University of Waterloo
Department of Economics

Economics 421: Econometric Theory

Winter 2018, 01/03/2017 – 04/04/2018

Instructor Information:

Sining Wang
Office: Hagey Hall 128
Office Hours: 11:45 AM - 1:00 PM, Tue&Thur, **AND** by appointment
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Class Details:

Classroom: EV3 4412
Meeting Time: 10:00 AM - 11:30 AM, Tuesday and Thursday

Textbook:

Principles of Econometrics, 4th Edition. by Hill, Griffiths, and Lim.
If you have an older version of this book, it is ok to use it in this class.

Course Description:

In this course, we will extend the knowledge and skills you learned from the fundamental level econometrics courses (ECON 322 and ECON 323). The goal of this course is to help you develop a **solid** theoretical backgroud in introductory level econometrics. In addition, you will be able to use the learned skills to play with data in quantitative research.As an advanced course in econometric theory, we will use mathematics and statistical tools intensively. Please prepare yourselves to love this course , my dear friends. Through this term, we will cover the learning materials in three sections.

In the first section (week 1 — week 5), we start with a review of some essential concepts in statistics. Then we will go through the simple/multiple regression models. Most of the knowledge in this section should be familiar to you, as you might still remember something from the prerequisite classes. In case you have forgotten everything, don't panic. Please see me to find out a solution.

In the second section (week 6 — week 10), we will extend our discussion in section 1, learn about more modeling issues in regression analyses. Specifically, the topics being covered include functional form, heteroskedasticity, the generalized least square (GLS), weighted least squares (WLS), and indicator variables. If time permitted, we will also discuss some basic ideas in maximum likelihood estimation.

The third section (week 11 — week 14) covers more advanced topics in econometrics, including simultaneous equations, large sample properties of the least square estimator, and time-series analysis. Please see more detailed schedule on **Page 4**.

Grading:

A student's grade will be determined according to the following criteria and percentages.

- In-class quizzes 10%
- Mid-term Exam 1 30%
- Mid-term Exam 2 30%
- Final Exam 30%
- Extra Credits up to 5%

Explanation of the grading criteria:

- In-class quizzes: we will have 6 in-class quizzes through this term. Please see detailed schedule on page 5. Each quiz will take 5- 10 mins. Only five of them will count for your final grade. The lowest one will be dropped.
- Three exams: all of the exams are cumulative (YES, comprehensive). But we will focus on different topics in each.
- Extra credits: there will be an **optional** research project by the end of the term. You may receive up to 5% extra credit based on your performance on the FINISHED project. I'll post the detailed project requirements in week 5.
- No make-up quiz or exam unless you have good and verifiable reason why you could not take the quiz or exam at the scheduled time, and you must promptly inform me and arrange to do the makeup.
- All the quizzes, assignments, and exams are supposed to be tools to collect feedback and to keep all of us on the same page, rather than demons who try to discourage you from becoming a better, well-educated person. Smile.

Economics Department Deferred Final Exam Policy

Deferred Final Exam Policy found at https://uwaterloo.ca/economics/current-undergraduates/policies-and-resources/deferred-final-exam-policy.

Academic integrity, grievance, discipline, appeals and note for students with disabilities:

Academic integrity: In order to maintain a culture of academic integrity, members of the University of Waterloo community are expected to promote honesty, trust, fairness, respect and responsibility. [Check the Office of Academic Integrity for more information.]

Grievance: A student who believes that a decision affecting some aspect of his/her university life has been unfair or unreasonable may have grounds for initiating a grievance. Read Policy 70, Student Petitions and Grievances, Section 4. When in doubt, please be certain to contact the department's administrative assistant who will provide further assistance.

Discipline: A student is expected to know what constitutes academic integrity to avoid committing an academic offence, and to take responsibility for his/her actions. [Check the Office of Academic Integrity for more information.] A student who is unsure whether an action constitutes an offence, or who needs help in learning how to avoid offences (e.g., plagiarism, cheating) or about "rules" for group work/collaboration should seek guidance from the course instructor, academic advisor, or the undergraduate associate dean. For information on categories of offences and types of penalties, students should refer to Policy 71, Student Discipline. For typical penalties, check Guidelines for the Assessment of Penalties.

Appeals: A decision made or penalty imposed under Policy 70, Student Petitions and Grievances (other than a petition) or Policy 71, Student Discipline may be appealed if there is a ground. A student who believes he/she has a ground for an appeal should refer to Policy 72, Student Appeals.

Note for students with disabilities: AccessAbility Services, located in Needles Hall, Room 1132, collaborates with all academic departments to arrange appropriate accommodations for students with disabilities without compromising the academic integrity of the curriculum. If you require academic accommodations to lessen the impact of your disability, please register with AccessAbility Services at the beginning of each academic term.

Tentative Schedule:

(This schedule is subject to change, with prior notification of the Instructor)

WEEK	Topics	Contents
Week 1 Jan 01 – Jan 05	Probability Primer and Fundamental Mathematic tools (Appendix A, B, and C.)	Probability; Distribution Functions, Linear Algebra, Moments
Week 2 Jan 08 – Jan 12	The Simple Regression Model (Chapter 2)	Model Assumptions; Least Square Estimation, Gauss-Markov Theorem
Week 3 Jan 15 – Jan 19	Multiple Regression Model (1) (Chapter 3,4, and 5)	Model Assumptions; Lest Square Estimation, Sampling Properties of the Least Squares Estimator; Hypothesis Tesing, Goodness-of-Fit.
Week 4 Jan 22 – Jan 26	Multiple Regression Model (2) (Chapter 3,4, and 5)	
Week 5 Jan 29 – Feb 02	Exam 1 and Feedbacks	**Exam 1 on January 30th.**
Week 6 Feb 05 – Feb 09	Modeling Issues in Regression Analyses (1) (Chapter 2, 4, 5, 6,7, 8, 16)	Functional Form; Heteroskedasticity; The Generalized Regression Model (GLS); Weighted Least Squares (WLS), Indicator Variables.
Week 7 Feb 12 – Feb 16	Modeling Issues in Regression Analyses (2) (Chapter 2, 4, 5, 6, 8, 16)	
Week 8 Feb 19 – Feb 23	READING WEEK (no classes)	HAPPY HOLIDAY.
Week 9 Feb 26 – Mar 02	Maximum Likelihood Estimation (Chapter 16, Appendix C)	Likelihood Functions; Efficient Estimation; Maximum Likelihood Estimation Examples.
Week 10 Mar 05 – Mar 09	Exam 2 and Feedback	**Exam 2 on March 06th.**
Week 11 Mar 12 – Mar 16	Simultaneous Equations Models (Chapter 11)	Supply and Demand Model; The Reduced-Form Equations; Two-Stage Least Squares Estimation.
Week 12 Mar 19 – Mar 23	Random Regressors and Moment-Based Estimation (Chapter 10)	Linear Regression with Random *x*;The Small/ Large Sample Properties of the Least Square Estimator
Week 13 Mar 26 – Mar 30	Regression with Time-Series Data (Chapter 9,12)	Dynamic Nature of Relationships; Stationarity; Autoregressive Distributed Lag Models; Random Walk Models; Unit Root Test.
Week 14 Apr 02 – Apr 06	Term Review (No class on Thursday)	

Important Dates: Mark your Calendar !

Schedule	Important Dates
Class Begin	Jan 04
Quiz 1	Jan 18
Quiz 2	Jan 25
Exam 1	**Jan 30**
Quiz 3	Feb 15
Quiz 4	Mar 01
Exam 2	**Mar 06**
Quiz 5	Mar 15
Quiz 6	Mar 22
Final Exam	**TBA**

Note: The final exam is scheduled by the registrar's office during the final examination period: April 9 - 24 (inclusive). Travel plans are not an acceptable reason to reschedule final exams.