Advanced Statistical Inference (PSYC 301)

Instructor: Dr. Leandre R. Fabrigar
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Class Times: Monday (10:00 AM - 11:15 AM), Wednesday (4:00 PM - 5:15 PM)
Class Location: Convocation Hall
Office Hour: Monday (12:00 PM - 1:15 PM) 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 26/27 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.

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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 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.

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 final exam 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. 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.

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

Valentina Mihajlovic
       Office Hour (Wednesday: 10:00 AM - 11:00 AM)
       Email: vm43@queensu.ca
       Lab Section A (002) (Friday: 2:30 PM - 5:30 PM)
       Lab Section F (007) (Tuesday: 11:30 AM - 2:30 PM)

Carina Pham
       Office Hour (Monday: 2:30 PM - 3:30 PM)
       Email: cp136@queensu.ca
       Lab Section D (005) (Monday: 11:30 AM - 2:30 PM)
       Lab Section E (006) (Tuesday: 2:30 PM - 5:30 PM)

Benjamin Streatch
       Office Hour (Tuesday: 6:00 PM - 7:00 PM)
       Email: brs3@queensu.ca
       Lab Section B (003) (Friday: 11:30 AM - 2:30 PM)

Kate Zucconi
       Office Hour (Thursday: 9:00 AM - 10:00 AM)
       Email: ketz@queensu.ca
       Lab Section C (004) (Friday: 8:30 AM - 11:30 AM)
       Lab Section G (008) (Tuesday: 8:30 AM - 11:30 AM)

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 Statement:

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 of their academic activities. The Senate Policy for Accommodations for Students with Disabilities was approved at Senate in November 2016 (see https://www.queensu.ca/secretariat/sites/webpublish.queensu.ca.uslcwww/files/files/policies/senateandtr ustees/ACADACCOMMPOLICY2016.pdf). 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 at: http://www.queensu.ca/studentwellness/accessibility-services/

Academic Considerations for Students in Extenuating Circumstances:

Queen's University is committed to providing academic consideration to students experiencing extenuating circumstances that are beyond their control and are interfering with their ability to complete academic requirements related to a course for a short period of time. The Senate Policy on Academic Consideration for Students in Extenuating Circumstances is available at
http://www.queensu.ca/secretariat/sites/webpublish.queensu.ca.uslcwww/files/files/policies/senateandtrustees/Academic%20Considerations%20for%20Extenuating%20Circumstances%20Policy%20Final.pdf

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 at: http://www.queensu.ca/artsci/accommodations Students in other Faculties and Schools who are enrolled in this course should refer to the protocol for their home Faculty.

If you need to request academic consideration for this course, you will be required to provide the name and email address of the instructor/coordinator. Please use the following:
Instructor/Coordinator Name: Leandre R. Fabrigar
Instructor/Coordinator email address: fabrigar@queensu.ca

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 *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

	Topic	Readings

Week 1:   **Course Overview**   Ch. 1-2
(Sept. 8)   **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

Week 2:   **Elementary Arguments and the Role of Chance**   Ch. 10
(Sept. 13, 15)   -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

Week 3:   **Elementary Arguments and the Role of Chance (continued)**   Ch. 10
(Sept. 20, 22)   -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

Week 4:   **Magnitude of Effects**
(Sept. 27, 29)   -Probability Measures: The p value and Bayesian Measures   Ch. 3
-Effect Sizes: Raw Effect Sizes and Standardized Effect Sizes
-Interpreting Effect Sizes
-Confidence Intervals
LAB 1 Due (October 3, 11:59 PM)

Week 5:   **More Complex Hypotheses: Multiple Levels of IVs**   Ch. 12, 15
(Oct. 4, 6)   -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

Thanksgiving/Fall Midterm Break (Oct. 11-17)

	Topic	Readings

Week 6: **More Complex Hypotheses: Multiple Levels of IVs (Continued)** Ch. 12, 15
(Oct. 18, 20) -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 20, locations to be announced)

Week 7: **Considering Data "Fishiness"** Ch. 6
(Oct. 25, 27) -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

Week 8: **More Complex Hypotheses: Two IVs** Ch. 14
(Nov. 1, 3) -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 7, 11:59 PM)

Week 9: **More Complex Hypotheses: Two IVs (Continued)** Ch. 14
(Nov. 8, 10) -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

Week 10: **Hypotheses with Continuous Variables: Correlation and** Ch. 8, 9
(Nov. 15, 17) **Regression**
-Characterizing relationships between continuos 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

	Topic	Readings

Week 11:   **Hypotheses with Continuous Variables: Correlation and**   Ch. 8, 9
(Nov. 22, 24)   **Regression (Continued)**
-Characterizing relationships between continuos variables
-The Pearson correlation coefficient
-Understanding and interpreting correlations
-Alternative measures of association
-Simple regression and prediction
-Standard error of estimate
No Class (November 24)

Week 12:   **MAGIC: Further Considerations**
(Nov. 29,   -Articulation: Ticks and buts
Dec. 1)   -Generality
-Interestingness
-Credibility
-MAGIC considered in totality
LAB 3 Due (December 5, 11:59 PM)

Final Exam (December 8-22)