

Prof. Xiaodong Liu

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Location: ECON 119  
Meeting Times: TTH 2:00-3:15  
Office Hours: TTH 10:30-12:00

**Course Description:**

This is the second course of the first year econometrics sequence. Built on the fundamental concepts in probability and statistics covered in ECON 7818, this course introduces linear and nonlinear regression models, and methods for estimation and inference.

**Prerequisite:** ECON 7818 (or equivalent).

**Text:**

Davidson, R. and J. G. Mackinnon, 2004, *Econometric Theory and Methods*, Oxford University Press.

**Other Reference Books:**

1. Davidson, J., 2000, *Econometric Theory*, Blackwell Publishing.
2. Cameron, A. C. and P. K. Trivedi, 2005, *Microeconometrics*, Cambridge University Press.

**Assessment:**

There will be a midterm exam, a final exam, and periodic problem sets.

1. Homework assignments (20%)
2. Midterm examination (40%)
3. Final Examination (40%)

## **Tentative Course Outline:**

1. Linear Regression Models
  - a. Specification of regression models
  - b. Method of moments estimation
  - c. Geometry of vector spaces and OLS
  - d. The Frisch-Waugh-Lovell Theorem
  - e. Influential observations
2. Statistical Properties of Ordinary Least Squares
  - a. Unbiasedness
  - b. Consistency, asymptotic normality and efficiency
  - c. Residuals and error terms
  - d. Misspecification
  - e. Goodness of fit
3. Hypothesis Testing and Confidence Intervals
  - a. Exact tests in the classical linear model
  - b. Large sample tests
  - c. Exact and asymptotic confidence intervals and confidence regions
  - d. Heteroskedasticity-consistent covariance matrices
  - e. The delta method
4. Nonlinear Regression
  - a. Method of moments estimators for nonlinear models
  - b. Nonlinear least squares
  - c. The Gauss-Newton Regression
  - d. One-Step Estimation
  - e. Hypothesis testing
5. Generalized Least Squares
  - a. GLS and feasible GLS estimators
  - b. Heteroskedasticity
  - c. Autoregressive and moving-average processes
  - d. Testing for serial correlation
  - e. Panel data models
6. Instrumental Variables Estimation
  - a. Instrumental variables
  - b. Statistical properties of IV estimators
  - c. Hypothesis testing
  - d. Testing overidentifying restrictions
  - e. DWH tests
  - f. IV estimation of nonlinear models

**University Policies:**

University policies regarding classroom behavior are available at <http://www.colorado.edu/policies/classbehavior.html> and at [http://www.colorado.edu/studentaffairs/judicialaffairs/code.html#student\\_code](http://www.colorado.edu/studentaffairs/judicialaffairs/code.html#student_code)

Information regarding the University Honor Code is available at <http://www.colorado.edu/policies/honor.html> and at <http://www.colorado.edu/academics/honorcode>. The Honor Code Council can be contacted by email at [honor@colorado.edu](mailto:honor@colorado.edu) or by telephone at 303-725-2273.

University policies regarding disabilities are available at <http://www.colorado.edu/disabilityservices>. Disability Services can be contacted by telephone at 303-492-8671, or in person at Willard 322.

University policies regarding religious practice are available at [http://www.colorado.edu/policies/fac\\_relig.html](http://www.colorado.edu/policies/fac_relig.html).

University policies regarding Sexual Harassment and Amorous Relationships are available at <http://www.colorado.edu/odh/>. The Office of Discrimination and Harassment can be reached by telephone at 303-492-2127. The Office of Judicial Affairs can be reached at 303-492-5550.