

PSYC 301: Advanced Statistical Inference  
School of Kinesiology and Health Studies Room 100  
Thursdays 6:30 pm – 9:30 pm  
Fall 2018

**Course Instructor:** Jill A. Jacobson, Ph.D.

*Email:* [jill.jacobson@queensu.ca](mailto:jill.jacobson@queensu.ca)

*Office:* Craine 318

*Office Hours:* By appointment – Click on “Sample Service” at the link below to schedule a meeting  
<http://my.setmore.com/bookingpage/cdc11dc5-c12f-48a0-806e-751124e7b7b7>

**Head Teaching Assistant:** Mark Khei

*Email:* [z.khei@queensu.ca](mailto:z.khei@queensu.ca)

*Office:* Humphrey 219

*Office Hours:* By appointment

### Office Hours/Appointments

You should take advantage of the opportunity to meet with the instructor and the Head TA. You also should feel free to ask questions during class/lab and/or immediately before or after it. If you are having trouble understanding the course material, please see the instructor and/or TA well in advance the exams. We want you to do well and learn the material in this course, but we can do little to help you if you do not take the initiative. Waiting until the last minute will not be a wise strategy.

### Teaching Assistants

The TAs lead the tutorials and grade the in-lab quizzes and lab assignments. They do not grade the exams. The TAs will be available for the full three hours of their scheduled lab time. Thus they are not required to hold any additional office hours, and you are strongly encouraged to take advantage of their availability during the lab times. Your TA is unlikely to monitor the onQ discussion board, but the Head TA and instructor will be able to answer questions about the lab material. The TAs want to help you, but bear in mind that the volume of emails generated even by one lab section in this course can be enormous. So please use email conscientiously and sparingly. Unnecessary inquiries limit your TA’s ability to respond to important emails. If you do have questions or need to meet with your TA, please contact him or her well in advance. If you wait until the last minute, you have no guarantee that your TA will have the opportunity to read your email and/or be able meet with you in time.

Section	Day	Time	TA	Email Address
002	Monday	11:30 am - 2:30 pm	Mark Khei	<a href="mailto:z.khei@queensu.ca">z.khei@queensu.ca</a>
008	Tuesday	8:30 am - 11:30 am	Andrew Nguyen	<a href="mailto:12aan3@queensu.ca">12aan3@queensu.ca</a>
006	Tuesday	11:30 am - 2:30 pm	Andrew Nguyen	<a href="mailto:12aan3@queensu.ca">12aan3@queensu.ca</a>
009	Tuesday	6:30 pm - 9:30 pm	Matt Kan	<a href="mailto:8mphk@queensu.ca">8mphk@queensu.ca</a>
005	Wednesday	8:30 am - 11:30 am	Suhui Yap	<a href="mailto:12sy30@queensu.ca">12sy30@queensu.ca</a>
004	Wednesday	11:30 am - 2:30 pm	Suhui Yap	<a href="mailto:12sy30@queensu.ca">12sy30@queensu.ca</a>
003	Wednesday	2:30 pm - 5:30 pm	Matt Kan	<a href="mailto:8mphk@queensu.ca">8mphk@queensu.ca</a>

### Course Purpose

The primary purpose of this course is for you to become a better consumer of research. You will be expanding on the knowledge you gained in PSYC 202 (or equivalent course) and PSYC 203 to better understand statistical inference and make better judgments about what research you should and should not trust. You also will be developing marketable skills in programming and conducting statistical tests in R and translating statistical results into understandable language.

## Intended Student Learning Outcomes

To complete this course, students will demonstrate their ability to:

1. Evaluate the trustworthiness of the statistical inferences made in research reports
2. Identify research practices that make statistical inferences more or less reliable and valid
3. Program and work with data in R
4. Conduct statistical analyses in R
5. Interpret and communicate the results of statistical analyses

## Course Materials

### Copyright

The syllabus and course materials are designed for use as part of PSYC 301 at Queen's University and are the property of the instructor, Jill A. Jacobson, unless otherwise stated. The course materials by Jill A. Jacobson are licensed under a Creative Commons Attribution-NonCommercial 3.0 Unported License and may not be posted to commercial course material sites without permission. However, they may be used and adapted, with attribution, for noncommercial purposes. Third party copyrighted materials (such as book chapters and articles) either have been licensed for use in this course or fall under an exception or limitation in Canadian Copyright law. Copying the PSYC 301 course material for distribution (e.g., uploading material to a commercial third-party website) can lead to a violation of Copyright law. Find out more about copyright here: <http://library.queensu.ca/copyright>.

### Required Free Texts

Ismay, C., & Kim, A. Y. (2017). *Modern Dive: An Introduction to Statistical and Data Sciences via R*.

Available at <http://moderndive.com/>

Navarro, D. J. (2015). *Learning Statistics with R: A Tutorial for Psychology Students and Other Beginners*. Available at <http://compcogscisydney.org/learning-statistics-with-r/>.

Phillips, N. D. (2018). *YaRrr! The Pirate's Guide to R*. Text and videos available at <http://nathaniieldphillips.com/thepiratesguidetor/>

Wickham, H., & Grolemund, G. (2016). *R for Data Science*. Available at <http://r4ds.had.co.nz/>

### Required Free Software

R software for Windows or Mac OS. R Core Team (2013). *R: A language and environment for statistical computing*. R Foundation for Statistical Computing, Vienna, Austria. URL <http://www.R-project.org/>.

RStudio software for Windows or Mac OS. Studio Team (2015). *RStudio: Integrated Development for R*. RStudio, Inc., Boston, MA URL <http://www.rstudio.com/>.

### Required Subscriptions

This course requires the use of Top Hat ([www.tophat.com](http://www.tophat.com)) a classroom engagement tool that is designed to assess your understanding of course material in class. You will be able to check-in for attendance, engage in discussions and submit answers for participation grades to in-class questions using iPhone, Android smartphones and tablets, laptops, or through text message.

You can visit the Top Hat Overview (<https://success.tophat.com/s/article/Student-Top-Hat-Overview-and-Getting-Started-Guide>) within the Top Hat Success Center, which outlines how you will register for a Top Hat account, as well as providing a brief overview to get you up and running on the system.

In addition to allowing for immediate response to questions in class through your device, we will be using Top Hat with Top Hat Test to allow us to go paperless and run exams online from any personal or mobile device (e.g., laptop) in an online, secure testing environment. If you leave the browser during a test, you will be automatically locked out of the test. It is very important that you purchase your Top Hat subscription with Top Hat Test option as soon as possible at the beginning of this course so that there are no complications when it is time for the first test! An email invitation will be sent to you by email during Week 2.

Top Hat and Top Hat Test will require a paid subscription, and a full breakdown of all subscription options available can be found here: [www.tophat.com/pricing](http://www.tophat.com/pricing). Top Hat. The subscription options are \$36

per semester, \$38 per year, or \$85 for a four-year account. The app is available for computers, tablets, and/or smartphones.

Should you require assistance with Top Hat at any time, due to the fact that they require specific user information to troubleshoot these issues, please contact their Support Team directly by way of email (support@tophat.com), the in-app support button, or by calling 1-888-663-5491.

### ***Web Content***

Additional information for the course will be available on onQ including links to readings and videos and discussion forums for course questions. Because students' questions tend to be similar, **please post your queries in the appropriate onQ discussion board rather than emailing the Head TA or the instructor directly.** We will check the discussion boards regularly and will respond to your questions there. This way everyone in the class has access to the same information. If you do email questions that should have been posted on onQ, please see onQ for the reply. As in PSYC 100, the message boards are intended only as a forum for posting questions and discussing topics related to the PSYC 301 course material. Messages pertaining to inappropriate topics like mark changes, course complaints, or subjects unrelated to PSYC 301 content will be deleted, and if those messages are deemed harassing, abusive, or insulting, disciplinary action will be taken.

### ***Calculators***

No calculators will be needed for this course. All computations will be done in R.

### ***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.

**All written assignments in this course including the exams must be originally and individually written.** If you are uncertain about what constitutes plagiarism, please see the section below labeled *Academic Integrity*. All written assignments including the midterm and final exams must be submitted to Turnitin in electronic format (e.g., Word, PDF, etc.).

### ***Accessibility***

Queen's is committed to an inclusive campus community with accessible goods, services, and facilities that respect the dignity and independence of persons with disabilities. Materials for this course will be made available in an accessible format or with appropriate communication supports upon request.

### **Privacy Statement**

This course makes use of Top Hat for quizzing and attendance and Turnitin for lab assignments and exams. Be aware that by logging into Turnitin, you will be leaving onQ, and accessing Turnitin's website and program. Your independent use of these sites, beyond what is required for the course (for example, purchasing the company's products), is subject to each company's terms of use and privacy policy. You are encouraged to review these documents, using the links below, before using the sites.

- Top Hat - <https://tophat.com/legal/privacy-policy/>
- Turnitin - [http://turnitin.com/en\\_us/about-us/privacy](http://turnitin.com/en_us/about-us/privacy)

### **Grade Scheme**

LAB ASSIGNMENT TOTAL	Best 80% of lab assignments	30%
QUIZ TOTAL	Best 80% of quiz questions	15%
EXAM TOTAL	2 Exams (each = 25%)	50%
PARTICIPATION TOTAL	TopHat/attendance/etc.	<u>5%</u>
GRAND TOTAL		100%

### **Grading Method**

All components of this course will receive letter grades, which, for purposes of calculating your course average, will be translated into numerical equivalents using the Faculty of Arts and Science approved scale (see below). Your course average then will be converted to a final letter grade according to Queen's Official Grade Conversion Scale (see below).

#### ***Arts & Science Letter Grade Input Scheme and Official Grade Conversion Scale***

<b>Grade</b>	<b>Numerical Value for Calculation of Final Grade</b>	<b>Numerical Course Average (Range)</b>
A+	93	90-100
A	87	85-89
A-	82	80-84
B+	78	77-79
B	75	73-76
B-	72	70-72
C+	68	67-69
C	65	63-66
C-	62	60-62
D+	58	57-59
D	55	53-56
D-	52	50-52
F	48	49 and below

### **Late Policy**

Late assignments and exams will be penalized two letter grades per each day late (i.e., if you earn an A on the assignment/exam, your grade will be a B+ once the penalty is applied).

### **Statement of Academic Integrity**

Queen's students, faculty, administrators and staff 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 (see [www.academicintegrity.org](http://www.academicintegrity.org)) 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.

Students are responsible for familiarizing themselves with and adhering to the regulations concerning academic integrity. General information on academic integrity is available at Integrity@Queen's University, 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.

## Lectures

All lectures are held in KINE Room 100. No lectures will be held on October 25 due to Fall Break or on November 22 due to an advising session led by the UG Office. Lectures will focus on: 1) learning about statistical inference; and 2) weekly quizzes of the prior week's lecture material administered using the Top Hat app. Your final quiz grade, which is 15% of your final grade, will be based on the best 80% of the quiz questions. You must complete 80% of the quiz questions to pass this course (i.e., if you do not provide an answer for 80% of the quiz questions, you will receive a failing mark for the class regardless of your performance on the other components of the course).

## Laboratories

All labs are held in Humphrey Hall Room 219 and will begin during the 1<sup>st</sup> week of the term. No lab meetings will be held during the week of Thanksgiving (October 8-10). Laboratories will focus on: 1) learning to program in R via RStudio; 2) reviewing statistical techniques and conducting the tests in R; and 3) a weekly assignment to be uploaded to Turnitin at the end of the lab.

You are expected to attend your assigned laboratories for the full three hours and to participate in and complete all laboratory activities. If you cannot attend your regular lab one week, you may attend an alternate lab as a visitor *for that week only*. Please contact the TA whose lab you are visiting in advance to let him or her know that you will be attending and to ensure that space is available. Also, please let your regular TA know that you will be attending another lab for that week only.

**Lab assignments.** The weekly lab assignments will consist of exercises in R. These assignments will be completed during the lab, so your TA can assist you with any problems, and they must be submitted to Turnitin at the end of the lab. Lab assignments will receive letter grades, and late assignments will be penalized two letter grades per each day late (i.e., if you earn a B+, your grade will be a B- once the penalty is applied). Your final lab assignment grade, which is 30% of your final grade, will be based on the best 8 out of 10 assignments. You must complete a minimum of 8 assignments to pass this course (i.e., if you do not submit at least 8 lab assignments, you will receive a failing mark for the class regardless of your performance on the other components of the course).

## Exams

The midterm exam will be completed during your regular lab time during Week 7 (Oct. 22-24). The final exam will be a take-home test uploaded on onQ by 11:59 pm on Friday, December 7, 2018. Both exams will receive letter grades. Each exam will be worth 25% of your final grade. You are expected to write all exams as scheduled, and you must write all exams to pass this course (i.e., if you do not write an exam, you will receive a failing mark for the class regardless of your performance on the other components of the course). For more information, see the section *Exam Absence* below. The PSYC 301 exam dates will not be changed to accommodate conflicts with your other courses' schedules. Furthermore, exams will not be moved or deferred to accommodate employment, travel/holiday plans, or flight reservations. Late exams will be penalized two letter grades per each day late (i.e., if you earn an A on the exam, your grade will be a B+ once the penalty is applied).

**Exam absence.** Students who cannot write an exam during the December or April exam period due to a serious, extenuating circumstance (illness, death in the family) must follow the steps below to be eligible to write a deferred exam during the Psychology Department's *Make up Exam period* in January, April/May, and September.

1. Apply for academic consideration using the Faculty of Arts and Science Portal: <http://www.queensu.ca/artsci/accommodations>
2. As soon as possible, follow up with your instructor(s) either by email or in-person to discuss your academic consideration request
3. If your request for a deferred exam is approved, be available to write the makeup exam the Psychology Department's Make up Exam period in January, April/May or September, or receive '0' on the exam and fail this course. Also, note that you will not be able to enroll in PSYC 302 until you complete PSYC 301.
4. Complete and return the instructor-signed [Permission for an Incomplete Grade](#) (PDF, 256 KB) form (also available on the Arts and Science website) and return to the Undergraduate Office.

Students who do not write the make-up exam are advised to drop the course. If a student cannot write the make-up exam due to a serious extenuating circumstance for which they can provide new documentation, they will either be granted a second deferral by their instructor or be supported in their appeal to drop the course after the deadline although this decision rests with the Associate Dean (Studies).

**Travel during exams.** According to University regulations, students are expected to be available to write scheduled exams at any time during the official December and April examination periods as well as during any scheduled class times. Requests to write a make-up exam because of conflicting travel plans (e.g., flight bookings) or requests to miss an in-class exam due to other plans will NOT be considered except under extraordinary circumstances. Students are advised to wait until the final exam schedules are posted before making any travel arrangements.

**Accommodation after the fact.** Once a student has written an exam or submitted an assignment, they may not subsequently be granted accommodation such as being offered a second opportunity to write the exam or assignment or have it count for less than originally specified in the course syllabus (reweighted). Students who cannot perform to the best of their abilities due a serious, extenuating circumstance must inform their instructor **before** attempting an exam or completing a course to arrange appropriate accommodation. Appeals to change a grade after the fact must be made to the Associate Dean (Studies) and will be supported by the Department only in exceptional circumstances.

### **Academic Consideration 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, not to exceed three months. Students receiving academic consideration must meet all essential requirements of a course. The Senate Policy on Academic Consideration for Students in Extenuating Circumstances was approved at Senate in April, 2017 (see <http://www.queensu.ca/secretariat/sites/webpublish.queensu.ca.uslclwww/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 coordinator. Please use the following:

Coordinator Name: **Mark Khei**

Coordinator email address: **[z.khei@queensu.ca](mailto:z.khei@queensu.ca)**

### **Academic Consideration Request Portal ([ACRP](#))**

A period of 48 hours ([self-declaration](#))

More than 48 hours, up to 3 months ([supporting documentation required](#))

## **Accommodations Statement**

Queen's University is committed to achieving full accessibility for persons 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. If you are a student with a disability and think you may need accommodations, you are strongly encouraged to contact Student Wellness Services (SWS) and register as early as possible. For more information, including important deadlines, please visit the Student Wellness website at: <http://www.queensu.ca/studentwellness/accessibility-services/>

## **Student Code of Conduct**

As a Queen's student, you are bound by the [Student Code of Conduct](#). The code is the foundation for the university's non-academic misconduct (NAM) system, which provides a process for identifying and addressing misconduct within the Queen's community, encouraging informal resolution of grievances while taking into account the well-being of each student and the safety and well-being of the community.

PSYC 301 Course Outline 2018

Week	Lecture Date/Topic	Assigned Readings/Podcasts	Lab Dates/Topics
1	<u>September 6</u> Introduction Crisis in Science	LSR1 Why do we learn statistics? Simmons, J. P., Nelson, L. D., & Simonsohn, U. (2011). False-positive psychology: Undisclosed flexibility in data collection and analysis allows presenting anything as significant. <i>Psychological Science</i> , 22(11), 1359-1366. Lilienfeld & Waldman Ch 9	<u>September 10-12</u> Introduction R Basics LSR Ch 3 YAR Ch 2 & 4 Assignment 1 Due
2	<u>September 13</u> Crisis (continued)	LSR2 A brief introduction to research design Lilienfeld & Waldman Ch 11	<u>September 17-19</u> LSR5 Descriptive Statistics Assignment 2 Due
3	<u>September 20</u> NHST and $p$ values	LSR9 Introduction to probability LSR10 Estimating unknown quantities from a sample Chambers Ch 3	<u>September 24-26</u> LSR13 Comparing Two Means Assignment 3 Due
4	<u>September 27</u> Likelihood and Bayes	LSR11 Hypothesis testing LSR17 Bayesian statistics	<u>October 1-3</u> LSR14 Comparing Several Means Assignment 4 Due
5	<u>October 4</u> Multiple Comparisons and Error Control	Cramer, A. O., van Ravenzwaaij, D., Matzke, D., Steingroever, H., Wetzels, R., Grasman, R. P., ... & Wagenmakers, E. J. (2016). Hidden multiplicity in exploratory multiway ANOVA: Prevalence and remedies. <i>Psychonomic Bulletin &amp; Review</i> , 23(2), 640-647.	<u>October 8-10</u> Labs Cancelled – Thanksgiving
6	<u>October 11</u> Power	Lilienfeld & Waldman Ch 3	<u>October 15-17</u> LSR16 Factorial ANOVA Assignment 5 Due
7	<u>October 18</u> Sample Size Planning and Optional Stopping	Several links within this blog post that are worth reading to better understand power and sample size determination: <a href="https://pigeer.wordpress.com/2016/09/13/the-power-dialogues/">https://pigeer.wordpress.com/2016/09/13/the-power-dialogues/</a>	<u>October 22-24</u> Midterm Exam during labs
	<u>October 25</u> No lecture	Fall Break	--

8	November 1 Mediation and Moderation	Kline (2015) <a href="https://www.tandfonline.com/doi/pdf/10.1080/01973533.2015.1049349?needAccess=true">https://www.tandfonline.com/doi/pdf/10.1080/01973533.2015.1049349?needAccess=true</a>	<u>October 29-31</u> LSR15 Linear Regression Assignment 6 Due
9	November 8 Confidence Intervals, Effect Size, and Meta- Analysis	<a href="http://people.uncw.edu/galizio/PSY589/Cummings2014.pdf">http://people.uncw.edu/galizio/PSY589/Cummings2014.pdf</a>	<u>November 5-7</u> Multiple Regression and Mediation Assignment 7 Due
10	<u>November 15</u> Replication	Lilienfeld & Waldman Ch 6	<u>November 12-14</u> LSR12 Categorical Data Analysis Assignment 8 Due
11	<u>November 22</u> Lecture Cancelled	<i>Special Advising Session led by the UG Office</i>	<u>November 19-21</u> Advanced R Assignment 9 Due
12	<u>November 29</u> QRP Detection and Best Practices	<a href="http://curatescience.org/docs/lebeletal(2018,ampss)a-unified-framework-to-quantify-the-credibility-of-scientific-findings.pdf">http://curatescience.org/docs/lebeletal(2018,ampss)a-unified-framework-to-quantify-the-credibility-of-scientific-findings.pdf</a>	<u>November 26-28</u> YAR Ch 11-12 Assignment 10 Due
EXAM	December 7	Upload Final Exam to Turnitin via onQ by 11:59 pm	

*Note.* LSR = Learning Statistics with R