**Who and Where?**

Lecture Time:  Tuesday & Thursday 2:30-3:45PM  
Lecture Location:  Van Vleck B135

Instructor:  Prof. Felix Elwert  
Office:  4426 Social Science Building  
Office Hours:  By electronic appointment via:  
[https://felix-elwert.youcanbook.me](https://felix-elwert.youcanbook.me)  
Tuesday 10-11am; Thursday 4-5pm  
Email:  elwert@wisc.edu

Teaching Assistant:  Jungmyung Kim  
Office:  7110 Social Science  
Office Hours:  Wednesday & Friday 9-10am.  
Email:  jungmyung.kim@wisc.edu

Course Website:  [https://canvas.wisc.edu/courses/140490](https://canvas.wisc.edu/courses/140490)

**Administration Information**  
Credits:  3  
Credit hours are met by 150 minutes of lecture plus 90 minutes of lab per week, plus a minimum of 7 hours of out-of-class student work per week.

Course Designations:  
Level – Advanced; L&S Credit - Counts as Liberal Arts and Science credit in L&S; Grad 50% - Counts toward 50% graduate coursework requirement; Honors - Accelerated Honors.

Prerequisites:  Junior standing, and Soc 361 or equivalent, or consent of instructor.

Instructional Model:  All Face-to-face.

**Course Description**  
This is the third course in the statistics sequence for sociologists. It is required for CAR and sociology Ph.D. students; it is elective for others.

This course aims to give students a keen understanding of the purposes and methods of modern quantitative research in sociology. We will engage with two overarching topics.

1. Learn the key strategies for drawing causal inferences from experimental and observational data ("identification").

2. Develop a deeper technical understanding of the main statistical techniques for empirical research in sociology ("estimation").

We will move back and forth between identification and estimation throughout the course, since different identification strategies may require different estimation approaches. For example, when
analysts believe that they can identify causal effects by adjusting or controlling for observed covariates, then they will resort to regression and matching estimators. When adjustment for observed covariates is not sufficient (perhaps because of unobserved confounding factors), they may defend specific functional form assumptions and resort of difference-in-difference or fixed-effects estimators. Alternatively, when they can pinpoint the source of random variation in treatment assignment, they may use regression-discontinuity or instrumental variables estimators.

Throughout, linear regression will serve as the traditional point of reference for all estimation topics. In contrast to Soc 361, however, move beyond OLS by considering important extensions for non-metric outcomes (general linear models), nested data structures (hierarchical or mixed models), and censored data (tobit).

We will cover our topics at various levels of technical depth. We will emphasize concepts and intuitions where these are sufficient, and we will additionally develop more formal notation where it is useful for linking to more advanced courses.

Since quantitative research is an interdisciplinary enterprise, we will liberally draw on methodological contributions from econometrics, statistics, biostatistics, political methodology, and computer science.

**Learning Outcomes**
By the end of this course, you will be able to recognize what statistical techniques are appropriate to extract answers for common sociological questions from data in a variety of realistic scenarios.

Students who want to produce quantitative empirical research, will learn the tools to execute competent work and be able to decide which of the more specialized methodological courses they should take next. (You will have to take more courses.)

Students who will primarily consume quantitative empirical research will acquire the necessary tools to become critical readers of the majority of quantitative research in sociology.

**Grading**
**Exams (55%):** Students will complete 2 midterm exams and one cumulative final exam. Exams cover all material presented in lecture and strongly build on the problem sets in content and form. To respect that everybody can have a bad day, we will give greater weight to your better midterm (15%) and less weight to your weaker midterm (10%). The final exam counts 30%.

There is no possibility of make up midterms. If you have to miss a midterm, please provide a compelling reason before the beginning of the exam, in which case your other midterm will count more. If both midterms are missed, the final exam will constitute the entire exam grade.

For each exam, you may bring one single-sided sheet of your own handwritten notes (for formulas etc.).

**Problem sets (40%):** Students will complete nine computational and conceptual problem sets, some of which contain data-analysis exercises. Problem sets are typically due one week after they have been distributed. Late assignments receive a score of zero. You can drop one assignment
without penalty. Assignments will be graded on effort for partial credit and for correctness to achieve full credit.

**Attendance (5%)**: Lecture and section attendance are required and accounts for 5% of the grade. Students may miss a total of 2 lecture and 2 section meetings and still receive full attendance credit. Attendance credit drops to 0% with the fifth absence.

**Readings**

We post required and recommended readings on the course website. Students must complete all required readings before lecture. Students should revisit their readings, and the lecture script again after lecture. *I cannot stress this enough*: in order to learn statistics, you must read the material repeatedly.

This course does not follow any one textbook. Instead, we are assembling the readings from a journal articles, published textbooks, and the de facto draft of a textbook (Chris Winship’s lecture scripts) to cover the material you need at an appropriate technical level.

Students are encouraged to buy at least one of two excellent and highly accessible books on the logic of empirical research, which focus on foundational insights and guiding intuition that will be useful for both producers and consumers of statisticians, whatever their level of technical sophistication.


Additionally, graduate and CAR students who plan to produce quantitative research should obtain Angrist and Pischke’s justly famous *Mostly Harmless Econometrics* (the graduate version of #2 above). Some of the material in this book is presented at a higher technical level than Soc 362, but it is the minimal level to which you will need to rise eventually to produce state-of-the-art quantitative research on your own.


Several good texts on social science statistics in Stata exist. I recommend:


How much should you read? My advice is to *read more than required, especially if you struggle with the material*. Reading the same text twice is good; but reading the same material twice from different authors may be even better.

Do not be tricked by apparently low page counts (e.g. 30 pages per week). Reading statistics is different from reading prose. It is important to read slowly and carefully. The devil is in the details. Take note of symbols, formulas, and definitions. Highlight and annotate your text. Excerpt your readings by hand and on paper. It is perfectly normal to spend 1-3 or hours on 10 pages of technical reading.
Academic Integrity
By enrolling in this course, each student assumes the responsibilities of an active participant in UW-Madison’s community of scholars in which everyone’s academic work and behavior are held to the highest academic integrity standards. Academic misconduct compromises the integrity of the university. Cheating, fabrication, plagiarism, unauthorized collaboration, and helping others commit these acts are examples of academic misconduct, which can result in disciplinary action. This includes but is not limited to failure on the assignment/course, disciplinary probation, or suspension. Substantial or repeated cases of misconduct will be forwarded to the Office of Student Conduct & Community Standards for additional review. For more information, refer to studentconduct.wiscweb.wisc.edu/academic-integrity/.

Accommodations for Students with Disabilities
The University of Wisconsin-Madison supports the right of all enrolled students to a full and equal educational opportunity. The Americans with Disabilities Act (ADA), Wisconsin State Statute (36.12), and UW-Madison policy (Faculty Document 1071) require that students with disabilities be reasonably accommodated in instruction and campus life. Reasonable accommodations for students with disabilities is a shared faculty and student responsibility. Students are expected to inform me of their need for instructional accommodations by the end of the third week of the semester, or as soon as possible after a disability has been incurred or recognized. I will work either directly with you or in coordination with the McBurney Center to identify and provide reasonable instructional accommodations. Disability information, including instructional accommodations as part of a student’s educational record, is confidential and protected under FERPA. http://mcburney.wisc.edu/facstaffother/faculty/syllabus.php

Diversity and Inclusion
Diversity is a source of strength, creativity, and innovation for UW-Madison. We value the contributions of each person and respect the profound ways their identity, culture, background, experience, status, abilities, and opinion enrich the university community. We commit ourselves to the pursuit of excellence in teaching, research, outreach, and diversity as inextricably linked goals. https://diversity.wisc.edu/

Parenting
If you are a parent, you are invited to bring your baby or child to class if you find yourself in a rare childcare crisis and would miss lecture otherwise. Make sure to bring food, drink, and something to keep your child entertained quietly. Position yourself near the door so you can step out with your child if need be.

Course Outline
Subject to change. Please monitor course announcements.

Readings and assignments are posted on the course website.

| MHE: Mostly Harmless Econometrics |
| MM: Measuring Metrics |
| OE: Observation and Experiment |

All readings are required, unless marked * for recommended or ** for technically hard.

January 22 L1: Introduction
* Lalonde (1986)
| L2: | Potential Outcomes Causality & Randomized Experiments  
MHE: Chapter 2  
* OE: Chapters 1-2 |
|---|---|
| L3: | Matching I  
Readings for the entire week:  
Stuart (2010)  
*OE: Chapter 5  
*Gerber and Green (2012), Chapter 4 |
| L4: | Matching II  
(Same readings as L3) |
| L5: | Matching III & Estimation Error  
Read one of the following two:  
Iacus, King, Porro (2011) (read for ideas, skip math if you must)  
Blackwell et al. (2009) (Stata manual for Iacus et al.) |
| L6: | Path Models  
Pearl 2013: 155-159  
| L7: | Technical Tools 1: Properties of Estimators  
Winship, Lecture Script R1 |
| L8: | Technical Tools 2: Relationships Between Distributions  
Winship Lecture Script R2 |
| L9: | Technical Tools 3: Matrix Algebra  
Winship Lecture Script L4 |
| L10: | Regression in Matrix Notation  
Winship Lecture Script L5 |
| L11: | Identification and Misspecification I  
Winship Lecture Script L6  
** MHE, CH3 pp. 68-77 |
| L12: | Identification and Misspecification II  
Pearl 2013 (remaining pages) |

**Midterm**

| L13: | Robust Inference and GLS  
Winship Lecture Script 12  
*Baum 2006, Chapter 6  
14  | L14: Mixed Models I  
    | Note: The following two required readings overlap in substance, but differ greatly in presentation. You should read all for L14 and L15.  
    | Raudenbush and Bryk 2002, Ch. 2  
    | Winship Lecture Script 13  
    | Raudenbush and Bryk 2002, Ch. 3  

19  | Spring break (no class)  

21  | Spring break (no class)  

26  | L15: Mixed Models II  
    | Same readings as L14  

28  | L16: Limited Dependent Variables  
    | Winship Lecture Script 10  
    | * Long, pp34-54  

April 2  | L17: Logistic Regression  
    | Long, pp 61-79, *79-83  
    | Mood 2010  
    | * **MHE, Section 3.4.2  

4  | L18: Instrumental Variables I  
    | MM Chapter 3  
    | *MHE Sections 4.1 & 4.2  

9  | L19: Instrumental Variables II  
    | TBD  

11  | Review  

16  | Midterm II  

18  | L20: Regression Discontinuity Design  
    | MM Chapter 4  

23  | L21: Panel Models: DiD and Fixed Effects I  
    | MM Chapter 5  

    | TBD  

30  | L23: Mediation Analysis  
    | * VanderWeele 2015, Ch. 1  
    | VanderWeele 2015, Ch.2  

May 2  | Review  

8  | Final Exam: 2:45-4:45 (Place: TBD)