Office Hours: M 1:30-3 or by appointment.
Web site: www.montana.edu/cstoddard
All problem sets, data sets, and answer keys will be posted on the website.

Objectives:
1. Learn to think carefully about the issue of identification of causal relationships. We will cover the most common methods used by applied economists (panel data methods, instrumental variables, regression discontinuity design).
2. Cover other topics as time permits—usually maximum likelihood estimators and limited dependent variables, quantile regressions, sometimes more time series topics.
3. Develop enough general tools to be able to address other econometric problems this course did not cover.
4. Get a start on your thesis or substantive research project.

Text: Wooldridge, Introductory Econometrics  Older editions are fine. This text is required.

Complementary resources:

EASIER: I strongly encourage you to use at least one undergraduate text to help with intuition and the “big picture.” Good choices: Pindyck and Rubinfeld, Economic Models and Economic Forecasts, Gujarati’s Essential Econometrics or Basic Econometrics.

MORE ADVANCED: Greene, Econometric Analysis. Much more technical, covers additional topics including many you may encounter in your thesis. Many PhD programs use this text. There are also a number of more specialized advanced texts on panel data, time series, limited dependent variables, etc. See me as needed for these. A. Cameron and P. Trivedi, Microeconometrics is another great resource for many modern methods.

Angrist and Pischke’s Mostly Harmless Econometrics is well written and covers several of the core econometric techniques we will be discussing. Depth more than breadth. Funnier than most texts. Highly recommended.

STATA:
Problem sets and answer keys will be provided using STATA, but you are welcome to use whatever package you prefer. SAS is used most often in industry. STATA is used most often by academic applied economists. R and MATLAB are used most when you need to program your own estimator. I am most proficient in Stata.

Baum, An Introduction to Modern Econometrics Using Stata or Baum is useful for figuring out how to organize your data, conduct tests, deal with functional form, instrumental variables, etc. Not a substitute for the Stata manuals, but a terrific bridge between the text and your project.

A. Cameron and P. Trivedi, Microeconometrics Using Stata, is more advanced and comprehensive. Useful for simulation, nonlinear models, more maximum likelihood estimators, learning to program your own estimators.
Grading: Paper 20% (8% presentation; 12% paper)
Midterm 25%
Final 35%

No late exams. Contact me as soon as possible if you must miss an exam. If you feel that an exam question was not graded correctly, you must submit a written justification of your claim within two class periods. The entire exam will be reevaluated.

Homework 20% (Problem sets and readings)

Problem sets are due in class on the date assigned. You may turn in 1 assignment up to two weeks late. Full credit for a serious attempt. Answers will not be corrected—you are expected to check the keys. You are welcome work with others, but turn in individual assignments. Reading assignments are due in class on the date assigned. No lates accepted.
Paper Assignment

Your paper should draw on the **tools developed in this course** (e.g., panel data methods, time series methods, limited dependent variables, instrumental variables, two-stage least squares). This is a good opportunity to begin thinking seriously about the viability of a thesis topic.

If you are working with a professor on a thesis topic, you should (1) let me know and (2) not consult them on your paper for this class.

Your grade will be based on the following:

1. **Does the paper connect the question of interest to economics?** That is, your paper should model the behavior of economic agents—individuals, state government agencies, political agents, firms, universities, etc. How does this agent make decisions? What is their objective? What are their constraints? Does your data represent the choices of only one agent or the interactions of several agents? How does your regression equation relate to these decisions?

   *You do not need to include a long theory section, but your regression equations should NOT represent "a list of variables I found that might be related to this topic" or even "a list of variables I found be statistically related."
*

2. **Does the paper apply the appropriate tools from this class?** To the degree that it is appropriate, your paper should explore different methods of estimation, different sets of included variables, etc.

3. **Does the paper clearly outline the remaining problems with the analysis?** Do you have omitted variable bias that is unresolved? Sign it. Do you have measurement error in some of your variables? Explain why and how your results are likely affected. Are your instruments weak/invalid? Discuss why that might be the case and sign the bias. For many of you, this paper may be the kernel of your thesis—I do not expect you to have resolved all econometric issues, but I do expect you to have identified many you hope to work out later.

4. **Clarity of writing.**

**Paper Presentations:**

Please come see me before spring break to discuss your topic. Presentations will be 15 minutes with a hard time limit. We will meet in Econ 306 for the presentations at 9:30. Your slides may include

1. Explanation of your question
2. Discussion of the economic agent and the decision
3. Description of your data
4. Discussion of empirical problems
5. Regression results (OLS, other models)
6. Relevant hypotheses and tests
7. Interpretation of results
8. Unresolved problems and how those affect estimates
9. Outline for future analysis (this class or future)
A Common Outline for Econometrics Papers

I. Introduction (1-2 pages)
   • Why is the question interesting? (Is there a disagreement in the literature? Is the basic correlation counterintuitive? Has this population not been examined before?)
   • What is the hypothesis being tested?
   • What are your main methods and results? (Briefly)

II. Background/Brief Literature Review (1-2 pages)
   • What other work has been done on this issue? What has been found?
   • How does your paper differ from the others? (different data, time period, methods, etc.)

III. Economic Theory (1-2 pages)
   • What does economic theory predict about the relationship being tested?

IV. Description of Data (1-2 pages)
   • What kind of data would be ideal to test your hypothesis?
   • What data are you using?
   • Discussion of summary statistics for key variables (table).

V. Empirical Methodology
   • The ideal experiment
   • Your econometric model:
     Justification of variables used (often based on theory)
     Justification of functional form (often based on theory)
     Discussion of anticipated sign of coefficients (based on theory)
   • Potential empirical problems, your proposed solutions and justification for those solutions

VI. Results
   • Discussion and interpretation of basic OLS results—Tables and charts
   • Discussion and interpretation of alternative estimators (e.g., fixed effects, IV, 2SLS, Probit/Logit)
   • Relevant hypothesis tests
   • Other robustness checks—e.g., other reasonable specifications, other ways to deal with outliers, alternative data sources, etc.
   • Problems with the current analysis that you have not solved yet

VI. Conclusions and Summary (1-2 pages)
   • What have you learned?
   • What are the policy implications? (Don’t go overboard)
   • Are there suggestions for future research (especially for your own thesis)?
Course Outline

Please use this as a rough guide to the coverage and ordering of chapters.
Dates for each assignment will be finalized as we go along.

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<td>Jan 9</td>
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| Jan 14     | Basics of STATA—meet in computer lab | HMK 1
|            | CH 13: Simple Panel Data Methods |
| Jan 21     |                                  | HMK 2
|            | CH 14: Advanced Panel Data Methods |
| Jan 28     |                                  | HMK3 |
| Feb 4      | BDM paper                       | HMK 4
|            | CH 15: Instrumental Variables    |
| Feb 11     |                                  |      |
| Feb 18     |                                  | HMK 5 |
| Feb 25     | MIDTERM                         | CH 16: Simultaneous Equations |
| March 4    |                                  | HMK 6 |
|            | Spring Break                    |      |
| Mar 18     | Acemoglu paper,                | CH 17: Limited Dependent Variables |
|            | Hoxby paper                     |      |
| Mar 25     |                                  |      |
| Apr 1      |                                  | HMK 7 |
| Apr 8      | Paper presentations             | Paper presentations |
| Apr 15     | Quantile Regression             |      |
| Apr 22     | Blundell and Dias paper        | Papers due Friday at 5:00 |
|            | HMK 8                           |      |