A mathematician, a theoretical economist, and an econometrician are asked to find a black cat (who doesn’t really exist) in a closed room with the lights off. The mathematician gets crazy trying to find a black cat that doesn’t exist inside the darkened room and ends up in a psychiatric hospital. The theoretical economist is unable to catch the black cat that doesn’t exist inside the darkened room, but exits the room proudly proclaiming that he can construct a model to describe all his movements with extreme accuracy. The econometrician walks securely into the darkened room, spends one hour looking for the black cat that doesn’t exist and shouts from inside the room “I’ve caught it by the neck!” — Anonymous

Course Overview and Objectives
The purpose of this course is to expose you to econometric techniques frequently used by economists working with cross-sectional and/or panel data. The emphasis will be on the importance of research design for the identification of casual effects, as well as the limitations in the applicability of these techniques. Ten broad topics will be covered throughout the semester: 1) interpreting regressions, 2) panel data and correlated errors, 3) instrumental variables estimation, 4) experimental data, 5) differences-in-differences, 6) regression discontinuity design, 7) binary dependent variable and maximum likelihood estimation, and 8) censored/truncated data, and sample selection. Each topic will include an overview of the econometric theory, followed by model estimation using Stata, and discussion of papers that apply these models. I will lead the presentation of the theory and model estimations, and you will lead the paper discussions (see below). Correspondingly, you are expected to read the assigned papers, write a short summary on each of them before coming to lecture class meetings, and assess/discuss the quality and content of things you read and hear. Upon completion of this course, you will:

- Learn the most widely used econometrics models in our field;
- Develop skills of selecting appropriate data, estimating an econometric model, and communicating your results to a non-technical audience;
- Gain practical experience in using Stata for data management and model development; and
- Become more critical/skeptical consumers of empirical research in economics.

Completing most problem sets in this course will require the use of Stata statistical software package. The version you need is Intercooled Stata (Stata/IC) or better; Small Stata will not suffice for our purposes. If you don’t have easy access to a computer with Stata, you may want to consider renting this package for six-month (details here: http://www.stata.com/order/new/edu/gradplans/student-pricing/).

Course prerequisites: ECON 521

Course requirements and grading schemes: There will be five problem sets, presentations of assigned papers, a midterm and a final exam at the end of the course. The final grade will consist of the following:
Presentations & Participation: 20%
Problem Sets (5): 20%
Midterm: 20%
Final: 40%

1. **Presentations & Participation:** You will read 6-10 empirical papers applying the models we cover in class and write a short summary on each of them. The summary should include, but not necessarily limited to the following elements:
   i. What is the article’s hypothesis and what are its main finding?
   ii. What are the primary cause and effect variables analyzed in the article?
   iii. What data was used in this study?
   iv. What is the primary estimating equation in the paper?
   v. What are the conditions under which it will generate unbiased and/or inconsistent estimate of the coefficient of interest?

Try to emphasize the question and method of the paper more than the results. For each paper, one of you will be assigned to present the paper and your summary. The presentation should be 20-30 minutes long, followed by in-class discussion. You should prepare slides for your presentation. The focus of your presentation should be on the econometric methods employed, whether you think the results are convincing, and why or why not. The non-presenters are expected to participate in the discussion following each presentation.

2. **Problem Sets:** Five problem sets will be made available throughout the semester. They consist of two types of questions. The first are “pencil to paper” where you will calculate an estimate, derive an equation, interpret statistical results etc. The second type requires the use of Stata to perform computer exercises. Before each problem set is due, I will work through Stata examples in our lab sessions. You can then review the material and complete assignments outside of classroom. I encourage you to find a partner to work with so that if you run into problems, you can troubleshoot your code together.

3. **Exams:** There is one midterm and one final exam each consisting of a theoretical portion and a Stata portion. The two portions of an exam will be held in class during the same week. The theory exam will be closed-book and closed-notes. The applied/Stata exam will be conducted in the lab or take-home, open-book and open-notes. The exams will cover material from the lectures and from the computer labs (such as writing code and interpreting the output from a regression in Stata). Make-up exams will be given only under special conditions, and you must request a make-up at least a week prior to the exam. Exceptions will be made only in the event of an emergency. You may be asked to provide evidence to substantiate the reason for your absence.

**Textbook and Readings:** The principal textbook for this course is:


Despite being an undergraduate textbook, Stock and Watson offers an interesting and easier introductory reading to a variety of econometrics topics. It also has a great companion website at [http://wps.aw.com/aw_stock_ie_3/](http://wps.aw.com/aw_stock_ie_3/) that contains useful resources for students, including datasets and replication files used in examples and exercises presented in the book.

Our lectures will also be supplemented with a few chapters from the following books:
A couple of more good references that I also recommend are:

- Cameron, A. Colin, and Pravin K. Trivedi. Microeconometrics: Methods and Applications. Cambridge University Press, 2005. This book covers both old (panel data, IV) and the new topics (bootstrapping, quantile regressions, clustered standard errors, etc.) and it has a nice blend of statistical intuition and mathematical rigor.

In addition, we will go over a number of empirical papers that employ the methods discussed in class. About one third of them will be presented by you or your peers and you are expected to read them ahead of class in order to be prepared for their discussion:


• Cameron, Adrian Colin. Microeconometrics Using Stata. College Station, Tex.: Stata Press, 2009.

Academic Dishonesty
The penalty for any breach of the honor code is a zero for the problem set or exam. More severe offenses call for receiving a failing grade, being dismissed from the class, suspension, or expulsion. If you have questions about what constitutes academic dishonesty in general, please see the following link. If any questions arise about what is allowable in this class, please ask me. The link to BSU policy on academic honesty is: http://registrar.boisestate.edu/Catalogs/03-04UndergradCatalog/Chapter2.pdf.

Disabilities
If you have a disability that requires special accommodation in class, for assignments, exams or any other task, please come and see me by the second week of class. For information regarding disabilities and accommodations that the University can make for you see http://drc.boisestate.edu/FAQ/index.cfm?subsection_id=46.

Course outline and readings:
A preliminary outline of topics to be covered and related readings is presented below.
<table>
<thead>
<tr>
<th>(Week) Dates</th>
<th>Lecture Topic</th>
<th>Readings</th>
<th>Lab Activity</th>
<th>Deliverables</th>
</tr>
</thead>
</table>
| Week 1 1/10  | Introduction  | • Stock and Watson Ch. 1 and Ch. 8  
|              | • Economic questions and data  
|              | • Correlation and causation  
|              | • Threats to external and internal validity  
| Week 1 1/12  | Review of Probability | • Stock and Watson Ch. 2  
|              | • Mean and variance  
|              | • Conditional probabilities and independence  
|              | • Sampling  
| Week 2-3 1/17, 1/19 & 1/24 | Review of Linear Regressions | • Stock and Watson Ch. 4 – Ch. 7  
|              | • OLS estimation and assumptions  
|              | • Hypothesis tests: t and F  
|              | • Heteroskedasticity  
|              | • Collinear variables  
|              | • Polynomials, logarithm transformation and interactions  
|              | • Angrist and Pischke Ch. 3  
| Week 3-4 1/26, 1/31, & 2/2 | Panel Data and Correlated Errors | • Stock and Watson Ch. 10  
|              | • “Before and after” comparisons  
|              | • Fixed effects regression  
|              | • Clustered standard errors  
|              | • Angrist and Pischke Ch. 5.1 & 8  
| Week 5-6 2/7, 2/9, 2/14 & 2/16 | Instrumental Variables Regression | • Stock and Watson Ch. 12  
|              | • Two stage least squares  
|              | • The general IV regression model  
|              | • Checking instrument validity  
|              | • Angrist and Pischke Ch. 4  
|              | • Angrist, J. D., & Krueger, A. B. (2001). Instrumental Variables Estimation (Lab handout #4)  
|              | • Presentation & discussion on Angrist (1990) and Levitt (1996)  

<table>
<thead>
<tr>
<th>Week 7 2/21 &amp; 2/23</th>
<th>Midterm exam</th>
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<tr>
<th>Week 8-9</th>
<th>Experiments and Quasi-Experiments</th>
<th>Experiments and Quasi-Experimental Data (Lab handout #5)</th>
</tr>
</thead>
</table>
| 2/28, 3/2 & 3/7 | • Idealized experiments and threats to validity of experiments  
• Quasi-experiments and threats to validity of quasi-experiments  
• Experimental and quasi-experimental estimates in Heterogeneous Populations | • Presentation & discussion on Fernald et al. (2008) and (2009) |
| 3/9, 3/14 & 3/16 | • Program evaluation  
• The DD estimator  
• Problems with DD estimators  
• DD with control variables  
• DD with multiple time periods | • Angrist and Pischke Ch. 5.2  
<table>
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<tr>
<th>Week 11</th>
<th>SPRING BREAK</th>
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</thead>
</table>

**Week 12**
3/28, 3/30 & 4/4

- **Regression Discontinuity**
  - Sharp RD
  - Fuzzy RD

- **Angrist and Pischke Ch. 6**
- **Matsudaira, J. D. (2008).** Mandatory summer school and student achievement. Journal of Econometrics, 142(2), 829-850.

**Experiments and Quasi-Experimental Data (Lab handout #5)**
- **Presentation & discussion on Angrist and Lavy (1999)**

**Week 13-14**
4/6, 4/11 & 4/13

- **Binary Dependent Variable and Maximum Likelihood Estimation**
- **Stock and Watson Ch. 11**

- **Presentation & discussion on Krueger and**
|-------------------------------|------------------------------------------------|

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<tr>
<th>Variables (Lab handout #6)</th>
<th>Malečková (2003)</th>
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| Week 16 4/27 | Final exam       | Models of Discrete and Limited Dependent Variables (Lab handout #6) | • Presentation & discussion on LaLonde (1986) |