1. *Friday, January 4: Intro; Logistics; Linear Algebra Fundamentals*

WG: 2.1-2.9; DG1: Intro; JK: Appendices A, B; AC: 4-8; SB/KR as needed.

WEEK TWO

2. *Monday, January 7: Probability and Distribution Theory Review*

WG: 3, 4; DG1: 1, Appendices A, B; JK: 1-6.

3. *Wednesday, January 9: Statistical Inference Review; Classic Linear Regression Model: Bivariate*

WG: 5; JW: 1, 2; DG1: 2, 3; JK: 7.

WEEK THREE

Monday, January 14: C(N)LRM: Finish bivariate; begin Multivariate

WG: 3, 4; JW: 2, 3; DG1: 3-6; JK: 1-6.

4. *Wednesday, January 16: C(N)LRM: Multivariate contd*

WG: 3, 4; JW: 3; DG1: 7, Appendix C; JK: 1-6.

WEEK FOUR

5. *Monday, January 21: **No Class for MLK Day***

6. *Wednesday, January 23: C(N)LRM: Finish Multivariate*

WG: 3, 4; JW: 4; DG1: 7; JK: 1-6.

WEEK FIVE

7. *Monday, January 30: Hypothesis Testing*

WG: 7; JW: 4; DG1: 8; PK: 4.

8. *Wednesday, February 30: Hypothesis Testing*

WG: 7; JW: 4; DG1: 8; PK: 4.

WEEK SIX

9. *Monday, February 04: Functional Form, Non-Linearity in the Xs, Specification*

WG: 8; JW: 6, 7; DG1: 9; JK: 10.4, 11.1, 11.7; PK: 5-6.

10. *Wednesday, February 06: Data "Problems"*

WG: chp. 9; JW: 9; DG1: 10.

a. *Multicollinearity*: **WG: 9.2**; JK: 10.3; PK: chp. 11.

b. *Measurement Error and Proxy Variables*: **WG: 9.5**; JK: 9.1.

c. Missing Observations and Grouped Data: WG: 9.3-9.4; JK: 9.2-9.3.

WEEK SEVEN

11. Monday, February 11: More Regression Diagnostics

WG: 9.6; DG1: 13; PK: 18.

12. Wednesday, February 13: Some Large Sample Results for the CLRM

WG: 10; JW: 5; JK: Appendix C.

WEEK EIGHT

13. Monday, February 18: Non-Spherical Disturbances: General Treatment

WG: 13; JK: 12.1; PK: 8.

14. Wednesday, February 20: Heteroskedasticity

WG: 14; JW: 8; DG1: 11; JK: 8.2; PK: 8.3.

WEEK NINE

15. Monday, February 25: Correlated Disturbances: Autocorrelation

WG: 15; JW: 12; DG1: 12; JK: 8.3; PK: 8.4.

16. Wednesday, February 27: Pooled TSCS

WG: 16; JW: 13, 14; DG1: 16; JK: 12.2-12.3.

WEEK TEN

17. Monday, March 03: Endogeneity and Simultaneous Equations

WG: 20.1-20.5; JW: 15, 16; DG1: 18-20; JK: 13; PK: 10.

18. Wednesday, March 05: Dichotomous Dependent Variables

WG: 21.-1-21.4; JW: 17.1; DG1: 15; JK: 11.5; PK: 22.8.

**FINAL EXAM: Monday, March 10, from 3:30-5:18pm in 102 Caldwell
Laboratory**