

ED-793: Quantitative Methods in Educational Research Fall 2015

Lecture: Wednesday 1:00 p.m. – 4:00 p.m.
Room: 2229 SEB
Instructor: Brian McCall (bpmccall@umich.edu)

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Instructor Assistants:

Matt DeMonbrun (mdemonbr@umich.edu)

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Michael Brown (mbrowng@umich.edu)

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Lab Sessions:

Lab Day & Time: Thursday 9:00 a.m.-11:00 a.m.

Lab Room: 2302 SEB

Lab Instructor: DeMonbrun

Lab Day & Time: Thursday 1:00 p.m.-3:00 p.m.

Lab Room: G444B MH

Lab Instructor: 2302 SEB

In the Lab sessions you will learn the Stata program, review material covered in lecture and questions about class material and homework exercises.

canvas:

Much of the communications for this course will be through a canvas worksite. This site includes:

- An electronic form of the syllabus.
- Chat room for discussions on difficult topics.
- Homework and Other Assignments.
- Additional Reading Material and Powerpoint slides used in lecture.
- General Announcements.
- Web Content.

Course Description:

This course provides an introduction to quantitative methods for research in education and the social sciences. Topics explored include the logic of research design, graphical and tabular displays of univariate and bivariate distributions, statistical inference and significance testing, contingency tables, t-tests, ANOVA, and regression.

Prerequisites:

No prior instruction in statistical analysis is required. A basic understanding of introductory algebra is the sole mathematical prerequisite.

Required Book:

A. Agresti and B. Finlay, *Statistical Methods for the Social Sciences 4th Edition*, Pearson Prentice Hall: Upper Saddle River, NJ.

Optional Book:

A. Acock, *A Gentle Introduction to Stata 4th Edition*, Stata Press: College Station, TX.

Software:

There are several statistical software programs, the three major ones being SAS, SPSS and Stata. For this class we will use Stata. Most of the discussion of how to use Stata will be covered in the lab sessions.

Learning Objectives:

By the end of the course students will gain enough familiarity with:

- basic statistical methods to read and evaluate government and academic reports and research articles that use these basic methods as well as critically evaluate newspaper and magazine articles that report on such research.
- the Stata software and statistical concepts to be able to perform simple statistical analysis on data, for example, ANOVA and linear regression analysis.
- two datasets different nationally representative datasets used in educational research: ECLS and ELS to be comfortable conversing about them and use them in future research projects.
- basic research methods to be able to evaluate the type of research design in a study.

Policy on Accommodating Students with Special Needs:

In order to enable you to be successful in this course I encourage you to talk to me as early in the semester as possible so that the necessary accommodations can be made. See <http://www.umich.edu/~sswd/> for more information about services for students with disabilities.

Students Rights and Responsibilities:

I encourage you to read your rights and responsibilities as a student. Information on these topics can be found at: <http://www.umich.edu/~oscr/>. I would also encourage you to read the University’s General Catalogue, especially the sections that detail your rights as a student and the section that discusses the University’s expectations of you as a student. (See <http://www.rackham.umich.edu/StudentInfo/Publications> .)

Policy on Diversity:

I intend to present materials and activities that are respectful of our diverse world and I encourage you to provide suggestions on how we can incorporate new materials to improve the course for all students. The University of Michigan has a number of affirmative action policies and these policies can be found at: <http://www.umich.edu/~hrra/oie/>

*****Please turn cell phones off before entering the class*****

Data Sets Used in Class:

While we will occasionally use other data in class homework, data for many of the exercises in the homework as well as for the group projects will come from two data sets that are widely used in educational research.

Early Childhood Longitudinal Study (ECLS) conducted by the National Center for Education Statistics

and

Education Longitudinal Study of 2002 (ELS) conducted by the National Center for Education Statistics.

Brief Descriptions of the Data:

The Early Childhood Longitudinal Study (ECLS) program provides national data on children's status at birth and at various points thereafter, children's transition to non-parental care, early education programs, and school, and children's experiences and growth through the eighth grade. ECLS also provides data to test hypotheses about the effects of a wide range of family, school, community, and individual variables on children's development, early learning, and early performance in school. The Kindergarten Class of 1998-1999 addresses four key issues: (1) school readiness, (2) children's transitions to kindergarten, first grade, and beyond, (3) the relationship between children's kindergarten experience and their elementary school performance, and (4) children's growth in math, reading, and general knowledge (i.e., science and social studies), and their progress through elementary school. The third-grade, fifth-grade and eighth-grade data collections include information about the diversity of the study children, the schools they attended, and their academic progress in the years following kindergarten.

The Education Longitudinal Study of 2002 (ELS) is designed to monitor the transition of a national sample of young people as they progress from 10th grade through high school and on to postsecondary education or the world of work, or both. The ELS has two distinctive features. First, it is a longitudinal study, in which the same units (schools and students) are surveyed repeatedly over time. Individual students were followed through high school and for 8 years thereafter. The base-year schools were surveyed twice, in 2002 and in 2004. Second, in the high school years is an integrated, multilevel study that involves multiple respondent populations. The respondents include students, their parents, their teachers, and their schools (from which data are collected at four levels: from the principal, the librarian, a facilities checklist, and school course catalogues and records, which support a course offerings component in the first follow-up transcript study).

Course Grading:

A student's grade will consist of their performance in four areas class participation, homework, the group project, and exams.

The relative breakdown of each of these areas in determining a student's overall grade is as follows.

- **10% Class Participation**
 - Class participation includes attending class and labs, actively participating in all group activities during class and labs, turning in all non-graded exercises in class and participating in class and lab discussions.
 - At the end of the semester each student will write a brief summary of their participation activities during the semester.

- **25% Homework**
 - Homework assignments must be turned in the day that they are due. Late homework assignments will receive an automatic 10% reduction in points.

- **15% Group Project:**
 - Group projects will involve an analysis of some hypothesis using data from either the ELCS or NELS.
 - Groups will consist of five individuals. Each group will be required to make a fifteen minute presentation discussing their findings and an 8-10 page paper which is a write up of the project.
 - Fifty percent of the group's grade is determined by the presentation and fifty percent of the grade is determined by the paper.
 - More information about the projects will be given later in class.

- **50% Exams:**
 - There will be two exams (October 28 and December 9) in this class each worth 25% of the grade.
 - During each exam, you will be allowed to use a basic hand calculator and four pages (both sides of four 8.5" x 11" sheets of paper) of handwritten (not typed, photocopied, or electronically printed) notes. You will not be allowed to use the course textbooks, a computer, a graphing or programmable calculator, or any other aids during the exams.

Course Topics:

- **Sampling and Measurement**
 - Agresti & Finlay Chapters 1 & 2 (Acock Chapters 1-4)
- **Descriptive Statistics:**
 - Agresti & Finlay Chapter 3 (Acock Chapter 5)
- **Probability Theory**
 - Agresti & Finlay Chapter 4
- **Statistical Inference: Estimation**
 - Agresti & Finlay Chapter 5
- **Statistical Inference: Significance Tests**
 - Agresti & Finlay Chapter 6 (Acock Chapter 6)
- **Comparison of Two Groups**
 - Agresti & Finlay Chapter 7 (Acock Chapter 7)
- **Association between Categorical Variables**
 - Agresti & Finlay Chapter 8
- **Correlation and Simple Linear Regression**
 - Agresti & Finlay Chapter 9 (Acock Chapter 8)
- **Multiple Linear Regression**
 - Agresti & Finlay Chapters 10 & 11 (Acock Chapter 10)

- **Analysis of Variance (ANOVA)**
 - Agresti & Finlay Chapter 12 (Acock Chapter 9)

Mid-Semester Evaluation:

At the halfway point in this course I will administer a mid-semester teaching evaluation. This is done in order for me to make some adjustments in the course based on student comments.