

**Epidemiological Methods for Psychological Science (“Medium Data”)
Psychology 640 – Winter 2022
Course Outline**

Instructor: Dr. Dillon Browne, C.Psych.
TA: Jackson Smith, MA
Class Day: Thursday 9:00am-11:50am
Office Hours: Available upon request

Email: dillon.browne@uwaterloo.ca
Email: jackson.smith@uwaterloo.ca
Location: Online/PAS 3026

Course Description and Goals:

The amount of publicly available data relevant to psychological research continues to proliferate. Yet, one of the great challenges of our scientific epoch is that the mass expansion of *information* does not always yield greater *understanding* of phenomena. There are many ways to tackle this dilemma, from knowledge integration exercises (scoping and systematic review, individual participant data, and standard meta-analysis), to artificial intelligence applications that are designed to read the literature and respond to queries. Another moderate approach is to think big about research questions and to consider the epidemiological, sociological, public health, and population-level manifestations of psychological research questions using publicly available data sets. Consistent with the idea of multiple levels of analysis in psychological research, we are being increasingly challenged to think about topics “from the neuron to the neighborhood” and beyond. Ask yourself, “How does my phenomenon of study show up in society, at large?” If the answer is unclear, you are in the right place!

The purpose of this course is to provide students with highly practical training in applied statistical methods for medium-to-large scale epidemiological survey data. Exercises in secondary data analysis will be facilitated by students accessing available data sets on individual human subjects, where psychological constructs (or related variables) are measured at the level of the population (e.g., a representative national sample). Our Canadian standard are the national surveys regularly conducted by Statistics Canada. There are many other national and international examples that students may find relevant. Open-source statistical software (e.g., The R Project for Statistical Computing) will be prioritized for data analysis.

Throughout this course, students will complete a research project from start-to-finish, where their research question is answerable using an existing database. There is no restriction on the data that can be used, so long as it adequately answers the research question, is of high quality, and fits reasonably within the umbrella of “medium data” (i.e., nationally representative survey samples, publicly available longitudinal cohorts, administrative records). **In completing this course, students will advance their skills in:**

- 1) Complex survey methods, sampling designs, and survey weighting
- 2) Secondary data analysis
- 3) Advanced modeling techniques (SEM, MLM, mixture modeling, network analysis, etc.)
- 4) The R Project for Statistical Computing (via R Studio)
- 5) Data visualization (i.e., graphics, via the “ggplot” package or equivalent)
- 6) Industry-relevant and marketable research/coding skills
- 7) Principles of open science (i.e., pre-registration with OSF)
- 8) Manuscript preparation and publication and/or conferencing

Class Format

Our course will be run as a seminar-style workshop (e.g., “flipped classroom” where students are completing work in class, with the support of the instructor). **There will be no weekly lecture**, following an overview and introduction by the instructor in the initial two weeks. The instructor will provide some examples (particularly when areas of need arise), however, most of the learning in this course will occur via self-directed research. Students will attend class every week with their laptops (or virtually) and work on their projects. Throughout the semester, there will be opportunities for students to share their ideas and receive feedback. Evaluation will be based primarily upon the final products (a formatted results section in a manuscript with supporting code, see below). Given the self-directed nature of this course, it is best suited for students who have completed introductory graduate statistics and have a strong working level of independent data analysis. Basic topics (e.g., ANOVA, regression) are not covered.

COVID-19 Pandemic Considerations

The COVID-19 Pandemic has presented remarkable challenges and opportunities to psychological researchers around the world. As laboratory-based studies have been disrupted due to social distancing, the necessary reliance on secondary data in psychological science has increased. Additionally, the pandemic has opened a host of important questions for social scientists to explore, including the putative consequences of social disruption on psychological functioning, to attitudes and beliefs around masks and vaccines, to broader sociological and economic questions related to labor force disruption.

For the running of this course in Winter 2022, there will be two modifications in response to the pandemic. First, we will be start with meeting online via MS Teams link (sent to your email) on Thursdays from 9:00am-11:50am every week. At present, the Winter 2022 semester is beginning virtually with plans to transition to in-person. However, we will modify as necessary in response to the Omicron variant. The second modification (optional) has to do with students’ research topics. Statistics Canada has several COVID-19 specific data collections from 2020/2021 that students may find interesting, including the Canadian Perspective Survey Series (CPSS), Impacts of COVID-19 on Canadians (ICC), Impacts of COVID-19 on Health Care Workers (ICCHCW), and Impacts of COVID-19 on Postsecondary Students (ICPSS). Students are encouraged to explore these databases for their projects, should they wish.

Evaluation

There are several components to the evaluation.

1. Weekly Participation (10%)

- Students will attend class every week (either remotely, or with laptops if we move to in-person learning) to work on their projects. During this time, the instructor and TA will be available to work one-on-one with groups, review concepts, provide examples, brainstorm research questions, troubleshoot code and analyses, etc. There will be a very small amount of instruction. The instructor (better, “facilitator”) will regularly have the R Studio program open on the projector/screen to help cultivate shared learning. Note, if we return to in-person learning and a student does not have a laptop computer, please contact the instructor and one will be obtained from departmental IT services.

2. Show and Tell #1 (5%)

- In the first few weeks of the course, students (who may work in groups of two or alone) will informally tell students (a) their research question and background, (b) their data source, and (c) their proposed analysis. This is not a formal presentation and should not be prepared for beyond a few slides. Casual feedback will be provided and an opportunity for discussion will take place.

3. OSF Pre-Registration (5%)

- Keeping with the principals of open science, prior to commencing data analysis, students are required to pre-register their proposed plans with the Open Science Framework: <https://osf.io/prereg/>. This step should only be completed after receiving approval from the instructor. Students are directed to: Foster, E. D., & Deardorff, A. (2017). Open Science Framework (OSF). *Journal of the Medical Library Association: JMLA*, 105(2), 203–206. <https://doi.org/10.5195/jmla.2017.88>

4. Show and Tell #2 (10%)

- At the end of the course, we will have an informal research symposium, where students can share their projects and analyses, to date. Again, feedback will be provided which will be helpful for final course submissions and eventual publication or submission to conferences. A slide deck will be compiled of all student projects and circulated to the department as a virtual science fair. If in person learning is possible, the class will have a research gala (with refreshments provided by the instructor) and other faculty/students will be invited.

5. Statistical Code & Output (35%)

- Students are required to submit annotated statistical code in R Studio that will **reproduce all data manipulations and the entire analysis** from the raw, publicly available database. The instructor and TA will verify the analysis by running this code at the end of the semester on the database and comparing output to that presented by the student(s). It is recommended that students make their code available alongside of their manuscript (via OSF) when published.

6. Final Manuscript (35%)

- The final product for this course is an APA style manuscript, complete with Introduction, Methods, Results and Discussion. **Note, students will not be graded intensively on the substantive content of the literature review (intro) and discussion, so long as it is minimally adequate, logical, and flows into the research question and analysis.** Students may treat the intro & discussion as a Brief Report (e.g., see papers in Psychological Science). That is, the crux of the evaluation is on the Methods and Results. Of course, this will only make sense in the context of a well-defined research question.

Note, this course can be graded either numerically (%) or on a credit/no credit basis. Each student will be asked for their preference at the beginning of the course. For those who chose the credit/no credit option, credit will be provided to students who would obtain a numerical grade of at least 50%. That said, as this is an advanced graduate course that requires a great deal of independent work, only highly motivated students will do well. The ultimate goal for students is a high degree of mastery over their proposed analysis and research project.

Texts

Field, A., Miles, J., & Field, Z. (2012). *Discovering Statistics using R*. Sage.

Foster, E. D., & Deardorff, A. (2017). Open Science Framework (OSF). *Journal of the Medical Library Association: JMLA*, 105(2), 203–206. <https://doi.org/10.5195/jmla.2017.88>

Wickham, H. (2016). *ggplot2: Elegant graphics for Data Analysis (2nd edition)*. Springer.

Computing Requirements

Students will conduct all data analysis in The R Project for Statistical Computing (via R Studio). These free, open-source resources are available here:

<https://www.r-project.org/>

<https://www.rstudio.com/>

Additional resources are provided on the accompanying LEARN website for this course.

Suggested Timeline for Success in this Course

Time Period	Date	Major Tasks
Week 1	Jan 6 th 2022	Course Overview Orientation to Secondary Data Analysis Begin Exploring Data Sets
Week 2-3	Jan 13 th – 20 th 2022	Deciding on a Research Topic Selecting a Database Outlining an Analysis Plan
Week 4	Jan 27 th 2022	Show & Tell # 1 Pre-Registration with OSF Begin Data Manipulations
Week 5-6	Feb 3rd – 10th 2022	Data Cleaning Constructing/Recoding Variables File Prepared for Primary Analysis
Week 7-10	Feb 17th – Mar 10th 2022	Statistical Modeling Troubleshooting Errors Model Optimization & Analysis Complete
Week 11-12	Mar 17 th – Mar 24 th 2022	Interpreting Results Writing Manuscript Submitting Course Requirements
After Course		Conference Submissions Prepare for Publication Peer Review & Resubmission

Roles and Responsibilities

The instructor is available to address questions about any aspect of the course. The instructor is available to review all materials and to assist with the final written assignment.

Class attendance is mandatory. Students must attend classes as they will contain information that will not be covered in the readings nor detailed on the slides. Slides are intended to serve as a framework for note taking (not as a substitute for attendance). Power point files will be provided. Students are encouraged to ask questions when material is unclear. Due to the pandemic, all sessions will be recorded and posted to the LEARN website.

Intellectual Property

Students should be aware that this course contains the intellectual property of the course instructor as well as others. Intellectual property includes items such as: Lecture content, spoken and written (and any audio/video recording thereof); Lecture handouts, presentations, and other materials prepared for the course; Questions or solution sets from various types of assessments (e.g., assignments); and Work protected by copyright (e.g., any work authored by the instructor or used by the instructor with permission of the copyright owner, readings, etc.).

Course materials and the intellectual property contained therein, are used to enhance a student's educational experience. However, sharing this intellectual property without the intellectual property owner's permission is a violation of intellectual property rights. For this reason, it is necessary to ask the instructor for permission before uploading and sharing the intellectual property of others online (e.g., to an online repository).

Permission from an instructor is also necessary before sharing the intellectual property of others from completed courses with students taking the same/similar courses in subsequent terms/years. In many cases, instructors might be happy to allow distribution of certain materials. However, doing so without expressed permission is considered a violation of intellectual property rights.

Please alert the instructor if you become aware of intellectual property belonging to others (past or present) circulating, either through the student body or online. The intellectual property rights owner deserves to know (and may have already given their consent).

Electronic Media and Health Record Policy

Students are requested to turn cell phones off and to close unrelated applications during class. At the same time, students are encouraged to use all electronic mediums to facilitate their learning, share materials and resources, and promote a collaborative environment.

Academic Integrity

To maintain a culture of academic integrity, members of the University of Waterloo are expected to promote honesty, trust, fairness, respect and responsibility. See the UWaterloo Academic Integrity webpage for more information.

Discipline: A student is expected to know what constitutes academic integrity, to avoid committing academic offences, and to take responsibility for his/her actions. A student who is unsure whether an action constitutes an offence, or who needs help in learning how to avoid

offences (e.g., plagiarism, cheating) or about “rules” for group work/collaboration should seek guidance from the course professor, academic advisor, or the Undergraduate Associate Dean.

When misconduct has been found to have occurred, disciplinary penalties will be imposed under Policy 71 – Student Discipline. For information on categories of offenses and types of penalties, students should refer to Policy 71 - Student Discipline. For typical penalties check Guidelines for the Assessment of Penalties.

Concerns about a Course Policy or Decision

Informal Stage: We in the Psychology Department take great pride in the high quality of our program and our instructors. Though infrequent, we know that students occasionally find themselves in situations of conflict with their instructors over course policies or grade assessments. If such a conflict arises, the Associate Chair for Graduate Affairs (Jonathan Fugelsang) is available for consultation and to mediate a resolution between the student and instructor: Email: jafugels@uwaterloo.ca.

Grievance: A student who believes that a decision affecting some aspect of his/her university life has been unfair or unreasonable may have grounds for initiating a grievance. Read Policy 70 - Student Petitions and Grievances, Section 4. When in doubt, please be certain to contact Richard Eibach, the Associate Chair for Undergraduate Affairs who will provide further assistance; reibach@uwaterloo.ca.

Appeals: A decision made or penalty imposed under Policy 70 - Student Petitions and Grievances (other than a petition) or Policy 71 - Student Discipline may be appealed if there is a ground. A student who believes he/she has a ground for an appeal should refer to Policy 72.

Accommodation for Students with Disabilities

The AccessAbility Services office, located on the first floor of the Needles Hall extension (1401), collaborates with all academic departments to arrange appropriate accommodations for students with disabilities without compromising the academic integrity of the curriculum. If you require academic accommodations to lessen the impact of your disability, please register with the AS office at the beginning of each academic term.

Accommodations for Course Requirements

Students requesting accommodation for course requirements (e.g., final assignment) due to illness should do the following: (1) Seek medical treatment as soon as possible and obtain a completed uWaterloo Verification of Illness Form, (2) Submit that form to the instructor within 48 hours, (3) inform the instructor by the due date for the course requirement that you will be unable to meet the deadline and that documentation will be forthcoming.

In the case of a missed assignment deadline, the instructor will either: (1) Waive the course component and re-weight remaining term work as he/she deems fit according to circumstances and the goals of the course, or (2) Provide an extension.

In the case of bereavement, the instructor will provide similar accommodations to those for illness. Appropriate documentation to support the request will be required. Students who are experiencing extenuating circumstances should also inform their academic advisors regarding their personal difficulties. Elective arrangements such as travel plans are not acceptable grounds for granting accommodations to course requirements per the uWaterloo Examination Regulations and Related Matters.

Official Version of the Course Outline

If there is a discrepancy between the hard copy outline (i.e., if students were provided with a hard copy at the first class) and the outline posted on LEARN, the copy on LEARN will be deemed the official version. Outlines on LEARN may change as instructors develop a course, but they become final as of the initial class meeting for the term.