

PSYO 271 Section 102

Introduction to Data Analysis
(3 Credits)

Location: LIB 305
Time: Wednesdays, 5:00pm



Instructor: Dr. William Spencer Murch
Online Office Hours: by Appointment
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 looks at addictive behaviours like gambling and video gaming.



Teaching Assistant: Laura Wrighton
Email: lmaren@mail.ubc.ca
Online Office Hours:
Office Link:

Please contact us when
you have questions.

We're here to help!

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 are in Kelowna – as I am – 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 self-reliant 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 course is designed to introduce you to data analysis practices in psychology research.

Throughout this course, please remember:

1. Statistics is just one of many tools we can use to understand psychology.
2. Statistics is a challenging field, but it doesn't need to be scary! This course is only meant to introduce you to important statistical ideas; no one is expecting you to master the whole topic this semester.
3. If you try your best on the homework, work to keep up with the readings, and ask for help with you get stuck, you will be in a great position to succeed in this course.

The primary goals of this course are to:

1. Give you a strong foundation in both descriptive and inferential statistics.
2. Foster an understanding of mathematical probability and its applications to science.

By the end of this course, students should be able to:

1. Define and explain the relationships between major statistical concepts (e.g., alpha, power, effect size, sample size).
2. Carry out common statistical procedures, and explain the theory underlying them.
3. Differentiate between statistical tests in order to develop appropriate analysis strategies.
4. Draw conclusions about scientific hypotheses by examining the results of statistical tests.

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Course Material

Readings

You may have noticed that there is no textbook listed for this course. This is because the PSYO 271 instructors believe that you should not be asked to pay for a textbook when *free* alternatives are available. I have uploaded all of the required readings to this course’s Canvas page. They can be found under the “Readings” tab in the left-side navigation bar.

Please try your best to read the week’s [Assigned Readings](#) before you come to each lecture. This will help you to stay on top of the material (...and it will help you to correct *me*, if and when I get something wrong).

Lectures

I know that mathematics can be a stressful topic. That’s why my #1 goal is to make these lectures informative, engaging, and fun. Each week, we will come together in LIB 305 to discuss and expand on the assigned readings. Here are some things you can expect from my lectures:

- I will explain important terms.
- I will provide many examples and walkthroughs.
- I will give you activities to work on by yourself and with your classmates.

Your engagement with the lecture content is important and expected; you will find it hard to succeed in this course if you do not attend or watch the lectures.

Calculator

For lectures and exams in this course, you will need a simple calculator that can do exponents (i.e., x^2) and square roots (\sqrt{x}). The Bookstore sells calculators with these functions for approximately \$16.

You may not use your smartphone as a calculator during exams. I have approximately two calculators that can be borrowed during exams if you forget yours at home. However, I cannot guarantee that you will have access to a calculator unless you bring your own.



Course Assessments

Assessment	% of Final Grade
Weekly Homework	20%
Midterm Exam #1	20%
Midterm Exam #2	25%
Final Exam	30%
In-Class Participation	5%
Research Participation	+2% Bonus

Weekly Homework (20%)

Each week, I will release a homework assignment in the form of a short quiz on Canvas. Most often, these assignments will involve 5-10 multiple choice questions. In many cases, these questions will involve mathematical computation.

I encourage you to work collaboratively on these assignments! Ask your TA! Ask a Tutor at the Student Learning Hub! Search the internet for solutions! **But whatever you do, try your best!** The purpose of this homework is to give you regular practice with the mathematical concepts in this course (... and to show me which lessons I need to revisit and improve). This will help you to succeed on your exams (and it will help me to be a better instructor for you).

There will be 12 assignments in total, and each one is worth 2% of your final grade. However, I will only count your 10 highest scores. This means that you can miss or skip two weeks' homework assignments without incurring any penalties. You can submit a week's homework any time before the following Wednesday at 4pm PST. I cannot accept homework that is submitted after the deadline has passed.

Midterms and Final Exam (75% total)

The midterms and final exam will consist of multiple choice, true-or-false, computation, and short answer questions. These questions will be based on the lecture material and assigned readings. The best strategy for these tests is to have a strong grasp of the material in *both* the readings and lectures.

These tests are **cumulative**. All readings assigned before a given exam may be tested. But don't worry! This is because this course builds extensively on earlier concepts like graphing, and calculating means. In reality, most material you will encounter on each exam will have been assigned more recently than your last exam.

The examinations in this course are all closed-book, so **you are not permitted to access any of the course materials, including your notes, during the exam**. I will provide you with all relevant tables and mathematical formulas for each exam. You are also not allowed to communicate with anyone about the exam during the scheduled write time or after the examination – you are to work independently. Communication with other students (written, text, verbal, etc.) is not permitted and will constitute Academic Misconduct. If you violate these conditions you have engaged in Academic Misconduct and will be subject to the consequences articulated in the [Academic Integrity section](#).

In-Class Participation (5%)

I expect you to attend class each week. Your regular attendance will help you to succeed on the exams (... and it will help me to organize in-class activities). Since we are a relatively small group, I will be taking attendance each week, and I will ask you to sign and submit in-class worksheets to demonstrate your participation in different activities. Don't worry too much about getting the right answers; this is just a participation mark!

You will earn 0.5% for each class. If you attend and participate in at least 10 out of the 12 weekly lectures, you will receive full marks for this section (5%).

Research Participation (+2% Bonus)

Students earn Sona credit from participating in research activity. This can be either through direct participation in research through the Sona online volunteer subject pool (Option 1), by completing summaries of primary research articles (Option 2), or by a combination of the two types of activities.

Research Participation (Option 1)

As a participant in one of numerous Psychology Department Subject Pool experiments posted at <http://ubco.sona-systems.com/>, you will obtain 0.5% credit for each 0.5 hour of participation at UBCO. Hence, participation requiring a 1-hour time commitment provides a credit of 1%, 1.5 hours provides a credit of 1.5%, and 2 hours provides a credit of 2.0%, etc.

Important requirements. You may participate in more than one experiment in order to accrue credits. It is important to sign up for experiments early in the semester in order to increase the odds that a timeslot is available. If you wait until late in the semester, all timeslots may be taken.

IMPORTANT: Due to concerns related to COVID-19, only online studies will be hosted on Sona, with the exception of some in-person studies that have received special permission to be conducted.

Logging on to the system. Sona is only open for those students who are registered in a psychology course offering Sona credit. Please only use the request account option if you have never used the Sona system before. If you have used the Sona system before, please use the most recent login information you remember to log in.

Missed appointments & penalties. Missed appointments (i.e., failure to cancel the appointment at least 3 hours prior to the session) will be tracked. The consequence will be that you will not receive credit for participation in the experiment and will lose the credit value of the study from possible marks associated with participation in research.

Please email psyc.ubco.research@ubc.ca with any questions or concerns that you may have regarding the Sona system, including unassigned bonus credits. Your professor does NOT have access to this information.

Research Summary Assignment (Option 2)

As an alternative to participating in a Psychology Subject Pool experiment, you may obtain subject pool credit by completing library-writing projects to a satisfactory level. Each library-writing project is worth a total of two credits.

Important Requirements.

1. This project consists of reading and summarizing (in written form) a recent, peer-reviewed, primary research article.

- A “recent” article has been published within the past 12 months.
- A “peer reviewed” article is one that has been reviewed by other scholars before it is accepted – for example, it **cannot** be a news item, an article from a popular magazine, a notice, or a letter to the editor.
- A “primary” research article describes an experiment or study where data are collected by the authors. In other words, the article you choose to review **cannot** be a book review, literature review, or summary article.

2. You must choose an article published by one of the following agencies:

- The American Psychological Society - *Psychological Science*, *Current Directions in Psychological Science*, *Psychological Science in the Public Interest*, or *Perspectives on Psychological Science*.
- The American Psychological Association - www.apa.org/journals/by_title.html has a full listing.
- The Canadian Psychological Association - *Canadian Psychology*, *Canadian Journal of Behavioural Science*, or *Canadian Journal of Experimental Psychology*.
- The Psychonomic Society - *Behavior Research Methods, Cognitive, Affective, & Behavioral Neuroscience*, *Learning & Behavior*, *Memory & Cognition*, *Perception & Psychophysics*, or *Psychonomic Bulletin & Review*.

3. Other Assignment Guidelines

The summary should be about 300-500 words in length. The source must be cited and referenced in accordance with the *Publication Manual of the American Psychological Association* (6th ed.). The review will be graded on a pass – fail basis (2% or 0%). At least **14 days before the end of classes** each term, submit the following to the course instructor:

- the article summary
- a copy of the article
- a cover page that specifies your name, student number, email address, and word count of the summary.
- the course title and number

Submitting the assignment 14 days in advance is necessary to ensure that you have an opportunity to make corrections, if required. If you do not check your email frequently, provide a phone number on the cover page.

Course Policies

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](tel:250-807-9263) Email: earllene.roberts@ubc.ca

Copyright Disclaimer

Diagrams and figures included in lecture presentations adhere to [Copyright Guidelines for UBC Faculty, Staff and Students](#) and [UBC Fair Dealing Requirements for Faculty and Staff](#). Some of these figures and images are subject to copyright and will not be posted to Canvas. All material uploaded to Canvas are used with permission of the publisher; are in the public domain; are licensed by Creative Commons; meet the permitted terms of use of UBC's library license agreements for electronic items; and/or adhere to the UBC Fair Dealing Requirements for Faculty and Staff. Access to the Canvas course site is limited to students currently registered in this course. **Under no circumstance are students permitted to provide any other person with means to access this material.** Anyone violating these restrictions may be subject to legal action. Permission to electronically record any course materials must be granted by the instructor. Distribution of this material to a third party is forbidden.

Missing Exams and Assignments

Sometimes, an acute illness or serious life event make 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) 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.

Missing a Final Exam

Except in the case of examination clashes and hardships (three or more formal examinations scheduled within a 24-hour period) or unforeseen events, students will be permitted to apply for out-of-time final examinations only if they are:

1. Representing the University, the province, or the country in a competition or performance; serving in the Canadian military.

2. Observing a religious rite.
3. Working to support themselves or their family.
4. Caring for a family member.

Unforeseen events include (but may not be limited to) the following: ill health or other personal challenges that arise during a term and changes in the requirements of an ongoing job.

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 Exams

Once all students have had a chance to complete a given exam, I will invite students who wish to review their exams to book a Zoom meeting with the TA and myself. In these 15-minute sessions, we will provide a walkthrough of your exam, with an emphasis on topics you may want to revisit prior to the next exam.

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 the 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.

- ◆ Collusion, defined as working with others to give or receive help on exams.
- ◆ Submitting the same assignment to multiple classes (“self-plagiarism”).
- ◆ Asking someone else to complete an exam on your behalf.
- ◆ Completing an exam on someone else’s behalf.
- ◆ Searching for exam answers on “study guide” websites.
- ◆ Publishing exam answer keys to “study guide” websites.

I expect that the exams in this course will be completed *independently*. If you are unsure about whether a particular action constitutes academic misconduct, you must contact an instructor or teaching assistant as soon as possible.

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](tel: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](tel: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](tel: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](tel: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](tel: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](tel:604-827-2060)

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

Course Schedule

Week of...	Assigned Readings (R)	Lecture Topics	Exams / Due
Jan. 12	R1, R2, R3	First Day of Class <ol style="list-style-type: none"> 1. Course Introduction and Syllabus 2. Review: Science and Empiricism 3. Measurements 4. Scales and Variables 5. Statistics vs Parameters 	
Jan. 19	R4, R5, R6, R7	Visualizing Data <ol style="list-style-type: none"> 1. Frequency Distributions 2. Graphing 3. Summation 	Homework #1 due at 4:00pm
Jan. 26	R8, R9, R10	Descriptive Statistics Part 1 <ol style="list-style-type: none"> 1. Measures of Central Tendency 2. Measures of Variability 	Homework #2 due at 4:00pm
Feb. 2	R11, R12	Descriptive Statistics Part 2 <ol style="list-style-type: none"> 1. Measuring Outliers 2. Robust Estimates 3. Percentiles and Percentile Ranks 	Homework #3 due at 4:00pm
Feb. 9	R13	Descriptive Statistics Part 3 <ol style="list-style-type: none"> 1. Normal Distribution 2. Z-Scores 	Homework #4 due at 4:00pm Midterm #1 at 5:00 pm
Feb. 16	R14	Probability Part 1 <ol style="list-style-type: none"> 1. Randomness and Independence 2. Mutual Exclusivity 3. The Addition Rule 4. The Multiplication rule 	Homework #5 due at 4:00pm
Feb. 23	Reading Break (no assigned lessons or readings)		
Mar. 2	R15	Probability Part 2 <ol style="list-style-type: none"> 1. The Sampling Distribution 2. Standard Error of the Mean 3. Hypothesis Testing – Null vs. Alternative 4. P-values 	Homework #6 due at 4:00pm

Mar. 9	R16	Inferential Statistics Part 1 <ol style="list-style-type: none"> 1. One-tailed and Two-tailed hypothesis tests 2. Confidence Intervals 3. Type I and Type II Errors 4. Power 5. Statistical vs. Practical Significance 	Homework #7 due at 4:00pm
Mar. 16	R17, R18	Inferential Statistics Part 2 <ol style="list-style-type: none"> 1. The t-distribution 2. Single Sample t-test 3. Independent Samples t-test 	Homework #8 due at 4:00pm Midterm #2 at 5:00 pm
Mar. 23	R21, R22, R24	Inferential Statistics Part 3 <ol style="list-style-type: none"> 1. Effect Sizes 2. More About Confidence Intervals 3. Interpreting Correlations 4. Computing Correlations 	Homework #9 due at 4:00pm
Mar. 30	R19, R20	Inferential Statistics Part 4 <ol style="list-style-type: none"> 1. Paired Samples t-test 2. Linear Regression 3. Standard Error of the Estimate 	Homework #10 due at 4:00pm
Apr. 6	R25	Inferential Statistics Part 5 <ol style="list-style-type: none"> 1. (Finish up Inferential Statistics Part 4) 2. F-test – One-way Analysis of Variance (ANOVA) 	Homework #11 due at 4:00pm
Final Exam (date will be set by the University Registrar)			