Johns Hopkins University
Zanvyl Krieger School of Arts and Sciences
Advanced Academic Program in Applied Economics

Syllabus
Microeconometrics 440.618
Spring 2017

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Office Hours: as needed via Adobe Connect (e-mail me in advance to set up a time)

I. Course Description

This course covers a number of advanced techniques frequently encountered in applied microeconomic analysis. Topics include asymptotic theory, hypothesis testing, proxy and instrumental variables, systems of equations, simultaneous equation models, panel data models, difference-in-differences techniques, measurement error, nonlinear regression, bootstrapping, maximum likelihood estimation, limited dependent variable analysis, and generalized method of moments estimation. This course is taught at a level that assumes comfort with the course content in 440.304 Mathematical Methods for Economists, 440.605 Statistics, and 440.606 Econometrics.

II. Course Goals and Learning Objectives

In this course you will develop an understanding of what econometric procedures are available for a given estimation problem; recognize the circumstances under which it is appropriate to apply a given procedure; gain familiarity with the assumptions under which each procedure is valid; and learn how to practically implement each procedure using statistical software. You will be evaluated based on weekly problem sets and a final presentation. There are no exams, but recognize that the problem sets and presentation will be very time-consuming. Per JHU guidelines, in order to be successful you should expect this course to require **15-20 hours** per week of your time.

III. Course Materials and Requirements

All lecture video links, lecture slides, handouts, data sets, problem sets, and problem set solutions will be posted on the course web site arranged in weekly modules under the *Lessons* tab. Please regularly check the *Announcements* window on the course website for any updates.

Technology Requirements. This course requires the use of an internet-enabled computer with a text editor (e.g., Word), presentation slide editor (e.g., PowerPoint), and browser (e.g., Firefox) of your choice. The computer must be able to record audio for the final presentation. If you are new to Blackboard, see the Blackboard Student Orientation course on your "My Institution" page.

Text. The required text for this course is Wooldridge's *Econometric Analysis of Cross Section and Panel Data, 2nd ed.* (ISBN: 978-0-262-23258-6). All of the concepts necessary for this course will

be covered in detail during lecture. However, the text will be a critical reference for you as the lectures will parallel the text, albeit in a somewhat different order. The text will be complemented with handouts that clarify some of the lengthier mathematical derivations.

Grading. Grades will be based on weekly problem sets (80%) and a final presentation (20%). Given the difficulty of the problem sets there is no expectation that all questions will be answered correctly; there is, however, an expectation that all questions will be faithfully *attempted*. The possible final grades are A (83%-100%), A- (75%-82%), B+ (67%-74%), B (58%-66%), B- (50%-57%), C, and F. The lowest passing grade acknowledged in this program is a B-.

Problem Sets. The problem set for a given week will be posted at 12:01 am Eastern Time Wednesday and is due by 6:00 pm Eastern Time the following Thursday (i.e., eight days later). You may find it helpful to discuss the problem sets with other students, but each student must submit his/her own solutions. You may turn in one late problem set during the semester; afterward, late problem sets will not be accepted unless an explicit, one-time exception is made by the instructor for a unique circumstance.

Each problem set should be submitted via the *Blackboard* assignment feature and should be comprised of three files. The first file is a set of solutions (hand-written or typed, your choice). This is a stand-alone document: it should not include any programming code or automatically-generated software tables. If the problem asks for a mathematical result, show all of the steps; if the problem asks for an explanation, use your own words; if the problem asks for econometric estimates or test results, describe what you did and what results you found; if you get stuck, explain *why* you are stuck. (Put more simply: the objective behind everything you write is to demonstrate that you know what you are talking about.) The second and third files of your problem set submission are your programming code and log file, respectively. All submissions should be in .pdf form and should include your last name in the file name.

After the submission of each problem set, my solutions will be made available and each student will receive brief feedback under the *My Grades* tab on *Blackboard*.

Given the complexity of the material, this course is intentionally designed to be very practice-heavy. The problem sets are difficult and they are not designed with the expectation that all of the problems will be answered correctly. When I grade your problem sets, the general rule I follow is to assign full credit for each part of a question answered correctly and partial credit for each part of a question answered incorrectly but thoughtfully. By "correctly" I mean that the essential point of the question was addressed properly even if all of the algebraic or coding details were not perfect; by "thoughtfully" I mean that there is a written record of a serious thought process, even if that process led you down the wrong path.

Discussion Threads. Each week there will be a discussion thread inside that week's learning module for asking questions about the problem sets in particular and the course material in general. Simply hit "Reply" to participate. Students will find it helpful to check the thread daily but there is no participation requirement. Aside from the given that all postings should have a respectful tone, it is important that students neither request nor give explicit solutions to a given problem on the problem set. It is fine to write "I found it useful to set up the problem this way..." or "the formula for X was helpful here."

If a student has a personal question or concern, he or she should e-mail me directly and will receive a response within 48 hours.

Software. Each problem set includes exercises that require the use of statistical software. The recommended software for this course is SAS v. 9.4. Free remote access is available online through SAS OnDemand for Academics; unfortunately, students cannot purchase SAS licenses through JHU for installation on a non-JHU owned computer. Although not encouraged, you are permitted to use a different statistical software (e.g., Stata, R, etc.) if you have prior expertise with that software. Note, however, that my ability to advise you regarding the coding syntax of software other than SAS will be limited.

To set up a SAS OnDemand account, go to the SAS registration page and then link to my course using this enrollment link. From the "Dashboard" page, launch SAS Studio—it may take a few seconds to fully load—and you should see a folder structure on the left and a large window with the tabs "Code," "Log", and "Results."

Presentation. Each student is responsible for a 20-minute presentation of a published, peer-reviewed applied econometrics article of their choosing (subject to my approval) that uses the Generalized Method of Moments (GMM). The article should not be an econometric theory article about GMM as an estimation method; rather, it should be about a topic of personal interest to you (e.g., development, industrial organization, labor, public finance, etc.) that answers a research question in that field using GMM estimation. Each student will record his/her presentation using the web-based presentation software *VoiceThread* and post it to the course website during the final week of class. The presentation will use slides and should describe the economic question of interest, the econometric model and any issues inherent to the economic problem, the available data, and the results. It should also provide a critique of the model and estimation, with an explanation of what was done well and what improvements could be made. Once all of the presentations are posted, each student will view the presentation of another randomly-assigned student and provide three questions. Grades will be based on the clarity of presentation, demonstrated grasp of the material, and ability to pose and answer questions.

IV. University Policies

General. This course adheres to all University policies described in the academic catalog. Please pay close attention to the following policies:

Students with Disabilities. Johns Hopkins University is committed to providing reasonable and appropriate accommodations to students with disabilities. Students with documented disabilities should contact the coordinator listed on the Disability Accommodations page. Further information and a link to the Student Request for Accommodation form can also be found on the Disability Accommodations page.

Ethics & Plagiarism. JHU Ethics Statement: The strength of the university depends on academic and personal integrity. In this course, you must be honest and truthful. Ethical violations include cheating on exams, plagiarism, reuse of assignments, improper use of the Internet and electronic devices, unauthorized collaboration, alteration of graded assignments, forgery and falsification, lying, facilitating academic dishonesty, and unfair competition. Report any violations you witness to the instructor. Read and adhere to JHUs Notice on Plagiarism.

Dropping the Course. You are responsible for understanding the universitys policies and procedures regarding withdrawing from courses found in the current catalog. You should be aware of the current deadlines according to the Academic Calendar.

Getting Help. You have a variety of methods to get help. Please consult the help listed in the "Blackboard Help" link in the online classroom for important information. **If you encounter technical difficulty in completing or submitting any online assessment, please immediately contact the designated help desk listed on the AAP online support page. Also, contact your instructor at the email address listed atop this syllabus.**

Week	Material	Requirement[†]
0. (Before Jan. 12)	Course Introduction, SAS Software, and Linear Algebra Review	
1. (Jan. 12 - Jan. 18)	*Lecture 1.* Foundations of Microeconometrics Readings: Wooldridge Chapters 1, 2 (except 2.2.5), 3, 4.2.1, 4.2.2	Wk. 1 Problem Set due Jan. 19th 6:00 pm
2. (Jan. 19 - Jan. 25)	*Lecture 2.* Asymptotic Standard Errors and Hypothesis Testing Readings: Wooldridge Chapters 4.2.3, 4.2.4, 6.3.3, 6.3.4	Wk. 2 Problem Set due Jan 26th 6:00 pm
3. (Jan. 26 - Feb. 1)	*Lecture 3.* Addressing Endogeneity with Proxy and Instrumental Variables (IV) Readings: Wooldridge Chapters 4.1, 4.3.1, 4.3.2, 5, 6.1, 6.2, 6.3.1, 6.3.2	Wk. 3 Problem Set due Feb. 2nd 6:00 pm
4. (Feb. 2 - Feb. 8)	*Lecture 4.* Linear Systems of Equations (SOLS, FGLS, 2SLS, and 3SLS) Readings: Wooldridge Chapters 7.1-7.7, 8.1, 8.2, 8.4, 8.7	Wk. 4 Problem Set due Feb. 9th 6:00 pm
5. (Feb. 9 - Feb. 15)	*Lecture 5.* Identification in Simultaneous Equations Models (SEMs) Readings: Wooldridge Chapter 9	Wk. 5 Problem Set due Feb. 16th 6:00 pm
6. (Feb. 16 - Feb. 22)	*Lecture 6.* Linear Panel Data Models I (POLS and FE) Readings: Wooldridge Chapters 7.8, 10.1-10.3, 10.5	Submit copy of GMM paper and post *VoiceThread* Haiku
7. (Feb. 23 - Mar. 2)	*Lecture 7.* Linear Panel Data Models II (FD and FGLS) Readings: Wooldridge Chapters 10.4, 10.6, 10.7	Wks. 6/7 Problem Set due Mar. 2nd 6:00 pm
8. (Mar. 2 - Mar. 8)	*Lecture 8.* Other Topics in Linear Estimation Readings: Wooldridge Chapters 4.4, 6.5, 8.6, 10.5.6, 10.6.4, 11.2-11.5, 11.7.1, 12.8	Wk. 8 Problem Set due Mar. 9th 6:00 pm
9. (Mar. 9 - Mar. 16)	*Lecture 9.* Nonlinear Least Squares (NLS) Readings: Wooldridge Chapters 2.2.5, 12.1-12.7, 12.9	Wk. 9 Problem Set due Mar. 16th 6:00 pm
10. (Mar. 16 - Mar. 29)	*Lecture 10.* Maximum Likelihood Estimation (MLE): Probit and Logit Readings: Wooldridge Chapters 13.1-13.7, 13.10, 13.11.1-13.11.3, 15.1-15.6, 15.7.1, 15.7.4	Wk. 10 Problem Set due Mar. 30th 6:00 pm
Mar. 17 (Fri.)	**Last day to drop**	
Mar. 20 - Mar. 26	**Spring Break**	
11. (Mar. 30 - Apr. 5)	*Lecture 11.* Binary Response Models: Systems, Endogeneity, and Panel Data Readings: Wooldridge Chapters 13.8, 13.9, 13.11.4, 15.7.2-15.7.3, 15.8.1-15.8.5	Wk. 11 Problem Set due Apr. 6th 6:00 pm
12. (Apr. 6 - Apr. 12)	*Lecture 12.* Multinomial and Ordered Response Models Readings: Wooldridge Chapter 16	Wk. 12 Problem Set due Apr. 13th 6:00 pm
13. (Apr. 13 - Apr. 19)	*Lecture 13.* Tobit and Count Models Readings: Wooldridge Chapter 17	Wk. 13 Problem Set due Apr. 20th 6:00 pm
14. (Apr. 20 - Apr. 24)	*Lecture 14.* Generalized Method of Moments (GMM) Readings: Wooldridge Chapters 8.3, 8.5, 11.1, 11.6, 14.1-14.4, 14.6.1	
14. (Apr. 25th)	**VoiceThread presentation of GMM article posted by 6:00 pm**	*VoiceThread* posting
14. (Apr. 26th)	**Presentation questions posted by 6:00 pm**	*VoiceThread* posting
14. (Apr. 27th)	**Response to presentation questions posted by 6:00 pm**	*VoiceThread* posting

[†] All times refer to Eastern Time.