

**Economics 139D/239: Introduction to Econometrics
Spring Quarter 2008**

Prerequisites: Economics 2, 2A, 2D, 52D or 55D; Statistics 101 or 103.

Lectures: Tuesday-Thursday, 8:30-9:45 AM, 130 Social Psychology
Instructor: Paul Ellickson 201b Social Sciences (paul.ellickson@duke.edu)
Teaching Assistants: Shuo (Stephanie) Guan
Stephen Raymond
James Richman
Rayhaneh Sharif-Askary

Note: If you need a *permission number* to add this class, please contact Christopher Genwright in the EcoTeach center (christopher.genwright@duke.edu). Here's a link to the EcoTeach registration guidelines:

<http://www.econ.duke.edu/ecoteach/undergrad/courses.php>

Office Hours:

Monday 6pm-8pm with Stephanie Guan in SocSci 124

Tuesday: 10am-12pm with Paul Ellickson in 201B

Tuesday: 7pm-9pm with James Richman in SocSci 105

Wednesday: 7pm-9pm with Stephen Raymond in Allen 326

Thursday:

10:30am-11:30am with Rayhaneh Sharifaskary in EcoTeach Conf Room

1:15pm-2:30pm with Rayhaneh Sharifaskary in EcoTeach Conf Room

As a general rule, for questions relating to the problem sets or using Stata, you should see one of the TAs. For questions relating to lecture material or other conceptual issues, you should see me on Tuesdays from 10 am-12 pm in room 201B.

I lecture using overhead slides that will be posted on the course website (courses.duke.edu) the day before each class. You should print a copy of the slides to bring to class. Handouts for discussion sections will be posted at the beginning of each week (with solutions posted on Fridays). Problem sets will be posted as they are assigned, so check the website frequently. I will post all documents in pdf format, for which you will need Adobe Acrobat or Adobe reader. The reader can be downloaded for free at: <http://www.oit.duke.edu/comp-print/software/acrobat.html>

Required text:

James Stock and Mark Watson (2007), "Introduction to Econometrics," 2nd Edition, Addison-Wesley, ISBN 0321278879.

Supplementary online material: http://www.aw-bc.com/stock_watson/

Students who would like to see alternative treatment of the material might also consult: Jeffrey M. Wooldridge (2003), "Introductory Econometrics," Thomson/South-Western.

Software:

We will be using the program Stata in the discussion sections and for homework assignments. Stata is available on the computers in 229 Social Sciences as well as in the Basement (Room 01) of the Old Chem Building. If you wish, you can purchase your own copy of Stata/IC 10 for \$95.00 online at

<http://www.stata.com/order/new/edu/gradplan.html>

Most students do not purchase their own copy of Stata.

Course Policies:

Grading:

Problem Sets	10%
Midterm 1	20%
Midterm 2	30%
Final	40%

Homework:

- There will be 9 problem sets which will be posted on the course website.
- **Problem sets will not be graded.** We will simply record whether you have turned each one in. We will also drop one, so that if you turn in 8 of 9, you will receive full credit; if you turn in 5 out of 9 you will receive ½ credit, and so forth.
- We will not return the problem sets to you until the end of the term so that, if you are on the border between grades, we can refer back to them to break ties. This is to give you some additional incentive to take these assignments seriously.
- While solving the problem sets, you are allowed (in fact encouraged) to work in groups, as long as each group is comprised of no more than three people and as long as each member submits their own written answers.
- Problem sets should be turned in at the beginning of class on the day that they are due. Late homework will not be accepted and **there will be no extensions.**

Exams:

- There will be **no makeup midterms.** If you miss a midterm, and have a Dean's excuse, the weight of the missed exam will be reallocated to the final exam, regardless of the respective means of the individual exams.
- The final exam is comprehensive, so you will be responsible for all the material covered in this course. The time of the final is set and will not be moved under any circumstances.
- Exams will be closed book, but you will not need to memorize a bunch of formulas. For each exam, you will be given a set of formulas and notes prepared by me. I will post a copy of this handout well before each exam so you know what to expect.

Preparing for Exams:

- The best way to prepare for exams is to solve lots of problems!
- The homework assignments and section handouts contain tons of past exam problems, so you should know what to expect on the tests.
- Trying to solve these problems on your own is the best way to prepare for exams.
- I will post pdf files with the past five years of exams before each test, so you don't need to worry about finding "exam files".

Grading:

- This course will be graded on a curve. Historically, the median (not the mean) is a low B, although this could change if this class is particularly weak or strong. For obvious reasons (i.e. grade lobbying), the exact final cutoff points will not be disclosed under any circumstances (so don't ask).
- I take **objectivity and consistency** in grading very seriously. The course policies outlined here apply to everyone: there will be no extra assignments, no re-weighting of existing assignments, and no special consideration given to individual students who "feel their grade does not reflect their understanding of the material".

Re-grading:

- We work very hard to make sure that exams are graded accurately and fairly, but mistakes sometimes happen. If you think your exam should be re-graded, you have to submit *in writing* the detailed reasons why you think this is the case (unless your points have been added up incorrectly, in which case you can just bring the exam to me for an immediate correction). Take into account that if you ask for a re-grade, the *entire exam* will be checked again, meaning that you may *lose* points (since mistakes can happen in both directions). In addition, arguments for additional *partial* credit will not be considered: you must believe your answer is *entirely* correct as written. You must submit requests for midterm re-grades **within two weeks** of the day the exam was *returned*.

Course Outline

Part 1: Statistics Review

Note: The due dates for problem sets are tentative and will be subject to change. Refer to the problem set handouts for the final due dates.

Thursday January 10

Introduction, course description

Statistics review: random variables; probability functions and distribution functions; expected value and variance (Chapter 2)

Tuesday January 15

Statistics review: relationships between two random variables: marginals, joint, conditional; law of iterated expectations; Correlation and Independence. (Chapter 2)

Thursday January 17

Statistics review: some important probability distributions; iid; estimators and estimates; sample mean (Chapter 2, 3)

Tuesday January 22

Statistics review: properties of estimators; bias, variance, Mean Squared Error, consistency, Asymptotic Normality; the Central Limit Theorem (Chapter 3)
PS #1 due

Thursday January 24

Statistics review: Hypothesis tests and Confidence Intervals, p-values (Chapter 3)

Part 2: Basic Econometrics (Ordinary Least Squares)

Tuesday January 29

Conditional expectations. Ordinary Least Squares (OLS) with only one conditioning variable. (Chapters 4 & 17)

PS #2 due

Thursday January 31

The OLS assumptions and properties of the estimators, sampling distribution (Chapters 4 & 17)

Tuesday February 5

Tests and confidence intervals, Goodness of Fit & R-squared. (Chapters 4, 5, & 17)

Thursday February 7

Homoskedasticity vs Heteroskedasticity, Weighted Least Squares (Chapters 5 & 17)

Tuesday February 12

Omitted variables, introduction to multivariate OLS. (Chapter 6)
PS #3 due

Thursday February 14

Catch up or Review

Tuesday February 19

First Midterm

Thursday February 21

Multivariate OLS, Assumptions and Properties. (Chapter 6)

Tuesday February 26

Imperfect multicollinearity, tests and confidence intervals for single coefficients, goodness of fit and adjusted R-squared. (Chapters 6 & 7)

Thursday February 28

Testing joint hypotheses (with and without homoskedasticity) (Chapter 7)

Tuesday March 4

Extensions to OLS: nonlinearities, estimation of elasticities, dummy variables and interactions. (Chapter 8)
PS #4 due

Thursday March 6

Nonlinearities (continued). (Chapter 8)

SPRING BREAK (March 10-14)

Part 3: Advanced Econometrics (beyond OLS)

Tuesday March 18

Regression with limited dependent variables; Linear probability model, logit and probit. (Chapter 11)
PS #5 due

Thursday March 20

Logit and probit; Maximum Likelihood Estimation (MLE) (Chapter 11)

Tuesday March 25

MLE and limited dependent variables (Chapter 11)
PS #6 due

Thursday March 27

Linear models and panel data. (Chapter 10)

Tuesday April 1

Catch up or Review

PS #7 due

Thursday April 3

Second Midterm

Tuesday April 8

Endogenous regressors, simultaneity, and Instrumental Variables (Chapter 12)

Thursday April 10

Two Stage Least Squares (2SLS) (Chapter 12)

Tuesday April 15

Strength and Exogeneity (Chapter 12)

Testing for Weak Instruments

The Test of Over-identifying Restrictions

2SLS in Stata

PS #8 due

Thursday April 17

Experiments and Quasi-Experiments (Chapter 13)

The Differences Estimator

Tuesday April 22

The Differences-in-Differences Estimator (Chapter 13)

Heterogeneous Effects

Review

PS #9 due

The **Final Exam** will be Tuesday April 29th from 7 pm to 9 pm.