

EPsy 8251

Methods in Data Analysis for Educational Research I

FALL | 2022
MW 2:30pm–3:45pm
Scott Hall 4

Welcome to EPsy 8251

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. EPsy 8251 provides rigorous coverage of estimation and hypothesis testing with a particular focus on the General Linear Model.

<https://zief0002.github.io/miniature-garbanzo/>

TEXTBOOKS

- **Required:** Lewis-Beck, C., & Lewis-Beck, M. (2016). [Applied regression: An introduction \(2nd ed.\)](#). Thousand Oaks, CA: Sage. doi: 10.4135/9781483396774

A Note on Inclusion and Respect

In this class, we will work together to develop a learning community that is inclusive and respectful, and where every student is supported in the learning process. As a class full of diverse individuals (reflected by differences in race, culture, age, religion, gender identity, sexual orientation, socioeconomic background, abilities, professional goals, and other social identities and life experiences), I expect that different students may need different supports to promote their learning. The TAs and I will do everything we can to help with this, but as we only know what we know, we need you to communicate with us if things are not working for you or you need something we are not providing. I hope you all feel comfortable in helping to promote an inclusive classroom through respecting one another's individual differences, speaking up, and challenging oppressive/problematic ideas. Finally, I look forward to learning from each of you and the experiences you bring to the class.



Instructor

ANDREW ZIEFFLER
zief0002@umn.edu

OFFICE HOURS

M 9:00am–10:00am and by appointment
[EdSciB 178](#)



Teaching Assistant

KYLE STAGNARO
stagn011@umn.edu

OFFICE HOURS

R 1:00pm–2:00pm and by appointment
[EdSciB](#)

COURSE REQUIREMENTS

Students will complete nine homework assignments. The homework assignments and due dates will be posted on the [course website](#). These assignments include problems that will help you learn the course material through reflection and practice. Submit each assignment as a PDF file via email to the TA.

To foster cooperation and collaboration, you are permitted to form groups of no larger than three to work on the homework. Submit only one assignment per group, and list the names of each group member on the assignment. Each assignment will be scored and this score will be given to all individuals in the 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.).

If you work alone on the assignments, you need to truly work alone. To protect against running afoul of the scholastic dishonesty policy, students working alone are not permitted to interact with any other student in regards to the assignment, including discussion, obtaining help, 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

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

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.

INCOMPLETE

An incomplete will be assigned only in extraordinary circumstances (e.g., hospitalization). An incomplete is an arranged grade which requires a written contract between instructor and student that includes by when and how the incomplete will be satisfied. Incomplete contract forms are available at z.umn.edu/incompletegradecontract or from program staff in 250 EdSciB.

ACCESSING COURSE GRADES

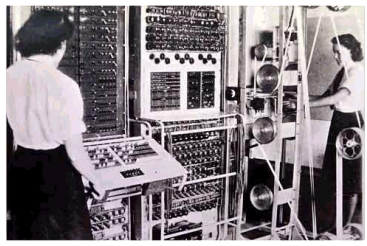
Shortly after the course, you may access your grades online at <http://myu.umn.edu>. Assignments will be handed back in class or during office hours. Uncollected assignments will be retained for six weeks after the course and then discarded.

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>.

Tilly the Therapy Chicken
(@TherapyChicken)





Statistical Computing

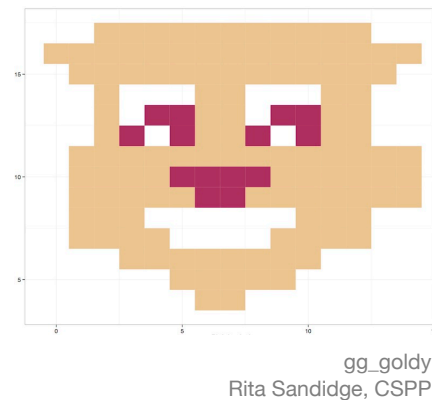
Statistical computing is an integral part of statistical work, and subsequently, EPsy 8251. To support your learning in this area, this course will emphasize the use of R. R is a free software environment for statistical computing and graphics. It compiles and runs on a wide variety of UNIX platforms, Windows and MacOS (<http://www.r-project.org>). It should be noted that while some R syntax and programming is taught during class time, there is also a fair amount that you may need to learn on your own outside of class. There are several tutorials and resources available on the web to help you learn R.

TECHNOLOGY

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.

INTERACTING WITH R

You can install R and RStudio onto your local machine. (There are instructions for how to do this on the [course website](#).) You are responsible for getting things to work on your computer. While it should be straightforward, each OS and computer has their quirks. I can try to help you with this if you are having trouble.



Policy for in-person class meetings

Students in this class are expected to comply with all University public health policies, including the [wearing of face coverings](#) when in any enclosed or indoor space, including our classroom. [FAQ about the mask policy](#)

CEHD Policy on Recording Classes

All class sessions may be recorded by the instructor using the procedures in the CEHD Policy on Recording Classes , with or without prior notice. Students should assume that a class session is being recorded unless otherwise notified. No person (student or otherwise) may record a class without express written permission from the instructor or an authorized administrator implementing a disability accommodation. All permitted recordings are governed by this policy's limits on distribution and redistribution of recordings.



Communication

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 OUTLINE

The outline below lists the tentative course topics. The dates listed are subject to change at the instructor’s discretion. A more nuanced calendar, including links to readings, assignments, and course notes will be posted on the [course website](#).

Introduction to Statistical Computing

Introduction to R and RStudio
(Sept. 12)

Data Wrangling with dplyr
(Sept. 14)

Plotting with ggplot2
(Sept. 19)

Regression Basics

Simple Linear Regression: Description
(Sept. 21–26)

Ordinary Least Squares (OLS) Estimation
(Sept. 28)

Correlation and Standardized Regression
(Oct. 03–05)

Coefficient-Level Inference
(Oct. 10–12)

Model-Level Inference
(Oct. 17–19)

Deeper Understanding

Introduction to Multiple Linear Regression
(Oct. 24–26)

Understanding Statistical Control
(Oct. 31–Nov. 02)

Distributional Assumptions Underlying the Regression Model
(Nov. 09–14)

Extending the Regression Model

Dummy Coding Categorical Predictors
(Nov. 16–21)

Polychotomous Categorical Predictors
(Nov. 23–28)

Introduction to Interaction Effects
(Nov. 30–Dec. 05)

More Interaction Effects
(Dec. 07–14)

Quantitative Methods in Education Mission Statement

QME strives to be a premier program recognized for leadership, innovation, and excellence, and to enable human potential through the advancement of education. QME prepares students to become cutting-edge professionals in educational measurement, evaluation, statistics, and statistics education, through excellence in teaching, research, and service; and through investigating and developing research methodology in education.

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 mission of the University of Minnesota College of Education and Human Development is to contribute to a just and sustainable future through engagement with the local and global communities to enhance human learning and development at all stages of the life span.



Goldy, c. 1965



I have three dogs—Iggy (left), Hank (center) and Sadie (right). If we move to remote teaching during the semester, you will probably hear them at some point during class as they announce the mail or UPS.

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 (Kristen McMaster; mcmas004@umn.edu), your adviser, the associate dean of the college (Tabitha Grier-Reed; grier001@umn.edu), or the Vice Provost for Faculty and Academic Affairs in the Office of the Provost (Rebecca Ropers; ropers@umn.edu).

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

Appropriate Student Use of Class Notes and Course Materials

Taking notes is a means of recording information but more importantly of personally absorbing and integrating the educational experience. However, broadly disseminating class notes beyond the classroom community or accepting compensation for taking and distributing classroom notes undermines instructor interests in their intellectual work product while not substantially furthering instructor and student interests in effective learning. Such actions violate shared norms and standards of the academic community. For additional information, please see: <http://policy.umn.edu/education/studentresp>.

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>.

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/regents.umn.edu/files/policies/Student_Conduct_Code.pdf) If it is determined that a student has cheated, the student 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/education/instructorresp>. The Office for Community Standards has compiled a useful list of Frequently Asked Questions pertaining to scholastic dishonesty: <https://communitystandards.umn.edu/avoid-violations/avoiding-scholastic-dishonesty>. If you have additional questions, please clarify with your instructor for the course. Your instructor can respond to your specific questions regarding what would constitute scholastic dishonesty in the context of a particular class—e.g., whether collaboration on assignments is permitted, requirements and methods for citing sources, if electronic aids are permitted or prohibited during an exam.

Senate Academic Workload Policy

One conventional credit is hereby defined as equivalent to three hours of learning effort per week, averaged over an appropriate time interval, necessary for an average student taking that course to achieve an average grade in that course. It is expected that the academic work required of graduate and professional students will exceed three hours per credit per week or 45 hours per semester.

Sexual Assault and Higher Education: Training Modules and Information

The Department of Educational Psychology supports the efforts of the University of Minnesota towards prevention of sexual assault. We encourage all students to participate in the free online training that has been established for undergraduate students and graduate students. The training highlights pertinent issues regarding sexual assault, including, but not limited to: defining healthy relationships, consent, bystander intervention, and gender roles. The guide for the training in your [My Training page](#) is available at <https://it.umn.edu/training-guide-preventing-responding>. Additionally, to learn more about how you can help reduce sexual assault at the University of Minnesota, please visit the [Aurora Center](#).

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: https://regents.umn.edu/sites/regents.umn.edu/files/policies/Sexual_Harassment_Sexual_Assault_Stalking_Relationship_Violence.pdf

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."

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/education/studentresp>.

Grading and Transcripts

University Grading Scales

The University has two distinct grading scales: A–F and S–N.

A–F grading scale. The A–F grading scale allows the following grades and corresponding GPA points:

Grade	GPA Points	Definitions for undergraduate credit
A	4.000	Represents achievement that significantly exceeds expectations in the course.
A–	3.667	
B+	3.333	
B	3.000	Represents achievement that is above the minimum expectations in the course.
B–	2.667	
C+	2.333	
C	2.000	Represents achievement that meets the minimum expectations in the course.
C–	1.667	
D+	1.333	
D	1.000	Represents achievement that partially meets the minimum expectations in the course. Credit is earned but it may not fulfill major or program requirements.
F	0.000	Represents failure in the course and no credit is earned.

S–N grading scale. The S–N grading scale allows for the following grades and corresponding GPA points:

Grade	GPA Points	Definitions for undergraduate credit
S	0.000	Satisfactory (equivalent to a C– or better)
N	0.000	Not Satisfactory

For additional information, please refer to: <https://policy.umn.edu/education/gradingtranscripts>.