Advanced Statistical Inference (PSYC 301)

Instructor: Dr. Leandre R. Fabrigar
Office: Craine 319
E-mail: fabrigar@queensu.ca
Phone: 613-533-6492

Class Times and Locations: Tuesday (11:30 AM - 12:15 PM): Convocation Hall
                                 Wednesday (10:00 AM - 11:15 AM): Kingston - Room 201
Office Hour: Tuesday (9:45 AM - 11:00 AM) or by Appointment

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 to 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 plagiarism.

Turnitin is a suite of tools that provide instructors with information about the authenticity of submitted work and facilitates the process of grading. Turnitin compares submitted files against its extensive database of content, and produces a similarity report and a similarity score for each assignment. A similarity score is the percentage of a document that is similar to content held within the database. 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.

Please read Turnitin's Privacy Pledge, Privacy Policy, and Terms of Service, which governs users' relationship with Turnitin. Also, please note that Turnitin uses cookies and other tracking technologies; however, in its service contract with Queen's Turnitin has agreed that neither Turnitin nor its third-party partners will use data collected through cookies or other tracking technologies for marketing or advertising purposes. For further information about how you can exercise control over cookies, see Turnitin's Privacy Policy.

Turnitin may provide other services that are not connected to the purpose for which Queen's University has engaged Turnitin. Your independent use of Turnitin's other services is subject solely to Turnitin's Terms of Service and Privacy Policy, and Queen's University has no liability for any independent interaction you choose to have with Turnitin.

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, but will also have Teams open for virtual discussion. During that time, the instructor will answer any questions you might have regarding lecture material and the course more generally.

Teaching Assistants, Lab Sections, and Lab Office Hours:

James Hillman (Head TA)
       Office Hour (Friday: 12:00 PM - 1:00 PM)
       Email: jh250@queensu.ca

Devin Fowlie
       Office Hour (Tuesday: 10:00 AM – 11:00 AM)
       Email: dif@queensu.ca
       Lab Section E (006) (Thursday: 11:30 AM – 2:30 PM)
       Lab Section F (007) (Thursday: 6:30 PM – 9:30 PM)

Krista Jones
       Office Hour (Wednesday: 9:00 AM – 10:00 AM)
       Email: kmj7@queensu.ca
       Lab Section A (002) (Wednesday: 6:30 PM – 9:30 PM)
       Lab Section G (008) (Friday: 2:30 PM – 5:30 PM)

Valentina Mihajlovic
       Office Hour (Thursday: 10:00 AM - 11:00 AM)
       Email: vm43@queensu.ca
       Lab Section B (003) (Thursday: 2:30 PM - 5:30 PM)

Carina Pham
       Office Hour (Tuesday: 1:30 PM - 2:30 PM)
       Email: cp136@queensu.ca
       Lab Section C (004) (Tuesday: 2:30 PM - 5:30 PM)
       Lab Section D (005) (Wednesday: 11:30 AM - 2:30 PM)

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

Statement on Academic Integrity:

Queen's students, faculty, administrators and staff all have responsibilities for upholding the fundamental values of academic integrity; honesty, trust, fairness, respect, responsibility and courage. These values 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 (see the Senate Report on Principles and Priorities).

Students are responsible for familiarizing themselves with the regulations concerning academic integrity and for ensuring that their assignments and their behaviour conform to the principles of academic integrity. Information on academic integrity is available in the Arts and Science Calendar (see Academic Regulation 1), on the Arts and Science website, and from the instructor of this course. Departures from academic integrity include plagiarism, use of unauthorized materials, facilitation, forgery and falsification, and are antithetical to the development of an academic community at Queen's. Given the seriousness of these matters, actions which contravene the regulation on academic integrity carry sanctions that can range from a warning or the loss of grades on an assignment to the failure of a course to a requirement to withdraw from the university.

Accommodations for Disabilities:

Queen's University is committed to achieving full accessibility for people with disabilities. Part of this commitment includes arranging academic accommodations for students with disabilities to ensure they have an equitable opportunity to participate in all their academic activities. The Senate Policy for Accommodations for Students with Disabilities was approved at Senate in November 2016. If you are a student with a disability and think you may need academic accommodations, you are strongly encouraged to contact the **Queen's Student Accessibility Services (QSAS)** and register as early as possible. For more information, including important deadlines, please visit the QSAS website.

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 health issues (e.g., stomach flu, pneumonia, COVID diagnosis, vaccination, etc.)
- Responses to traumatic events (e.g., Death of a loved one, divorce, sexual assault, social injustice, etc.)
- Requirements by law or public health authorities (e.g., court date, isolation due to COVID exposure, 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. Arts and Science undergraduate students can find the Faculty of Arts and Science protocol and the portal where a request can be submitted. Students in other Faculties and Schools who are enrolled in this course should refer to the protocol for their home Faculty.

For guidance on **submitting requests**, please see refer to the Resource Guides available on the Academic Consideration website under "Applying for Academic Consideration."
N.B: The COVID-19 pandemic is an evolving situation. If you have symptoms or are deemed a close contact of someone with COVID, please access our **COVID-Related Absence Reference Guide** on the Academic Consideration website. This guide will provide you with information on applying for consideration, the types of documentation (including non-medical documentation) you can use to support your request, as well as insight into how the Faculty office will assess these requests.

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.

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 our website.

Timing of Final Examinations:

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 via SOLUS immediately prior to the Thanksgiving holiday; for the Winter Term they are posted on the Friday before Reading Week, and for the Summer Term they are individually noted on the Arts and Science Online syllabi. **Students should delay finalizing any travel plans until <u>after</u> the examination schedule has been posted. Exams will**

<u>not</u> be moved or deferred to accommodate employment, travel/holiday plans or flight reservations.

Copyright of Course Materials

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 *<u>express consent.</u>* 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. 6, 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. 13, 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. 20, 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. 27, 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 2, 11:59 PM)**	Ch. 3

Week 5 (Oct. 4, 5)	**More Complex Hypotheses: Multiple Levels of IVs** -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	Ch. 12, 15
Fall Break (Oct. 10-14)	**No Class**	
Week 6 (Oct. 18, 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. 25, 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 (Nov. 1, 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 6, 11:59 PM)**	Ch. 14
Week 9 (Nov. 8, 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. 15, 16)	**Hypotheses with Continuous Variables: Correlation and Regression** -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 -Hypotheses for Regression -Standard and Unstandardized Solutions -Hypotheses for Regression	Ch. 8, 9
Week 11 (Nov. 22, 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. 29, 30)	**MAGIC: Further Considerations** -Articulation: Ticks and buts -Generality -Interestingness -Credibility -MAGIC considered in totality **LAB 3 Due (December 4, 11:59 PM)**	None

Final Exam (December 8-22)