PSYO 372 Lab L01

Research Methods and Statistics Lab

(Part of PSYO 372 001, 2023 W T1)

Location: ART 215 (area map)
Time: Tuesdays, 2:00pm

Instructor: Dr. William Spencer Murch (pronouns: he/him/his)
Office Hours: Tuesdays 12:45-1:45pm (FIP 350 – area map)
Fridays 2:00-3:00pm (Zoom – click here)
Email: spencer@psych.ubc.ca

Hello, I'm Spencer! I am a cognitive psychologist from Vancouver. When I'm not teaching, I work as a postdoctoral fellow at Concordia University. My research works to develop artificial intelligence models that use online gambling behaviours to connect people at-risk for experiencing addiction with relevant social services.

Teaching Assistant: Zakary Draper
Email: zakary.draper@ubc.ca
Online Office Hours: TBA
Office Link: TBA

Land Acknowledgment

As a learning community, we come together from all over the world. I would like to respectfully acknowledge the Syilx Okanagan Nation and their peoples, in whose traditional, ancestral, and unceded territory UBC Okanagan is situated.

If you live in Kelowna – like I do – then you also enjoy the privileges of living, working, and playing in Syilx Okanagan territory. I would like to encourage you to reflect on the history of this region and the economic, social, and environmental systems that were developed and maintained here for thousands of years prior to colonization.

Regardless of where you find yourself, I would also like to encourage you to learn more about contributions made by the traditional owners and caretakers of the land or territory where you live. As you reflect on our collective human history, I ask you to please renew your personal commitment to treating others with dignity, honesty, and compassion.

Course Description

This laboratory presents a detailed introduction to several research methodologies and univariate statistical techniques in the field of Psychology. The goal of this laboratory is to provide you with hands-on training in statistical programming so that you can carry out independent analyses in your Honours project, graduate school, and beyond.

By the end of this course, you will develop practical skills for univariate statistical analysis and scientific writing. Specifically, you will:

1. Become familiar with the foundations of statistical programming (*objects, data frames, functions, arguments, etc.*).
2. Learn how to plan and carry out data analysis from start to finish (*'The Analysis Pipeline'*)
3. Learn to conduct specific statistical analyses using cutting-edge software (*R* and *RStudio)*.
4. Learn to interpret and report statistical findings using real data and APA formatting.
5. Create a functioning codebook that you can refer to in future research.

Syllabus Contents

Course Material

Readings

Your instructors have built this course using *open-source* materials. This means that every assigned reading, every optional reading, and every piece of software you will use, is free. Required readings are listed on the Course Syllabus provided by Dr. ten Brinke. Optional readings for this lab are found on the Lab Schedule, page 10 of this Laboratory Syllabus. They provide additional detail and tutorials for the methods we use in the labs, and although they are entirely optional, I will encourage you to investigate them throughout the course. There are two types of optional readings: **Recommended Readings**, and **Optional Extras**. The recommended readings all come from a *co-laboratory* manual that I have put together based on my lesson plans. They provide additional detail and clear tutorials for the exact material we will use in class. The optional extras are external lessons from open-source textbooks available online. They provide additional context and perspectives on our laboratory material.

Software

This course uses ***R***, a programming language for statistical computing. Please download and install it from: https://cran.r-project.org/

This course also requires you to run *R* inside of a second program called ***RStudio***. Please download *RStudio* here: https://posit.co/download/rstudio-desktop/ (make sure to select "RStudio Desktop")

For Chromebook / iPad users: I understand that *R* and *RStudio* are not available in the Apple, Microsoft, or Android app stores. In order to run *RStudio* on these devices, I would recommend making a free account at https://posit.cloud/. This will allow you to create and work on *R* projects inside of your favourite web browser.

If you get stuck while downloading R and RStudio at home, don't worry! We will take time to make sure everyone is up and running during our first class.

Portable Computer

The majority of this lab will involve working through exercises and troubleshooting problems as a team. If you have access to a portable computer (e.g., a laptop), you might consider bringing it to each scheduled lab. This will allow you to easily pick up wherever we left off once the lab is over.

If you do not have access to a portable computer, that's ok too! We are fortunate enough to have each lab scheduled in the Arts Computer Lab, meaning that you can do all necessary work on one of the 40 desktop computers in the room. When each class is over, you can save your progress and email it to yourself for completion at a later time.

If you do not have consistent at-home access to a computer, tablet, or Chromebook, please send me (spencer@psych.ubc.ca) an email so we can find a solution.

Course Assessments

Lab Component	% of PSYO 372 Grade
Regular homework assignments (top 5 of 6)	4% each (20% total)
Lab Quiz #1	4%
Lab Quiz #2	6%

Regular homework assignments (20% total)

The first few weeks of this lab will work towards building foundational skills for using *R* and *RStudio*. Once we start dealing with specific statistical tests, I will begin assigning short, weekly homework assignments. This is a chance for you to demonstrate your effort in the lab in order to earn a portion of your final PSYO 372 grade. It will also help me to find any gaps or issues in my teaching, so that we can stay on course as a team.

Starting in October, Weekly homework will **become available at 2pm on Tuesdays** (the start of our class), and will **be due at 2pm the following Tuesday**. You will be able to access the homework assignments through your course Canvas page.

In each homework assignment, I may ask you to perform a statistical procedure using R, provide a description or interpretation of some results, or think critically about some analysis that has been conducted. The goal is to provide you with the tools and skills to work effectively and think critically using statistics.

I will only count your top five out of six homework assignments. In other words, your homework grade will come from your five best performances during the term. This means that you can skip an assignment altogether without earning a penalty against your final grade.

Lab Quizzes (10% total)

Twice during the course, we will set aside 1.5 hours of class time in order to do a lab quiz. The first quiz will focus on foundational skills for managing data and creating visualizations, and the second quiz will take a broader look at all the material we worked on in the lab. You can expect that I will ask you to create an R script from scratch, conduct some kind of analysis, and answer some questions relating to your code and analyses.

At the end of the quiz, I will ask you to upload your answers and the code you created to our course Canvas page, where I can review your work.

These quizzes are **open book**, **open notes**, and **open internet**, **but you may not consult or work in teams with your classmates**. This will help to maintain a quiet and respectful testing environment, and will closely replicate the everyday situation where psychologists need to figure out how to do an analysis but do not have an expert standing-by to help.

Course Policies

Attendance

In-person attendance is vital to your success in this lab because learning to program in R will require a great deal of tutorial and debugging that we will do as teams and one-on-one. If you miss a class, it is your responsibility to go through the code posted to canvas after each class, and ask any questions at either my office hours, or in a one-on-one meeting (I am more than happy to set these up via zoom).

Please do not come to class if you are feeling ill. Instead, send me an email at your earliest convenience so that we can make alternative arrangements.

Accessibility

In accordance with the BC Human Rights Code and UBC Policy LR7, I am committed to making sure that every student has a fair chance at success in this course. The Disability Resource Centre (DRC) facilitates a wide range of accommodations for students with disabilities and ongoing medical conditions. If something is creating a barrier between you and our course content, I encourage you to register with the DRC so that we can explore ways to make the course more accessible for you. Please note that the DRC requires students to make any accommodation requests at least 7 days before any test, and 7 days before the start of the formal exam period in April.

For more information, contact Earllene Roberts – Diversity Advisor for the Disability Resource Centre, University Centre building room #214. Phone: 250-807-9263 Email: earllene.roberts@ubc.ca

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Missing Homework and Quizzes

Sometimes, an acute illness or serious life event makes us unable to sit an exam or submit an assignment on time. UBC has introduced a compassionate policy for navigating these events. If you have an illness or serious life event that will prevent you from completing an exam or assignment on time, please fill out the form found on this webpage and email it to me (Spencer Murch, spencer@psych.ubc.ca) as soon as possible. This declaration does not exempt you from any exam or assignment. I will contact you to arrange a make-up exam or assignment.

Further information on Academic Concession can be found under Policies and Regulation in the Okanagan Academic Calendar.

Grading

Faculties, departments, and schools reserve the right to scale grades in order to maintain equity among sections and conformity to University, faculty, department, or school norms. Students should therefore note that an unofficial grade given by an instructor might be changed by the faculty, department, or school. Grades are not official until they appear on a student's academic record.

Percent Grade	Letter Grade
90 – 100	A+
85 – 89	A
80 – 84	A-
76 – 79	B+
72 – 75	B
68 – 71	B-
64 – 67	C+
60 – 63	C
55 – 59	C-
50 – 54	D
0 – 49	F

Reviewing Assessments

Please email me (spencer@psych.ubc.ca) to discuss any points of concern of clarification for either the lab quizzes or homework assignments.

Academic Honesty and Academic Misconduct

All UBC students are expected to behave as honest and responsible members of an academic community. While I neither want nor expect cheating or plagiarism to occur, I am prepared to take appropriate actions to ensure that all students receive the grades they have earned. Whenever you turn in an assignment or exam in this course, you can expect that I will use the best-available tools and procedures to discourage and discover academic misconduct.

All suspected cases of academic misconduct will be investigated. When the university determines that academic misconduct has occurred, the work in question is typically granted zero credit (0%). Pursuant to Section 61 of the University Act, UBC's president has the right to impose additional penalties including a failing grade for the course, and suspension from the university.

Students are responsible for informing themselves of the applicable standards for academic honesty. All of the following activities count as academic misconduct:

- Plagiarism, defined as any time a student submits work done by another person or AI system.
- Collusion, defined as working with others to give or receive help on assessments.
- Submitting the same assignment to multiple classes ("self-plagiarism").
- Asking someone else to complete an assessment on your behalf.
- Completing an assessment on someone else's behalf.
- Searching for or publishing assessment answers on "study guide" websites.

Your instructors know that Psychology is a highly collaborative field. I encourage you to work together to understand the course material as a team. However, I expect that every graded assessment (i.e., every homework assignment and unit quiz) in this lab will be *completed independently*. In other words, although I encourage you to work together to understand the material, all assignments and tests must consist of 100% original work completed by only you. If you

are unsure about whether a particular action constitutes academic misconduct, you must contact an instructor or teaching assistant as soon as possible.

A Note About ChatGPT and Other Large Language Models

As in the lecture portion of this course, submitting material generated by ChatGPT and/or other AI tools as part of your graded homework or quizzes is prohibited, and will be treated as academic misconduct.

That said…

Large Language Models (LLMs) like ChatGPT, BERT, and Google Bard are generative AI systems that take whatever text you give them, and confidently provide the most-likely response based on large databases of online interactions. This has some advantages for our lab. Namely, LLMs will often be able to help you understand course content (try asking ChatGPT: “Summarize the data types in R”), or even find bugs in your code (try asking: “Debug this R code: data <- round(c(10.5,12.45,13.67)),0)”).

However, when these programs are *wrong*, they are *confidently wrong*. This means that they will happily tell you things that are factually untrue, and you will need to use your own expertise to decide what is right and what is wrong.

Further, I want to warn you that relying too heavily on LLMs during your undergraduate training will undermine your chances of success in graduate school and the field of psychological science more broadly. This is because, as you dive further into the advanced research topics that will make up your career, there will be less and less information available online to train LLMs. This means that they will be wrong very often, and you will need to rely on your own expertise to make new scientific discoveries. Now is the time to develop good research habits and expertise.

Finally, I must warn you to never – under any circumstances – enter confidential psychological data into LLMs like ChatGPT. These models usually record everything you enter in order to improve their behaviour over time. For example, if I conduct a psychological assessment that finds John Doe’s IQ is 95, and then ask an LLM “What does it mean that John Doe’s IQ is 95?”, the developers and users of that LLM may now have *open access* to that information by asking “What is John Doe’s IQ?”. This is not just a breach of John Doe’s confidentiality, it is likely also a breach of the British Columbia data privacy law FOIPPA.

If you have any questions about the legal and ethical use of LLMs like ChatGPT in this laboratory, please do not hesitate to email me.

Helpful Resources

UBC Student Learning Hub

Your go-to resource for free math, science, writing, and language learning support. The Hub welcomes undergraduate students from all disciplines and year levels to access a range of supports that include tutoring in math, sciences, languages, and writing, as well as help with study skills and learning strategies.

In Person: LIB room #237

Phone: 250-807-9185

Online: https://students.ok.ubc.ca/student-learning-hub/

UBC Okanagan Equity and Inclusion Office

UBC Okanagan is a place where every student, staff and faculty member should be able to study and work in an environment that is free from discrimination and harassment. UBC prohibits discrimination and harassment on the basis of the following grounds: age, ancestry, colour, family status, marital status, physical or mental disability, place of origin, political belief, race, religion, sex, sexual orientation, or unrelated criminal conviction. If you require assistance related to an issue of equity, discrimination, or harassment, or to get involved in human rights work on campus, please contact the Equity and Inclusion Office.

In Person: UNC room #216

Phone: 250-807-9291

Email: equity.ubco@ubc.ca

Online: https://equity.ok.ubc.ca/

UBC Health & Wellness

At UBC Okanagan health services to students are provided by Health and Wellness. Nurses, physicians, and counsellors provide health care and counselling related to physical health, emotional/mental health, and sexual/reproductive health concerns. As well, health promotion, education and research activities are provided to the campus community. If you require assistance with your health, please contact Health and Wellness for more information or to book an appointment.

In Person: UNC room #337

Phone: 250-807-9270

Email: healthwellness.okanagan@ubc.ca

Online: https://students.ok.ubc.ca/health-wellness/

Office of the Ombudsperson for Students

The Office of the Ombudsperson for Students offers independent, impartial, and confidential support to students in navigating UBC policies, processes, and resources, as well as guidance in resolving concerns related to fairness.

Email: ombuds.office@ubc.ca

Online: https://ombudsoffice.ubc.ca/

Safewalk

Don't want to walk alone at night? Not too sure how to get somewhere on campus? For more information, contact Safewalk.

Phone: 250-807-8076

Online: www.security.ok.ubc.ca

Sexual Violence Prevention and Response Office (SVPRO)

A safe and confidential place for UBC students, staff and faculty who have experienced sexual violence regardless of when or where it took place. Just want to talk? SVPRO is here to listen and help you explore your options. They can help you find a safe place to stay, explain your reporting options (UBC or police), accompany you to the hospital, or support you with academic accommodations. You have the right to choose what happens next. SVPRO supports your decision, whatever you decide.

Phone: 250-807-9640

Online: https://svpro.ok.ubc.ca/

Independent Investigations Office (IIO)

If you or someone you know has experienced sexual assault or some other form of sexual misconduct by a UBC community member and you want the Independent Investigations Office (IIO) at UBC to investigate, please contact them. Investigations are conducted in a trauma-informed, confidential, and respectful manner in accordance with the principles of procedural fairness.

You can report your experience directly to the IIO.

Email: director.of.investigations@ubc.ca

Phone: 604-827-2060

Online: https://io.ubc.ca/

Lab Schedule

Week of…	Recommended Readings	Optional Extras	Lab Topics	Quizzes / Homework
Sept. 5	*FIRST WEEK OF CLASSES - NO LAB*			
Sept. 12	**Co-Lab Manual Lesson 1**	**Hands-On Programming with R:** APPENDIX A, Sections 2.1–2.3, 3.2 [LINK]	Introduction to R Part I	
Sept. 19	**Co-Lab Manual Lesson 2**	**Hands-On Programming with R:** Sections 2.5–2.7, 3.1, 5.8–5.10 [LINK]	Introduction to R Part II	
Sept 26	**Co-Lab Manual Lesson 3**	**Hands-On Programming with R:** Section 3.2 [LINK] **R for Data Science:** Section 3 [LINK]	Data Cleaning and Visualization Using *dplyr* and *ggplot2*	
Oct. 3	[None]	[None]	[None]	**Lab Quiz #1**
Oct. 10	**Co-Lab Manual Lesson 4**	**Discovering Statistics Using R:** Section 18.6 - see Canvas Modules page	Frequency tables, chi squared test, and the odds ratio	
Oct. 17	**Co-Lab Manual Lesson 5**	**Cookbook for R:** Section 't-Tests'[LINK]	t-Tests: Single, paired, and independent samples	**Homework #1** due at 2:00pm
Oct. 24	**Co-Lab Manual Lesson 5 and 6**	**U of V Library:** Tutorials on 'Diagnostic plots' [LINK] 'Q-Q plots' [LINK]	Linear Regression: t-Tests computed as regression, continuous independent variables, and model assumptions	**Homework #2** due at 2:00pm **Check-in Survey**
Oct. 31	**Co-Lab Manual Lesson 6**	**Cookbook for R:** Section 'Logistic regression' [LINK]	Linear Regression: Correlation, and dichotomous dependent variables	**Homework #3** due at 2:00pm

Nov. 7	**Co-Lab Manual Lesson 7**	**Lakens (2013), Draper (2021):** See Canvas Modules page	One-way ANOVA	**Homework #4** due at 2:00pm
Nov. 14	*MIDTERM BREAK – NO LAB*			
Nov. 21	**Co-Lab Manual Lesson 8**	**Discovering Statistics Using R:** Section 12.4-12.5 - see Canvas Modules page	Factorial ANOVA	**Homework #5** due at 2:00pm
Nov. 28	[None]	[None]	Revision Q&A, and special topics lecture	**Homework #6** due at 2:00pm
Dec. 5	[None]	[None]	[None]	**Lab Quiz #2**

How to get an A+ in this lab:

- Take detailed notes in the form of comments on all your codes. Review them regularly.
- Keep up with the homework, study the optional readings, and challenge yourself by testing your own research questions using the methods and datasets we use in lab.
- When you get stuck: ask your peers, your TA, your instructor, RDocumentation or ChatGPT.
- Remember that statistical programming is challenging and a little scary, but we do not expect you to master *R* this semester. Remember that no test, quiz, or assignment measures your value as a person. Everything will be OK.