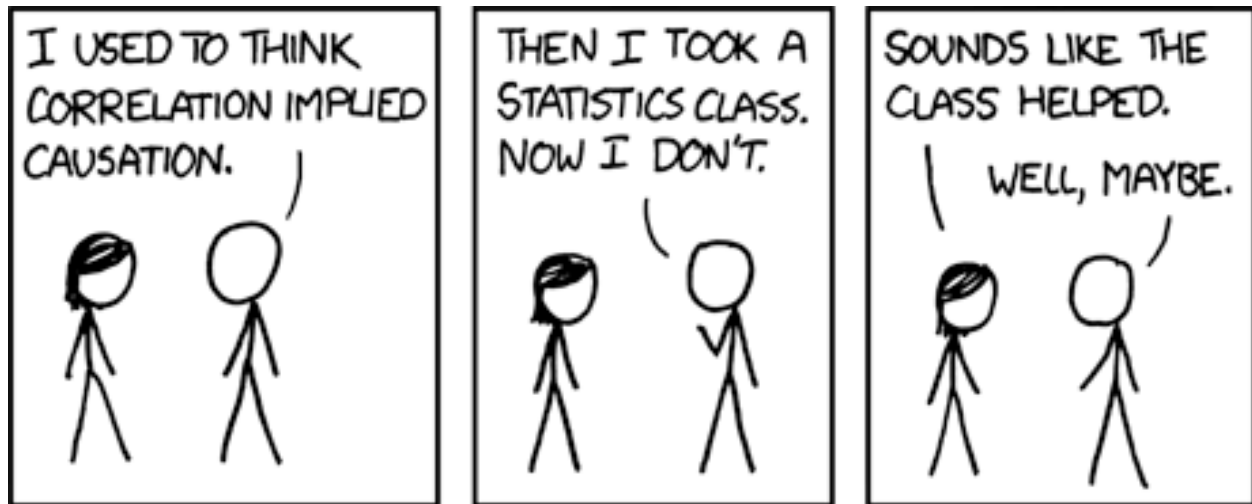


Economics B253: Introduction to Econometrics
Fall Semester 2026

Sebastian Anti, Assistant Professor of Economics

A General Note: All syllabi are broad initial plans for the administration of a class and are subject to change throughout the semester.



1. Contact Information

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Office: Dalton Hall 204

Office Hours: Tuesday 12:00 PM to 1:30 PM
Thursday 12:45 PM to 2:15 PM
Other days by appointment

Schedule Book time through Calendly. Follow this link: <https://calendly.com/santi-8/15min>
Time in Office
Hours:

Note: Please know that I don't respond to email outside of business hours (8:30 am to 5:00 pm Mon.-Fri.).

Title: I like to be called “Sebastian.” You should feel comfortable addressing me by my first name. If you are more comfortable being more formal, you can call me Prof. or Dr. Anti.

Pronouns: He/Him/His

Teaching
Assistant: Winona Wardwell

Teaching
Assistant
Email: wwardwell@brynmawr.edu

Teaching
Assistant
Sessions Info: Look for an email from the TA

2. Class Meeting Information

Class Meeting

Times: Tuesdays and Thursdays 2:40 PM – 4:00 PM

Classroom: Carpenter Library 25

3. Course Materials

Required Texts: *Introductory Econometrics: A Modern Approach 7th Edition* By Jeffrey Wooldridge

- Older or newer editions are fine but it’s your responsibility to make sure you read the appropriate chapter in your edition that corresponds with the topic I’ve assigned.

Introductory Statistics by Barbara Illowsky and Susan Dean

- This text is open source and free! You can find it by following this link: <https://openstax.org/details/books/introductory-statistics>
- This book contains many great exercises and examples embedded in the text. While useful, they are not part of your assigned readings with this text.

Required

Software: Stata

To access Stata on a Bryn Mawr Computer Lab Computer go to this link and follow the instructions, <https://techdocs.blogs.brynmawr.edu/9708>

Moodle Site: The syllabus, readings not contained in Wooldridge, problem sets, and answer keys can be found on Moodle when they become available.

4. Course Description and Objectives

4.1 Course Description

Pundits, politicians, family members, and friends make claims all the time in casual conversations, in the news, and in opinion pages about why things happen in the economy and society. How should one evaluate these claims?

One could turn to economic theory, but this only gets you so far. While economic theory provides a framework to rigorously derive claims about economic systems, and is much clearer and structured than your friend's argument at the coffee shop, it still doesn't provide a framework to empirically test those claims. Making claims about how economic systems work is easy. Providing original and compelling quantitative empirical evidence to support a claim is much harder.

Econometrics fills this gap and provides a rigorous methodological framework to find evidence for (or against) relationships that theory predicts. Econometric results can help to validate and test theoretical predictions for how economic systems operate. Often results from econometrics are counterintuitive and push theorists to reconsider their models, or account for important complexity that they overlooked. It also provides powerful evidence for policymakers interested in quantifiable evidence for the effects of policy interventions into various economic systems. For these reasons, econometrics is extremely valuable and is a required skillset for any practicing researcher in economics, and increasingly political scientists, and policymakers.

This course will teach you how to use data to evaluate claims and produce real original evidence in support of one claim over another. It will equip you with quantitative research tools, which you can use to test theories and arguments with data from the real world. In the process, you will learn how to analyze and critique other quantitative empirical work, think critically about how researchers claim to have measured a causal effect, and gain competency with applying statistical concepts and using statistical software.

Through this, the class will prepare you well to pursue your own quantitative empirical projects, engage quantitative empirical research and scholarly work in economics at a new level, and it will prepare you to competently take on tasks in a professional environment related to data analysis and statistical modelling. If all this interests you, you're in the right place!

4.2 Course Objectives

1. To equip students with the foundational principles, intuition, and analytical skills required to critically read econometric research,
2. To provide a skillset (e.g. fluency in reading econometric notation, basic knowledge of Stata, etc.) allowing students to conduct independent econometric research in a professional setting, advanced undergraduate economics classes and/or graduate school programs, and
3. To acquaint students with the foundational knowledge necessary to pursue more advanced courses in econometrics at the undergraduate and graduate levels.

4.3 Prerequisites

Students are required to have completed Bryn Mawr's ECON B105: Introduction to Economics or equivalent, and one 200-level economics course.

Prior courses in statistics, calculus, and data science are not required pre-requisites. If you have taken courses in statistics before, the first couple weeks of content will likely feel like review material.

While maybe helpful, prior experience with coding languages is not a pre-requisite. Learning to code as we go through the class will not be a problem.

5. Exams, Assignments, and Grading

5.1 Exams

I require two midterm exams and a final exam. The final exam is cumulative but will focus on material in the later part of the semester.

There will be practice midterms posted on Moodle.

Exams are closed book, but students are allowed to prepare and bring a 4x6 inch index card of formulas and notes (front and back) for each exam.

5.2 Problem Sets

The problem sets combined equal 10 percent of your grade. You will submit them individually, although there is no limit on your collaboration with others.

The problem sets will require you to analyze actual datasets using Stata, a statistical software commonly used by economists and other social scientists.

I encourage you to work with classmates on these as much as you want, but each student must turn in their own work. When you turn in your work, please write the names of all the students with whom you collaborated in completing the assignment. **While this inevitably will lead to your problem sets resembling the work of your collaborators, they should not be identical. Do not sit together and workshop precise answers to questions. You can work out ideas and come to the same conclusions together, but write up your final answers on your own.**

With your problem sets you will submit your code script (in Stata this is called a “.do” file) on Moodle. The standard in classes requiring coding is that you may **collaborate on code but not copy code.**

The topics the problem sets will cover are the following:

Problem Set 1 – Data management, variable creation, data visualization, descriptive statistics, basic statistics

Problem Set 2 – Expected value notation, conditional expectation notation, and properties

Problem Set 3 – Bivariate regressions, OLS assumptions, interpreting coefficients

Problem Set 4 – Multivariate regressions, interpreting coefficients, statistical inference, joint significance

Problem Set 5 – Panel data models, instrumental variables, internal validity and causal inference, bad controls

I do not grade late problem sets, except in rare situations. I describe these below in Section 6.4.

If you turn in a problem set late, then you automatically receive a zero. Deadlines I give are binary. If you are late you receive a zero. It doesn't matter if you turn the work in one minute late or one week late, it is the same result. Please make the effort to turn your work in on time.

You will submit your problem set write ups to me in class on paper. Do not email me your late submissions. You will submit your .do file on Moodle. Please plan ahead and ensure you aren't turning in your problem sets at the last minute.

5.3 Optional Problem Set 6

Sometimes it takes time and practice to work through the concepts in this class and apply them effectively. As a result, some students struggle on the first two exams. I don't want weak performance on the first two exams to discourage students from being successful in the class.

For students that are not happy with the scores on their first two midterms, there will be an optional extra problem set that I will grade like an exam. If you complete this problem set, I will recalculate your midterm score weighting the average of your first two exams scores with a 70 percent weight and your optional problem set score with a 30 percent weight.

For example, let's say you really struggled on the first two exams and you get a 60 and 65. Your average would be a 62.5 going into the final. Let's say you then take some time and work hard on the optional problem set and you get 100. Then I'll recalculate your midterm grade as follows $(62.5 \times 0.7) + (100 \times 0.3) = 73.75$.

Notice how this works, if you underperform on the midterms, completing this extra problem set boosts your score up roughly three letter grades. If you do well on the final then you can finish the class with a strong grade.

5.4 Grading Criteria

I use criterion-based grading on exams. So if everyone earns an A, everyone in the class will receive an A. I may grade on a curve in certain situations.

Point totals for specific questions are included in parentheses in the question text. While the way I score your exams is ultimately up to my discretion, I generally follow this criteria in deducting points:

1. Complete response to a question addressing every component in an appropriate way: Full credit
2. Minor mistake: -1 to -3
3. Misuse of a term, misstatement of fact, incorrect calculation indicating lack of clarity on a concept: -2 to -6
4. Leaving out an important point in response to a question: -1 to -7
5. Mistake indicating serious misunderstanding: My discretion
6. No engagement with a question: No credit

Other issues in responses not fitting these descriptions are again up to my discretion in how I apply them to your score.

I generally do not provide much feedback on the problem sets and exams themselves beyond pointing out big mistakes. **It is your responsibility to consult the answer keys to figure out how to correct your errors.** If you are still confused even after consulting the answer keys, I recommend seeing me or the TA in office hours. This process of discovering your mistake and reasoning through the correction is an extremely valuable learning experience. Do not neglect it when preparing for exams.

I grade the problem sets differently from the exams. I grade the problem sets on a "Zero, Check minus, Check, Check plus" basis. A "zero" means you either did not turn in the assignment or you left much of it unanswered, or answered in superficial ways that show no ability to work with the concepts from class. A zero shows little or no skill building in using Stata. A zero means no credit in the grade book.

“Check minus” means you submitted at least a semi-complete set of answers that demonstrates limited ability with the material and some limited skill building. A check minus receives half credit (50%) in the grade book. “Check” means you submitted a complete set of answers and you have displayed adequate ability to use the material in class to answer the questions. A check receives full credit (100%) in the grade book. “Check plus” means full credit (100%) and an indication that you did exceptional work. A check plus does not mean you earned any extra credit. It just is meant as a way for me to signal that your work was exceptional and you demonstrated strong ability with the material and strong skill building.

Again, I will generally not offer much feedback on returned problem sets. It is your responsibility to compare your work to the suggested answers in order to figure out where you went wrong. **Note that I will likely give checks and check pluses to work that is not perfect. It would be a serious mistake to interpret a check or check plus as an indication that you don't need to examine the suggested answers in depth in preparation for the midterm and final.**

5.5 Final Grade Calculations

The weights of the exams and assignments are as follows,

Exams (Total: 90%):

- Midterm I: 20%
- Midterm II: 20%
- Cumulative Final Exam: 50%

Problem Sets: 10%

- Each problem set has equal weighting

To convert your score to Bryn Mawr's A-F scale, I use the following criteria,

$94 \leq A$,
 $90 \leq A- < 94$,
 $87 \leq B+ < 90$,
 $83 \leq B < 87$,
 $80 \leq B- < 83$,
 $77 \leq C+ < 80$,
 $73 \leq C < 77$,
 $70 \leq C- < 73$,
 $67 \leq D+ < 70$,
 $60 \leq D < 67$,
 $F < 60$.

6. Course Policies

6.1 Attendance and Participation

Gaining competence in the material in this class often requires multiple attempts to engage it and work with it. The lectures are an important part of this process. There is no formal requirement for attendance. However, realistically if you are trying to be successful in this class, you will need to attend lectures.

There is no requirement that you participate in class, although I strongly encourage it! I appreciate all engagement as long as it is an earnest effort to understand and apply the material. If you feel something is unclear or that I need to spend more time on something in a session, it is highly likely other students have the same issue, and bringing it up benefits everyone!

6.2 Lateness

Please do not arrive late. It is disruptive for me and other students. Although I imagine this won't be a problem for the class, if this becomes an issue I reserve the ability to have it affect grades.

6.3 Technology in the Classroom

You may not record the class yourself unless you've been given prior permission by the Access Services Director and myself.

I have no policy on use of personal technology during class, but I ask that you please use your personal technology in class to enhance your engagement with the material. Please to not distract yourself and others by using it in other ways.

6.4 Extensions

As I state above, I do not accept late work. If your work is late, I automatically count it as receiving a zero.

In the case of legitimate emergencies, I will work with you to create a plan that allows you sufficient time to complete the assignment with no penalty for the lateness. In these situations, I ask that you communicate with me and your dean as much as possible so that we can determine a supportive course of action. For students that need more than a one-week extension, I ask you communicate with both me and your dean to arrive at a workable plan for timely submission.

6.5 Academic Dishonesty

Students are responsible for knowing and adhering to the Bryn Mawr College Honor Code. If you need to refamiliarize yourself with the Code, it is available here:

<http://sga.blogs.brynmawr.edu/honor-board/honor-code/>. If you have any questions about expectations, please ask.

6.6 Generative Artificial Intelligence Policy

Many argue that the use of generative artificial intelligence (AI) technologies will make doing tasks like econometric analysis more efficient and it is therefore important to learn how to use AI effectively. This may or may not be true for the well-trained and experienced analyst, but it is completely incorrect for students early in their econometrics training.

For students just starting out and trying to work with the ideas in this class to accomplish an econometric analysis, most uses of generative AI can only disrupt your learning process. It would be like using generative AI to write a novel in French without learning the French language first. Imagine how that would turn out. For this reason, I highly discourage your use of generative AI in this class.

That said, if you use these technologies as shortcuts to answers on the problem sets (really the only opportunity to use them in this class) it will become very apparent to me on the exams, which are in person and on paper, and are really where your grade is determined. So there is no ban on using generative AI in the class.

I remind you that plagiarism is against the Bryn Mawr Honor Code and this is applied to “thoughts” attributable to generative AI in the same way it is applied to thoughts from human beings. If I discover work that is plagiarized from generative AI, I will have to report it as an honor code violation.

6.7 Accommodations

Bryn Mawr College is committed to providing equal access to students with a documented disability. Students needing academic accommodations for a disability must first register with Access Services. Students can call 610.526.7516 to make an appointment with the Director of Access Services, Deb Alder, or email her at dalder@brynmawr.edu to begin this confidential process. Once registered, students should schedule an appointment with me as early in the semester as possible to share the verification form and make appropriate arrangements. Please note that accommodations are not retroactive and require advance notice to implement. More information can be obtained at the Access Services website: <http://www.brynmawr.edu/access-services/>.

Any student who has a disability-related need to record this class first must speak with the Director of Access Services and to me. Class members need to be aware that this class may be recorded.

6.7 Religious Observances

It is the College's policy to respect students' religious identities and commitments. Any student who is unable to attend classes, exams or submit work due to a religious observance is excused and given an opportunity to make up missed work without penalty.

If you anticipate a religious holiday to affect your ability to submit work please let me know at least a week in advance of the holiday.

7. Class Schedule

The following is a **tentative** ordering of topics and their associated readings this semester.

There are no dates provided for the material because our progress will depend on students' questions and needs. I will make it clear where we are in the syllabus each class so students know when to complete readings.

Section 1: Introduction: What is Econometrics? How is it Used?

Session 1

1. Introduction to your instructor and the course
2. Syllabus review
3. Introduction to the uses of econometrics

Session 1b

4. Orientation to Stata
 - We will be meeting in the Bryn Mawr College computer lab in Dalton 20 for the Sept. 4 class session.

Section 2: Statistics Basics and the Bivariate Regression Model

Session 2

1. Statistical Background I: The goal of statistics, sampling and data collection, descriptive statistics
Readings: Illowsky and Dean Chapters 1 and 2: 5 – 120
2. Statistical Background II: Probability, Discrete and Continuous Random Variables
Reading: Illowsky and Dean Chapters 3, 4, and 5: 175 – 338
3. Statistical Background III: The normal distribution, skewness, the central limit theorem, and confidence intervals
Reading: Illowsky and Dean Chapters 6, 7, and 8: 365 – 471

4. Statistical Background IV: Confidence intervals, and hypothesis testing
Reading: Illowsky and Dean Chapters 8 and 9: 443 – 590
Wooldridge Math Refresher B: 684 – 702

Session 3

5. The ordinary least squares (OLS) algorithm for fitting a model to data and coefficient interpretation
Reading: Wooldridge Chapter 2: 20 – 34, Wooldridge Math Refresher A: 666 – 672
6. The R-squared as a measure of fit
Reading: Wooldridge Chapter 2: 35 – 36

Session 4

7. Properties of OLS and necessary assumptions
Reading: Wooldridge Math Refresher C: 714 – 724
8. OLS estimators as random variables themselves
Reading: Wooldridge Chapter 2: 40 – 56

Section 3: Multivariate Regression Models

Session 5

1. Introduction to multivariate regression analysis
Reading: Wooldridge Chapter 3: 66 – 70
2. OLS and fit in a multivariate framework
Reading: Wooldridge Chapter 3: 71 – 79
3. OLS assumptions revisited
Reading: Wooldridge Chapter 3: 79 – 102

Session 6

4. Functional transformations of variables
Reading: Wooldridge Appendix A: 672 – 708, Wooldridge Chapter 2: 37 – 40, and Wooldridge Chapter 6: 186 – 195
5. Binary independent variables
Reading: Wooldridge Chapter 7: 220 – 239
6. Model specification
Reading: On Moodle

Section 4: Statistical Inference of Model Estimates

Session 7

1. Families of statistical distributions
Reading: Wooldridge Math Refresher B: 704 – 710
2. OLS under the normality assumption
Reading: Wooldridge Chapter 4: 117 – 120

Session 8

3. Confidence intervals of OLS parameters
Reading: Wooldridge Chapter 4: 134 – 136, Math Refresher C: 727 – 733
4. Testing hypotheses about a single parameter
Reading: Wooldridge Chapter 4: 120 – 134, Math Refresher C: 733 – 743

Session 9

5. The distinction between statistical significance, economic significance, and bias
Reading: On Moodle
6. Testing joint hypotheses and the F distribution
Reading: Wooldridge Chapter 4: 136 – 149
7. Presentation of regression results and how to read regression output
Reading: Wooldridge Chapter 4: 149 – 152

Section 5: Models for Binary Dependent Variables

Session 10

1. Just use OLS: the Linear Probability Model (LPM)
Reading: Wooldridge Chapter 7: 239 – 244
2. The Maximum Likelihood (ML) algorithm (**Not on exam**)
Reading: Wooldridge Math Refresher C: 724 – 725

Session 11

3. The Probit and Logit estimators (**Not on exam**)
Reading: Wooldridge Chapter 17: 559 – 565
4. Interpretation of Probit and Logit estimates (**Not on exam**)
Reading: Wooldridge Chapter 17: 565 – 5871

Section 6: Methods for Causal Inference

Session 12

1. Omitted variable bias (OV) and its consequences
Reading: Wooldridge Chapter 3: 84 – 87
2. Selection bias as a type of OV
Reading: Wooldridge Chapter 7: 244 – 249

Session 13

3. Use of proxy measures
Reading: Wooldridge Chapter 9: 299 – 306
4. Experiments and quasi-experimental approaches
Reading: Wooldridge Chapter 13: 426 - 452

Session 14

5. Instrumental variables
Reading: Wooldridge Chapter 15: 495 – 513

Section 7: Real World Challenges in the Practice of Econometrics

Note: Material in this section will be included in the class as time permits.

Session 15

1. Including irrelevant variables in a model
Reading: Wooldridge Chapter 3: 83
2. Measurement error in dependent and independent variables
Reading: Wooldridge Chapter 9: 308 – 313
3. Multicollinearity
Reading: Wooldridge Chapter 3: 87 - 92

Session 16

4. Missing data challenges and solutions
Reading: Wooldridge Chapter 9: 315 – 316
5. Heteroskedasticity
Reading: Wooldridge Chapter 8
6. Grouped structures to the error term
Reading: On Moodle

7. Miscellaneous

8. Exam Schedule

Around October 1: Midterm I

Around November 5: Midterm II

Finals Period: In-person Scheduled Cumulative Final Exam. Location and time to be determined by the Registrar. See the Registrar's page when is updates for the current semester for time and room details: <https://www.brynmawr.edu/inside/academic-information/registrar/final-exams>
