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Office Hours: Wednesdays 12:30-2pm (starting January 27), or by appointment

Teaching Assistants: Gregory Lewin & Renee Van Siclen  
Email: lewin040@umn.edu & vansi044@umn.edu  
Office hours (& Location): Mondays & Wednesdays 11:30am-12:30pm (Cube P) & Tuesdays 10-11am & Fridays 12:30-1:30pm (Cube P)

Lecture: Monday & Wednesday 9:45-11:00 AM, Blegen 415

Lab: Fridays 9:45-11:00 AM (Section 002) & Fridays 11:15 AM-12:30 PM (Section 003), HHH 85

Course Objectives: This course will cover bivariate and multivariate regression models, including the assumptions behind them and the problems that arise when these assumptions are not met. It covers the same topics as PA5032 (Regression Analysis) but in more depth and using more mathematical notation. Students will also become familiar with the Stata statistical package.

Prerequisites: This course is designed for master’s students with some background in mathematics/statistics/economics in their undergraduate education. At a minimum, students should have completed or waived PA5031. If you have questions about whether this course or PA5032 is most appropriate for you, I’m happy to offer my advice. You are also encouraged to watch the video Professors Kleiner, Kudrle, and I made discussing PA5032, 5044, and 5033, available here: https://player.vimeo.com/external/136968066.sd.mp4?s=0ab252117104aedff548ea22c73a01af&profile_id=112

Texts and Readings: The required text for this class is *Introductory Econometrics: A Modern Approach* by Jeffrey Wooldridge. It is currently in its sixth edition. I highly encourage you to purchased used older editions of the text as they are much cheaper, around $20 on Amazon. Other readings will be posted on the course’s Moodle site.

Grading: Grades will be based on three assignments, a final exam, and class participation, most likely according to the following weighting scheme:

45% Assignments (3)  
40% Final Exam  
15% Class Participation
All questions on exams and assignments will be given a clearly stated point total. Grades for each assignment and exam will be calculated on a points basis - you will be given the class median point total as well as the minimum and maximum when each assignment is returned. Each assignment will be given equal weight in the final grade, no matter their stated point total. I do not assign letter grades to each assignment, but the final grade for the course will be graded on a “curve”, with the likely median grade being a B+. I highly encourage asking questions during lecture, as well as answering my questions posed to the class, hence the class participation part of the grade.

Incompletes will be only given in the most extenuating of circumstances (documented family crisis, medical emergency, etc.). University and Humphrey policies on incompletes will be followed. There will be no opportunity for extra credit.

**Assignments:** Assignments will consist of questions on concepts and methods (“pencil and paper”) and questions involving the application of the methods to data using Stata. Note that some questions on the assignments, especially those using Stata, will be purposely vague. I do this to approximate how regression analysis is used in the “real world”, such as in your future job! Assignments are due at the beginning of the designated class period. Late assignments will not be accepted. Assignments will be handed in in class on the designated due date as well as uploaded to Moodle. **All parts of all assignments must be typed.** I will provide a guide to using Microsoft Equation Editor to type up equations. You may ask the instructor, TAs, and other students for help on the assignments, but you must hand in your own work. **Students who hand in identical (or nearly identical) assignments will receive a score of 0 for that assignment.**

I have specific requirements on the formatting of Stata output for assignments. Not following these requirements will result in reduced grades. I will provide a handout detailing these requirements with the first assignment.

**Access to Stata:** This class will involve the use of Stata both for assignments and lab. You have several options for accessing Stata. First, the Humphrey School has a site license under which you can use Stata free of charge on your own computer. To use Stata in this manner, you must have a Remote Desktop Connection installed as well as a VPN client if you want to use it off campus. For help installing the RDC and VPN clients, I recommend visiting OneStop IT support in Blegen 90. In addition, the Humphrey computer lab has Stata installed on its computers for you to use.

You can also buy Stata, a good option if you’d like to be able to use the software after graduation. Student pricing for the program is actually very good, $198 for a perpetual license for Stata/IC. For most users, Stata/IC is great. Don’t buy Small Stata - you’re limited to only 1200 observations and most datasets we’ll be using in this class will have many more than that! For more information on purchasing Stata see [www.stata.com](http://www.stata.com).

**Exams:** There will be one final exam, held on Friday, March 11 from 9:45AM-12:30PM. The exam will be closed-note. You are required to take the exam during the scheduled time. Make-up exams will only be scheduled in extreme cases (family emergency, serious illness etc.) in accordance with the University policy on legitimate absences [http://www.policy.umn.edu/Policies/Education/Education/MAKEUPWORK.html](http://www.policy.umn.edu/Policies/Education/Education/MAKEUPWORK.html).

**Attendance and Class Participation:** Attendance is required. This course is impossible to succeed in without attending lecture. Chronic lateness or multiple absences will reduce your
class participation component of your grade. If you need to miss a class, please notify me beforehand. If you miss a class or lab, it is your responsibility to find out what you missed.

**Lecture Notes:** I teach my lectures from PDF slides. I will try my best to post the day’s slides to Moodle by midnight on the day before class. You are welcome to print out the slides and bring them to class to facilitate note-taking.

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](http://policy.umn.edu/Policies/Education/Education/STUDENTRESP.html)

**Instructor and Course Feedback:** I am a new professor, and have enough experience teaching myself and seeing other new professors teach to know that things don’t always go very well the first few times around. Therefore, I want to make it clear that I encourage you to share any feedback you have about the course. You can do so with me directly during office hours or after class, or with the TAs. The only things I ask for are honesty and feedback that is constructive. I’m going to do my best to incorporate your feedback as the semester goes on, but please keep in mind there are some things that I can’t change (my underlying personality, for example), and that no matter how hard I try, it’s impossible to make the class perfect for everyone. That being said, I am passionate about helping all of you learn to the best of my ability, and therefore I very much appreciate any comments and suggestions you may have.

**Use of Electronics in Class:** You are allowed to use your laptop or tablet for taking notes in class, and to run Stata during labs, but not for any other purpose (facebook, email, etc.). I’d also like everyone to keep their mobile phones put away and silent during class unless you have a good reason (small children, etc.), but if so please tell me.

**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](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.”

**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; submit-
mitting 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 profes-
sional endorsement; altering, forging, or misusing a University academic record; or fabricat-
ing 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.

Sexual Harrassment: “Sexual harassment” means unwelcome sexual advances, requests
for sexual favors, and/or other verbal or physical conduct of a sexual nature. Such con-
duct has the purpose or effect of unreasonably interfering with an individual’s work or aca-
demic 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 will
provide 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 infor-
mation, please consult Board of Regents Policy: http://regents.umn.edu/sites/default/
files/policies/Equity_Diversity_EO_AA.pdf

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.
Table 1: Class Schedule and Topics (subject to change)

<table>
<thead>
<tr>
<th>Week</th>
<th>Monday</th>
<th>Wednesday</th>
<th>Friday</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>January 18 - MLK Day - No Class</td>
<td>January 20 - NO CLASS - WATCH VIDEO</td>
<td>January 22 - Lab: Stata Review</td>
</tr>
<tr>
<td>3</td>
<td>February 1 - Single Variable Regression II</td>
<td>February 3 - Multiple Regression I</td>
<td>February 5 - Lab: Single Regression II</td>
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<tr>
<td>4</td>
<td>February 8 - Multiple Regression I/II</td>
<td>February 10 - Multiple Regression II/III</td>
<td>February 12 - Lab: Multiple Regression I</td>
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<tr>
<td>5</td>
<td>February 15 - Multiple Regression III/IV</td>
<td>February 17 - Multiple Regression IV/V</td>
<td>February 19 - Lab: Multiple Regression II</td>
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<tr>
<td>6</td>
<td>February 22 - Multiple Regression V/VI</td>
<td>February 24 - Multiple Regression VI/ Non spherical Errors I</td>
<td>February 26 - Lab: Multiple Regression III</td>
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<tr>
<td>7</td>
<td>February 29 - Non spherical Errors I/II</td>
<td>March 2 - Non spherical Errors II/ Time Series</td>
<td>March 4 - Lab: Non spherical Errors/ Time Series</td>
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<tr>
<td>8</td>
<td>March 7 - Measurement Error</td>
<td>March 9 - Review</td>
<td>March 11 - Final Exam</td>
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Reading List:

The chapter/section numbers and names are for the sixth edition of Wooldridge. I have provided the names of each chapter and section names as there is slight variation in chapter/section order in older editions. If you have questions about the correspondence of this list to your copy of Wooldridge, see me in office hours.

1. **Course Introduction, Causality and Selection** - Video in place of January 20 class
   - Wooldridge, chapter 1 “The Nature of Econometrics and Economic Data”

2. **Single Variable Regression: Assumptions, Properties, and Hypothesis Testing**
   - January 25 and 27, and February 1, 3
   - Wooldridge, chapter 2 “The Simple Regression Model”
     - 2.1 “Definition of the Simple Regression Model”
     - 2.2 “Deriving the Ordinary Least Squares Estimates”
     - 2.3 “Properties of OLS on Any Sample of Data”
     - 2.5 “Expected Values and Variances of the OLS Estimators”
   - Wooldridge, chapter 4 “Multiple Regression Analysis: Inference”
     - 4.1 “Sampling Distributions of the OLS Estimators”
• 4.2 “Testing Hypotheses about a Single Population Parameter: The t Test” (don’t worry much about 4.2c “Testing Other Hypotheses about $\beta_j$” until later)
• 4.3 “Confidence Intervals”

Wooldridge, chapter 7 “Multiple Regression Analysis with Qualitative Information: Binary (or Dummy) Variables”
• 7.1 “Describing Qualitative Information”
• 7.2 “A Single Dummy Independent Variable”

3. **Multiple Regression: Estimation, Inference, and Further Issues** - February 8, 10, 15, 17, 22, 24

Wooldridge, chapter 3 “Multiple Regression Analysis: Estimation”
• 3.1 “Motivation for Multiple Regression”
• 3.2 “Mechanics and Interpretation of Ordinary Least Squares”
• 3.3 “The Expected Value of the OLS Estimates”
• 3.4 “The Variance of the OLS Estimators”
• 3.5 “Efficiency of OLS: The Gauss-Markov Theorem”
• 3.6 “Some Comments on the Language of Multiple Regression” (Not required, but probably helpful to know!)

Wooldridge, chapter 4 “Multiple Regression Analysis: Inference”
• Review 4.1-4.3 (including all of 4.2)
• 4.4 “Testing Hypotheses about a Single Linear Combination of the Parameters”
• 4.5 “Testing Multiple Linear Restrictions: The $F$ test”

Wooldridge, chapter 2 “The Simple Regression Model”
• 2.4 “Units of Measurement and Functional Form”

Wooldridge, chapter 6 “Multiple Regression Analysis: Further Issues”
• 6.2 “More on Functional Form”

Wooldridge, chapter 7 “Multiple Regression Analysis with Qualitative Information: Binary (or Dummy) Variables”
• 7.3 “Using Dummy Variables for Multiple Categories”
• 7.4 “Interactions Involving Dummy Variables”

4. **Nonspherical Errors: Heteroskedasticity and Serial Correlation (including Time Series)** - February 24 & 29 and March 2

Wooldridge, chapter 8 “Heteroskedasticity”
• 8.1 “Consequences of Heteroskedasticity for OLS”
8.2 “Heteroskedasticity-Robust Inference after OLS Estimation”
8.3 “Testing for Heteroskedasticity”
8.4 “Weighted Least Squares Estimation”

Wooldridge, chapter 10 “Basic Regression Analysis with Time Series Data”

10.1 “The Nature of Time Series Data”

Wooldridge, chapter 12 “Serial Correlation and Heteroskedasticity in Time Series Regressions”

12.2 “Testing for Serial Correlation”
12.3 “Correcting for Serial Correlation with Strictly Exogenous Regressors”
12.5 “Serial Correlation-Robust Inference after OLS”

5. **All the Data Problems in the World** - March 7

Wooldridge, chapter 9 “More on Specification and Data Issues”

9.4 “Properties of OLS under Measurement Error”
9.5 “Missing Data, Nonrandom Samples, and Outlying Observations” (don’t worry about 9.5c “Outliers and Influential Observations”)


