

APEC 5031: Methods of Economic Data Analysis

Fall 2018 Syllabus

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Office Hours: Tuesday 1:30-2:30pm in Ruttan 316E, or by appointment
Course website: <https://canvas.umn.edu/courses/72659>

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TA office hours: Monday 1:15pm-2:15pm

Course Description

Statistical and econometrics techniques for applied economists. Theory and application of multivariate regression model using data sets from published economic studies. Emphasis on use of statistical techniques to understand market behavior.

Prerequisites

Math 1271, Stat 5021, familiarity with basic matrix algebra

Class Schedule

The class will be held Tuesdays and Thursdays from 4:30-5:45pm in Ruttan Hall B26.

Midterm Exam: Tuesday, October 23 (**In class**)

Final Exam: Tuesday, December 11 (**In class**)

There will be no class on Thursday, November 22 (Thanksgiving)

Objectives

You should leave this course with an understanding of and ability to apply the workhorse of econometrics: linear regression. In particular, you should be able to:

- Assess a data analysis problem and determine if linear regression is an appropriate analysis tool.
- Estimate coefficients and standard errors for regressions using SAS or R
- Test hypotheses using estimated models
- Predict outcomes and associated confidence intervals using fitted models
- Interpret the results of estimation and hypothesis tests
- Effectively communicate your findings in writing.

You will also learn the assumptions behind and how to implement some alternate methods that, in certain cases, can provide us with more credible estimates of causal effects. Finally, those of you who go on to ApEc 5032 should be well prepared for the topics covered there.

Grading

Homework 50%

Exams 25% each

There will be no opportunities for extra credit.

Both homeworks and exams will be graded for correctness – of estimates as well as interpretation and explanation. Partial credit will be given where appropriate, so please show steps in proofs and defend your answer for non-proof questions. You won't be graded on the elegance of any computer code you write. You will not be asked to write code on exams.

If you think that a homework or exam was graded incorrectly or unfairly, please come to my office hours. I am happy to revisit the grading, but will re-grade the entire assignment or exam. The purpose of that policy is to be as fair as possible: if one problem needs re-grading, they probably all should have a second look.

Please see the UMN policy below on make up work and policies concerning legitimate absences. In short, if a legitimate reason prohibits you from finishing an assignment on time or attending an exam, please let me know and I will make accommodations for you. If you're simply late turning in an assignment for some other (illegitimate) reason, you'll receive a zero for that assignment.

Textbook and Course Materials

Textbook: *Introductory Econometrics (5th edition)* by Jeffrey Wooldridge

Those of you going on to take 5032 will use the same book.

I have requested a copy be put on reserve in Magrath Library.

Other materials will be on the course Canvas site at

<https://canvas.umn.edu/courses/72659>

Software

We will use SAS to illustrate some of the analysis techniques we learn in the class. You have three primary options for using SAS:

- 1) SAS is available in the labs in Ruttan 314 and 50 Coffey Hall (thanks to Prof. Davis)
- 2) You can purchase a license through UM for \$35 for one year (Windows and Linux only)
- 3) SAS offers a [University Edition](#) for free, which requires the use of virtual machine software (all platforms).

If you do not plan to go on to take 5032, you are also welcome to use R to complete the homeworks. If you do plan to go on to 5032, please use SAS. We'll go over both SAS and R approaches to various estimators, statistical tests, etc. in class.

Homeworks

We will have 8 homeworks during the term, which will consist of a mix of written problems designed to help you understand the theory behind the approaches we're using and computer exercises to get practice estimating real economic models. Both types of problem will also focus on interpretation of results. All homeworks are due by the start of class on the date listed below unless otherwise indicated.

Approximate Course Schedule

All readings are from Wooldridge unless otherwise noted. We'll take more or less time on the topics as needed.

Dates	Topic	Readings	HW-due date
9/4, 9/6	Intro to Econometrics Math & Probability Refresher	Ch. 1, Appendix A.1, A.2, A.5, B.1-B.4	
9/11, 9/13	Simple Regression: Estimation Simple Regression: Software Basics	Ch. 2	
9/18, 9/20	Simple Regression: Properties Multiple Regression: Estimation (1 of 2)	Ch. 2, 3	HW1 – 9/20
9/25, 9/27	Multiple Regression: Estimation (2 of 2) Multiple Regression: Inference (1 of 3)	Ch. 3	HW2 – 9/27
10/2, 10/4	Multiple Regression: Inference (2 of 3) Multiple Regression: Inference (3 of 3)	Ch. 4	
10/9, 10/11	Qualitative Data: Regressors Qualitative Data: Outcomes	Ch. 5, 7	HW3 – 10/11
10/16, 10/18	Asymptotics Midterm Review	Ch. 7	HW4 – 10/18
10/23, 10/25	MIDTERM EXAM - 10/23 (In class) Multiple Regression: Other Issues	Ch. 6	
10/30, 11/1	Model Misspecification	Ch. 9	
11/6, 11/8	Heteroskedasticity	Ch. 8	HW5 – 11/8
11/13, 11/15	Instrumental Variables – Part 1	Ch. 15	HW6 – 11/15
11/20	Instrumental Variables – Part 2 Thanksgiving (no class 11/22)		
11/27, 11/29	Regression Discontinuity	See Canvas	HW7 – 11/29
12/4, 12/6	Matching	See Canvas	HW8 – 12/6
12/11	FINAL EXAM - 12/11 (In class)		

Course Policies

1. Class attendance is expected. You will not be graded on attendance, but I expect you to come: any material covered in class is fair game on assignments and exams. Equally importantly, the questions you and your peers ask and the comments you make during class will make for a better experience for everyone, so please make every effort to attend. That said, unexpected conflicts come up for all of us, so any lecture notes and slides used during class will be available online.
2. You may discuss and work on assignments with other students, but you must write up and turn in your own assignment. You all have different strengths and can learn from one another by working together, so I encourage you to do so. The point of this policy is so that you can learn more, not less, so please don't abuse the privilege and let someone else do the work and you simply copy their answer. That won't help you learn the material.

3. Do not violate the Student Conduct Code. The assignments you turn in and your answers on exams should reflect your own work. Simply copying someone else's work, or otherwise violating the Student Conduct Code (http://regents.umn.edu/sites/default/files/policies/Student_Conduct_Code.pdf) may result in a failing grade and/or additional University action. That may sound scary, and it's supposed to be, but know that if you turn in work that is your own, you have nothing to worry about. If you have any questions or concerns about this policy, please don't hesitate to ask.
4. Treat your classmates with respect. Everyone in the class is here to learn and has an equal right to be treated with respect. This means many things, but in summary, I will not tolerate any form of discrimination or sexual harassment. The University has official policies that you can read if you aren't sure what constitutes either of those things, but your common sense will take you a long way.

Other notes:

- If you require disability accommodations, please let me know at your earliest convenience and we will work together to arrange accommodations. If you have or think you may have a disability and have not yet contacted Disability Services (DS), please do so at 612-626-1333 to arrange for a confidential consultation.

University of Minnesota Policies

Student Conduct Code:

The University seeks an environment that promotes academic achievement and integrity, that is protective of free inquiry, and that serves the educational mission of the University. Similarly, the University seeks a community that is free from violence, threats, and intimidation; that is respectful of the rights, opportunities, and welfare of students, faculty, staff, and guests of the University; and that does not threaten the physical or mental health or safety of members of the University community.

As a student at the University you are expected adhere to Board of Regents Policy: *Student Conduct Code*. To review the Student Conduct Code, please see: http://regents.umn.edu/sites/default/files/policies/Student_Conduct_Code.pdf.

Note that the conduct code specifically addresses disruptive classroom conduct, which means "engaging in behavior that substantially or repeatedly interrupts either the instructor's ability to teach or student learning. The classroom extends to any setting where a student is engaged in work toward academic credit or satisfaction of program-based requirements or related activities."

Use of Personal Electronic Devices in the Classroom:

Using personal electronic devices in the classroom setting can hinder instruction and learning, not only for the student using the device but also for other students in the class. To this end, the University establishes the right of each faculty member to determine if and how personal electronic devices are allowed to be used in the classroom. For complete information, please reference: <http://policy.umn.edu/Policies/Education/Education/STUDENTRESP.html>.

Scholastic Dishonesty:

You are expected to do your own academic work and cite sources as necessary. Failing to do so is scholastic dishonesty. Scholastic dishonesty means plagiarizing; cheating on assignments or examinations;

engaging in unauthorized collaboration on academic work; taking, acquiring, or using test materials without faculty permission; submitting false or incomplete records of academic achievement; acting alone or in cooperation with another to falsify records or to obtain dishonestly grades, honors, awards, or professional endorsement; altering, forging, or misusing a University academic record; or fabricating or falsifying data, research procedures, or data analysis. (Student Conduct Code: http://regents.umn.edu/sites/default/files/policies/Student_Conduct_Code.pdf) If it is determined that a student has cheated, he or she may be given an "F" or an "N" for the course, and may face additional sanctions from the University. For additional information, please see: <http://policy.umn.edu/Policies/Education/Education/INSTRUCTORRESP.html>. The Office for Student Conduct and Academic Integrity has compiled a useful list of Frequently Asked Questions pertaining to scholastic dishonesty: <http://www1.umn.edu/oscai/integrity/student/index.html>. If you have additional questions, please clarify with your instructor for the course. Your instructor can respond to your specific questions regarding what would constitute scholastic dishonesty in the context of a particular class-e.g., whether collaboration on assignments is permitted, requirements and methods for citing sources, if electronic aids are permitted or prohibited during an exam.

Makeup Work for Legitimate Absences:

Students will not be penalized for absence during the semester due to unavoidable or legitimate circumstances. Such circumstances include verified illness, participation in intercollegiate athletic events, subpoenas, jury duty, military service, bereavement, and religious observances. Such circumstances do not include voting in local, state, or national elections. For complete information, please see: <http://policy.umn.edu/Policies/Education/Education/MAKEUPWORK.html>.

Appropriate Student Use of Class Notes and Course Materials:

Taking notes is a means of recording information but more importantly of personally absorbing and integrating the educational experience. However, broadly disseminating class notes beyond the classroom community or accepting compensation for taking and distributing classroom notes undermines instructor interests in their intellectual work product while not substantially furthering instructor and student interests in effective learning. Such actions violate shared norms and standards of the academic community. For additional information, please see: <http://policy.umn.edu/Policies/Education/Education/STUDENTRESP.html>.

Grading and Transcripts:

The University utilizes plus and minus grading on a 4.000 cumulative grade point scale. Please see <http://policy.umn.edu/education/gradingtranscripts> for details..

Sexual Harassment

"Sexual harassment" means unwelcome sexual advances, requests for sexual favors, and/or other verbal or physical conduct of a sexual nature. Such conduct has the purpose or effect of unreasonably interfering with an individual's work or academic performance or creating an intimidating, hostile, or offensive working or academic environment in any University activity or program. Such behavior is not acceptable in the University setting. For additional information, please consult Board of Regents Policy: <http://regents.umn.edu/sites/default/files/policies/SexHarassment.pdf>

Equity, Diversity, Equal Opportunity, and Affirmative Action:

The University provides equal access to and opportunity in its programs and facilities, without regard to race, color, creed, religion, national origin, gender, age, marital status, disability, public assistance status, veteran status, sexual orientation, gender identity, or gender expression. For more information, please consult Board of Regents Policy: http://regents.umn.edu/sites/default/files/policies/Equity_Diversity_EO_AA.pdf.

Disability Accommodations:

The University of Minnesota is committed to providing equitable access to learning opportunities for all students. The Disability Resource Center is the campus office that collaborates with students who have disabilities to provide and/or arrange reasonable accommodations.

If you have, or think you may have, a disability (e.g., mental health, attentional, learning, chronic health, sensory, or physical), please contact DS at 612-626-1333 to arrange a confidential discussion regarding equitable access and reasonable accommodations.

If you are registered with DS and have a current letter requesting reasonable accommodations, please contact your instructor as early in the semester as possible to discuss how the accommodations will be applied in the course.

For more information, please see the DS website, <https://diversity.umn.edu/disability/>.

Mental Health and Stress Management:

As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance and may reduce your ability to participate in daily activities. University of Minnesota services are available to assist you. You can learn more about the broad range of confidential mental health services available on campus via the Student Mental Health Website: <http://www.mentalhealth.umn.edu>.

Academic Freedom and Responsibility

Academic freedom is a cornerstone of the University. Within the scope and content of the course as defined by the instructor, it includes the freedom to discuss relevant matters in the classroom. Along with this freedom comes responsibility. Students are encouraged to develop the capacity for critical judgment and to engage in a sustained and independent search for truth. Students are free to take reasoned exception to the views offered in any course of study and to reserve judgment about matters of opinion, but they are responsible for learning the content of any course of study for which they are enrolled.*

Reports of concerns about academic freedom are taken seriously, and there are individuals and offices available for help. Contact the instructor, the Department Chair, your adviser, the associate dean of the college, or the Vice Provost for Faculty and Academic Affairs in the Office of the Provost.

** Language adapted from the American Association of University Professors "Joint Statement on Rights and Freedoms of Students".*