
Psychology 412	Multiple Regression in Psychological Research	Winter 2024
Instructor	Dr. C.R. Sears	Lecture Location SH 280
Phone	403-220-2803	Lecture Days/Time TR 9:30-10:45
		Lab 01 W 12:00- 13:50
		Lab 02 R 13:00 – 14:50
Email	sears@ucalgary.ca	Lab TA Daniel Cunningham
Office	EDT 1428	TA Email daniel.cunningham1@ucalgary.ca
Office Hours	By appointment (zoom or in-person available)	Office Hours By appointment (zoom or in-person available)

Course Description

This course covers the theory and application of multiple regression techniques to experimental and non-experimental research. PSYC 412 builds on PSYC 300 and 301 (Research Methods and Data Analysis in Psychology) and expands on what you learned in these courses. You will acquire a theoretical and practical understanding of a set of statistical methods common in psychological research. Students will acquire hands-on experience in the laboratory component of the course, and the labs and lectures will be closely integrated to facilitate your learning. You will use the IBM SPSS software to perform statistical analyses, and the lectures will rely extensively on the output files from this software. The knowledge and skills acquired in this course are important for all psychology majors and will be especially advantageous for students planning on graduate and professional studies.

Note: This course focuses on quantitative approaches. Students interested in qualitative psychological research should consider Psychology 415 (Qualitative Inquiry in Psychology).

Required Software

Students will need regular access to the IBM SPSS statistical software throughout this course. SPSS will be available in the lab facility, but you should obtain your own personal copy so that you can use the software anywhere on campus. SPSS is available (at no cost) for PC and Mac computers. Use the link below to go to the IT Software Distribution website and download SPSS. After you log in with your IT username and password, select "SPSS (Licensed to Sept 30, 2024)" and request a license for SPSS 29. Complete the form and accept the license agreement, then download and install the software (consult the ReadMe file, included in the downloaded files, for installation instructions; this file is posted on the course D2L). If you encounter issues use the IT contact email in the instructions. Install the software before the first day of lectures so that you have time to work through any problems you might experience.

<https://iac01.ucalgary.ca/SDSWeb/LandingPage.aspx?ReturnUrl=%2fSDSWeb%2fdefault.aspx>

Course Learning Outcomes

The Department of Psychology is committed to student knowledge and skill development. The table below lists the key learning outcomes for this course, the program-learning outcomes they facilitate (see <https://live-arts.ucalgary.ca/psychology/about#program-learning-outcomes>), and the expected level of achievement.

Course Learning Outcomes	Assessment Methods	PLO(s)	Level(s)
Interpret and evaluate psychological research – including interpreting graphical depictions of data, critically assessing statistical methods, and drawing appropriate conclusions.	Course and lab assignments	2, 3, 4, 5, 7	A
Identify and apply the appropriate quantitative analysis techniques required to address questions in psychological research or to help inform or generate solutions to personal, social, and/or societal problems.	Course and lab assignments	2, 3, 4, 7	A
Input, organize, and manipulate data, and conduct statistical analyses using statistical software	Course and lab assignments	2, 3	A
Describe the advantages, limitations, and assumptions of different research and/or statistical methods and apply these methods to real-world problems (e.g., scenarios given in lab assignments).	Course and lab assignments	1, 2, 3, 4, 7	A
Communicate psychological research findings effectively, to both scientific and non-scientific audiences, including the appropriate use of figures, graphs, and tables (and APA style)	Course and lab assignments	3, 4, 5	A

Notes. PLOs = Program-Learning Outcomes: 1 = demonstrate knowledge of psychological sciences, 2 = think critically and solve problems, 3 = conduct research and analyze data, 4 = communicate effectively, 5 = demonstrate information literacy, 6 = understand and implement ethical principles, 7 = apply psychological knowledge and skills. 8 = Demonstrate multicultural competence and awareness of issues related to equity, diversity, and inclusion. Level of PLO achievement facilitated by this course: I = introductory, C = competency, A = advanced.

Acknowledgments and Respect for Diversity

Our classrooms view diversity of identity as a strength and resource. Your experiences and different perspectives are encouraged and add to a rich learning environment that fosters critical thought through respectful discussion and inclusion. The Department of Psychology would also like to acknowledge the traditional territories of the people of the Treaty 7 region in southern Alberta. The City of Calgary is also home to Métis Nation of Alberta (Districts 5 and 6).

Course Format

This is an in-person class held on campus.

Prerequisites

Prerequisite(s): Psychology 300, 301 and admission to the Psychology major or Honours program.

Required Text

Introduction to Mediation, Moderation, and Conditional Process Analysis: A Regression-based Approach (Andrew Hayes), 3rd edition. This is a lengthy book, and we will not be covering every chapter, but it is a valuable resource and is used in many graduate-level statistics courses. Students can purchase the text at the campus bookstore or order it online. There is a PDF version available at a very reasonable cost.

Assessment Methods

Note: All assignments are to be submitted electronically (via Dropbox on D2L). Additional details on the assignments listed below will be provided during the first week of lectures and will be posted on D2L.

1. Midterm exam (30%)

There will be an in-class midterm exam on February 15, worth 30% of the final grade. The midterm exam will consist of short answer questions and will test for material covered in the course (lectures, labs, and textbook) up until the exam date. It will focus on basic concepts, definitions, and interpretation of SPSS output. The midterm is a closed-book exam. The use of resources, including class notes, the textbook, online resources, and calculators is prohibited during the exam. Students may not communicate with others about course material or the exam either in person or electronically during the exam.

2. Take-home assignments (30%)

There are two take-home assignments, each worth 15% of your final grade. The first assignment is due March 7 (@11:59 pm) and the second is due April 9 (@11:59 pm). Both assignments will be posted on D2L the first week of the course. These assignments will require you to analyze data using SPSS and explain the results of your analyses. The use of class notes and the textbook is permitted. The use of online resources and calculators is also permitted. Students must work alone on their assignments and may not communicate with others about their assignments either in person or electronically. Assignments submitted after the due date will be penalized 10% per day (unless a late submission has been previously approved).

3. Lab assignments (40%)

The lab component of the course is worth 40% of your final grade. The lab component requires you to attend each lab and complete 5 assignments, each worth 8% (i.e., each assignment is of equal weight). The assignments will require you to analyze data and interpret the results. See the Laboratory Schedule below for the list of assignments and due dates. Lab assignments will be posted on D2L. Lab assignments are due at 11:59 pm on the day of your scheduled lab. Unless a late submission has been previously approved, late assignments will receive a 10% penalty per day. The use of class notes and the textbook is permitted when working on the lab assignments. The use of online resources and calculators is also permitted. Students must work alone on their lab assignments and may not communicate with others about their assignments either in person or electronically.

Note: students must achieve a passing grade on both the class work and the lab component to pass this course.

Once approved by the course instructor, and at their discretion, alternative arrangements for missed assessments may be considered. <https://www.ucalgary.ca/pubs/calendar/current/g-1-2.html>. Students may be asked for documentation <https://www.ucalgary.ca/pubs/calendar/current/m-1.html>.

University of Calgary Academic Integrity Policy

Academic integrity is the foundation of the development and acquisition of knowledge and is based on values of honesty, trust, responsibility, and respect. We expect members of our community to act with integrity.

Research integrity, ethics, and principles of conduct are key to academic integrity. Members of our campus community are required to abide by our institutional code of conduct and promote academic integrity in upholding the University of Calgary's reputation of excellence. It is your responsibility to ensure that you have read and are familiar with the student academic misconduct policy:

<https://www.ucalgary.ca/legal-services/sites/default/files/teams/1/Policies-Student-Academic-Misconduct-Policy.pdf>.

Department of Psychology Criteria for Letter Grades

Psychology course instructors use the following criteria when assigning letter grades:

A+ grade: *Exceptional Performance.* An A+ grade indicates near perfect performance on multiple choice and short answer exams. For research papers/essays/course projects/presentations, an A+ grade is awarded for exceptional work deserving of special recognition and is therefore not a common grade.

A, A- Range: *Excellent Performance.* Superior understanding of course material. Written work is very strong in terms of critical and original thinking, content, organization, and the expression of ideas, and demonstrates student's thorough knowledge of subject matter.

B Range: *Good Performance.* Above average understanding of course material. Written work shows evidence of critical thinking and attention to organization and editing but could be improved in form and/or content.

C Range: *Satisfactory Performance.* Adequate understanding of course material. Knowledge of basic concepts and terminology is demonstrated. Written work is satisfactory and meets essential requirements but could be improved significantly in form and content. Note: All prerequisites for courses offered by the Faculty of Arts must be met with a minimum grade of C-.

D range: *Marginally meets standards.* Minimal understanding of subject matter. Written work is marginally acceptable and meets basic requirements but requires substantial improvements in form and content. Student has not mastered course material at a level sufficient for advancement into more senior courses in the same or related subjects.

F grade: *Course standards not met.* Inadequate understanding of subject matter. Written work does not meet basic requirements. Student has not demonstrated knowledge of course material at a level sufficient for course credit.

Grading Scale

A+	96-100%	B+	80-84%	C+	67-71%	D+	54-58%
A	90-95%	B	76-79%	C	63-66%	D	50-53%
A-	85-89%	B-	72-75%	C-	59-62%	F	0-49%

It is at the instructor's discretion to round off either upward or downward to determine a final grade when the average of term work and final examinations is between two letter grades. To determine final

letter grades, final percentage grades will be rounded up or down to the nearest whole percentage (e.g., 89.5% will be rounded up to 90% = A, and 89.4% will be rounded down to 89% = A-).

Tentative Lecture Schedule (Lecture topics subject to change as the course progresses)

Date	Topic / Readings
T Jan 9	First day of lectures; course introduction and overview (Chp. 1)
R Jan 11	Review of correlation; partial correlation and statistical control (Chp. 2)
T Jan 16	Review of linear regression (Chp. 2)
R Jan 18	Interpreting linear regression statistics (Chp. 2)
R Jan 18	<i>Last day to drop a class without financial penalty</i>
F Jan 19	<i>Last day to add or swap a course</i>
T Jan 23	Regression assumptions; detection of violations and outliers (Chp. 2)
R Jan 25	Fundamentals of multiple regression (Chp. 2)
F Jan 26	<i>Fee payment deadline for winter session full- and half-courses</i>
T Jan 30	Fundamentals of multiple regression (Chp. 2)
R Feb 1	Multiple regression coefficients; partial and semi-partial correlation (Chp. 2)
T Feb 6	Multiple regression diagnostics (Chp. 2)
R Feb 8	Categorical predictors in multiple regression (Chp. 2)
T Feb 13	Categorical predictors in multiple regression (Chp. 2)
R Feb 15	*** Midterm exam (basic concepts, definitions, interpretation of SPSS output) ***
Feb 18-24	Term Break, no classes
T Feb 27	Foundations of moderation analysis (Chp. 7)
R Feb 29	Foundations of moderation analysis (Chp. 7)
T Mar 5	Visualizing moderation (Chp. 7)
R Mar 7	Probing interactions (Chp. 7)
R Mar 7	*** Take-home assignment #1 due ***
T Mar 12	Probing interactions (Chp. 7)
R Mar 14	Moderation with covariates (Chp. 8)
T Mar 19	Moderation with a dichotomous moderator (Chp. 8)
R Mar 21	Multicategorical moderation analyses (Chp. 10)
T Mar 26	Multicategorical moderation analyses (Chp. 10)
R Mar 28	Multicategorical moderation analyses (Chp. 10)
T Apr 2	Mediation analysis (Chp. 3)
R Apr 4	Mediation analysis (Chp. 3)
T Apr 9	Mediation analysis (Chp. 3)
T Apr 9	*** Take-home assignment #2 due ***
T Apr 9	<i>Winter session lectures end</i> <i>Last day to withdraw with permission from winter session half-courses</i>
Apr 12-23	<i>Winter session final exam period</i>

Tentative Laboratory Schedule

Date	Topics and Lab Assignment
Jan 10, 11	Review of SPSS data entry and syntax
Jan 17, 18	Correlation and partial correlation (receive Lab Assignment 1)
Jan 24, 25	Linear regression (receive Lab Assignment 2)
Jan 31, Feb 1	Multiple regression (Lab Assignment 1 due)
Feb 7, 8	Multiple regression (Lab Assignment 2 due; receive Lab Assignment 3)
Feb 14, 15	Multiple regression
Feb 18-24	Term Break, no labs
Feb 28, 29	Moderation (Lab Assignment 3 due; receive Lab Assignment 4)
Mar 6, 7	Moderation (receive Lab Assignment 5)
Mar 13, 14	Visualizing and Probing interactions
Mar 20, 21	Multicategorical moderation (Lab Assignment 4 due)
Mar 27, 28	Mediation (Lab Assignment 5 due)
Apr 3, 4	Mediation
Apr 9, 10	Open lab

Course Credits for Research Participation

Note that extra research participation course credit is not offered in this course.

Seating During Exams

Instructors and exam invigilators are free to ask students to move seats before an exam begins or even during an exam. Students must comply with this request and refusal to do so may warrant a charge of academic misconduct.

Absence From Test/Exam

Makeup tests/exams are **NOT** an option without the approval of the instructor <https://www.ucalgary.ca/pubs/calendar/current/g-1-1.html>. At the instructor's discretion, a makeup test/exam may differ significantly (in form and/or content) from a regularly scheduled test/exam. Once approved by the instructor a makeup test/exam must be written within 2 weeks of the missed test/exam on a day/time scheduled by the instructor. If a student cannot write their final exam on the date assigned by the Registrar's Office, they need to apply for a deferred exam <https://www.ucalgary.ca/registrar/exams/deferred-exams>

Travel During Exams

Consistent with University regulations, students are expected to be available to write scheduled exams at any time during the official December and April examination periods. Requests to write a make-up exam because of conflicting travel plans (e.g., flight bookings) will NOT be considered by the department. Students are advised to wait until the final examination schedule is posted before making any travel arrangements. If a student cannot write their final exam on the date assigned by the Registrar's Office, they need to apply for a deferred exam [Deferred Final Exams | University of Calgary](#)

ucalgary.ca) Students with an exceptional extenuating circumstance (e.g., a family emergency) should contact the Department of Psychology psyugrd@ucalgary.ca

Reappraisal of Graded Term Work <http://www.ucalgary.ca/pubs/calendar/current/i-2.html>

Reappraisal of Final Grade <http://www.ucalgary.ca/pubs/calendar/current/i-3.html>

Academic Accommodations

Students seeking an accommodation based on disability or medical concerns should contact Student Accessibility Services; SAS will process the request and issue letters of accommodation to instructors. For additional information on support services and accommodations for students with disabilities, visit www.ucalgary.ca/access/. Students who require an accommodation in relation to their coursework based on a protected ground other than disability should communicate this need in writing to their instructor. The full policy on Student Accommodations is available at <https://www.ucalgary.ca/legal-services/sites/default/files/teams/1/Policies-Student-Accommodation-Policy.pdf>.

Academic Misconduct

For information on academic misconduct and its consequences, please see the University of Calgary Calendar at <http://www.ucalgary.ca/pubs/calendar/current/k.html>

Instructor Intellectual Property

Course materials created by professor(s) (including course outlines, presentations and posted notes, labs, case studies, assignments, and exams) remain the intellectual property of the professor(s). These materials may NOT be reproduced, redistributed, or copied without the explicit consent of the professor. The posting of course materials to third party websites (such as note-sharing sites) without permission is prohibited. Sharing of extracts of these course materials with other students enrolled in the course at the same time may be allowed under fair dealing.

Copyright Legislation

All students are required to read the University of Calgary policy on Acceptable Use of Material Protected by Copyright

(https://library.ucalgary.ca/services/copyright?_gl=1*bcjlpn*_ga*OTY1ODc0Njg0LjE2NjkxNTA1NTM.*_ga_X4GN9Y4W7D*MTY3Nzc5MjM3Ni4xNy4xLjE2Nzc3OTI4MDYuMC4wLjA) and requirements of the copyright act (<https://laws-lois.justice.gc.ca/eng/acts/C-42/index.html>) to ensure they are aware of the consequences of unauthorized sharing of course materials (including instructor notes, electronic versions of textbooks etc.). Students who use material protected by copyright in violation of this policy may be disciplined under the Non-Academic Misconduct Policy.

Freedom of Information and Protection of Privacy

Student information will be collected in accordance with typical (or usual) classroom practice. Students' assignments will be accessible only by the authorized course faculty. Private information related to the individual student is treated with the utmost regard by faculty at the University of Calgary

Student Support and Resources

<https://www.ucalgary.ca/registrar/registration/course-outlines>

Important Dates

The last day to drop this course with no “W” notation and **still receive a tuition fee refund** is **Thursday, January 18th, 2024**. Last day add/swap a course is **Friday, January 19th, 2024**. The last day to withdraw from this course is **Tuesday, April 9th, 2024**.