EPSY 8252

Methods in Data Analysis for Educational Research II

COURSE DESCRIPTION

Methods in Data Analysis for Educational Research II is the second course of a two-semester sequence for students in education. The course content for EPsy 8252 includes : (1) likelihood estimation and inference, (2) information criteria for model selection, (3) mixed-effects/multi-level models for analysis of cross-sectional data, (4) mixed-effects/multi-level models for analysis of longitudinal data, and (5) logistic models for analyzing dichotomous outcomes. Time permitting, miscellaneous topics (e.g., design weights, empirical Bayes estimation, semi-parametric models) will also be introduced.

https://zief0002.github.io/epsy-8252

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CLASS
TR 11:15am–12:30pm:
ZOOM

MW 2:30pm–3:45pm
ZOOM

OFFICE HOURS
W 9:00am–10:00am
and by appointment
ZOOM

Note that the Zoom link for office hours and each class are all different.

TEXTBOOKS

- **Required:** Fox, J. (2009). A mathematical primer for social statistics. Thousand Oaks, CA: Sage.
- **Optional:** Anderson, D. R. (2008). Model based inference in the life sciences: A primer on evidence. New York: Springer.

COURSE PREREQUISITES

Prerequisites include *EPsy 8251: Methods in Data Analysis for Educational Research I*, or a sound conceptual understanding of the topics of design, foundational topics in data analysis, correlation, simple and multiple linear regression. For the topics listed, students would be expected to be able to carry out an appropriate data analysis and properly interpret the results. It is also assumed that everyone enrolled in the course has some familiarity with using R. Students not meeting these prerequisites are strongly advised to not enroll in EPsy 8252.

Remote Learning and Office Hours

Our class is a remote learning version of EPsy 8252. Remote learning in this class means a blend of (1) in-person and synchronous work where the class meets online twice a week (via Zoom; M/W 2:30–3:45pm or T/R 11:15am–12:30pm) as a whole and (2) asynchronous learning (reading, independent learning, and assignments).

Instructor office hours (both scheduled and unscheduled) will also be remote, via Zoom. If you schedule time with Andy outside office hours, it is best to send a Google Calendar invite so it gets on my calendar. You can also include a Zoom link with this invitation by selecting "Add Video Conferencing" within the calendar event.

COURSE REQUIREMENTS

Students will complete eight 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.).

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 8252. Active participation includes 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.

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)

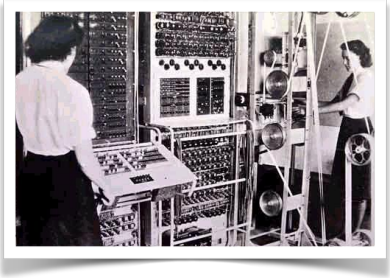
IMAGE CREDITS: Tilly's Twitter photo, used by permission from PAWS

Schedule and Due Dates

The calendar below lists the tentative dates of the course topics and assignments. These dates 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.

T/R	M/W	Course Content
Jan. 19	Jan. 20	Welcome to EPsy 8252
Jan. 21	Jan. 25	Introduction to R Markdown
Jan. 26	Jan. 27	Tables with kable(); Slides with xaringan
Jan. 28	Feb. 01	Probability distributions
Feb. 02	Feb. 03	**Assignment #1 Due:** *Introduction to RMarkdown* (Due date for this assignment is flexible)
		Probability distributions
Feb. 04	Feb. 08	Likelihood: A framework for evidence and estimation
Feb. 09	Feb. 10	Likelihood: A framework for evidence and estimation
Feb. 11	Feb. 15	**Assignment #2 Due:** *Probability distributions*
		Polynomial effects
Feb. 16	Feb. 17	Polynomial effects
Feb. 18	Feb. 22	Log-transforming the predictor
Feb. 23	Feb. 24	Log-transforming the predictor
Feb. 25	Mar. 01	**Assignment #3 Due:** *Polynomial effects*
		Log-transforming the outcome
Mar. 02	Mar. 03	Log-transforming the outcome
Mar. 04	Mar. 08	Rule of "the bulge" — An example
Mar. 09	Mar. 10	MENTAL HEALTH DAY/CATCH UP

T/R	M/W	Course Content
Mar. 11	Mar. 15	**Assignment #4 Due:** *Logarithmic transformations*
		Information criteria and model selection
Mar. 16	Mar. 17	Information criteria and model selection
Mar. 18	Mar. 22	Introduction to mixed-effects models
Mar. 23	Mar. 24	Introduction to mixed-effects models
Mar. 25	Mar. 29	**Assignment #5 Due:** *Information criteria and model selection*
		Mixed-effects models (cross-sectional)
Mar. 30	Mar. 31	Mixed-effects models (cross-sectional)
Apr. 01	Apr. 12	Mixed-effects models (cross-sectional)
Apr. 05–09		SPRING BREAK
Apr. 13	Apr. 14	Mixed-effects models (longitudinal)
Apr. 15	Apr. 19	**Assignment #6 Due:** *Mixed-effects regression models: Cross-sectional analysis*
		Mixed-effects models (longitudinal)
Apr. 20	Apr. 21	Mixed-effects models (longitudinal)
Apr. 22	Apr. 26	Generalized linear models — Logistic regression model
Apr. 27	Apr. 28	**Assignment #7 Due:** *Mixed-effects regression models: Longitudinal analysis*
		Generalized linear models — Logistic regression model
Apr. 29	May 03	Generalized linear models — Logistic regression model
May 06		**Assignment #8 Due:** *Logistic regression* (due at 12:00pm via email)



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

There are two ways to interact with and use R during the semester. You can install R and RStudio onto your local machine. (There are instructions for how to do this on the course website.) In this scenario, you are responsible for getting things to work on your computer. While it should be straightforward, each OS and computer has their quirks.
You can also access Studio via a University of Minnesota server at:

https://rstudio-prd-001.cla.umn.edu/

This requires an internet connection and you may not have access to this after the semester ends. Depending on how many students are logged into the server at one time, you also might experience some lag when you run more time-consuming computations.

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."

IMAGE CREDITS: Bombe machine used to decipher the Enigma code at Bletchley Park, 1943. https://bletchleypark.org.uk/; email by Dennis Skley from flickr

Quantitative Methods in Education Mission Statement

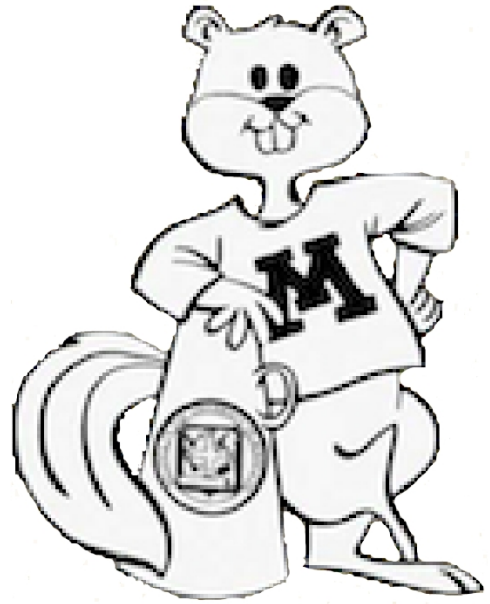
QME strives to be a premier program recognized for leadership, innovation, and excellence, and to enable human potential through the advancement of education. QME prepares students to become cutting-edge professionals in educational measurement, evaluation, statistics, and statistics education, through 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 two dogs (LEFT: Hank; RIGHT: Sadie). You will probably hear them at some point during class.

IMAGE CREDITS:Goldy comes courtesy the Twitter feed of the Minnesota Golden Gophers Creative Services department

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 (Frank Symons; symon007@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.

IMAGE CREDITS:Goldy comes courtesy the Twitter feed of the Minnesota Golden Gophers Creative Services department

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.