Advanced Statistical Inference (PSYC 301)

Required Text:

Field, A. (2018). *Discovering Statistics Using IBM SPSS Statistics* (5th Edition). Thousand Oaks, CA: Sage Publications.

Required Statistical Software (SPSS):

Statistical analyses in the course will be conducted using SPSS. SPSS is available to all Queen's students by logging into the Queen's Software Center. On this site, students can access SPSS 28 and the License Key. Students can go directly to the SPSS's info/download website with this direct link (NetID login required): https://queensuca.sharepoint.com/sites/software-centre/SitePages/SPSS.aspx

Turnitin Statement

This course makes use of Turnitin, a third-party application that helps maintain standards of excellence in academic integrity. Normally, students will be required to submit their course assignments through onQ to Turnitin. In doing so, students' work will be included as source documents in the Turnitin reference database, where they will be used solely for the purpose of detecting plagiarized text in this course. Data from submissions is also collected and analyzed by Turnitin for detecting Artificial Intelligence (AI)-generated text. These results are not reported to your instructor at this time but could be in the future.

Turnitin is a suite of tools that provide instructors with information about the authenticity of submitted work and facilitates the process of grading. The similarity report generated after an assignment file is submitted produces a similarity score for each assignment. A similarity score is the percentage of writing that is similar to content found on the internet or the Turnitin extensive database of content. Turnitin does not determine if an instance of plagiarism has occurred. Instead, it gives instructors the information they need to determine the authenticity of work as a part of a larger process.

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Course Objectives and Format:

This course is designed to provide students with an introduction to basic inferential statistics as they are used in psychology and related disciplines. Course lectures will provide students with a basic conceptual introduction to key statistical concepts in inferential statistics. Lectures will also provide a conceptual introduction to commonly used statistical procedures such as *t* Tests, One-Way ANOVA, Factorial ANOVA, correlation, and simple regression. Course labs will provide students with hands-on instruction in how to conduct statistical analyses using IBM SPSS Statistics.

Exams:

There will be two in-person exams. These exams will be a mixture of short answer, long answer, and essay questions. The midterm exam will include material covered in approximately the first half of the term. The final exam will cover material throughout the entire term, although a greater emphasis will be placed on material covered post-midterm. The final exam will be scheduled during the exam period at the end of the Fall term. The emphasis of exam questions will be on material covered in lecture, although some questions may be drawn exclusively from the text. The midterm will be weighted 34% of the total course mark and the final exam will be weighted 36% of the total course mark. It is expected that students will write both exams. If there is a valid medical reason or other important life circumstance that requires a student to miss the midterm exam, the general policy will be to proportionally prorate the midterm exam to the final exam and the remaining lab assignments. Exams are an essential component of the course and all students are required to complete at least one exam.

Labs Assignments:

Interspersed throughout the term will be 3 lab assignments. These lab assignments will focus on providing you with hands-on experience in conducting statistical analyses using SPSS. Lab assignments will be posted in onQ for download 9 days prior to their due date. Lab assignments will be submitted for marking in onQ. Each lab assignment will be weighted 10% of your total course mark. It is expected that students will complete all lab assignments. If there is a valid medical reason or other important life circumstance that requires a student to miss submitting an assignment, the general policy will be to proportionately prorate the lab assignment to the yet to be completed exams and the remaining lab assignments. If special accommodations permit the submission of a late assignment, the maximum possible extension will be limited by the date at which feedback on that assignment will be provided to the class (approximately two weeks after the original submission deadline). In other words, no submissions of assignments will be permitted after feedback on that assignment has been distributed to the class. It is course policy that answers on lab assignments submitted by students will be solely their own work and that students will not discuss the content of lab assignments with other people prior to submission of their work or with a student who has yet to submit the lab assignment. Any questions regarding lab assignments should be directed to the instructor or one of the course teaching assistants. All students will be assigned to lab sections. You will have a teaching assistant (TA) responsible for your lab section. This TA will hold a weekly in-person lab session and a weekly virtual office hour at which you can ask any questions you might have regarding a pending lab assignment. Virtual office hours will be hosted in Teams. This TA will also mark your lab assignments and provide you with feedback regarding your performance on the assignment. Lab assignments are an essential component of the course and all students are required to complete at least one lab assignment.

Weekly Instructor Office Hours:

The instructor will hold a weekly office hour session each week. The instructor will be in his office during this time. During that time, the instructor will answer any questions you might have regarding lecture material and the course more generally.

Grading: Midterm Exam (34%)
Lab Assignment 1 (10%)
Lab Assignment 2 (10%)
Lab Assignment 3 (10%)
Final Exam (36%)

All components of this course will receive numerical percentage marks. The final grade you receive for the course will be derived by converting your numerical course average to a letter grade according to Queens Official Grade Conversion Scale:

Queen's Official Grade Conversion Scale

Grade	Numerical Course Average (Range)
A+	90-100
A	85-89
A-	80-84
B+	77-79
B	73-76
B-	70-72
C+	67-69
C	63-66
C-	60-62
D+	57-59
D	53-56
D-	50-52
F	49 and below

Queen's Policy Statement on Academic Integrity

Queen's University is dedicated to creating a scholarly community free to explore a range of ideas, to build and advance knowledge, and to share the ideas and knowledge that emerge from a range of intellectual pursuits. Queen's students, faculty, administrators and staff therefore all have responsibilities for supporting and upholding the fundamental values of academic integrity. Academic integrity is constituted by the five core fundamental values of honesty, trust, fairness, respect and responsibility and by the quality of courage. These values and qualities are central to the building, nurturing and sustaining of an academic community in which all members of the community will thrive. Adherence to the values expressed through academic integrity forms a foundation for the "freedom of inquiry and exchange of ideas" essential to the intellectual life of the University.

The following statements from "The Fundamental Values of Academic Integrity" (2nd edition), developed by the International Center for Academic Integrity (ICAI), contextualize these values and qualities:

1. Honesty Academic communities of integrity advance the quest for truth and knowledge through intellectual and personal honesty in learning, teaching, research, and service.
2. Trust Academic communities of integrity both foster and rely upon climates of mutual trust. Climates of trust encourage and support the free exchange of ideas which in turn allows scholarly inquiry to reach its fullest potential.
3. Fairness Academic communities of integrity establish clear and transparent expectations, standards, and practices to support fairness in the interactions of students, faculty, and administrators.
4. Respect Academic communities of integrity value the interactive, cooperative, participatory nature of learning. They honor, value, and consider diverse opinions and ideas.
5. Responsibility Academic communities of integrity rest upon foundations of personal accountability coupled with the willingness of individuals and groups to lead by example, uphold mutually agreed-upon standards, and take action when they encounter wrongdoing.
6. Courage To develop and sustain communities of integrity, it takes more than simply believing in the fundamental values. Translating the values from talking points into action -- standing up for them in the face of pressure and adversity — requires determination, commitment, and courage.

Students are responsible for familiarizing themselves with and adhering to the Senate regulations concerning academic integrity, along with Faculty or School specific information. Departures from

academic integrity include, but are not limited to, plagiarism, use of unauthorized materials, facilitation, forgery and falsification. Actions which contravene the regulation on academic integrity carry sanctions that can range from a warning, to loss of grades on an assignment, to failure of a course, to requirement to withdraw from the university.

Accommodations for Disabilities

Queen's University is committed to working with students with disabilities to remove barriers to their academic goals. Queen's Student Accessibility Services (QSAS), students with disabilities, instructors, and faculty staff work together to provide and implement academic accommodations designed to allow students with disabilities equitable access to all course material (including in-class as well as exams). If you are a student currently experiencing barriers to your academics due to disability related reasons, and you would like to understand whether academic accommodations could support the removal of those barriers, please visit the QSAS website to learn more about academic accommodations or start the registration process with QSAS by clicking ***Access Ventus*** button at **Ventus | Accessibility Services | Queen's (queensu.ca)**

VENTUS is an online portal that connects students, instructors, Queen's Student Accessibility Services, the Exam's Office and other support services in the process to request, assess, and implement academic accommodations.

To learn more go to: https://www.queensu.ca/ventus-support/students/visual-guide-ventus-students

Academic Consideration for Students in Extenuating Circumstances

Academic Consideration is a process for the University community to provide a compassionate response to assist students experiencing unforeseen, short-term extenuating circumstances that may impact or impede a student's ability to complete their academics. This may include but is not limited to,

- Short term Physical or Mental Illness or Injury (stomach flu, anxiety/depression, mononucleosis, concussion, broken bones, surgery, medical treatments, etc.)
- Traumatic Event/Confidential (Bereavement, serious injury, illness or required treatment for a significant other/family member or a traumatic event such as divorce, sexual assault, social injustice, etc.)
- Requirements by Law or Public Health Authorities (court dates, jury duty, requirements to isolate, etc.)
- Significant Event (varsity athletic event, distinguished event, serving in the Reserve Forces, etc.)

Queen's University is committed to providing academic consideration to students experiencing extenuating circumstances. For more information, please see the Senate Policy on Academic Consideration for Students in Extenuating Circumstances.

Each Faculty has developed a protocol to provide a consistent and equitable approach in dealing with requests for academic consideration for students facing extenuating circumstances. For more information, undergraduate students in the Faculty of Arts and Sciences should consult the Faculty's webpage on Academic Consideration in Extenuating Circumstances and submit a request via the Academic Consideration Request Portal. Students in other Faculties and Schools who are enrolled in this course should refer to the protocol for their home Faculty.

Students are encouraged to submit requests as soon as the need becomes apparent and to contact their instructor and/or course coordinator as soon as possible once academic consideration has been granted.

Any delay in contact may limit the options available for academic consideration.
For more information on the Academic Consideration process, what is and is not an extenuating circumstance, and to submit an Academic Consideration request, please see the Faculty of Arts and Science's Academic Consideration website. ASO courses include links to information on Academic Consideration on your Course Homepage in onQ.

Please see the Teaching Team page for contact information for your instructor and TA(s), where relevant.

If you need to request academic consideration for this course, you will be required to provide the following name and email address to ensure it reaches our team accordingly:

Course Coordinator Name: Tara Karasewich
Course Coordinator email address: psyc.accom@queensu.ca

Students are encouraged to submit requests as soon as the need becomes apparent and to contact their Course Coordinator as soon as possible once Consideration has been verified. Any delay in contact may limit the Consideration options available.

Please follow up with Tara Karasewich using email (psyc.accom@queensu.ca) within 2 days of receiving verification of your Consideration request.

Timing of Final Examinations

Once the exam schedule has been finalized, the exam date will be posted on your SOLUS account. The exam dates for each term are listed on the Faculty of Arts and Science webpage under "Important Dates." Student exam schedules for the Fall Term are posted on SOLUS immediately prior to Thanksgiving and on the Friday before Reading Week for the Winter Term. Students should delay finalizing any travel plans until after the examination schedule has been posted. Exams will not be moved or deferred to accommodate employment, travel/holiday plans or flight reservations. For information regarding what is considered extenuating circumstances and qualifications for Academic Consideration, please visit the Faculty of Arts and Science's Academic Consideration webpage.

Copyright of Course Material

Course materials created by the course instructor, including all slides, presentations, handouts, tests, exams, and other similar course materials, are the intellectual property of the instructor. It is a departure from academic integrity to distribute, publicly post, sell or otherwise disseminate an instructor's course materials or to provide an instructor's course materials to anyone else for distribution, posting, sale or other means of dissemination, without the instructor's express consent. A student who engages in such conduct may be subject to penalty for a departure from academic integrity and may also face adverse legal consequences for infringement of intellectual property rights.

Course Outline

Dates	Topic	Readings
Week 1 (Sept. 5, 7)	**Course Overview** **Making Claims with Statistics** -Statistics as Principled Arguments -Using Inferential Statistics to Distinguish Among Claims -Systematic versus Chance Explanations -The Language and Limitations of Null Hypothesis Testing -The Quality of Statistical Evidence: MAGIC	Ch. 1-2
Week 2 (Sept. 12, 14)	**Elementary Arguments and the Role of Chance** -Random Sampling Processes as Explanation -Known Causes as Explanation for Departure from Randomness -The Independent Sample *t* Test -Setting Alpha: One-Tailed, Two-Tailed, and "Lopsided" Tests -Setting Beta: Power -The Repeated Measures *t* Test	Ch. 10
Week 3 (Sept. 19, 21)	**Elementary Arguments and the Role of Chance (continued)** -Random Sampling Processes as Explanation -Known Causes as Explanation for Departure from Randomness -The Independent Sample *t* Test -Setting Alpha: One-Tailed, Two-Tailed, and "Lopsided" Tests -Setting Beta: Power -The Repeated Measures *t* Test	Ch. 10
Week 4 (Sept. 26, 28)	**Magnitude of Effects** -Probability Measures: The *p* value and Bayesian Measures -Effect Sizes: Raw Effect Sizes and Standardized Effect Sizes -Interpreting Effect Sizes -Confidence Intervals **LAB 1 Due (October 1, 11:59 PM)**	Ch. 3
Week 5 (Oct. 3, 5)	**More Complex Hypotheses: Multiple Levels of IVs** -One-Way ANOVA (Between-Subjects) -Post-hoc comparisons and Family-Wise Error in ANOVA	Ch. 12, 15

	-Power and effect size in ANOVA -One-Way ANOVA (Repeated Measures) -Repeated Measures ANOVA post hoc comparisons, power, and effect sizes	
Fall Break (Oct. 9-13)	**No Class**	
Week 6 (Oct. 17, 19)	**More Complex Hypotheses: Multiple Levels of IVs (Continued)** -One-Way ANOVA (Between-Subjects) -Post-hoc comparisons and Family-Wise Error in ANOVA -Power and effect size in ANOVA -One-Way ANOVA (Repeated Measures) -Repeated Measures ANOVA post hoc comparisons, power, and effect sizes **Midterm Exam (October 19, locations to be announced)**	Ch. 12, 15
Week 7 (Oct. 24, 26)	**Considering Data "Fishiness"** -Assumptions of the independent samples *t* Test and the Between-Subjects ANOVA -Assumptions of the repeated measures *t* Test and the Repeated Measures ANOVA -Evaluating assumptions and responses to assumption violations -Related data considerations: scales of measurement and outliers	Ch. 6
Week 8 (Oct. 31, Nov. 2)	**More Complex Hypotheses: Two IVs** -The logic of multiple IVs -Interactions: Testing Moderation -The two-factor ANOVA (Between-Subjects) -Follow up comparisons in the two-factor ANOVA -Power and effect size in the two-factor ANOVA -Assumptions in the two-factor ANOVA **LAB 2 Due (November 5, 11:59 PM)**	Ch. 14
Week 9 (Nov. 7, 9)	**More Complex Hypotheses: Two IVs (Continued)** -The logic of multiple IVs -Interactions: Testing Moderation -The two-factor ANOVA (Between-Subjects) -Follow up comparisons in the two-factor ANOVA -Power and effect size in the two-factor ANOVA -Assumptions in the two-factor ANOVA	Ch. 14
Week 10 (Nov. 14, 16)	**Hypotheses with Continuous Variables: Correlation and Regression** -Characterizing relationships between continuous variables	Ch. 8, 9

	-The Pearson correlation coefficient -Understanding and interpreting correlations -Alternative measures of association -Simple regression and prediction -Standard error of estimate -Hypotheses for Regression -Standard and Unstandardized Solutions -Hypotheses for Regression	
Week 11 (Nov. 21, 23)	**Hypotheses with Continuous Variables: Correlation and Regression (Continued)** -Characterizing relationships between continuous variables -The Pearson correlation coefficient -Understanding and interpreting correlations -Alternative measures of association -Simple regression and prediction -Standard error of estimate **No Class (November 23)**	Ch. 8, 9
Week 12 (Nov. 28, 30)	**MAGIC: Further Considerations** -Articulation: Ticks and buts -Generality -Interestingness -Credibility -MAGIC considered in totality **LAB 3 Due (December 3, 11:59 PM)**	None

Final Exam (December 7-21)