SOC6708H: Improving the Evidentiary Value of (Your) Social Science Research: Problems, Strategies, and Solutions

Fall 2023
Lecture: Tuesdays, 10 am – 12 pm
Lecture Location: Room 17146
Lab: Tuesdays, 12 pm – 1 pm
Lab Location: Room 17146

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Office hours: by appointment

Teaching Assistant:

Course Description

Recent years have shown that business as usual approaches to research do not produce reliable evidence as often as we had previously assumed, leading to what some have dubbed a "replication crisis". This course is an introduction to some of the challenges the social sciences face with producing reliable, empirically accurate research, and an overview of some potential solutions. The primary aim of the course is practical—after outlining major challenges, we will spend the bulk of the course learning about techniques and practices that exist that (we think) can help us more rigorously evaluate existing work and produce new research with stronger evidentiary value.

The premise of this course is that the challenges we discuss are real. As with most things in the scholarly community, this has been (and continues to be) debated. However, my view is that these concerns are held widely enough that the best use of our time is discussing how to address them rather than exploring these larger meta-issues (though we might occasionally touch on them). In other words, this is not a course in the sociology of science. That means we are going to be making some assumptions about things like what research aims to do and our ability as scientists to accomplish those aims. In that regard, this course is opinionated.

Materials

Statistical Software

All analyses will be performed using R. R is available for free and can be downloaded at https://www.r-project.org/. You will also want to download the front-end application RStudio, which is freely available here: https://posit.co/downloads/.

If you are not familiar with R, I strongly encourage you to become familiar with its basic operations prior to the first day of class—things like data import, data recoding, etc. There are *so many* free resources available for learning R. Here are a few that might be helpful.

https://intro2r.com/
https://cran.r-project.org/doc/manuals/r-release/R-intro.pdf
https://r4ds.had.co.nz/

Class Format

Lecture time will be devoted to presenting statistical concepts and ideas. You should be prepared to take notes by hand as laptops are not permitted during class (see section on classroom etiquette below). To help you focus on learning the material rather than scrambling to take notes, simplified versions of lecture slides will generally be posted prior to lecture. It is recommended that you print a copy of these slides and bring them with you to lecture to take notes on. We will take a 10-minute break about halfway through each lecture period. Lectures are designed to lay down foundational concepts, with practical instruction in applying the concepts and techniques being given during the lab tutorials.

Lab Tutorials

The goal of lab tutorials is to apply concepts learned in class. Often, this will involve analyzing data in R, but might involve other exercises depending on the subject matter.

Reading

Reading the assigned materials and completing assignments provide useful repetition and practice of concepts and skills presented during lecture. Lectures allow for dialogue and clarification of key concepts. For this reason, I believe lectures are generally better as the first introduction to material. Consequently, in this course reading is intended as review, and should occur *after* lecture, but before the following lecture. In this way, lectures can provide a framework that will help you better understand and retain the material you read. (Note: I will not insist on this ordering—you may read before lecture if you find it helps you retain the material more effectively).

Evaluation and Grading

Coursework is weighted as follows in calculating the final grade.

Assignments	50%
Presentation	20%
Final paper	30%

Final grades will be assigned using the grading scale below, taken from the University Assessment and Grading Practices Policy.

Percentage	Grade
90-100	A+
85-89	A

80-84	A-
77-79	B+
73-76	B
70-72	B-
0-69	Fail

Description of Evaluation Components

Assignments

There will be an assignment posted on Quercus on most weeks that will allow you to review and practice the techniques discussed in class. Some assignments will include a computing component using R, the how-to's of which will be taught in lab sessions. Assignments can be found and submitted under *Assignments*.

Assignments should be no longer than 2 pages (excluding any appendices). Often a single page will be sufficient.

Assignments will be graded as follows:

Score	Meaning
3	Excellent
2	Adequate
1	Needs attention

For the purposes of final grade calculation, scores on assignments will be averaged and assigned the following values:

Score range	Grade	Numeric value
0	Fail	0
0-0.09	Fail	50
1-1.3	B-	71
1.4-1.6	B	75
1.6-1.7	B+	78
1.8-1.9	A-	82
2-2.4	A	87
2.5-3	A+	95

Note that a 2 is a perfectly fine grade—it is the grade that most work will receive. The 1's and 3's exist mainly to allow me to reward exceptional work, or conversely, to signal a need for improvement.

Presentations

Early in the term, you will select a topic that you wish to learn more about and that is not otherwise covered in the course. On the final day of the course, you will present what you have learned. The goal of the presentations is twofold: 1) to give you an opportunity to explore in some depth a topic that you are interested in, and 2) to provide a useful overview of relevant ideas/techniques/resources to other students. Presentations will roughly 10-20 minutes (depending on the class size). More details can be found on Quercus.

Final Paper

The final paper allows you to apply analytic techniques from this course to a question and data of your choosing. You can either conduct an exploratory/confirmatory sequence of analyses, or else a pre-registered analysis. In both cases, the data should be new to you—that is, you should not have explored the data previously.

Exploratory/Confirmatory Sequence: This requires two data sets, or one large data set that can be split into exploratory and confirmatory subsamples. During stage 1 of the final paper, the exploratory data are examined to "learn from the data" about the topic of interest. Then, a preferred analysis plan is generated. In stage 2, the preferred analysis plan is applied to the confirmatory data.

Pre-registered Analysis: During stage 1 of the final paper, all procedures related to data handling and analysis are specified based on prior theoretical and methodological knowledge, as well as general information about the data (e.g., a survey questionnaire). In stage 2, the plan developed in stage 1 is applied to the data.

The final paper will be graded using the same three-point scale as the assignments.

See the document posted to Quercus for additional details.

Course Schedule

Week	Date	Topic	Reading	Due this week (by the start of lecture)
Background: The Trouble with (Social) Science				
1	Sept 12	How (and how often) science is wrong	Read one of the following: Open Science Collaboration. (2015). Estimating the reproducibility of psychological science. *Science*, *349*(6251), aac4716–aac4716. https://doi.org/10.1126/science.aac4716 Camerer, C. F., Dreber, A., et al. (2016). Evaluating replicability of laboratory experiments in economics. *Science*,	

			351(6280), 1433–1436. https://doi.org/10.1126/science.aaf0918 Altmejd, A., Dreber, A., et al. (2019). Predicting the replicability of social science lab experiments. *PLoS ONE*, *14*(12), 1–18. https://doi.org/10.1371/journal.pone.0225826	
2	Sept 19	Reasons for the "replication crisis"	Simmons, J. P., Nelson, L. D., & Simonsohn, U. (2011). False-positive psychology: Undisclosed flexibility in data collection and analysis allows presenting anything as significant. *Psychological Science*, *22*(11), 1359–1366. https://doi.org/10.1177/0956797611417632	R basics checklist
Techniques for Evaluating the Published Literature				
3	Sept 26	Meta-analysis	Tong, G., & Guo, G. (2022). Meta-analysis in Sociological Research: Power and Heterogeneity. *Sociological Methods & Research*, *51*(2), 566–604. https://doi.org/10.1177/0049124119882479	(during lecture) assign presentation topics
4	Oct 3	P-curves and Z-curves	Simonsohn, U., Nelson, L. D., & Simmons, J. P. (2014). P-curve: A key to the file-drawer. *Journal of Experimental Psychology: General*, *143*(2), 534–547. https://doi.org/10.1037/a0033242	Assignment 1: meta-analysis
5	Oct 10	Evidence typologies	Read one of the following: GRADE Handbook sections 1, 2, 4, and 5 (https://gdt.gradepro.org/app/handbook/handbook.html) Movsisyan, A., Dennis, J., Rehfuess, E., Grant, S., & Montgomery, P. (2018). Rating the quality of a body of evidence on the effectiveness of health and social interventions: A systematic review and mapping of evidence domains. *Research Synthesis Methods*, *9*(2), 224–242. https://doi.org/10.1002/jrsm.1290	Assignment 2: p and z curves
Techniques for Improving Your Own Research				
6	Oct 17	Planning I: Literature search and pre-registration	Nosek, B. A., Ebersole, C. R., DeHaven, A. C., & Mellor, D. T. (2018). The preregistration revolution. *Proceedings of the National Academy of Sciences of the United States of America*, *115*(11), 2600–2606. https://doi.org/10.1073/pnas.1708274114	Assignment 3: evidence typologies
7	Oct 24	Planning II: Other Strategies	Read both: Lakens, D. (2023). Is my study useless? Why researchers need methodological review boards. *Nature*, *613*(7942), 9–9.	Assignment 4: pre-registration

			https://doi.org/10.1038/d41586-022-04504-8 Benjamin, D. J., Berger, J. O., et al. (2018). Redefine statistical significance. *Nature Human Behaviour*, *2*(1), 6–10. https://doi.org/10.1038/s41562-017-0189-z	
8	Oct 31	Analysis I: Effects and Bayes factors	Wagenmakers, E. J., Lodewyckx, T., Kuriyal, H., & Grasman, R. (2010). Bayesian hypothesis testing for psychologists: A tutorial on the Savage-Dickey method. *Cognitive Psychology*, *60*(3), 158–189. https://doi.org/10.1016/j.cogpsych.2009.12.001	Assignment 5: strong inference
9	Nov 7	Analysis II: Model robustness	Read Both: Young, C. (2018). Model Uncertainty and the Crisis in Science. *Socius*, *4*, 2378023117737206. https://doi.org/10.1177/2378023117737206 Olsson-Collentine, A., Link to external site, this link will open in a new window, van Aert, R. C. M., Bakker, M., & Wicherts, J. (2023). Meta-analyzing the multiverse: A peek under the hood of selective reporting. *Psychological Methods*. https://doi.org/10.1037/met0000559	Assignment 6: Bayes factors
10	Nov 14	Write-up and post publication: Transparent reporting and reproducible workflows	TBD	Assignment 7: BMA/multiverse
11	Nov 21	TBD (spill-over day)		Assignment 8: creating reproduction files
12	Nov 28	Presentations		
	Dec 3	Final paper (stage 1) due by midnight		
	Dec 10	Final paper (stage 2) due by midnight		

Every attempt will be made to follow this schedule, but it is subject to change at the discretion of the instructor. In fact, given that this is the first time this course is being offered, changes are very likely.

Procedures and Rules

Late Work

All assignments are due by the beginning of lecture on the date listed in the syllabus. Late work will not be accepted.

Late penalties can be waived for a legitimate reason with proper documentation (e.g., illness, family emergency, religious observance, but NOT family vacations, weddings, I want a long weekend, etc.). Where possible, these arrangements must be made in advance of the missed work.

Grade Appeals

If you believe that a mistake was made in grading your work, you may appeal the grade by submitting a written explanation of why you think your mark should be altered to the instructor. The instructor will then re-grade your work with the additional information in mind. Although in many cases re-grading results in a higher mark, this is not guaranteed, and your mark might go down.

Working With Other Students

Working with other students is often a useful way to learn methods. You are therefore encouraged (but not required) to work with other class members in completing assignments. However, each student must complete and submit his/her own work, written in his/her own words. Students who work together on class work should also indicate whom they worked with on each assignment (if anyone). These steps guard against situations where a student's academic integrity might be called into question (see section on Academic Integrity).

Classroom Etiquette

You are expected to arrive at class on time. If you need to leave during lecture, please do so in a way that will minimize disruption to the class.

Laptop computer are not to be used during class time. *This means that you should be prepared to take notes by hand*. Notes may be taken on tablet devices, but these should not be used for gaming, checking email, or any of the many other things that might distract from classroom engagement. Cellphones should not be used during class time and should be turned off or set to silent until class is over.

Attendance

Data analysis is a skill, and like any skill mastering requires time on task. Attendance is therefore mandatory at all lectures and lab tutorials. Any absences should be cleared with the instructor. More than two absences at either lecture or lab may result in a reduction in your final grade, usually one-half grade per absence beyond the two (e.g., from A to A-). These grade reductions will be at the instructor's discretion.

Academic Integrity

Copying, plagiarizing, falsifying medical certificates, or other forms of academic misconduct will not be tolerated. Any student caught engaging in such activities will be referred to the Dean's office for adjudication. Any student abetting or otherwise assisting in such misconduct will also be subject to academic penalties. Students are expected to cite sources in all written work and presentations. See this link for tips for how to use sources well: (http://www.writing.utoronto.ca/advice/using-sources/how-not-to-plagiarize).

According to Section B.I.1.(e) of the Code of Behaviour on Academic Matters it is an offence *"to submit, without the knowledge and approval of the instructor to whom it is submitted, any academic work for which credit has previously been obtained or is being sought in another course or program of study in the University or elsewhere."*

By enrolling in this course, you agree to abide by the university's rules regarding academic conduct, as outlined in the Calendar. You are expected to be familiar with the *Code of Behaviour on Academic Matters* (https://governingcouncil.utoronto.ca/secretariat/policies/code-behaviour-academic-matters-july-1-2019) and *Code of Student Conduct* (http://www.viceprovoststudents.utoronto.ca/publicationsandpolicies/codeofstudentconduct.htm) which spell out your rights, your duties and provide all the details on grading regulations and academic offences at the University of Toronto.

Please be cautious in this matter, as the penalties for academic misconduct can be quite severe.

Accessibility Services

It is the University of Toronto's goal to create a community that is inclusive of all persons and treats all members of the community in an equitable manner. In creating such a community, the University aims to foster a climate of understanding and mutual respect for the dignity and worth of all persons. Please see the University of Toronto Governing Council "Statement of Commitment Regarding Persons with Disabilities" at http://www.governingcouncil.utoronto.ca/Assets/Governing+Council+Digital+Assets/Policies/PDF/ppnov012004.pdf.

In working toward this goal, the University will strive to provide support for, and facilitate the accommodation of individuals with disabilities so that all may share the same level of access to opportunities, participate in the full range of activities that the University offers, and achieve their full potential as members of the University community. We take seriously our obligation to make this course as welcoming and accessible as feasible for students with diverse needs. We also understand that disabilities can change over time and will do our best to accommodate you.

Students seeking support must have an intake interview with a disability advisor to discuss their individual needs. In many instances it is easier to arrange certain accommodations with more advance notice, so we strongly encourage you to act as quickly as possible. To schedule a registration appointment with a disability advisor, please visit Accessibility Services at http://www.studentlife.utoronto.ca/as, call at 416-978-8060, or email at: accessibility.services@utoronto.ca. The office is located at 455 Spadina Avenue, 4th Floor, Suite

400.

Additional student resources for distressed or emergency situations can be located at distressedstudent.utoronto.ca; Health & Wellness Centre, 416-978-8030, http://www.studentlife.utoronto.ca/hwc, or Student Crisis Response, 416-946-7111.

Equity and Diversity

The University of Toronto is committed to equity and respect for diversity. All members of the class should strive to create an atmosphere of mutual respect and understanding. I will not condone discrimination, harassment, or hate speech. However, creating a respectful environment does not require agreement, and disagreement can sometimes be uncomfortable. You might find others' views wrongheaded or even offensive. But then, they might find your views equally odious, so please try to be understanding. We need all voices and experiences in the class to enrich our discussions and work our way toward a better understanding of the subject matter.

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