

**University of Waterloo
Department of Economics
Economics 421**

Course Outline

(Winter 2012)

Instructor: Dinghai Xu

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Lecture Time: T. & Th. 14:30 to 15:50

Lecture Location: ML 354

Office Hours: Fri. 1:30 to 3:00 or by appointment

TA: TBA

Course Description

This course covers several theoretical/applied topics in Econometrics, including regression models, some popular estimation methods and time series analysis. This course will provide a good understanding of the techniques and inference widely used in applied research in economics. The details for each topic of this class are listed below.

The lecture material will be based on a collection of reference books and/or published papers. There is no required textbook.

Useful References:

- [1] **Econometric Theory and Methods (ETM)**, by R. Davidson and J. G. Mackinnon, Oxford University Press, 2004
- [2] **Econometrics Analysis (EA)**, by W. H. Greene, Sixth Edition, NY, Macmillan, 2003.
- [4] **Time Series Analysis (TSA)**, by J. D. Hamilton, Princeton University Press, 1994.
- [4] **Econometrics**, by F. Hayashi, Princeton University Press, 2000.
- [5] **Probability and Random Process**, by G. R. Grimmett and D. R. Stirzaker, Oxford Science 1992.

Journals:

Econometrica, Journal of Econometrics, Journal of Business and Economic Statistics, Journal of Finance, Journal of Financial Econometrics, Journal of Applied Econometrics and etc.

Topics

1. Overview of Important Concepts in Statistics (EA: Appendix A, B)

Random Variable and Probability

Distribution Functions

Moments and Statistical Inference

2. Topics in Regression Models and the Statistical Inference

(EA: Chpt. 1, 2, 3, 4, 5, 7, 10; ETM: Chpt. 1, 2, 3, 4, 5)

Linear Regression Models

Non-Linear Regression Models

Multivariate Regression Models

Model Mis-specification Analysis

3. Topics in Estimation Methods and Procedures

(EA: Chpt. 15, 16; ETM: Chpt. 7, 8, 9, 10)

Method of Maximum Likelihood Estimation (MLE);

Method of Moments (MOM)/ GMM;

Generalized Least Squares (GLS) Procedure

Instrumental Variable (IV) Estimation (2SLS)

Monte Carlo Simulation

4. Topics in Time Series (if time permitted)

(TSA: Chpt. 3, 5, 8, 15, 21)

Introduction of Stochastic Process

Statistical Properties of Stationary ARMA

Autoregressive Conditional Heteroskedasticity (ARCH) /

Generalized ARCH (GARCH) Models

Stochastic Volatility Models

Non-Stationarity in Time Series

Some related papers (empirical / theoretical) for each topic might be discussed in the class.

Computing SoftWare

There might be several problem sets which require using statistical software for computation. Feel free to use any computing package you prefer. But I would suggest Stata or Matlab. Some popular computing software packages have been installed in the computers in the computer Lab or in Arts' public computing labs. For more information, please consult the Information Systems and Technology (IST) office.

Course Requirements

- Assignments (20%)
- Midterm Exam (30%)
- Final Exam (50%)

Avoidance of Academic Offenses

All students registered in the courses of the Faculty of Arts are expected to know what constitutes an academic offense, to avoid committing academic offenses, and to take responsibility for their academic actions. When the commission of an offense is established, disciplinary penalties will be imposed in accord with Policy #71, Student Academic Discipline. For information on categories of offenses and types of penalties, students are directed to consult the summary of Policy #71, Student Academic Discipline <http://www.adm.uwaterloo.ca/infosec/Policies/policy71.htm>

If you need help in learning how to avoid offenses such as plagiarism, cheating, and double submission, or if you need clarification of aspects of the discipline policy, ask your course instructor for guidance. Other resources regarding the discipline policy are the graduate advisor and the Associate Dean of Graduate Affairs. Students who believe that they have been wrongfully or unjustly penalized have the right to grieve; refer to Policy #70, Student Grievance <http://www.adm.uwaterloo.ca/infosec/Policies/policy70.htm>