**Spring 2021 – Economics 385: Econometrics[[1]](#footnote-1)**

**Professor Jun He**

**Monday and Wednesday 11:10 AM-12:30 PM (EST)**

**Student Hours:** Friday 4.30-6.00 pm EST

**Contact Info:** [**jhe03@wesleyan.edu**](mailto:jhe03@wesleyan.edu)

# General Course Information

Econometrics is the study of statistical techniques for analyzing economic data. Students are expected to learn from this course features of multiple regressions and the fundamental assumptions. Through participating in lectures, accomplishing assignments, and producing an independent research project, students should master how to properly apply econometric tools to find the causal relationship between the dependent variable and the variable of interest as well as how to justify such application with economic intuitions.

The teaching goals of this course include four aspects:

1. Fundamental assumptions: Students are expected to develop a solid understanding of the MLR assumptions, problems from violation of these assumptions, and how to rectify these problems with econometric tools or economic reasoning. This goal is achieved by mathematical derivation of the least square coefficients with the focus on cross-sectional regression. Mastery of this knowledge will be assessed by HM and exam.
2. Inferences: Students are expected to obtain a clear understanding of statistical inferences and more importantly, causal inference. Specifically, students should be able to find the corresponding randomized experiment, discover the possible confounding variables, and rectify the endogeneity problem with control variables and other advanced techniques. Such abilities are developed mainly through class discussions and examples. Mastery of inferences will be assessed through the verbal reasoning in the writing project.
3. Advanced techniques: dummy variable and its panel-data applications (diff-in-diff, fixed effect); Instrumental variables. The mastery of such techniques is assessed primarily by problem sets.[[2]](#footnote-2)
4. Software: I will introduce how to apply the above knowledge to research by leading students through several STATA examples. The assessment of mastery of STATA includes Computer HM, problem set, and the final project.

For this course, basic knowledge of calculus (unconstrained optimization) is necessary. Mastery of statistics (t-test, F-test, OLS) is preferred.

# Assignments and Credit

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| --- | --- |
| Cengage HM 15% | Research paper |
| Computer HM 10% | --Proposal 5% |
| Midterm Exam 20% | --Final Paper 20% |
| Problem Sets 25% | --Peer Review\*2 2%+3% |

# Readings

Required text: Jeffrey Wooldridge, *Introductory Econometrics: A Modern Approach*, 7th edition, ISBN 978-1-337-55886-0. (With access code to *Cengage* *MindTap*)

Supplemental text: Peter Kennedy, *A Guide to Econometrics*, 6th edition, ISBN 978-1405182577.

Stock and Watson, Introduction to Econometrics, 4th Edition. Pearson. ISBN 978-0134543826

The focus of lectures will be on the Wooldridge textbook, which provides a detailed elaboration of theories and applications. Some chapters of the Watson textbook will be adopted in demonstrating panel data methods (but purchase is not necessary). The Kennedy textbook, which targets econometrics of a higher-level degree of education, can function as a reference tool. You will find all other course-related materials, such as suggested videos, supplemental readings, and assignments posted on MindTap (integrated to Moodle), the online learning system that comes with the Wooldridge textbook. Therefore, you are required to (at least) purchase the access code for the latest version of the Wooldridge book.

# Class Participation

Lectures will be delivered through [Zoom](https://wesleyan.zoom.us/j/99995682333?pwd=OUdNZ1Q2RGEyd3c2THFCRjB6alppQT09) (password: 654321). I will normally arrive 5 minutes in advance and stay for 5 more minutes after class for questions. Students are required to attend the synchronistic meeting (absences will only be pardoned for legitimate reasons, which should be reported to the instructor promptly). Any student who attends class infrequently may be assessed a grade penalty for poor class participation. I also consider pertinent questions posed during the student hours or via emails as engagement. You are encouraged to preview assigned readings before class. You should understand that in class, I will focus on the most important topics as well as on those that are more difficult to comprehend.

# Cengage HM & Computer HM

Homework and computer homework are assigned periodically through *Cengage* *MindTap*. They serve several purposes: to review and extend concepts from the lecture or the notes, to provide feedback on your comprehension of the material to date, and to ensure that you will master necessary STATA skills. *Note: some problem sets may occasionally cover material before it is covered in class*.

Each assignment will allow three attempts. Hints are available as you work through the assignments. Late submissions are subject to a deduction of 10% per day. The deduction can be waived on a case-by-case basis (if reasonable excuses for late submission are accepted). If you experience difficulties, please let me know promptly.

Collaboration (on both assignments and the research paper) is welcomed. But you must submit your own individual set. You may seek help from your peer, classmates, course assistant, and QAC.

# Problem Sets

Problem sets include 2 parts: 1. 10 Pop-up questions that I leave as exercise questions or extensive thinking problems. These questions will appear randomly in class. 2. Homework problem sets such as math derivations and practical problems.

# Supportive Resources

***Moodle***: Supplemental materials (lecture outlines, lecture recordings, slides, answer keys to assignments, sample and guidance for writing) will be posted on Moodle. Announcements will also be posted through Moodle.

***Writing***: If you would like assistance with your writing, consult with the Writing Workshop (detailed information on https://www.wesleyan.edu/writing/writingworkshop/index.html).

***Software***: Some assignments (and the research project) will require the use of Stata, which is available in the data labs on campus. Assistance for Stata programming may be available from the QAC Tutors. Check https://www.wesleyan.edu/qac/ for detailed information. I also plan to hold several software workshops if needed.

***Student hours***: I will be standing by on [Zoom](https://wesleyan.zoom.us/j/5832430934) (no password, different from the lecture zoom) during the time of office hours. If that time does not work for you, you can email me to request individual online meetings. If there is any appeal of a grade, it cannot happen later than a week after the date when the grade was posted.

***Course Assistant***: Questions are suggested to be brought up primarily to the course assistant, Sophia Song. She can be reached by email, [ssong@wesleyan.edu](mailto:ssong@wesleyan.edu). She will hold her office hour on [Zoom](https://wesleyan.zoom.us/j/3810767777) every Monday, 7.30-8.30 pm EST.

# Exams

There is an in-class mid-term exam only. It will be closed-book and cumulative.

# Research Paper

A major goal of this course is to tour each student through the regular process of producing a well-written, carefully constructed, original piece of econometric research as well as the process of revising and presenting it. I include the peer review process to motivate interaction and collaboration among peers, exchange and improvement of ideas while promoting communicative skills.

The analysis employed in the paper should be using empirical techniques from this course. Excellent papers will take a creative approach towards an interesting topic and may form part of a thesis. Students who want to write a paper related to another elective should speak with me and the other professor as early as possible to obtain permission.

The research project has two stages: a peer-reviewed proposal, and a peer-reviewed final submission.

***Peer Review:*** You are required to find your review peer from this class before Mar. 15th. Your review peer is suggested to be the classmate that you normally collaborate with or the one with the research interest in the same field as yours. You and your review peer are expected to review the proposal and final paper, help each other improve writing as well as the economic logic of your paper. I will demand a 1-page review log (no more than 2 pages for the review log of the final paper) for the proposal and the final paper each, which will count as your own peer review grades.

***Proposal*:** A 2-3 page prospectus is to be uploaded to an assignment folder in the course Moodle no later than noon on Mar. 24th. It should include a brief discussion of your topic, related citations (from academic research), data description and summary, and some discussion of the proposed econometric techniques. *Ideally, all relevant data will have been collected before this assignment is due.* (Note: do not print out your data set; I am simply seeking evidence that you can implement your proposed project.)

***Every student is expected to meet with me at least once before or after the submission of the proposal to ensure the smooth progress of this research project.***

***Final paper:*** Papers are due no later than 5 pm on May 12th (the last day of the class). All students can have an extension without a penalty until 11:59 pm on May 17th (the last day of the reading period). The evaluation will be based primarily on the quality of economic analyses in the paper. However, I expect your paper to be well-written and free of any grammatical, logical, or spelling errors. Low-quality writing will cause deductions in scores.

***Format:*** Your paper will be an in-depth exploration of any topic in empirical economics. The final paper will be about 6-12 pages long (not including references, appendices, or exhibits), single-spaced, *Times New Roman*, font size 12, with the standard 1-inch margins. (Note: all written documents should follow this formatting.) Excessive length is generally detrimental to the quality of your work. The “Hockey paper” stands as a reference of format and structure.

***Submission:*** The proposal and peer review log will be submitted electronically to a Turnitin assignment folder in Moodle and marked-up copies of your proposals will be returned via Moodle as well. The final paper should be submitted electronically to the Turnitin folder in Moodle (automatically checking for plagiarism). All written projects should be uploaded in pdf format. ***Please do not email me any of these files.*** **Late submissions are penalized at the rate of half a letter grade per late day.**

***Prize:*** All final papers that earn a grade of A+ (100) will be eligible for consideration for the department’s *Lebergott-Lovell* Prize, which is awarded annually to the best paper written in the current academic year that uses econometric techniques to analyze an economic problem. However, any paper that forms part of an honors thesis or senior essay is automatically excluded from consideration for the prize. The 3-person committee is chaired by the fall econometrics instructor (*Aka Moi*).

# Grade Criterion

Any grading-related questions must be imposed within a week after the announcement of this grade. Disputes submitted exceeding this deadline are subject to automatic rejection.

The final letter grades will be dependent on the weighted sum of all your performances. The conversion of grades will be given based on <https://www.wesleyan.edu/registrar/general_information/GPA_calculation.html>. A+ will only be given to students who excel in all categories (above 95/100 for each).

# Grade Options

Students have the option of Cr/U, but please be advised that if this course is for thesis consideration, PBK (*Phi Beta Kappa*) and ODE (*Omicron Delta Epsilon*- Economic Honor Society), this course has to be letter-graded. The deadline for taking the Cr/U option is 5 pm Mar. 2nd. The withdrawal deadline for a full semester course is May 5th.

# Course Outline

Below is a list of topics that the course plans to cover and approximate dates for each topic. This outline is meant to be a rough guide only and subject to change. The required readings are almost entirely from the Wooldridge textbook.

**Date Topics**

**Module 1. Cross Section**

**Week 1:** Syllabus and expectations; Why study econometrics?

Introduction to Econometrics (Chpt 1)

STATA/R tutorial on Cengage

**Week 2:** The structure of economic data (Chpt 1); Simple linear regression (Chpt 2)

HM 1 on Chapter 1; CHM 1

**Week 3:** Review on Statistics (Appendix B): Expected value, variance, and distributions

Problem set 1

**Week 4:** Simple linear regression (continued); Multiple regression (Chpt 3)

HM 2 on Chapter 2, CHM 2

**Week 5:** Multiple regression continued (Omitted variable bias)

HM 3 on Chapter 3, CHM 3

Prepare proposal and find a research peer

**Week 6:** Hypothesis testing and confidence interval (Chapter 4, Appendix C.5-C.6)

Proofread and submit the proposal

Problem set 2

**Week 7:** Testing restrictions: F test and LM test (Chapter 4 continued, Appendix C.6)

HM 4 on Chapter 4, CHM 4

**Week 8:** Heteroskedasticity (Chapter 8); Matrix Algebra form of OLS (Appendix D, E)

HM 8, CHM 8

**Week 9:** Further issues in econometrics inferences, dummy variable (Chapter 7)

HM 7, CHM 7

**Module 2. Panel Data**

**Week 10:** Review and Midterm: Cross-Section regression

**Week 11:** Difference-in-difference (Chapter 13)

Problem set 3

**Week 12:**  Fixed effect (Chapter 14)

Problem set 4

**Week 13:** Instrumental Variable (Chapter 15)

Problem set 5

**Week 14: Term paper Submission, Final grades posted**

Please note that the focal point of this course is to set a solid foundation of econometrics through the teaching of cross-section econometrics. The realization of Module 2 is contingent on the pace of this course. However, if your paper involves panel data analysis, please feel free to contact me. I will share learning resources and provide individual assistance.

# Covid-19 Code of Conduct

To protect your health and safety, the health and safety of instructors and staff, and the health and safety of your peers, all students must understand and adhere to the [Covid-19 Code of Conduct](https://www.wesleyan.edu/academics/reactivating/campus-life/code-of-conduct.html). Students are encouraged to review the code of conduct regularly to stay up to date on the current code.

# Time Commitment

While the exact time commitment for the class will vary individually and over the course of the semester, I recommend that you budget approximately three out-of-class hours for every class hour to complete the reading, assignments, homework, and project. I have designed the class so that it should be feasible to satisfactorily complete the requirements with approximately twelve hours per week of time commitment. If you are spending more time than this on a regular basis, I encourage you to check in with me.

# Accommodation Statement

Wesleyan University is committed to ensuring that all qualified students with disabilities are afforded an equal opportunity to participate in, and benefit from, its programs and services. To receive accommodations, a student must have a disability as defined by the ADA. Since accommodations may require early planning and generally are not provided retroactively, please contact Accessibility Services as soon as possible.

If you have a disability or think that you might have a disability, please contact Accessibility Services in order to arrange an appointment to discuss your needs and the process for requesting accommodations. Accessibility Services is located in North College, rooms 021/218, or can be reached by email (accessibility@wesleyan.edu) or phone (860-685-2332).

# Religious Observances

Faculty make every effort to deal reasonably and fairly with all students who, because of religious obligations, have conflicts with scheduled exams, assignments, or required assignments/attendance. If this applies to you, please speak with me directly as soon as possible at the beginning of the term.

# Classroom Behavior

Students and faculty each have responsibility for maintaining an appropriate learning environment. Those who fail to adhere to such behavioral standards may be subject to discipline. Professional courtesy and sensitivity are especially important with respect to individuals and topics dealing with differences of race, color, culture, religion, creed, politics, veteran’s status, sexual orientation, gender, gender identity and gender expression, age, ability, and nationality. Class rosters are provided to the instructor with the student's legal name. I will gladly honor your request to address you by an alternate name or gender pronoun. Please advise me of this preference early in the semester so that I may make appropriate changes to my records. For more information, see the policies on the student code.

# Discrimination and Harassment

Wesleyan University is committed to maintaining a positive learning, working, and living environment. Wesleyan will not tolerate acts of discrimination or harassment based upon Protected Classes or related retaliation against or by any employee or student. For purposes of this Wesleyan policy, "Protected Classes" refers to race, color, national origin, sex, pregnancy, age, disability, creed, religion, sexual orientation, gender identity, gender expression, veteran status, political affiliation or political philosophy. Individuals who believe they have been discriminated against should contact the Office for Equity and Inclusion at 860-685-4771. The responsibility of the University Members has more information.

# Honor Code

All students of Wesleyan University are responsible for knowing and adhering to the Honor Code of this institution. Violations of this policy may include cheating, plagiarism, the aid of academic dishonesty, fabrication, lying, bribery, and threatening behavior. All incidents of academic misconduct shall be reported to the Honor Code Council – Office of Student Affairs. Students who are found to be in violation of the academic integrity policy will be subject to both academic sanctions from the faculty member and non-academic sanctions (including but not limited to university probation, suspension, or expulsion). The Office of Student Affairs has more information.

1. This is a tentative syllabus. As the university provost suggested: “A syllabus need not spell out all such details, but should help students understand how and where to access the information and resources they will need in order to participate fully. A syllabus shall not be taken to preclude flexibility, adaptation, and adjustments, so long as such revisions are clearly communicated and do not introduce additional significant burdens on students. The syllabus shall offer a descriptive overview of the course, and orient students to appropriate details (such as scheduling, materials, assignment structure, expectations and evaluation criteria, policies, resources, etc.).” [↑](#footnote-ref-1)
2. Accomplishment of the third teaching goal is contingent on the pace of this course. [↑](#footnote-ref-2)