

University of Wisconsin-Madison
Introduction to Quantitative Inquiry in Education (ELPA 822)
Fall 2013 | Education Building | Room L150 | Thursdays | 7:15-9:45pm

Instructor:

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Course Objectives:

The main objective of this course is to prepare doctoral students to use the concepts and methods of quantitative social science research to conduct research on education issues. A second objective is to help students become knowledgeable, critical consumers of quantitative education research. The course is an introduction to several (yet not exhaustive) core techniques, applications, and concepts useful for framing and evaluating quantitative inquiry. The course treats statistics as tools researchers use to gain insight into education issues through an inquiry process that involves the thoughtful and reflective application of logic, theory, prior research, and evidence in our pursuit of new knowledge. By participating in this course, you will learn how to:

1. Use quantitative data to understand and address problems in education
2. Understand how statistical analysis fits into a larger inquiry process
3. Perform basic statistical analyses and data displays using Stata (statistical analysis program)
4. Use statistics and graphical data displays to communicate key findings and evidence
5. Use statistics to examine differences between and among groups
6. Use statistics to examine relationships between variables

Students will develop these skills through reading assignments, lectures, class discussions, in-class activities, and assigned projects. This class can be counted towards the quantitative methods requirement for ELPA doctoral students.

Required Text:

1. [Statistics: A Tool for Social Research](#) (8th edition) by Joseph Healey.
2. [Using Stata for Quantitative Analysis](#) (2012) by Kyle Longest.
3. All other material is available on Learn@UW

Required Software:

Stata, version 12 or higher preferred, accessed via two options:

1. Free from Social Science Computing Cooperative (SSCC)
<http://www.ssc.wisc.edu/sscc/resources/soe.htm> or
2. Purchase from <http://www.stata.com/order/new/edu/gradplans/campus-gradplan/>

Helpful Statistics Resources:

1. Supplemental website for Longest book: <http://www.sagepub.com/longest/>
2. Stata's YouTube channel: <http://www.youtube.com/user/statacorp>
3. UW-Madison page: http://www.ssc.wisc.edu/sscc/pubs/stata_students1.htm

4. UCLA page: <http://www.ats.ucla.edu/stat/stata/>
5. How to Lie With Statistics (2010) by Darrell Huff

Course Requirements:

1. **Class participation (10%).** To receive full participation points, students will come to class prepared to engage in the weekly readings, to ask clarifying and critical questions about course material, and to collaborate with peers.
2. **Problem sets (30%).** To assess and provide feedback on your learning, a series of problem sets will be assigned following our class lectures. Supplemental lab time will be available to consult with the Teaching Assistant on these problem sets and for general Stata questions:
 - a. Problem Set 1: characteristics of the mean and central tendency
 - b. Problem Set 2: calculating variance and standard deviation
 - c. Problem Set 3: calculating confidence intervals
 - d. Problem Set 4: hypothesis testing
 - e. Problem Set 5: correlation and bivariate regression
3. **Article critique (20%).** One of the crafts of becoming an effective and creative researchers deals with critiquing existing scholarship. Students will write one methodological critique of a published quantitative research study relatively early in the semester as an exercise to become familiar with quantitative research design. Critiquing this article will expose students to real world examples of statistics in use and will engage students in the authentic practice of critical research review. I will provide three articles from which to choose; students select only one. The review will describe the purpose and methodology of the article and will provide a brief critique. Some of the articles contain methods that aren't covered in class. In those cases, please simply describe the methods as you understand them. In writing your critique, please use the document "Guiding Questions for Reviewing Quantitative Research Articles" posted in the "Resources" section of Learn@UW. Your critique doesn't need to address every question outlined in the document. Instead you should choose guiding questions that are particularly relevant to the article.
4. **Research Proposal (40%).** The culminating assignment for the course can take two forms—a proposal for conducting a quantitative study or a report of original quantitative research. Most will probably opt for the first option to propose a quantitative research project. For students planning to conduct quantitative research as part of their dissertation, this assignment can serve as a draft of the methods section of your dissertation proposal. The assignment should provide a brief background of the problem or question motivating the research. The remainder of the assignment should lay out a methodological strategy that allows you to address your research problem or question. The methodological strategy should touch on the following elements:
 - a. Describe the hypotheses you plan to test or actually tested
 - b. Describe the constructs on which the hypotheses are based
 - c. Describe how you will measure the constructs (i.e. where will the data on your constructs come from?)

- d. Describe a sample for your study/proposed study
- e. Discuss the statistical analyses you conducted or plan to conduct, including descriptive analyses and formal hypothesis tests involving inferential statistics
- f. Discuss how your research design supports inferences related to your research question or problem. This includes issues of causality and generalization.

All assignments must be submitted to me (via email or Learn@UW) prior to the start of class on their due date. I deduct one letter grade for each day an assignment is late, and I do not allow extensions. In the event of an unforeseen emergency, please notify me and we will proceed on a case-by-case basis.

Also, a helpful tip on all assignments: write in active voice whenever possible. For example, instead of saying “the car was hit by the bus” say “the bus hit the car.” This keeps your prose clear and concise, and it’s a habit we can all practice in every-day communication. Writing is a craft that takes time to perfect, so please strive to be effective and clear communicators.

Grading:

When grading, I evaluate assignments using four criteria: 1) how much *effort* you put forth, 2) the *degree of challenge* you undertake, 3) how well you *understand* the material, 4) and how well you *communicate* your ideas. I provide written feedback on each assignment and am available to follow-up with any questions/concerns you may have regarding this feedback. Any evidence of academic dishonesty will not be tolerated. While collaboration is encouraged, plagiarism and cheating is unacceptable; no points will be awarded in these cases and I will enforce university policies regarding academic integrity.

Full Inclusion:

Students needing special accommodations to enable full participation in this course should contact the instructor as early as possible. All information will remain confidential. You also may contact the McBurney Disability Resource Center, 702 W. Johnson Street, Suite 2104 Madison, WI 53715, 608 263.2741 (<http://www.mcburney.wisc.edu>) regarding campus policies and services.

Week	Date	Topic	Readings	Reflections	Due
1	9/5	Introduction to Quantitative Inquiry		How comfortable are you with statistics? What are your personal goals for the course?	
2	9/12	Measurement & Research Design	Healey, Ch. 1; Kerlinger; McEwan & McEwan	What is the basis for making inferences and judgments based on quantitative data? How do we 'know' x caused y?	
3	9/19	Descriptive Stats & Central Tendency	Healey, Chs. 2 & 3; Angrist	What are the promises and pitfalls of exploring education phenomena via quantitative inquiry?	
4	9/26	Lab 1 –Introduction to Stata	Longest, Chs. 1 & 2; Gladwell	What are the data structures and basic steps in getting started with Stata?	PS1
5	10/3	Lab 2 – Making Descriptive Statistics	Longest, Ch. 4; Jencks	How can measures of central tendency help us understand educational inequality and equity?	
6	10/10	Measures of Dispersion & Normal Dist.	Healey, Chs. 4 & 5	Why is variation such a critical element in quantitative inquiry?	
7	10/17	Introduction to Inferential Statistics	Healey, Chs. 6 & 7; Lynam et al.	Why is sampling distribution important? How do we collect data (surveys, experiments, etc)?	PS2
8	10/24	Lab 3 – Confidence intervals	Longest Ch. 6; Shager et al.	How can research design impact a study's results? How can we communicate results effectively?	PS3
9	10/31	Introduction to Hypothesis Testing	Healey, Chs. 8 & 10; Best & Horiuchi	If groups have systematic differences on an outcome, how can this information guide policy?	
10	11/7	Lab 4 – t-tests and ANOVA	Lee & Laorie; Shadish et al	How might you frame an inferential analysis in the future? Where might you find your data?	
11	11/14	Bivariate Measures of Correlation	Healey, Chs. 12 & 15 (stop at 15.3)	How do we estimate the nature of relationships? How can this information be used in educational policy?	PS4
12	11/21	Lab 5 – Correlation	Longest, Chs. 7 & 8	Why is it so important in education policy to be ever-mindful of the quote "correlation is not causation?"	AC
13	11/28	Thanksgiving	-		
14	12/5	Measuring the Line of Best Fit	Healey, Chs. 15 (start at 15.3) & Allison	How might correlation and regression analysis help answer your own research questions?	
15	12/12	Flex night	Schneider et al (skim) & Cellini	What does the future holds for quantitative inquiry in education? How can you be a critical consumer/creative producer of this work?	PS5
16	12/19	Submit final papers		What were your best/worst learning experiences this term?	RP

Note: PS = "Problem Set" AC = "Article Critique" RP = "Research Proposal"