EPSY 8251

METHODS IN DATA ANALYSIS FOR EDUCATIONAL RESEARCH I

Course Description

Methods in Data Analysis for Educational Research I is the first course in an entry-level, doctoral sequence for students in education. The two semester sequence provides in-depth coverage of widely used statistical methods and models and prepares students for advanced statistical coursework such as: Statistical Analysis Using Structural Equation Methods (EPsy 8266), Applied Multivariate Analysis (EPsy 8267), Hierarchical Linear Modeling in Educational Research (EPsy 8268), Statistical Analysis of Longitudinal Data (EPsy 8282), and Item Response Theory (EPsy 8290).

Methods in Data Analysis for Educational Research I provides rigorous coverage of estimation and hypothesis testing with a particular focus on ANOVA and multiple linear regression.

Tue/Thr Course

T, R, 11:15 a.m.–12:30 p.m.

Elliott Hall N647

Mon/Wed Course

M,W, 2:30 p.m.–3:45 p.m.

Ford Hall 110

Website

http://zief0002.github.io/epsy-8251

Textbooks

The two required textbooks for the course are:

- Lewis-Beck, C., & Lewis-Beck, M. (2016). Applied regression: An introduction (2nd ed.). Thousand Oaks, CA: Sage.
- Nicol, A. A., & Pexman, P. M. (2010). Presenting your findings: A practical guide to creating tables (6th ed.). Washington, DC: American Psychological Association.

Course Prerequisites

EPsy 8251 requires that students enrolled in the course have successfully completed previous coursework in data analysis. Previous coursework include EPSY 5261 or a comparable course. Students are responsible for all prerequisite topics which include, but are not limited to, descriptive/exploratory data analysis, ordinary least squares (OLS) parameter estimation, estimators, probability distributions, statistical hypotheses, sampling distributions, type I and type II errors, two-sample t-test of independent means, bivariate regression, and at least an introduction to one-way ANOVA. Students who are unfamiliar with these topics are strongly advised to not enroll in EPsy 8251 and instead to complete one or more of the above prerequisites based on their statistics background before pursuing EPSY 8251.

2018

Fall Semester

Andrew Zieffler
Office: Educational Sciences Building 178
Office Hours: Wednesdays 9:00 AM–10:00 AM; and by appointment
Email: zief0002@umn.edu

Course Requirements

Students will complete eight homework assignments. These assignments will help you learn the course material via structured application and practice. These assignments, each weighted equally, will make up the entirety of your grade for the course. Submitted homework assignments must be typed—handwritten assignments will receive no credit. Any assignment that is submitted via email without prior instructor approval will receive no credit. If approval is granted to turn in an assignment via email the only acceptable format is a PDF file.

You are permitted to collaborate with other students (2–3) in the course to complete the assignments. If you collaborate with others, please turn in only one homework assignment with all your names on it. Although I believe you will learn more by collaborating with others, you do not need to join a group to ultimately be successful in this course.

For those students who work collaboratively, note that I am not willing to manage intra-group conflicts nor will I assign varying grades within a group. From past experience, student collaborations work most fluidly when everyone in the group has chosen the same grading option for the course (e.g., A/F, S/N, etc.).

Evaluation of Student Performance

Course grades will be based entirely on performance on the homework assignments. The points from the eight homework assignment will be pooled to compute the final course grade. Students who earn below 63% will receive the letter grade of F. If you are taking the course S/N, the minimum criterion to receive an S is 80% (the equivalent of a B– letter grade). Any student who does not complete all homework assignments without making prior arrangements with the instructor will receive a grade of F/N.

Cutoff	Grade	Cutoff	Grade	Cutoff	Grade
93%	A	83%	B	73%	C
90%	A–	80%	B–	70%	C–
87%	B+	77%	C+	63%	D

Discussion/ Participation

While not a part of the course grade, active participation in the course is expected of all students enrolled in EPsy 8251. Active participation includes, but is not limited to, being engaged during the class, asking questions, providing additional insight and material, responding to other students and the instructor, and always being open and inquisitive.

Required Reading

As part of the course, there are several articles, papers and technical reports that you will need to read during the semester. Most of the articles themselves are accessible through the University of Minnesota library website (http://www.lib.umn.edu). In order to access the full text of some of the articles, you will need to log in using your University x500 username and password. More detailed information, including references or links to specific readings, are given in the course calendar, or will be made available to students on the course website.

Accessing Course Grades

Shortly after the course, you may access your grades online at http://myu.umn.edu. Assignments will be handed back in class or during office hours. Uncollected assignments will be retained for six weeks after the course and then discarded. application and practice.

Tue/Thr Course Requirements

The calendar below lists the tentative dates of the course topics and assignments. These dates are subject to change at the instructor's discretion. Readings will be posted on the course website, and should be done prior to class.

Date	Course Content	Date	Course Content
Sept. 04	Welcome to EPsy 8251	Oct. 25	Regression assumptions
Sept. 06	Introduction to R and RStudio	Oct. 30	Regression assumptions
Sept. 11	Data Wrangling with dplyr	Nov. 01	NO CLASS — PORTLAND
Sept. 13	Plotting with ggplot2	Nov. 06	Regression assumptions
Sept. 18	Simple linear regression: Description	Nov. 08	Categorical predictors (two levels)
Sept. 20	Simple linear regression: Description	Nov. 13	Categorical predictors (two levels)
Sept. 25	Least Squares Estimation	Nov. 15	Categorical predictors (more than two levels)
Sept. 27	Coefficient-Level Inference	Nov. 20	Categorical predictors (more than two levels)
Oct. 02	Coefficient-Level Inference	Nov. 22	THANKSGIVING BREAK
Oct. 04	Model-Level Inference	Nov. 27	Post hoc tests
Oct. 09	Model-Level Inference	Nov. 29	Interaction models
Oct. 11	Multiple linear regression	De. 04	Interaction models
Oct. 16	Multiple linear regression	Dec. 06	Interaction models
Oct. 18	Multiple linear regression	Dec. 11	Interaction models
Oct. 23	Multiple linear regression		

Assignment Due Dates

- Assignment #1: Introduction to R, RStudio, dplyr, and ggplot (due Sept. 20)
- Assignment #2: Simple regression: Description (due Sept. 27)
- Assignment #3: Simple regression: Inference (due Oct. 16)
- Assignment #4: Introduction to multiple regression (due Oct. 30)
- Assignment #5: Regression assumptions (due Nov. 13)
- Assignment #6: Analysis of covariance I (due Nov. 20)
- Assignment #7: Analysis of covariance II (due Dec. 04)
- Assignment #8: Interaction models (due Dec. 13; 12:00 pm in EdSciB 250)

Mon/Wed Course Requirements

The calendar below lists the tentative dates of the course topics and assignments. These dates are subject to change at the instructor's discretion. Readings will be posted on the course website, and should be done prior to class.

Date	Course Content	Date	Course Content
Sept. 05	Welcome to EPsy 8251	Oct. 29	Regression assumptions
Sept. 10	Introduction to R and RStudio	Oct. 31	NO CLASS – PORTLAND
Sept. 12	Data Wrangling with dplyr	Nov. 05	Regression assumptions
Sept. 17	Plotting with ggplot2	Nov. 07	Regression assumptions
Sept. 19	Simple linear regression: Description	Nov. 12	Categorical predictors (two levels)
Sept. 24	Simple linear regression: Description	Nov. 14	Categorical predictors (two levels)
Sept. 26	Least Squares Estimation	Nov. 19	Categorical predictors (more than two levels)
Oct. 01	Coefficient-Level Inference	Nov. 21	THANKSGIVING BREAK
Oct. 03	Coefficient-Level Inference	Nov. 26	Categorical predictors (more than two levels)
Oct. 08	Model-Level Inference	Nov. 28	Post hoc tests
Oct. 10	Model-Level Inference	Dec. 03	Interaction models
Oct. 15	Multiple linear regression	De. 05	Interaction models
Oct. 17	Multiple linear regression	Dec. 10	Interaction models
Oct. 22	Multiple linear regression	Dec. 12	Interaction models
Oct. 24	Multiple linear regression		

Assignment Due Dates

- Assignment #1: Introduction to R, RStudio, dplyr, and ggplot (due Sept. 24)
- Assignment #2: Simple regression: Description (due Oct. 01)
- Assignment #3: Simple regression: Inference (due Oct. 17)
- Assignment #4: Introduction to multiple regression (due Oct. 31; 3:45pm to EdSciB 250)
- Assignment #5: Regression assumptions (due Nov. 14)
- Assignment #6: Analysis of covariance I (due Nov. 26)
- Assignment #7: Analysis of covariance II (due Dec. 05)
- Assignment #8: Interaction models (due Dec. 13; 12:00 pm in EdSciB 250)

Email

Email is the primary source of communication among instructors, teaching assistants, and students for this course. As such, you will be expected to check your email frequently (i.e., at least once per day). As per the University policy, "students are responsible for all information sent to them via their University assigned email account. If a student chooses to forward their University email account, he or she is responsible for all information, including attachments, sent to any other email account."

Course Technology Policy

The course uses technology on a regular basis during both instruction and assessments (e.g., homework assignments, exams, etc.). Student difficulty with obtaining or operating the various software programs and technologies–including printer trouble–will not be acceptable as an excuse for late work. Due to the variation in computer types and systems, the instructor or TA may not be able to assist in trouble shooting all problems you may have.

Campus Computer Labs

The Office of Information Technology (OIT) manages numerous computer labs on the Twin Cities campus. Students from all colleges may drop in to use the computer labs during open hours. The OIT website contains information pertaining to the location, hours, and software available for each of the computer labs (http://www.oit.umn.edu/computer-labs/).

Use of Personal Electronic Devices in the Classroom

Using personal electronic devices in the classroom setting can hinder instruction and learning, not only for the student using the device but also for other students in the class. To this end, the University establishes the right of each faculty member to determine if and how personal electronic devices are allowed to be used in the classroom. For complete information, please reference: http://policy.umn.edu/Policies/Education/Education/CLASSROOMPED.html

R

In order to download and install R your computer must be connected to the Internet. The latest version of R can be obtained from the R Project for Statistical Computing at http://www.r-project.org/

After navigating to the website click on "CRAN" under "Download, Packages" on the left-hand side of the welcome screen. You must choose a server in your country of origin, called a CRAN mirror. After doing so, select the appropriate operating system for your computer–Linux, MacOS, or Windows. For Linux and MacOS, follow the directions at the top of the download page. For Windows, download the base package and install it like any other executable file. On Windows machines you might need to have "administrator" privileges to successfully install and use the program.

RStudio

RStudio is an integrated development environment (IDE) for R. A free application, RStudio combines an intuitive user interface with powerful coding tools to help you get the most out of R. It can be downloaded at http://www.rstudio.org/

Microsoft Office

Microsoft Office 365 Pro Plus is available free of charge for University of Minnesota faculty, staff and students. Download and install the latest version of Microsoft Office from https://it.umn.edu/microsoft-office-pro-plus-365-faculty-o

Quantitative Methods in Education Mission Statement

The Quantitative Methods in Education (QME) track offers educational opportunities in both quantitative and qualitative methods with a broad array of introductory and advanced coursework. Students who choose QME as their track within educational psychology may specialize in any of four areas: measurement, evaluation, statistics, and statistics education. The goal of QME is to provide students with broad but rigorous methodological skills so that they may conduct research on methodologies, may help to train others in methodology, or will have the skills necessary to conduct research in related fields.

Department of Educational Psychology Mission Statement

Educational psychology involves the study of cognitive, emotional, and social learning processes that underlie education and human development across the lifespan. Research in educational psychology advances scientific knowledge of those processes and their application in diverse educational and community settings. The department provides training in the psychological foundations of education, research methods, and the practice and science of counseling psychology, school psychology, and special education. Faculty and students provide leadership and consultation to the state, the nation, and the international community in each area of educational psychology. The department's scholarship and teaching enhance professional practice in schools and universities, community mental health agencies, business and industrial organizations, early childhood programs, and government agencies. Adopted by the Department. of Educational Psychology faculty October 27, 2004

College of Education + Human Development Mission Statement

The new College of Education and Human Development is a world leader in discovering, creating, sharing, and applying principles and practices of multiculturalism and multidisciplinary scholarship to advance teaching and learning and to enhance the psychological, physical, and social development of children, youth, and adults across the lifespan in families, organizations, and communities.

Tilly the Therapy Chicken
@TherapyChicken

Stress Management

Stress management is an important piece of the skill set needed for success in graduate school. Pet Away Worry & Stress (PAWS) is one of the many resources available to students. Find out more at http://www.bhs.umn.edu/services/wellness-paws.htm.

University of Minnesota Policies and Procedures

Academic Freedom and Responsibility

Academic freedom is a cornerstone of the University. Within the scope and content of the course as defined by the instructor, it includes the freedom to discuss relevant matters in the classroom. Along with this freedom comes responsibility. Students are encouraged to develop the capacity for critical judgment and to engage in a sustained and independent search for truth. Students are free to take reasoned exception to the views offered in any course of study and to reserve judgment about matters of opinion, but they are responsible for learning the content of any course of study for which they are enrolled.* Reports of concerns about academic freedom are taken seriously, and there are individuals and offices available for help. Contact the instructor (Andrew Zieffler; zief0002@umn.edu), the Department Chair (Geoff Maruyama; geoff@umn.edu), your adviser, the associate dean of the college (Kenneth R. Bartlett; bartlett@umn.edu), or the Vice Provost for Faculty and Academic Affairs in the Office of the Provost (Arlene Carney; carne005@umn.edu).

*Language adapted from the American Association of University Professors "Joint Statement on Rights and Freedoms of Students".

Disability Accommodations

The University of Minnesota views disability as an important aspect of diversity, and is committed to providing equitable access to learning opportunities for all students. The Disability Resource Center (DRC) is the campus office that collaborates with students who have disabilities to provide and/or arrange reasonable accommodations.

- If you have, or think you have, a disability in any area such as, mental health, attention, learning, chronic health, sensory, or physical, please contact the DRC office on your campus (612.626.1333) to arrange a confidential discussion regarding equitable access and reasonable accommodations.
- Students with short-term disabilities, such as a broken arm, can often work with instructors to minimize classroom barriers. In situations where additional assistance is needed, students should contact the DRC as noted above.
- If you are registered with the DRC and have a disability accommodation letter dated for this semester or this year, please contact your instructor early in the semester to review how the accommodations will be applied in the course.
- If you are registered with the DRC and have questions or concerns about your accommodations please contact your (access consultant/disability specialist).

Additional information is available on the DRC website: diversity.umn.edu/disability or e-mail drc@umn.edu with questions.

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 information, please consult Board of Regents Policy: http://www1.umn.edu/regents/policies/administrative/Equity_Diversity_EO_AA.html.

Makeup Work for Legitimate Absences

Students will not be penalized for absence during the semester due to unavoidable or legitimate circumstances. Such circumstances include verified illness, participation in intercollegiate athletic events, subpoenas, jury duty, military service, bereavement, and religious observances. Such circumstances do not include voting in local, state, or national elections. For complete information, please see: http://policy.umn.edu/education/makeupwork.

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.

Respecting Intellectual Property

Students may not distribute instructor-provided notes or other course materials, except to other members of the same class or with the express (written) consent of the instructor. Instructors have the right to impose additional restrictions on course materials in accordance with copyright and intellectual property law and policy. Students may not engage in the widespread distribution or sale of transcript-like notes or notes that are close to verbatim records of a lecture or presentation. For additional information, please see: http://policy.umn.edu/Policies/Education/Education/STUDENTRESP.html.

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; submitting 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 professional endorsement; altering, forging, or misusing a University academic record; or fabricating 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. For additional information, please see: http://policy.umn.edu/Policies/Education/Education/INSTRUCTORRESP.html.

The Office for Student Conduct and Academic Integrity has compiled a useful list of Frequently Asked Questions pertaining to scholastic dishonesty: http://www1.umn.edu/oscai/integrity/student/index.html. If you have additional questions, please clarify with your

Sexual Harassment

"Sexual harassment" means unwelcome sexual advances, requests for sexual favors, and/or other verbal or physical conduct of a sexual nature. Such conduct has the purpose or effect of unreasonably interfering with an individual's work or academic 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://www1.umn.edu/regents/policies/humanresources/SexHarassment.html

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.

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."

Senate Grading Policy

The University of Minnesota's grading policy is available online. For additional information, please refer to http://policy.umn.edu/Policies/Education/Education/GRADINGTRANSCRIPTS.html. The University utilizes plus and minus grading on a 4.000 cumulative grade point scale in accordance with the following:

A	4.000	Represents achievement that is outstanding relative to the level necessary to meet course requirements
A–	3.667	
B+	3.333	
B	3.000	Represents achievement that is significantly above the level necessary to meet course requirements
B–	2.667	
C+	2.333	
C	2.000	Represents achievement that meets the course requirements in every respect
C–	1.667	
D+	1.333	
D	1.000	Represents achievement that is worthy of credit even though it fails to meet fully the course requirements
S		Represents achievement that is satisfactory, which is equivalent to a C– or better
F/N		Represents failure (or no credit) and signifies that the work was either (1) completed but at a level of achievement that is not worthy of credit or (2) was not completed and there was no agreement between the instructor and the student that the student would be awarded an I (see also I).
I	Incomplete	Assigned at the discretion of the instructor when, due to extraordinary circumstances, e.g., hospitalization, a student is prevented from completing the work of the course on time. Requires a written agreement between instructor and student.