

PSYC*6380, Course Outline: Winter 2023

General Information

Due to the ongoing COVID-19 pandemic, some courses are being offered virtually and some are being offered face-to-face. **This course is offered using the Alternate-Delivery-Synchronous (AD-S) format. There is an assigned day and time for class lectures, but no classroom, because lectures are delivered virtually.**

Course Title: Psychological Applications of Multivariate Analysis

Course Description:

The purpose of this course is to give students the conceptual and practical tools they need to answer a wide variety of research questions in Psychology using a variety of topics in multivariate statistics, such as factor analysis, regression, multivariate analysis of variance and covariance. Some topics in categorical data analysis may also be covered, such as logistic models. In addition, we will explore ways to become informed, thoughtful, ethical, and skilled users of multivariate statistical techniques. In order to do this, emphasis throughout the course will be placed on openness and transparency in research, how to avoid questionable research practices, and the crucial distinction between exploration and confirmation in data analysis.

Credit Weighting: 0.5 credit(s)

Academic Department (or campus): Psychology

Semester Offering: W23

Class Schedule and Location: Tuesdays @ 2:30-5:20pm, via Zoom

Key knowledge or skills expected of students coming into the course

Students are expected to know how to write results sections in journal-article style using APA formatting. Students are also expected to have some experience analyzing data using statistical software, as well as general understanding of basic statistical principles (e.g., inferential statistics, p-values, confidence intervals, error, effect size) and the general linear model.

Instructor Information

Instructor name: Lisa Fiksenbaum, PhD

Instructor email: lfiksenb@uoguelph.ca

Office hours and location: Available by appointment

GTA Information

GTA Name: Rahul Patel

GTA Email:

rpatel40@uoguelph.ca

GTA office location and office hours: Available by appointment

Course Content

Specific Learning Outcomes:

1. Understand and apply advanced concepts in statistics to data analysis in psychology.
2. Recognize and describe various multivariate data analytic techniques, and apply them appropriately to a range of research questions in psychology.
3. Analyze and interpret statistical data to test a claim or investigate a research question.
4. Effectively utilize statistical software (i.e., R) to aid in data analysis.
5. Apply critical thinking and troubleshooting skills to the analysis of quantitative data.
6. Apply analytic approaches and concepts learned in class to novel research questions.
7. Explain and apply ethical considerations to the conduct of research in quantitative psychological science.
8. Demonstrate written communication skills - the ability to express ideas in a clear, concise, and professional manner.
9. Manage time effectively, and ensure personal organization.
10. Demonstrate academic and intellectual integrity.

Lecture Content:

The topics I'll be covering at our class will often build off of one another. My role as an instructor at our classes is twofold: First, my role is to provide background information and some context around the statistical concepts and techniques assigned for the class. Following this, my second role is to facilitate the application of the concepts we cover in class to applied activities and examples. We will use the class sessions to facilitate interactive learning in which we discuss and apply the concepts covered in class, and learn how to apply them to novel situations and research questions. As we do this, I expect you to participate in the active learning activities, ask about anything you do not understand, and comment on anything that you are interested in.

Labs:

There are no lab periods for this course.

Seminars:

There are no seminar periods for this course.

Methods of Assessment:

Minor Assignments (50% of final grade):

One of the main goals for this course is to practice and build mastery over various data analytic techniques in R. To help meet this goal, you will be asked to use the techniques we cover during the lecture portion of our class to analyze a novel data set. Most weeks, there will be a minor assignment where we do this. Each minor assignment will primarily cover material that was taught during the corresponding lecture (although any given assignment may also cover fundamental R skills or concepts that we covered earlier in the semester; for example, loading data files).

These activities will be structured in the following way: During these sessions, you will work with statistical software to analyze data under my direction. You will be given a dataset, as well as a handout with questions to answer. The TA and I will be there to help answer questions about the data and provide you with the scaffolding you need to complete the analysis. After class, you will write up a short report on the research question, data, and conceptual interpretation of the results you obtained (this may involve revisiting the lecture slides, supplementary readings, or external sources to help strengthen your understanding of the topic).

Once completed, the minor assignment should be submitted using the CourseLink Dropbox. Your grade minor assignment grade will be based on your analysis of the data, your interpretation, and presentation. Please include your full R script, the answer form for the results, and your conceptual write-up for all submissions. Unless stated otherwise, all submissions will be due by 11:59pm the night before our following class.

Though assignments may vary, they will generally all contain the following sections:

- Describing how the analysis was done
- Testing statistical assumptions
- Descriptives and bivariate correlations
- Hypothesis testing
- Tables and/or Figures
- A .R file with all of your statistical syntax

Discussion Leader (15%). Each session, 1-2 of you will lead a brief discussion on a sub-topic or an application related to the topic for that week. (~ 10 min.). It may be helpful to prepare a PowerPoint presentation, one-page handout or other visual materials.

Final Data Analysis Project (35% of final grade; 30% for paper & 5% for presentation):

A second goal for this course is to help you think about research questions in terms of their logistics (data set-up, complexity and appropriateness of analyses, etc.), so that you're in a better position to plan out your methodology and analyze your data when running your thesis project (or other research work). To help meet this goal, the other major assessment for this course will involve you selecting an analysis method for a given data set, and running and interpreting your findings in an analysis report.

I will upload a simulated data file on our CourseLink page during the semester, which you will be asked to analyze (instead of this simulated data set, you may also use actual data from other sources; such as archival data from your lab or open source data, pending my approval). You will then incorporate the relevant variables from the data set into an analysis plan that you run and report on in an APA-style report. Your final report should detail your operational variables and their proposed relations; what analysis or analyses you chose and why (i.e., what are you conceptually testing?); how you handled data cleaning, etc.; the results of the analyses, including any relevant post-hoc tests; and, conclusions about the research question(s) you sought to test.

This paper should not exceed eight double-spaced pages (excluding a cover page, any references that you feel are applicable, and any tables, figures, or appendices), and should be written in full-sentence APA style (i.e., 1" margins, 12-point Times New Roman Font). Once completed, your report should be submitted using the CourseLink Dropbox, along with your complete R script. Your report will be assessed in terms of its numerical accuracy, its replicability (i.e., whether your R script runs and is commented appropriately); the appropriateness of the analyses you ran; the thoroughness of your analyses (e.g., did you consider assumptions, missing data, etc.); your adherence to APA formatting guidelines; and, the extent to which your report demonstrates your understanding of the concepts we covered in class – as well as how those concepts pertain to the research question(s) you addressed.

In addition to submitting your final paper report, you will prepare a **short presentation** (maximum 12 minutes; worth 5% of the course grade) to the class on the last day of classes.

Course Assignments and Tests:

Assignment or Test	Due Date	Contribution to Final Mark (%)	Learning Outcomes Assessed
Minor Assignments	Assessed throughout the semester	50	1, 3, 4, 5, 6, 8, 9, & 10
Discussion Leader	Assessed throughout the semester	15	1, 2, 7, 8, 10
Final Data Analysis Project - Paper	April 6, 2023	30	1, 2, 3, 4, 5, 6, 7, 8, 9, & 10
Final Data Analysis Project – Presentation	Last day of classes	5	1, 2, 3, 4, 5, 6, 7, 8, 9, & 10

Additional Notes:

Given time restrictions, marks for the final data analysis project might not be released until the final grade submission at the end of the semester.

Final Examination Date and

Time: There is no final exam

for this course. **Final Exam**

Weighting:

N/A

Course Resources

Required Texts:

There is no required text for this course; all assigned readings will be posted on CourseLink prior to the start of class.

Recommended Texts:

N/A

Other Resources:

R Statistical Software: We will be using R and R Studio to complete exercises in class. Both are free software. You can download and install them with the links below. I encourage you to do so before the first class, as these downloads may be too large to efficiently download over some Internet connections during class time. You should download the version of R that corresponds to your computer's operating system (see headings below). The pieces of software that I've listed here build off of one another; so for best results, please install them in the order that I've presented them in below:

For Windows users:

- 1) First, install R: [here](#)
- 2) Then, install R Studio: [here](#)

For MAC OSX users:

- 1) First, install R compatibility software (i.e., XQuartz): [here](#)
- 2) Then, install R: [here](#)
- 3) Then, install R Studio: [here](#)

CourseLink: Assignments will be submitted via the CourseLink Dropbox. It is your responsibility to ensure that your assignments are submitted correctly. Please double check that you have done this correctly. Late submission penalties will apply in the case on incorrectly-submitted assignments.

DataCamp: An active subscription to DataCamp, though not strictly required for success in this course, is recommended. There are a number of courses and technical resources offered there that may be helpful for practicing and understanding the analyses we'll be covering in class.

Course Policies

Course Grading Policies:

Please be sure to submit all assignments by 11:59pm on the assigned date using the CourseLink Dropbox. Assignments submitted in any other way (e.g., email submissions to the instructor or teaching assistant) cannot be accepted. Marks will be docked for all late submissions (10% per day, including weekends).

Please note that these policies are binding unless academic consideration is given to an individual student.

Course Policy Regarding Group Work:

All assignments must be completed on an individual basis. Collaborations among students for the purpose of completing assignments are prohibited. Any student(s) suspected of unauthorized collaboration will be reported to the dean's office for an academic misconduct investigation (see the university's policy on academic misconduct below).

Course Policy Regarding Use of Electronic Devices and Recording of Lectures:

As with many classes at the University of Guelph, electronic recording of my classes is not allowed without my prior consent. If I do permit recordings of our sessions, they are solely for the use of the authorized student(s), and may not be reproduced or transmitted to others without my express written consent.

Disclaimer:

Please note that the ongoing COVID-19 pandemic may necessitate a revision of the format of course offerings, changes in classroom protocols, and academic schedules. Any such changes will be announced via CourseLink and/or class email. This includes on-campus scheduling during the semester, mid-terms and final examination schedules. All University-wide decisions will be posted on the COVID-19 website (<https://news.uoguelph.ca/2019-novel-coronavirus-information/>) and circulated by email.

Academic Consideration

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons, please advise the course instructor in writing, with your name, id#, and e-mail contact. See the academic calendar for information on regulations and procedures for

Academic Consideration:

[Grounds for Academic Consideration](#)

Academic Misconduct

The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community, faculty, staff, and students to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring.

University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection. Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

The Academic Misconduct Policy is detailed in the [Graduate Calendar](#)

Illness

Medical notes will not normally be required for singular instances of academic consideration, although students may be required to provide supporting documentation for multiple missed assessments or when involving a large part of a course (e.g., final exam or major assignment).

Accessibility

The University of Guelph is committed to creating a barrier-free environment. Providing services for students is a shared responsibility among students, faculty and administrators. This relationship is based on respect of individual rights, the dignity of the individual and the University community's shared commitment to an open and supportive learning environment. Students requiring service or accommodation, whether due to an identified, ongoing disability or a short-term disability should contact [Student Accessibility Services](#) as soon as possible.

For more information, contact SAS at 519-824-4120 ext. 54335 or email accessibility@uoguelph.ca or the [Student Accessibility Services Website](#)

Student Feedback Questionnaire

These questionnaires (formerly course evaluations) will be available to students during the last 2 weeks of the semester: March 30th – April 10th. Students will receive an email directly from the Student Feedback Administration system which will include a direct link to the questionnaire for this course. During this time, when a student goes to login to Courselink, a reminder will pop-up when a task is available to complete.

[Student Feedback Questionnaire](#)

Drop date

The last date to drop one-semester courses, without academic penalty, is Monday April 10, 2023. For regulations and procedures for Dropping Courses, see the [Schedule of Dates in the Academic Calendar](#).

Instructors must provide [meaningful and constructive feedback, at minimum 20% of the final course grade, prior to the 40th class day](#). For courses which are of shorter duration, 20% of the final grade must be provided two-thirds of the way through the course.

[Current Graduate Calendar](#)

Additional Course Information

Course instructors are allowed to use software to help in detecting plagiarism or unauthorized copying of student assignments. Plagiarism is one of the most common types of academic misconduct on our campus. Plagiarism involves students using the work, ideas and/or the exact wording of other people or sources without giving proper credit to others for the work, ideas and/or words in their papers. Students can unintentionally commit misconduct because they do not know how to reference outside sources properly or because they don't check their work carefully enough before handing it in. Whether or not a student intended to commit academic

misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

In this course, your instructor will be using Turnitin.com to detect possible plagiarism, unauthorized collaboration or copying as part of the ongoing efforts to prevent plagiarism in the College of Social and Applied Human Sciences.

A major benefit of using Turnitin is that students will be able to educate and empower themselves in preventing misconduct. In this course, you may screen your own assignments through Turnitin as many times as you wish before the due date. You will be able to see and print reports that show you exactly where you have properly and improperly referenced the outside sources and materials in your assignment.

Topics and Class Schedule:

Week	Date	Topic
1	Jan. 17	Course Introduction; Getting Acquainted
2	Jan. 24	Data Management Plans/Data Wrangling in R
3	Jan. 31	Missing Data and Ways to Deal with it
4	Feb. 7	Data Cleaning/Checking Assumptions
5	Feb. 14	Running Non-Parametric Analyses in R when Some of Your Assumptions Fail You
6	Feb. 21	Reading week – no class
7	Feb. 28	Categorical Outcomes: A Guide to Assessing Categorical Outcomes using Chi-Square and Logistic Regression Designs in R
8	March 7	Two-Way ANOVA/MANOVA
9	March 14	Correlation and Multiple Regression
10	March 21	Mediation/Moderation
11	March 28	Exploratory Factor Analysis/PCA
12	April 4	Confirmatory Factor Analysis
13	April 11	Structural Equation Modeling