Res Econ 703: Topics in Advanced Econometric Methods

Instructor: Dr. Emily Yucai Wang (please call me Emily)
Lecture Time: Tuesdays and Thursdays, 1:00pm – 2:15pm
Class Location: Stockbridge Hall, Room 124
Course Website: on Moodle

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Office Hours: Open Door Policy (See Below)

Mid-Term Exam: Tentatively Set on Oct 16th in Class.
Final Exam: TBA

Prerequisites: Res Econ 702 is the ideal prerequisite for this class. At the minimum, a graduate-level course in regression, knowledge of matrix algebra, and an introductory course in statistics are necessary.

Readings: I will provide you with both a set of lecture notes and the slides that I use in class. Lecture Slides will be posted by 8am the day before the intended lecture. Lecture Notes will be posted at most 2 hours after each lecture. In addition to these, there are also several good sources to read up on the material covered in class.

The main textbook for this course is Learning and Practicing Econometrics, by Griffiths, Hill, and Judge. This is the same book used in Res Econ 702. The book can be purchased at Textbook Annex.

There are two companion textbooks that I highly recommend reading:
1. Econometric Analysis of Cross Section and Panel Data by Jeffrey Wooldridge
2. Econometric Analysis by William Greene
These books will become very helpful when we start the nonlinear regression models. Both books thoroughly cover most common econometric models. Note that these books are fairly expensive. You may rent them from Textbook Annex instead of purchasing. Or alternatively you could purchase older editions of the books, which run much cheaper. If you are significantly financially constrained, please let me know.

Objectives: This course introduces advanced statistical theory and tools for estimating and testing models, evaluating policy changes quantitatively, and more generally studying the relation between economic variables. The goal is to learn enough theory and get enough practice to be able to conduct sensible economic analysis. To do this, you have to understand when you should use one tool rather than another. This requires not only a good understanding of the technical details but also the ability to operate some statistical software.

Office Hour: Given past experience, open door policy seems to work better given graduate students’ busy lives and other scheduling needs. So, if my office door is open, feel free to come in and talk. However, I do reserve the right to re-schedule the appointment.
Grading: Grades will be determined by three components:

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<th>component</th>
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<tr>
<td>Problem Sets</td>
<td>35%</td>
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<td>Mid Term Exam</td>
<td>30%</td>
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<td>Final Exam</td>
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1. Problem Sets:

I believe the best way to get a good handle on econometrics is through practice. Hence, there will be 5 problem sets throughout the semester, all of them are long. Homeworks will be topic based. That is, they will be posted at the beginning of each topic and will be collected a week after the conclusion of the topic. All problem sets will be due at the beginning of the class, prior to the start of the lecture. Please note that no late homework will be accepted except under extraordinary circumstances.

Statistical tools such as STATA and SAS have become not only essential to good economic researches but also to successful job searches. Whereas Res Econ 702 concentrates on developing skills in SAS, here we will introduce and develop a set of sufficient skills in operating STATA and Matlab. To that end, some problem sets will require the use of STATA and/or Matlab. You may choose to use other statistical software, but I will not be assigning partial credit should you choose to do so.

I encourage healthy discussions in class and out of class. Feel free to discuss lecture materials and homework questions amongst yourselves. To learn the concepts well, I encourage you to work out each problem by yourself. However, you may choose to form groups of 2 or 3 when doing your homework.

2. Exams: The mid-term exam will cover classical linear regression models. The final will be comprehensive but will focus more on nonlinear models. Exams will be quite difficult and they will cover questions they you do not see on the homeworks.
Course Outline:

**Topic 1: Single Equation Linear Models (1 Homework Set)**
- Ordinary Least Squares
- Endogeneity Issues
- Heteroskedasticity & Autocorrelation
- Panel Data Model

**Topic 2: System of Equations Linear Models (1 Homework Set)**
- Seemingly Unrelated Regressions
- Feasible GLS
- Single Equation Estimation
- Full System Estimation

**Topic 3: Maximum Likelihood Estimation (2 Homework Sets)**
- Likelihood Functions
- Identification
- Probit & Logit
- Conditional Logit
- Mixed Logit
- Hypothesis & Specification Tests

**Topic 4: Nonlinear Least Squares & GMM (1 Homework Set)**
- Nonlinear Least Squares Estimator
- Nonlinear GMM

**Topic 5: Semi-parametric & Non-parametric Regression Methods (No Homework)**