Course Description

This course is an introduction to regression analysis. It is designed to merge students’ knowledge of economic theory and statistics so that they will be comfortable testing economic theories by evaluating data. Students will apply mathematical and statistical techniques to test predictions about the relationships between variables.

Goals

- Understand the conceptual reasoning for using various econometric tools or approaches
- Gain a basic understanding of mathematical statistics which underlie applied econometric analysis
- Use data to estimate behavioral models using a statistical package (Stata)
- Test hypotheses, measure quantitative relationships, and interpret the results of the estimations performed
- Gain skill using a variety of datasets to answer questions about real-world issues

Course materials

The primary text for the course is *Introductory Econometrics: A Modern Approach*, a recent edition (not necessarily new) by Jeffrey Wooldridge.

It is required that you buy or have access to Stata. Stata is available on computers in the FOB and SWKT computer labs.

Prerequisites

ECON 378 and ECON 380. These courses are foundational for your success in this course. I expect that you have a working knowledge of statistics and economic theory.
Assignments and Evaluation

Midterm Exam (20%) and Final Exam (35%): Your understanding of econometrics will be evaluated in one midterm exam and a comprehensive final exam. The exams are based on class lectures and discussions, lab sessions, assigned reading, and homework assignments.

Research Project (15%): You are required to apply your econometric knowledge in an original research project including a research paper and oral presentation. This is an opportunity to formulate an economic model, collect data, use statistical software, and gain experience in interpreting regression results. The text of the paper (excluding tables) should not exceed fifteen pages. The guide posted in learning suite, Chapter 19 of the textbook, and Section I.C of the class notes provides some helpful suggestions for formulating an econometric project and writing your paper. You will submit assignments relating to the project throughout the semester. The final project is due the last day of class.

Homework assignments (20%): Homework assignments are graded on completeness, effort, and accuracy. You are strongly encouraged to work on problem sets with other students. Homework is due at 4:45 p.m. in the TA box in 130 FOB on the due date (see the class outline for due dates).

Quizzes and Participation (10%): Active participation in class and outside of class fosters learning. Please ask questions, answer questions, and engage in discussion. Periodic, unannounced quizzes will be given on new material, previous lectures, and assigned readings (course notes and text). The two lowest quizzes will be dropped.

Late work will not be accepted for credit. Under some circumstances, I grant extensions prior to a deadline; ask in advance.

Grading

Your letter grade will be determined by the percentage of total points earned as follows:

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<th>A</th>
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<th>B+</th>
<th>87-89</th>
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<th>77-79</th>
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<th>67-69</th>
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<td>90-92</td>
<td>B-</td>
<td>80-82</td>
<td>C-</td>
<td>70-72</td>
<td>D-</td>
<td>60-62</td>
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I want to help you learn and succeed in this course. Please visit me during the semester so I can help you succeed. The week before the final exam will be too late to earn the grade that you want.

Office hours

My office hours are MW 9:30-10:30 a.m. or by appointment. I hold office hours to help you. You might want to come by if you have questions about homework, want to discuss something from class, want to know more, need help with your research project, or have questions about upcoming or past exams. I highly encourage you to come visit me.
**Learning Suite and Course Communication**

The syllabus, assignments, grades, and other material will be posted on the Learning Suite course website. I use class and/or Learning Suite to announce important information relating to the course. Please check regularly. I prefer to see you in office hours if you have questions about econometrics. You may ask questions via email and I’ll do my best to stay on top of my inbox.

**Attendance and expectations**

Students are expected to attend all regularly scheduled classes and lab sessions. This course is demanding, and you need to be in class to succeed. Absences are excused only for participation in university-approved events or observance of a religious holiday, and it is your responsibility to inform me before the event and make yourself aware of missed material and announcements. Absences may at my discretion be excused for severe illness or personal emergency. Please inform me in advance when possible. Excessive absences and tardiness can affect the participation grade. This course is designed with the expectation that students work outside of class a minimum 2 hours per week, per credit.

**Student Rights, Honor Code, and Learning Outcomes**

Brigham Young University is committed to providing a working and learning atmosphere which reasonably accommodates qualified persons with disabilities. If you have any disability which may impair your ability to complete a course successfully, please contact the University Accessibility Center (UAC) located at 2170 WSC (801-422-2767) as soon as possible. A disability is a physical or mental impairment that substantially limits one or more major life activities. Examples include vision or hearing impairments, physical disabilities, chronic illnesses, emotional disorders (e.g., depression, anxiety), learning disorders, and attention disorders (e.g., ADHD). When registering with the UAC, the disability will be evaluated and eligible students will receive assistance in obtaining reasonable University approved accommodations.

As required by Title IX of the Education Amendments of 1972, the university prohibits sex discrimination against any participant in its education programs or activities. Title IX also prohibits sexual harassment—including sexual violence—committed by or against students, university employees, and visitors to campus. As outlined in university policy, sexual harassment, dating violence, domestic violence, sexual assault, and stalking are considered forms of “Sexual Misconduct” prohibited by the university. University policy requires any university employee in a teaching, managerial, or supervisory role to report incidents of Sexual Misconduct that come to their attention through various forms including face-to-face conversation, a written class assignment or paper, class discussion, email, text, or social media post. If you encounter Sexual Misconduct, please contact the Title IX Coordinator at t9coordinator@byu.edu or 801-422-2130 or Ethics Point at https://titleix.byu.edu/report-concern or 1-888-238-1062 (24-hours). Additional information about Title IX and resources available to you can be found at titleix.byu.edu.
Students should act with honesty and integrity, which includes properly citing the work of others and collaborating with others only when it is specifically authorized. Plagiarism is the submission of another’s work as one’s own without acknowledgement in the written work. Four or more directly quoted words require quotation marks, and paraphrasing requires a citation. Use of the FHSS Writing Center is always legitimate and highly encouraged; use of the writing center does not violate the honor code. BYU students should seek to be totally honest in their dealings with others. They should complete their own work and be evaluated based upon that work. They should avoid academic dishonesty and misconduct in all its forms, including plagiarism, fabrication or falsification, cheating, and other academic misconduct. It might be helpful to refer to http://www.byu.edu/honorcode for a complete version of the Academic Honesty Policy and specific examples of intentional and inadvertent plagiarism.

Course outline

I. Introduction. (W 1)
   A. Models and basic concepts
   B. Data
   C. Econometric project
   D. Problem set

II. Simple Regression—Classical Linear Regression Model (W 2)
   A. Introduction (W 2.1)
   B. Alternative parameter estimators
      a. OLS (W 2.2)
      b. MLE and BLUE (notes)
      c. Instrumental variables
   C. Properties of least squares estimators (W 2.3, 2.5)
   D. Distribution of estimators (W 2.5)
   E. Statistical inference (Classical Normal Linear Regression Model)
      (See Wooldridge 4—extended to multiple variables)
   F. Prediction (W 6.4)
   G. Some basic Stata commands
   H. Functional forms (W: 2.4)
   I. Problem sets (1 and 2)

III. Classical Normal Linear Regression Model Extended to the Case of K Independent Variables (W 3 (estimation), W 4 (inference), and W 5(properties) in algebraic form. W App. E for a matrix approach.)
   A. Basic concepts
   B. Basic model
   C. Estimation
   D. Distribution of estimators
   E. Statistical inference
   F. Omitted variable bias
   G. Stepwise regression
   H. Forecasting
   I. Problem sets (1 and 2)
IV. Miscellaneous Topics
   A. Multicollinearity (W pp. 95-102)
   B. Dummy variables
      1. Independent variables (W 7.1-7.4)
      2. Dependent variables: LPM, Probit, Logit (W 7.5 & 7.1)
   C. Lagged variables (W: 18.1)
      1. Distributed lag models - lagged independent variables
      2. Autoregressive models - lagged dependent variables
   D. Granger causality
   E. Differences in differences
   F. Regression discontinuities

V. Violations of the Basic Assumptions and extensions of the Classical Normal Linear Regression Model
   A. Introduction
   B. Normality assumption
   C. Assumption of a zero mean (W 5.1)
   D. Generalized regression model
   E. Heteroskedasticity (W 8)
   F. Autocorrelation of the error term (W 12)
   G. Panel Data (W 13)
   H. Stochastic independent variables (W 5.1 & 15) & instrumental variables revisited
   I. Errors of measurement (W 9.4)
   J. Specification error (W 9.1)
   K. Problem set

VI. A Brief Introduction to Simultaneous Equations Models (W 15 & 16)
   A. Structural and reduced form representation, identification, and interpretation of coefficients
   B. Inconsistency of structural OLS estimators, consistent estimators, and statistical inference
   C. A brief overview
   D. Problem set
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Final Exam – Section 2, Tuesday Dec. 13th, 7 a.m.
Section 3, Thursday Dec. 15th, 11 a.m.

A. Monday homework is due on Thursday; Wednesday homework is due on Monday.
B. Research proposal due Sept. 28th.
C. Write up of the descriptive statistics using project data due Nov. 2nd.
D. Rough draft of the paper due Nov. 28th.
E. Final copy of the research paper due Dec 7th.

Disclaimer: this syllabus is not a binding contract and may be changed.