

ADVANCED DATA ANALYSIS WINTER 2023

PSYCH 391

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CLASS SCHEDULE

Section	Location	Time	Instructor(s)
PSYCH 391 001 [LEC]	ML 354	Mondays & Wednesdays 2:30 p.m. - 4:20 p.m.	James Beck james.beck@uwaterloo.ca
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INSTRUCTOR / TA INFORMATION

Instructor: James Beck

Office: PAS 4028

Office Hours: T/Th, 10:00-11:00 AM via Teams

Email: james.beck@uwaterloo.ca

TA: Alex Milovanov

Office Hours: Tuesday, 10:00-11:00 AM via Teams

Email: alex.milovanov@uwaterloo.ca

COURSE DESCRIPTION

Calendar Description for PSYCH 391

Aimed at developing an understanding of the use and interpretation of statistics in complex research designs, this course emphasizes analysis of variance and multiple comparison techniques to interpret the results of multi-factor experiments. The importance of power in factorial designs is discussed. The course includes a computer component that ties the use of a statistical package to the topics discussed in lectures. [Offered: F, W]

Prereq: PSYCH 291, 292; Level at least 3A Honours Psychology or Make-up Psychology; Psychology average at least 74%. Antireq: STAT 322, 332, 430

This course builds from the material covered in Psychology 292. Topics that will be covered include: t-tests, power, ANOVA, factorial ANOVA, repeated measures and mixed designs, and multiple comparisons associated with those

designs.

The primary goal of the course is to provide students with a solid understanding of both the logic and computations underlying many of the statistical procedures that psychologists use when analyzing data collected from experiments. An additional goal for this course is that students will learn to perform these statistical analyses using SPSS.

LEARNING OUTCOMES

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

Understand sampling error and its effects on inferences that can be drawn from data
Identify appropriate statistical procedures for a given research question/design
Conduct various statistical tests (e.g., Ttests, ANOVA, Regression)
Interpret and report empirical results

TENTATIVE COURSE SCHEDULE

Date	Topic	Reading/Assignment
09-Jan	Course introduction	
11-Jan	Review of basics	H1, H2, H4, H5, H6, H8
13-Jan	No lab	
16-Jan	Hypothesis testing	H12, H13, H14
18-Jan	T-tests	H12, H13, H14
20-Jan	Lab 1 - T-tests	
23-Jan	Power, effect sizes	H15
25-Jan	ANOVA	H16
27-Jan	Lab 2 - One way ANOVA	
30-Jan	ANOVA	H16
01-Feb	Review day	
03-Feb	No lab	
06-Feb	Midterm Exam 1	Homework 1 due
08-Feb	Post hoc comparisons	H16, Sup 1
10-Feb	Lab 3 - Post hoc tests	
13-Feb	Post hoc comparisons	H16, Sup 1
15-Feb	Planned comparisons	H16, Sup 1

17-Feb	Lab 4 - Linear contrasts	
20-Feb	Reading Week	
22-Feb		
24-Feb		
27-Feb	Planned comparisons	H16, Sup 1
01-Mar	Factorial ANOVA	H17
03-Mar	Lab 5 - Factorial ANOVA	
06-Mar	Factorial ANOVA	H17
08-Mar	Review day	
10-Mar	No lab	
13-Mar	Midterm Exam 2	Homework 2 due
15-Mar	Repeated measures	H18, Sup 2
17-Mar	Lab 6 - Repeated Measures	
20-Mar	Repeated measures	H18, Sup 2
22-Mar	Mixed designs	Sup 2
24-Mar	Lab 7 - Mixed ANOVA	
27-Mar	Mixed designs	Sup 2
29-Mar	Correlation and regression	H10, H11
31-Mar	Lab 8 - Correlation and regression	
03-Apr	Review day	
05-Apr	Midterm Exam 3	Homework 3 due

TEXTS / MATERIALS

Title / Name	Notes / Comments	Required
Howell, D. C. (2014). Fundamental statistics for the behavioral sciences.	Any edition is acceptable. Not required	No

There will also be supplemental readings listed on LEARN. H = Howell on the schedule.

STUDENT ASSESSMENT

Component	Value
Homework 1	5
Homework 2	8
Homework 3	12
Midterm Exam 1	25
Midterm Exam 2	25
Midterm Exam 3	25

The ongoing COVID-19 pandemic may make it difficult or impossible to attend class in person this term. In the event that classes are canceled for any period of time, students will be expected to review class lecture videos that will be posted on Learn. If class is canceled for a short-period of time (e.g., 1 week) there will likely be no change to the exam format -- they will continue to be in-person. If the canceled classes correspond to an exam, the exam will be rescheduled. In the event of a longer period of canceled in-person classes (e.g., more than one week), the midterms may be replaced by weekly quizzes. The quizzes will be completed online via Qualtrics.

If a student is required to miss class, either due to illness or the need to self-isolate, they are responsible for downloading the detailed slides from Learn. Students may also wish to contact fellow classmates for lecture notes. In the event of a missed exam, the student is responsible for contacting the instructor as soon as possible and for scheduling a make-up exam with the TA.

LATE WORK

In general I do not accept late work. Under certain circumstances exceptions can be made. Contact instructor within 48 hours. Whenever possible, contact should be made before the deadline has passed.

ASSIGNMENT SCREENING

No assignment screening will be used in this course.

ADMINISTRATIVE POLICY

ACADEMIC FREEDOM AT THE UNIVERSITY OF WATERLOO

[Policy 33, Ethical Behaviour](https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-33) (<https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-33>) states, as one of its general principles (Section 1), “The University supports academic freedom for all members of the University community. Academic freedom carries with it the duty to use that freedom in a manner consistent with the scholarly

obligation to base teaching and research on an honest and ethical quest for knowledge. In the context of this policy, 'academic freedom' refers to academic activities, including teaching and scholarship, as is articulated in the principles set out in the Memorandum of Agreement between the FAUW and the University of Waterloo, 1998 (Article 6). The academic environment which fosters free debate may from time to time include the presentation or discussion of unpopular opinions or controversial material. Such material shall be dealt with as openly, respectfully and sensitively as possible." This definition is repeated in Policies 70 and 71, and in the Memorandum of Agreement, Section 6

CHOSEN/PREFERRED FIRST NAME

Do you want professors and interviewers to call you by a different first name? Take a minute now to verify or tell us your chosen/preferred first name by logging into [WatIAM](https://idm.uwaterloo.ca/watiam/) (<https://idm.uwaterloo.ca/watiam/>) .

Why? Starting in winter 2020, your chosen/preferred first name listed in WatIAM will be used broadly across campus (e.g., LEARN, Quest, WaterlooWorks, WatCard, etc). Note: Your legal first name will always be used on certain official documents. For more details, visit [Updating Personal Information](https://uwaterloo.ca/the-centre/updating-personal-information) (<https://uwaterloo.ca/the-centre/updating-personal-information>) .

Important notes

- If you included a preferred name on your OUAC application, it will be used as your chosen/preferred name unless you make a change now.
- If you don't provide a chosen/preferred name, your legal first name will continue to be used.

INTELLECTUAL PROPERTY

Students should be aware that this course contains the intellectual property of their instructor, TA, and/or the University of Waterloo.

Intellectual property includes items such as:

- Lecture content, spoken and written (and any audio/video recording thereof);
- Lecture handouts, presentations, and other materials prepared for the course (e.g., PowerPoint slides);
- Questions or solution sets from various types of assessments (e.g., assignments, quizzes, tests, final exams); and
- Work protected by copyright (e.g., any work authored by the instructor or TA or used by the instructor or TA with permission of the copyright owner).

Course materials and the intellectual property contained therein, are used to enhance a student's educational experience. However, sharing this intellectual property without the intellectual property owner's permission is a violation of intellectual property rights. For this reason, it is necessary to ask the instructor, TA and/or the University of Waterloo for permission before uploading and sharing the intellectual property of others online (e.g., to an online repository).

Permission from an instructor, TA or the University is also necessary before sharing the intellectual property of others from completed courses with students taking the same/similar courses in subsequent terms/years. In many cases, instructors might be happy to allow distribution of certain materials. However, doing so without expressed permission is considered a violation of intellectual property rights.

Please alert the instructor if you become aware of intellectual property belonging to others (past or present) circulating, either through the student body or online. The intellectual property rights owner deserves to know (and may have already given their consent).

MENTAL HEALTH SUPPORT

All of us need a support system. The faculty and staff in Arts encourage students to seek out mental health support if they are needed.

On Campus

Due to COVID-19 and campus closures, services are available only online or by phone.

- Counselling Services: counselling.services@uwaterloo.ca (mailto:counselling.services@uwaterloo.ca) / 519-888-4567 ext. 32655
- [MATES](https://wusa.ca/services/uw-mates) (https://wusa.ca/services/uw-mates) : one-to-one peer support program offered by the Waterloo Undergraduate Student Association (WUSA) and Counselling Services

Off campus, 24/7

- [Good2Talk](https://good2talk.ca/) (https://good2talk.ca/) : Free confidential help line for post-secondary students. Phone: 1-866-925-5454
- Grand River Hospital: Emergency care for mental health crisis. Phone: 519-749-4300 ext. 6880
- [Here 24/7](https://here247.ca/) (https://here247.ca/) : Mental Health and Crisis Service Team. Phone: 1-844-437-3247
- [OK2BME](https://ok2bme.ca/) (https://ok2bme.ca/) : set of support services for lesbian, gay, bisexual, transgender or questioning teens in Waterloo. Phone: 519-884-0000 extension 213

Full details can be found online on the Faculty of Arts [website](https://uwaterloo.ca/arts/get-mental-health-support-when-you-need-it) (https://uwaterloo.ca/arts/get-mental-health-support-when-you-need-it)

Download [UWaterloo and regional mental health resources \(PDF\)](#)

(https://uwaterloo.ca/arts/sites/ca.arts/files/uploads/files/counselling_services_overview_002.pdf)

Download the [WatSafe app](https://uwaterloo.ca/watsafe/) (https://uwaterloo.ca/watsafe/) to your phone to quickly access mental health support information.

Sona Participation and Research Experience Marks Information and Guidelines

Experiential learning is considered an integral part of the undergraduate program in Psychology. Research participation is one example of this, article review is another. A number of undergraduate courses have been expanded to include opportunities for Psychology students to earn grades while gaining research experience.

Since experiential learning is highly valued in the Department of Psychology, students may earn a **"bonus" grade of up to 3%** in this course through research experience. Course work will make up 100% of the final mark and a "bonus" of up to 3% may be earned and will be added to the final grade if/as needed to bring your final grade up to 100%.

The two options for earning research experience grades; participation in research through online remotely operated and In Lab studies, as well as article review; are described below. Students may complete any combination of these options to earn research experience grades. For Winter 2023, credits will be permitted to be earned with half from online, and the other half (1.5) from In-lab or Remote Access studies

Option 1: Participation in Psychology Research

Research participation is coordinated by the Research Experiences Group (REG). Psychology students may volunteer as research participants in remotely operated, In Lab and/or online (web-based) studies conducted by students and faculty in the Department of Psychology. Participation enables students to learn first-hand about psychology research and related concepts. Many students report that participation in research is both an educational and interesting

experience. Please be assured that all Psychology studies have been reviewed and received ethics clearance through a University of Waterloo Research Ethics Board.

How to earn extra marks for your Psychology course(s) this term by participating in studies ...

- You will earn "credits" which will be converted to "marks" (1 credit = 1%)
- You can schedule your studies using the "Sona" website.

Educational focus of participation in research

To maximize the educational benefits of participating in research, students will receive feedback information following their participation in each study detailing the following elements:

- Purpose or objectives of the study
- Dependent and independent variables
- Expected results
- References for at least two related research articles
- Provisions to ensure confidentiality of data
- Contact information of the researcher should the student have further questions about the study
- Contact information for the Director of the Office of Research Ethics should the student wish to learn more about the general ethical issues surrounding research with human participants, or specific questions or concerns about the study in which s/he participated.

Participation in remotely operated (counts as the same as in-lab) studies has increment values of 0.5 participation credits (grade percentage points) for each 30-minutes of participation. Participation in ONLINE studies is worth .25 credits for each 15-minutes of participation. Researchers will record student's participation and at the end of the term the REG Coordinator will provide the course instructor with a credit report of the total credits earned by each student.

How to participate?

Study scheduling, participation and grade assignment is managed using the SONA online system. All students enrolled in this course have been set up with a SONA account. You must get started early in the term.

For instructions on how to log in to your SONA account and for a list of important dates and deadlines please, as soon as possible, go to:

Participating/SONA information: [How to log in to Sona and sign up for studies](https://uwaterloo.ca/research-experiences-group/welcome-research-experiences-group-and-sona/sona-information) (https://uwaterloo.ca/research-experiences-group/welcome-research-experiences-group-and-sona/sona-information)

***** Please do not ask the Course Instructor or REG Coordinator for information unless you have first thoroughly read the information provided on this website.*****

More information about the REG program in general is available at:

[Sona Information on the REG Participants website](https://uwaterloo.ca/research-experiences-group/welcome-research-experiences-group-and-sona/sona-information) (https://uwaterloo.ca/research-experiences-group/welcome-research-experiences-group-and-sona/sona-information) or you can check the [Sona FAQ on the REG website homepage](https://uwaterloo.ca/research-experiences-group/sites/ca.research-experiences-group/files/uploads/files/sona_faq_for_fall_2019.pdf) (https://uwaterloo.ca/research-experiences-group/sites/ca.research-experiences-group/files/uploads/files/sona_faq_for_fall_2019.pdf) for additional information.

Option 2: Article Review as an alternative to participation in research

Students are not required to participate in research, and not all students wish to do so. As an alternative, students may opt to gain research experience by writing short reviews (1½ to 2 pages) of research articles relevant to the course. The course instructor will specify a suitable source of articles for this course (i.e., scientific journals, newspapers, magazines, other printed media). *You must contact your TA to get approval for the article you have chosen before*

writing the review. Each review article counts as one percentage point. To receive credit, you must follow specific guidelines. The article review must:

- **Be submitted before the last day of lectures** (<http://www.quest.uwaterloo.ca/undergraduate/dates.html>) . **Late submissions will NOT be accepted under ANY circumstances.**
- Be typed
- Fully identify the title, author(s), source and date of the article. A copy of the article must be attached.
- Identify the psychological concepts in the article and indicate the pages in the textbook that are applicable. Critically evaluate the application or treatment of those concepts in the article. If inappropriate or incorrect, identify the error and its implications for the validity of the article. You may find, for example, misleading headings, faulty research procedures, alternative explanations that are ignored, failures to distinguish factual findings from opinions, faulty statements of cause-effect relations, errors in reasoning, etc. Provide examples whenever possible.
- Clearly evaluate the application or treatment of those concepts in the article.
- Keep a copy of your review in the unlikely event we misplace the original.

UNIVERSITY POLICY

Academic integrity: In order to maintain a culture of academic integrity, members of the University of Waterloo community are expected to promote honesty, trust, fairness, respect and responsibility. [Check [the Office of Academic Integrity](https://uwaterloo.ca/academic-integrity/) (<https://uwaterloo.ca/academic-integrity/>) for more information.]

Grievance: A student who believes that a decision affecting some aspect of their university life has been unfair or unreasonable may have grounds for initiating a grievance. Read [Policy 70, Student Petitions and Grievances, Section 4](https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-70) (<https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-70>) . When in doubt, please be certain to contact the department’s administrative assistant who will provide further assistance.

Discipline: A student is expected to know what constitutes academic integrity to avoid committing an academic offence, and to take responsibility for their actions. [Check [the Office of Academic Integrity](https://uwaterloo.ca/academic-integrity/) (<https://uwaterloo.ca/academic-integrity/>) for more information.] A student who is unsure whether an action constitutes an offence, or who needs help in learning how to avoid offences (e.g., plagiarism, cheating) or about “rules” for group work/collaboration should seek guidance from the course instructor, academic advisor, or the undergraduate associate dean. For information on categories of offences and types of penalties, students should refer to [Policy 71, Student Discipline](https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-71) (<https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-71>) . For typical penalties, check [Guidelines for the Assessment of Penalties](https://uwaterloo.ca/secretariat/guidelines/guidelines-assessment-penalties) (<https://uwaterloo.ca/secretariat/guidelines/guidelines-assessment-penalties>) .

Appeals: A decision made or penalty imposed under [Policy 70, Student Petitions and Grievances](https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-70) (<https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-70>) (other than a petition) or [Policy 71, Student Discipline](https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-71) (<https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-71>) may be appealed if there is a ground. A student who believes they have a ground for an appeal should refer to [Policy 72, Student Appeals](https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-72) (<https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-72>) .

Note for students with disabilities: [AccessAbility Services](https://uwaterloo.ca/disability-services/) (<https://uwaterloo.ca/disability-services/>) , located in Needles Hall, Room 1401, collaborates with all academic departments to arrange appropriate accommodations for students with disabilities without compromising the academic integrity of the curriculum. If you require academic accommodations to lessen the impact of your disability, please register with AccessAbility Services at the beginning of each academic term.

Turnitin.com: Text matching software (Turnitin®) may be used to screen assignments in this course. Turnitin® is used to verify that all materials and sources in assignments are documented. Students' submissions are stored on a U.S. server, therefore students must be given an alternative (e.g., scaffolded assignment or annotated bibliography), if they are concerned about their privacy and/or security. Students will be given due notice, in the first week of the term and/or at the time assignment details are provided, about arrangements and alternatives for the use of Turnitin in this course.

It is the responsibility of the student to notify the instructor if they, in the first week of term or at the time assignment details are provided, wish to submit alternate assignment.