UNIVERSITY OF CALGARY

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PSYC 411	Design and Analysis in Psychological Research	Winter 2023

Instructor:	Dr. Mark Holden	**Lecture Info**	TR 8:00 – 9:15 am in ST 64
Phone:	403-210-9552	**Lab Info:**	T 10:30am -12:20pm in SS 018
Email:	mark.holden@ucalgary.ca		OR W 2:00-3:50 pm in SS 018
Office:	Admin 214	**TA Info:**	TBD
Office Hours:	By appointment		

Course Description

This course builds on the foundation of Psyc 300/301 (Research Methods and Data Analysis in Psychology I and II) OR Psyc 312 (Experimental Design and Quantitative Research Methods in Psychology) by introducing students to numerous statistical methods and experimental design considerations that are frequently encountered in Psychological Research. The aim of this course is to provide students with an overview of different design considerations or methods that they are likely to encounter, whether through their own research or when evaluating research by other psychologists. These skills are useful for psychology majors, those considering graduate studies in psychology, or even those who simply wish to be better consumers of research.

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

Because this course seeks to introduce students to various statistical procedures, there is a laboratory component in which students will gain direct experience with these methods. This experiential learning (learning by doing) component of the course will therefore be integrated with the lecture material, as a way of reinforcing the concepts discussed in class.

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.	Exams, 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	Exams, Lab assignments	2, 3, 4, 7	A

inform or generate solutions to personal, social, and/or societal problems.			
Input, organize, and manipulate data, and conduct statistical analyses using statistical software (or by hand)	Exams, Lab assignments	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).	Exams, Lab assignments	2, 3, 4, 7	A
Communicate psychological research findings effectively, to both scientific and non-scientific audiences, including the appropriate and effective use of figures, graphs, and tables (and APA style)	Exams, Lab assignments	3, 4, 5	A
Critically assess the limitations of psychological research that is not diverse or representative. Describe how these factors can affect the validity and reliability of statistical analysis, and how to correct these issues.	Exams, Lab assignments	1, 2, 5, 8	C

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 in a diverse world, 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, Region III.

Course Format

This is an in-person class, held on campus. Instruction in course will make use of a variety of techniques, including lectures, demonstrations, videos, discussions, readings, practice problems, and (maybe) the occasional guest speaker. I outline these techniques below. You will notice that there are a number of activities in which I expect students to be *active participants* in the learning process. Research shows that this type of participation improves learning and retention of material, and – anecdotally – it makes classes a lot more fun, too! *I strongly advise students to engage in these activities, to watch the videos, and so on - as these activities are meant to make the material come to life, improve student engagement, and* <u>*aid in retention of the material*</u>*.*

> **Lectures**: formal lectures will expand upon and emphasize key points from the readings. These lectures may be the primary method of instruction, but they are by no means the only method.
>
> **Demonstrations**: demonstrations are common in my courses, and they often are used to highlight or emphasize concepts, methods, or techniques. Some demonstrations require the assistance of a single, brave volunteer while others may include the entire class. Students are expected to participate in demonstrations, whenever possible. As I said above, this actively helps with retention of the material. The key point is that students are expected to be active participants in the learning process.
>
> **Audio-Visual Presentations**: sometimes a picture can be worth a thousand words. And a video might be worth millions. Research has shown that carefully-selected videos can make material

much more memorable. Videos and links will be provided in lectures, and I strongly encourage students to attend to these videos. They are typically only a couple of minutes long, and yet they help solidify concepts in our mind!

Readings: the textbook is a strong resource for this course. Typically, when I teach concepts for this course, the majority of students understand my examples, activities, and so on. But, in some rare cases, you might find that the methods that I used just didn't *click* for you, for some reason. If this is the case, the textbook can be a valuable resource as it might explain things in a different way, which might work a little better for you. Honestly, this is pretty rare, but I do like to mention it as a possibility. There may also be sections of the textbook that are required reading, which may not be covered in class (though this is relatively rare). Chapters are included in the lecture schedule if you'd like to read along as we progress through the course. Also, because lectures do expand on the readings, I would not expect to do well by *only* reading the book (and not attending class/listening to lectures). However, I want to reassure students that this is NOT one of those dreaded "the professor will sit back and make the students read the book and learn on their own" types of courses!

Classroom Problems: I occasionally give students sample problems in class. Students are expected to try to solve the problem on their own, or in pairs or small groups. I will give time in the lectures for this, before I then go over the answers. Although you might be tempted to not bother trying to answer (and just wait, then write down the correct answer later), research strongly suggests that your learning will be better for the effort – even if you don't solve the problem the first time!

Guest Speakers: I occasionally invite guest speakers to class, if they have a unique and valuable perspective on some aspect of the course material.

Prerequisites

Psyc 300 and 301 – Research Methods and Data Analysis in Psychology I and II

AND admission to either the Psychology major or Honors Program

Course Website

The course website is on D2L at https://d2l.ucalgary.ca

It is on this website that you will find important announcements, download lecture slides, hand in assignments, and find links to other resources (as necessary). Please check it often.

Recommended Text

Field, A. (2017). *Discovering statistics using IBM SPSS statistics* (5th North American ed.). London: Sage Publications Ltd.

The textbook is available in the bookstore, as well as through online retailers. Please ensure that you are getting the North American edition, though.

Course Expectations

For all of my courses, I have some expectations for both the students as well as for myself, below. In general, these all boil down to one simple rule, though: **I expect us all to be respectful of one another, and for each of us to do our part in making this a safe, comfortable learning environment for everyone.** By working together we can make this class something that we can all be proud of! Most of all, I will insist upon maintaining a civil atmosphere – in which members of the class treat each other with mutual respect. It is through this kind of learning environment what we can focus our attention and energy on teaching and learning, rather than on frustration, conflict, and distrust. ***Please note: it is sometimes easier to say mean-spirited things online than it is in person. Even with any online communications (e.g. a group chat, discussion board, etc.), remember that the people that you are engaging with are still*** <u>***people***</u> ***and*** <u>***classmates***</u>***. As such, I will hold and strictly enforce guidelines of mutual respect for all meetings or course-based communication systems.***

<u>Expectations of Students</u>

- **To be punctual, prepared, and attentive during class**
  - o Lecture will start at 8:00 a.m. Please be sure to be in your seat and ready for class by this time. If you absolutely cannot avoid being late, please enter the room as quietly as possible and minimize the disruption for your fellow students. If necessary, sit in the first available seat and try to find your friends at the break.

- **To stay in class (and not begin packing bags) until dismissed**
  - o Please refrain from packing up as I begin to wind down a class. Oftentimes, at the end of class I have an important announcement about readings to be omitted, assignment deadlines, and so on. Packing up, or shuffling up and down the aisles causes a great deal of distraction, and may result in you or your fellow students missing these important announcements.

- **To make every effort not to be a distraction to students around you**
  - o In some cases, students are not even aware of how distracting certain activities are. Obvious examples include talking on a cell phone, or with a neighbor. <u>Less obvious examples include texting, or checking social media on one's laptop</u>. These are incredibly distracting behaviors for everyone behind or near you. Please refrain from doing so until the break. Also, I would request that cell phones be turned off during class lecture.

- **To be willing to participate positively and constructively during class**
  - o As outlined above, active participation is a critical component to my teaching style, and improves student learning and retention of material. Acting bored or dismissive is disrespectful to both the instructor and to your fellow students.

- **To treat all other students in the class, as well as the instructor, with respect**
  - o We are very lucky to have a diverse population of students at the U of C, who come from different backgrounds and bring different experiences with them. These differences are a valuable means by which we will learn about individual and group differences. I will insist that all of us treat those students who are willing to share their thoughts and experiences with our full respect and attention. Avoid disrespectful comments, tones of voice, or facial expressions.

- **To understand and abide by the procedures and regulations outlined in the syllabus**

<u>Expectations of the Instructor</u>

- **To be punctual, prepared, and enthusiastic during class to facilitate student learning**
  - As I mentioned in the opening note on the syllabus, I love this course. I will always come to class prepared and happy to be teaching you.

- **To treat all students with dignity, respect, and fairness in order to provide a class structure that encourages learning**
  - Teachers who are disrespectful to students need to find another occupation. Seriously. A proper learning environment is one in which students feel safe to share their thoughts, experiences, or questions. Therefore, I have always treated my students with dignity, respect, and fairness. I do not play favorites, and I *never* belittle my students. I know that it is a bit daunting to raise your hand and share your personal experiences in class. As such, I hold *all* my students in high esteem, regardless of how well they perform in my classes, and I try my best to communicate this to them through both my words and my actions.

- **To grade objectively, consistently, and to return grades in a timely manner**
  - Again, I do not play favorites. In an attempt to keep marking from being subjective, all written materials are marked using a rubric (grading scheme) which is applied fairly and consistently to all students. The grading time may vary with time of year and the type of assignment. However, you will always have your assignment grades returned in as timely a manner as possible.

- **To be genuinely concerned about and interested in student learning and performance, and to be sensitive to student needs or concerns**
  - I always want my students to succeed. I do not provide "easy bonus marks" but I will readily try to help any student with *any* aspect of the course that they are struggling to understand. If special circumstances arise that might adversely affect your course performance, please let me know as soon as possible. I can't help if I don't know about it.

- **To understand and abide by the procedures and regulations outlined in the syllabus**

Asking Questions During Class

Asking questions during lecture is an extremely important part of learning. I strongly encourage you to ask a question whenever you require clarification on an issue, or have an observation to make yourself. Sometimes, though, we may have so many questions or comments on a particular topic that I will need to limit the amount of time we spend on that topic, so that we can cover the required material. If this is the case, please make sure to add your question to the class discussion board (preferred) or send an email.

Note: Routine questions such as "Where is the exam?" or "What chapters are covered for the midterm?" (and so on) may already be addressed on the course website and are listed in the tentative Lecture Schedule.

Assessment Methods

Exam 1 (27.5%)   **October 3rd, 2023**
Covers all class material up to and including Sept 28 (approx. topics 1-3)
40 points, multiple choice and short answer questions

Exam 2 (27.5%)   **November 9th, 2023**

Covers all class material from Oct 3 – Nov 8 (approx. topics 4-7)
40 points, multiple choice and short answer questions

Exam 3 (15%)   **December 5th, 2023**
Covers all class material from November 9 – Dec 1 (approx. topics 8-9)
25 points, multiple choice and short answer questions

Laboratory Assignments (30%)
Several lab assignments will be due during the course of the semester.
For more information on the topics, due dates, and more, please see below
==*Students must achieve a passing grade in both the class and lab components to pass this course.*==

Extra Information about Exams:

Exams in this course are closed-book. The use of resources, including class notes, the textbook, study aids, online resources, and calculators is prohibited during the exams in this course. Similarly, the use of computers, iPads, phones, graphing calculators, or any other programmable technology is NOT permitted during the exams.

Students may not communicate with others about course material or the exam either in person or electronically during the exams.

Extra Information about Lab Assignments:

Lab assignments will be handed in online using the D2L dropbox. For most of the labs, the due date is on the day of your lab section, at 11:59 p.m. Please see the listing of lab topics OR lecture schedule (both are below) for more detail about lab due dates.

All students will be given two free "late pass" which will allow you to hand in your assignment up to 3 total days beyond the due date (no questions asked). The late pass CANNOT be split across multiple assignments (e.g. 1 day late on 3 different assignments). Late passes cannot be combined for a single assignment (e.g. 6 days late for one assignment). Late passes are also non-transferrable (i.e. you cannot "gift" them to someone else).

Without instructor approval, any *other* late assignments (i.e. after the passes have been used) will receive a penalty of 20% per day late (including weekend days), up to a maximum of 4 days late. After this time, the assignment will receive a grade of 0.

There are 8 lab assignments over the course of the semester. When calculating your final grade, of which assignments are worth 30%, **the 8 assignments will count equally toward the 30% component (i.e. 3.75% per lab).**

Lab Topics:
    Note: Dates for labs, and due dates for the lab assignments may be found below, included in the Lecture Schedule.

        Lab 1: Refresher on SPSS, Critical Thinking, Defining Variables – due Sept 19/20
        Lab 2: Experimental and Non-Experimental Research Methods – due Sept 26/27
        Lab 3: T-tests, Effect Sizes, and Power Analysis – due Oct 10/11
        Lab 4: Oneway and Factorial ANOVA – due Oct 24/25

Lab 5: Post-hoc Contrasts in Oneway and Factorial Designs – due Oct 31/Nov 1
Lab 6: Planned & Complex Contrasts in Oneway and Factorial Designs – due Nov 7/8
Lab 7: Within-Subjects ANOVA (and contrasts) – due Nov 21/22
Lab 8: Correlations and (Semi-)Partial Correlations – Nov 28/29
Lab 9: Simple and Multiple Regression – *no assignment due*

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

Tentative Lecture Schedule
Below is a tentative schedule for the lecture topics. However, this schedule is just a general guideline. Some topics may require more/less time, depending on many factors, such as class questions. The due date for lab assignments is, as stated above, typically on the day of your lab section, at 11:59 p.m.

Date	Topic	Lab Topic	Assignment
T Sept 5	*University Lectures Begin* Review: Critical Thinking, Defining and Measuring Variables	*No lab*	
R Sept 7	Review: Correlations		
T Sept 12	Review: Experimental Methods	Lab 1: Refresher on SPSS, Critical Thinking, and Defining Variables	
R Sept 14	Reliability & Validity, T-tests, Cohen's d *Last day to drop a course without penalty*		
F Sept 15	*Last day to add or swap a course* .		

T Sept 19	T-test & Cohen's d
	Hypothesis Testing
	  ▪ Type I and Type II Error rates
	  ▪ Power Analysis
		Lab 2: Non-experimental Research Methods	Lab Assignment 1 due

R Sept 21	Hypothesis Testing, Replication Crisis:
	  ▪ Problems with NHST
	  ▪ P-hacking
	  ▪ HARKing
	  ▪ Solutions		

F Sept 22	*Fee Payment Deadline for Winter Term full and half courses*		
T Sept 26	Replication Crisis (cont'd)	Lab 3: T-tests, Effect Sizes, Power Analysis	Lab Assignment 2 due
R Sept 28	Between-Subjects One-way & Factorial ANOVA		
S Sept 30	**UNIVERSITY CLOSED. National Day for Truth and Reconciliation.**		
T Oct 3	**EXAM 1**	**27.5%**	**Topics 1-3**

R Oct 5	Between-Subjects One-way & Factorial ANOVA (cont'd)		
M Oct 9	**UNIVERSITY CLOSED. Thanksgiving Day.**		
T Oct 10	Between-Subjects One-way & Factorial ANOVA (cont'd)	*No labs (Thanksgiving)*	**Lab Assignment 3 due**
R Oct 12			
T Oct 17	Planned & Post-Hoc Contrasts (Between-Subj)	Lab 4: One-way and Factorial ANOVA	
R Oct 19	▪ Orthogonality ▪ Built-in Contrasts (SPSS) ▪ Polynomial Contrasts		
T Oct 24	▪ Custom Contrasts ▪ Effect Sizes of Contrasts	Lab 5: Post-hoc Contrasts in One-way and Factorial ANOVA	**Lab Assignment 4 due**
R Oct 26	Custom Contrasts for Factorial Designs		
T Oct 31		Lab 6: Planned Contrasts in One-way and Factorial ANOVA	**Lab Assignment 5 due**
R Nov 2	Within-Subjects ANOVA & Contrasts		
T Nov 7	Correlations (review)	Lab 7: Within-Subjects ANOVA (and contrasts)	**Lab Assignment 6 due**
R Nov 9	**EXAM 2**	**27.5%**	**Topics 4-7**
S Nov 11	**UNIVERSITY CLOSED. Remembrance Day (Observed Monday, Nov 13)**		
Nov 12-18	**Term Break. No Classes.**		
T Nov 21	Correlations (cont'd) ▪ Biserial & Point Biserial ▪ Partial & Semi-Partial	Lab 8: Correlations and (Semi-)Partial Correlations	**Lab Assignment 7 due**
R Nov 23			
T Nov 28	Regression ▪ Simple Regression ▪ Multiple Regression	Lab 9: Simple and Multiple Regression	**Lab Assignment 8 due**
R Nov 30			
T Dec 5	**EXAM 3**	**15%**	**Topics 8-9**
W Dec 6	*Last day to withdraw with permission from Fall Term half courses.*		
Dec 9-20	*Fall Final Exam Period*		

Extra Research Participation Course Credit is Not Offered for 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 the 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, September 14th, 2023**. Last day add/swap a course is **Friday, September 15th, 2023**. The last day to withdraw from this course is **Wednesday, December 6th, 2023**.