

Econometrics II

Econ 423

University of Maryland

MW 6:00pm-9:10pm, Tydings 2102

1 Course Info

Instructor: Seth Murray

- Office: Tydings 5104
- Office Hours: MW 4:50pm-5:50pm, or by appointment
- Email: murray@econ.umd.edu
- Communication: The best way to contact me is during my office hours since it allows for more in-depth discussions. You can also send me an email. **When sending emails, please include in the subject line *ECON423*.** Also note that, if the answer is complicated, I may respond to your email by asking that you come to my office hours instead. If you cannot make it to my office hours because of a scheduling conflict, then email me and we will schedule a meeting.

Course Website: myelms.umd.edu/courses/1264770

Prerequisites: Minimum grade of C- in ECON 422 or equivalent and enrollment in the Economics Bachelor of Science program.

Required Textbook: Wooldrige, J.M. (2016) *Introductory Econometrics – A Modern Approach*, 6th Edition, Cengage Learning.

Complementary Textbook: Angrist, Joshua D. and Jorn-Steffen Pischke (2015): *Mastering Metrics: The Path from Cause to Effect*, Princeton University Press.

Tutoring: If you need tutoring for this class, please check the availability of tutors at www.econ.umd.edu/undergraduate/tutoring

Class Rules and Policies: It is our shared responsibility to know and abide by the University of Maryland's policies that relate to all courses, including academic integrity, student and instructor conduct, accessibility and accommodations, attendance and excused absences, and grades and appeals. Please visit www.ugst.umd.edu/courserelatedpolicies.html for the Office of Undergraduate Studies' full list of campus-wide policies and follow up with me if you have questions.

2 Course Goals

This course looks beyond both ordinary least squares and the linear regression model that are covered in introductory econometrics classes. Much economic data gathering does not satisfy the strong assumptions required to justify OLS estimation and many economic problems are better cast in non-linear models. Examples include labor force participation decisions, consumer choice between different brands of a product, and household income and consumption surveys stretching over several years. In this course more advanced statistical models are covered that are needed to analyze these types of data and to make causal inferences from the data, including instrumental variables,

difference-in-differences, regression discontinuity, and selection on observables and unobservables. The course also covers discrete choice models and censored or truncated regression models. The emphasis of the course is on i) understanding the need for the various methods, ii) being able to apply them to data, and iii) interpreting of the results of these methods.

3 Exams and Homework

3.1 Homework & Empirical Projects

The homework for the class will consist of a combination of empirical projects, paper summaries, and a set of mini-homeworks. Collaboration on homework is allowed and encouraged, however, make sure you write up your answers individually (i.e. don't copy some else's homework verbatim).

Homework (25% of total grade): Mini-homeworks will be assigned periodically throughout the course. Paper Summaries (with the exception of the first one) are due at 9:00pm the evening before the paper discussion. The Paper Summaries will include:

1. Dale and Krueger, *Estimating the payoff to attending a more selective college: An application of selection on observables and unobservables*. (2002) **Due** 4:00pm Wednesday, July 10th
2. Eissa and Liebman, *Labor supply response to the earned income tax credit*. (1996) **Due** 9:00pm Sunday, July 14th
3. Ashenfelter and Krueger, *Estimates of the economic return to schooling from a new sample of twins*. (1994) **Due** 9:00pm Tuesday, July 16th
4. Acemoglu, Johnson, and Robinson, *The colonial origins of comparative development: An empirical investigation*. (2001) **Due** 9:00pm Sunday, July 21st
5. Chetty, Hendren, and Katz, *The effects of exposure to better neighborhoods on children: New evidence from the Moving to Opportunity experiment*. (2016) **Due** 9:00pm Tuesday, July 23
6. Tuttle, *Snapping back: Food stamp bans and criminal recidivism*. (2019) **Due** 9:00pm Tuesday, July 30th
7. Sunday, August 4th, 9:00pm - Your own research paper idea

Empirical Projects (30% of total grade): The empirical projects require written answers as well as a copy of the computer program and log file you used to answer the questions.

1. Difference-in-Differences (Diff-in-Diff): Due Tuesday July 23rd 9:00pm (10%)
2. Instrumental Variables (IV): Due Thursday, August 1st, 9pm (10%)
3. Regression Discontinuity (RD): Due Saturday, August 10th, 9pm (10%)

3.2 Exams

There will be a mid-term and a final exam, both of which will be in class, closed book exams. You should bring a calculator with you to the exam. Any form of collaboration during the exams or use of unauthorized materials is strictly forbidden.

- Mid-term Exam: Monday, July 29th (20% of total grade)
- Final Exam: Cumulative (covers all class topics) Wednesday, August 14th (25% of total grade)

4 Grading

Your grade is determined by your performance on the exams homeworks, and empirical projects in the course and is assigned individually (not curved). If you have particular goals for this course that are important to you, please speak with me at the beginning of the semester so that I can offer some helpful suggestions for achieving your goals. Your exam and homework scores will be posted on the course ELMS website. If you would like to review any of your grades (including the exams), or have questions about how something was scored, please email me to schedule a time for us to meet in my office. Late work will not be accepted for course credit so please plan to have it submitted well before the scheduled deadline. I am happy to discuss any of your grades with you, and if I have made a mistake I will immediately correct it. Any formal grade disputes must be submitted in writing and within one week of receiving the grade.

5 Course Outline

1. Review: Review of univariate and multivariate OLS, hypothesis testing, and relevant statistical methods
Wooldridge: 1 (all), 2 (all, read twice 2.2 and 2.5), 3.1-3.4, 4.1-4.6 (read twice 4.2.b,c,d,e and 4.5), 5.1
2. Introduction to Causal Estimation: Causal estimation and bias, Reuben causal model, directed acyclic graphs, selection on observables, bad controls.
Wooldridge: 3.3(read twice) , 6.3.c,d, 9.2-9.5 (read 9.4 twice)
Discussion paper: Dale and Krueger (2002)
3. Panel Data: Panel data, omitted variable bias, difference-in-differences, serial correlation and clustered standard errors.
Wooldridge: 13 (read twice 13.4) and 14
Discussion paper: Eissa and Liebman (1996)
4. Instrumental Variables Part I: Instrumental variables, measurement error, omitted variable bias
Wooldridge: 15 (read twice the initial section of 15.1, 15.2, and 15.3a)
Discussion paper: Ashenfelter and Krueger (1994)
5. Instrumental Variables Part II: Instrumental variables (continued), simultaneity bias, heterogeneous treatment effects, local average treatment effects (LATE), weak instruments.
Wooldridge: 16 (read twice 16.2 and 16.3a)
Discussion paper: Acemoglu et al. (2001)
6. Randomized Control Experiments: Experiments, power, attrition bias, compliance, intent-to-treat
Angrist and Pischke: Chapter 1 (all, including "From Daniel to R.A. Fisher")
Discussion Paper: Chetty et al. (2016)
7. Regression Discontinuity: Regression Discontinuity
Angrist and Pischke: Chapter 4 (all)
Discussion Paper: Tuttle (2019)
8. Heckit, Tobit, Probit, Logit: Models of sample selection (Heckit, Tobit), binary response models (probit and logit), maximum likelihood estimation
Wooldridge: 17 (all)
9. Time-Series: Time series data, auto-regressive and moving average processes, cointegration, vector auto regressions. Wooldridge: 10 (all), 11 (all), 18.3, 18.4

6 Course Outline

1. Monday, July 8th: Review of univariate and multivariate OLS, hypothesis testing, and relevant statistical methods
Wooldridge: 1 (all), 2 (all, read twice 2.2 and 2.5), 3.1-3.4, 4.1-4.6 (read twice 4.2.b,c,d,e and 4.5), 5.1
2. Wednesday, July 10th: Causal estimation and bias, Reuben causal model, directed acyclic graphs, selection on observables, bad controls.
Wooldridge: 3.3(read twice) , 6.3.c,d, 9.2-9.5 (read 9.4 twice)
Discussion paper: Dale and Krueger (2002)
3. Monday, July 15th: Panel Data, omitted variable bias, difference-in-differences, serial correlation and clustered standard errors.
Wooldridge: 13 (read twice 13.4) and 14
Discussion paper: Eissa and Liebman (1996)
4. Wednesday, July 17th: Instrumental variables, measurement error, omitted variable bias
Wooldridge: 15 (read twice the initial section of 15.1, 15.2, and 15.3a)
Discussion paper: Ashenfelter and Krueger (1994)
5. Saturday, July 20th: Empirical project #1 due at 9pm
6. Monday, July 22nd: Instrumental variables (continued), simultaneity bias, heterogeneous treatment effects, local average treatment effects (LATE), weak instruments.
Wooldridge: 16 (read twice 16.2 and 16.3a)
Discussion paper: Acemoglu et al. (2001)
7. Wednesday, July 24th: Experiments, power, attrition bias, compliance, intent-to-treat
Discussion Paper: Chetty et al. (2016)
8. Saturday, July 27th: Empirical project #2 due at 9pm
9. Monday, July 29th: MID-TERM EXAM
10. Wednesday, July 31st: Regression Discontinuity
Discussion Paper: Tuttle (2019)
11. Monday, August 5th: Models of sample selection (Heckit, Tobit), binary response models (Probit and Logit), maximum likelihood estimation
Discussion Paper: Student Research Idea Presentations
12. Wednesday, August 7th: Time series data, auto-regressive and moving average processes, cointegration, vector auto regressions.
Discussion Paper: Student Research Idea Presentations
13. Saturday, August 10th: Empirical project #3 due at 9pm
14. Monday, August 12th: More on Time series data, vector autogressions.
Discussion Paper: none, instead Q&A for final exam.
15. Wednesday, August 14th: FINAL EXAM

References

- Acemoglu, Daron, Simon Johnson, and James A Robinson**, “The colonial origins of comparative development: An empirical investigation,” *American Economic Review*, 2001, *91* (5), 1369–1401.
- Ashenfelter, Orley and Alan Krueger**, “Estimates of the economic return to schooling from a new sample of twins,” *The American Economic Review*, 1994, *84* (5), 1157–1173.
- Chetty, Raj, Nathaniel Hendren, and Lawrence F Katz**, “The effects of exposure to better neighborhoods on children: New evidence from the Moving to Opportunity experiment,” *American Economic Review*, 2016, *106* (4), 855–902.
- Dale, Stacy Berg and Alan B Krueger**, “Estimating the payoff to attending a more selective college: An application of selection on observables and unobservables,” *The Quarterly Journal of Economics*, 2002, *117* (4), 1491–1527.
- Eissa, Nada and Jeffrey B Liebman**, “Labor supply response to the earned income tax credit,” *The Quarterly Journal of Economics*, 1996, *111* (2), 605–637.
- Tuttle, Cody**, “Snapping back: Food stamp bans and criminal recidivism,” *American Economic Journal: Economic Policy*, 2019, *11* (2), 301–27.