

PSYC*1010-02, Course Outline: Winter 2016

General Information

Course Title: Quantification in Psychology

Course Description:

The course is an introduction to statistical methods in research. There are two goals: 1) to make you a more knowledgeable audience for statistical information so that you will not be fooled when a faulty argument is made; 2) to provide you with the statistical tools you need to carry out your own empirical research. The course begins with descriptive statistics (techniques of summarizing or describing research findings) and progresses to inferential statistics (techniques for making predictions about populations based on findings from samples). Please note that is a challenging course that requires regular attendance at lectures and consistent hard work. However, if you master this material, not only will you be well set for later Psychology courses (many courses require that you know this information as a prerequisite), but you will acquire skills that you may find valuable in your later career. To do well in this course, it is essential that you keep up with the readings and homework or you will find yourself overwhelmed. Effective time management is critical. However, if you take a disciplined approach, if you do your readings, keep up with the homework, do the quizzes, and make sure to ask questions when you are struggling, you will find that the course is easier to manage.

This course is taught from a research methods perspective. Although there will be numerical calculations, a critical component of this course is gaining the ability to be able to describe and explain what it is you are doing – that is indicate how quantification and statistics fit into a more general process of learning about human nature using observation and reasoning. That means that one of the things you will be required to do is explain what the statistics do and why you might choose on statistic over another given the underlying research question. In every exam there will be “big picture” questions where you have to explain what you are doing and why in your own words, using simple (jargon-free) language and concrete examples of your own creation. Furthermore, part of the homework assignment will involve questions where you have to explain something, indicate what something means and why it is important. Consequently, there is more to this course than “number crunching”. You will also be developing important critical thinking skills (including the ability to analyze and evaluate an argument), and communication skills, including both writing skills and listening and note-taking skills.

Credit Weight: 0.5

Academic Department (or campus): Psychology University of Guelph campus

Semester Offering: Winter 2016**Class Schedule and Location:**

Schedule: Tuesday and Thursday, 4:00 – 5:20 pm.

Location: ROZH 103 (Rozanski Hall Room 103)

Instructor Information

Instructor Name: Lana Trick

Instructor Email: ltrick@uoguelph.ca

Office location: MacKinnon Building (new extension) Room 4003

Office hours: Tuesday, 1-3 pm, Wednesday, 12 - 2 pm or *by appointment

GTA Information

GTA Name: Oriana Vaccarino, Grace Ewles, Kelsea Beadman, Amanda Amaral, Paul Sheppard, Sulan Kith

GTA Emails: ovaccari@uoguelph.ca, gewles@uoguelph.ca, kbeadman@uoguelph.ca, aamaral@uoguelph.ca, pshepp01@uoguelph.ca, skith@uoguelph.ca

GTA office location and office hours: By appointment only

Course Content**Specific Learning Outcomes:**

Specific process and content outcomes for the course.

On successful completion of this course, you will be able to accomplish the following:

1. Describe the stages involved in scientific reasoning and specify the role and importance of quantification in the scientific method (the scientific reasoning process). Use an example of your own creation to help you explain how this process works.
2. Identify the weak points within scientific arguments (places where error can enter), and the places where an individual could lie or mislead using statistics or the graphical presentation of data.
3. Analyze a research question, identifying the relevant measured and manipulated variables and the scale of measurement for variables. Indicate whether the study is a true experiment, a quasi-experiment, or correlational design and describe the relative strengths and weaknesses of each type of design.

4. Identify the independent and dependent variables in true and quasi-experiments, being sure to report the measures in terms of how they are measured or manipulated (operational definitions). Identify the relevant variables in a correlational study, describing each variable in terms of how it is measured.
5. Describe the differences between descriptive and inferential statistics, indicating when each would be used. Determine the appropriate form of statistical analysis for simple experiments. This involves choosing the correct descriptive and inferential statistic.
6. Create and graph frequency information (frequency distributions). Calculate measures of central tendency (mean, median, mode) and variability (e.g., range, standard deviation, variance). Explain the meaning and importance of these measures, using jargon-free language and concrete examples of your own creation.
7. Interpret information that is presented in graphical format (graphs). Create graphs for frequency distributions, true and quasi-experiments, and correlational studies.
8. Explain what hypothesis testing is, indicating its purposes, the processes involved, and the places where error can enter into the process using jargon-free language and concrete examples of your own creation. Indicate the role of probability in hypothesis testing and inferential statistics. (Note: This involves knowing how to define probability and inferential statistics in your own words.)
9. Carry out hypothesis testing using z-tests, t-tests, and Pearson correlation. (This involves calculating the statistic as well as using the result in decisions). Calculate measures of effect size (e.g. Cohen's d , r^2). Indicate what statistical significance means and indicate how this is related to effect size and statistical power. (Note: This means you will have to be able to describe what each concept means in simple jargon-free language, using a concrete example of your own creation to explain what you mean).

These outcomes will be measured in exams, quizzes, and the design assignments. The homework will be used to help develop these skills.

Generic Process Objectives for the course.

In taking this course, students will develop the following general skills:

1. Critical thinking skills (analysis, evaluation of arguments)
2. Quantitative skills (calculations, interpreting the meaning of mathematical formulas, graphs)
3. Communication skills (written communication, explaining complex concepts in simple language, using diagrams and examples), listening skills (note-taking requires the ability to determine the important information on the fly and documenting it).

4. Time management

Lecture Content:

The table below lists the content of the lectures and the associated readings from the text. Notice that much of the material will be covered solely in lecture (I chose the text because the chapters were nice, brief, and to the point. The down side is that the coverage is too skimpy on some topics.) Please note that these dates are tentative. Although exam and quiz dates and deadlines will not change, it is possible that it may take more or less time to cover the various topics in a given year. In the event that we get off schedule, please see the class website (Courselink D2L) to see the readings required for a given exam.

Date	Content	Readings (Either from Geher and Hall text, "Straightforward Statistics " or Courselink website).	Homework/quizzes
<p>Jan. 12 -14* (Be sure to attend. There will be an assignment for you on the first day – an practice online quiz that you will need to complete to be prepared for the actual online quiz on January 14).</p> <p>You also need to get Top Hat Organized immediately. Tuesday, Jan 19 you will have your first Top Hat question.</p>	<p>Introduction to Statistics and Research Design (Scientific reasoning, goals of science)</p> <p>Identifying variables</p> <p>Samples and populations</p> <p>Random assignment vs. Random sampling</p>	<p>Math Review: Appendix A (Posted under the Content section on Courselink)</p>	<p>It is critical that you go through the arithmetic review and work on the associated online quiz on the weekend so you can review your basic arithmetic skills and be prepared for the online quiz on January 14.</p> <p>*Online Quiz 1 on Courselink on January 14 (Quiz on Appendix A and on materials covered in lecture)</p>

Jan. <u>19, 21</u> *	Research Design (identifying different types of study) Descriptive Statistics Frequency distributions	Chapter 2 in text	* First official Top Hat Question (T1) on <u>Jan 19</u> * Quiz 2 (in class) On all materials covered in class and in text so far. Thursday, Jan 21
Jan <u>26, 28</u> **	Visual displays of data Central tendency and variability, Start Standardized scores (Chapter 3) if time.	Chapters 2 in text	* Top Hat (T2) Question Jan 26 * Exam 1 on <u>Jan 28</u> On all materials covered so far (to the end of Jan 26).
Feb <u>2, 4</u>	Standardized scores Introduction to Hypothesis testing	Chapter 3 Chapter 7	*Top hat questions on Feb 2 and 4 (T3 and T4).
Feb. 9, <u>11</u> *	Introduction to hypothesis testing Hypothesis testing: $N > 1$	Chapter 7 Chapter 8	* Quiz 3 (online) Cumulative (on everything so far)
READING WEEK February 15-19	No classes		
Feb <u>23, 25</u> *	Basic elements of hypothesis testing, Introduction to hypothesis testing	Chapter 7, Chapter 8, Hypothesis testing	* Top Hat (T5) Feb 23 * Quiz 4 (in class) on Feb 25 : On all material you have learned to this point (Cumulative)
Mar 1, <u>3</u> **	Hypothesis testing	Chapter 8	* Exam 2 <u>March 3.</u> On all of the material you have learned to this point (Cumulative)

Mar <u>8, 10</u> TopHat (T6, T7)	Hypothesis testing	Chapter 8	*Top Hat question Mar 8 and 10 (T6 and T7).
Mar <u>15, 17</u> Top Hat (T8)	One sample and within groups (paired samples) t-tests	Chapter 10	*Top hat (T8) March 15 * Quiz 5 (online) on March 17
Mar. 22, <u>24*</u>	Within Groups t-test Between groups t-test	Chapter 10 Chapter 11	* Quiz 6 (in-class) on March 24 . On all of the material you have learned to this point. (Cumulative)
Mar. <u>29, 31</u> Top Hat (T9).	Correlation	Chapter 4	*Top Hat (T9) on Mar 29
Apr. <u>5, 7</u> Top Hat (T10)	Big picture: Putting it all together. Learning to recognize ANOVA, Chi Square, and other forms of correlation Ethical use of statistics (how not to mislead)		*Top Hat (T10) on April 5. Exam preparation. *Notice that SONA participant pool closes no April 7. Last day to get Research Participation Design assignment in to SONA).
April 11 **	Final Exam** Monday, April 11 7 – 9 pm.	Cumulative final exam. Exam will be based on everything covered in lecture or the text since the beginning of the term.	

Labs: None

Seminars: None

Course Assignments and Tests:

Assignment or Test	Due Date	Contribution to Final Mark (%)	Learning Outcomes Assessed
Quizzes 1-6	Quiz 1: Jan 14 Quiz 2: Jan 21 Quiz 3: Feb 11 Quiz 4: Feb 25 Quiz 5: Mar 17 Quiz 6: Mar 24	Average of the best 4 of 6 quizzes: 16% total	Specific: 3-9 Generic: 1-2 and 4
Top Hat: In-class questions	T1: Jan 19 T2: Jan 26 T3: Feb 2 T4: Feb 4 T5: Feb 23 T6: Mar 8 T7: Mar 10 T8: Mar 15 T9: Mar 29 T10: Apr 5	Average of the best 6 of 10 questions: 9% (1.5% each)	Specific: 3-9 Generic: 1-2 and 4
Research Participation and Design Assignments	Last Design Assignment due: April 8, 2016	5% total	Specific: 3-5, 9 Generic: 1-4

Homework 1-3	<p>The homework is strongly recommended but not mandatory. You do not hand it in.</p> <p>If you do the homework, this will help you ensure that you are ready for the exams.</p> <p>Recommended deadlines for you to help you with your time management.</p> <p>Homework 1: Jan 20 Homework 2: Feb 24 Homework 3: Mar 30</p>	<p>The homework is not marked though you will be receiving feedback. What you are doing with the homework is developing the skills you need for the exams and quizzes. If you do a good job on your homework, that means you will be able to perform well on exams and quizzes. Although the homework is not marked, ultimately it contributes indirectly towards the 95% of your grade that is associated with</p>	<p>Specific: 1-9 Generic: 1-4</p>
Exams 1-3	<p>Exam 1: Jan 28 Exam 2: Mar 3 Exam 3: Apr 11</p>	<p>Exam 1: 20% Exam 2: 20% Exam 3: 30%</p>	<p>Specific: 1-9 Generic: 1-4</p>

Additional Notes (if required):

1. Given that the quiz mark reflects an average of the best 4 of 6 quizzes, there will be no makeup quizzes. The quizzes must be done on the days assigned and if you do not attend for whatever reason (religious holidays, illness, personnel issues, weather, scheduling and technical problems), then you can consider it one of the 2 quiz marks they will drop. (It would be unfair to the others that did the quizzes at the appropriate time. The answers are made available soon after quiz is administered.) However, in the second last full week of class (Mar 29-31), there will be an optional online "Bonus quiz" to make up a missed a quiz if you choose. If you choose to do the optional bonus quiz, this means that your quiz grade will reflect an average based on the best 4 of 7 quizzes instead of the average of the best 4 of 6. Quizzes must be completed on the day they are due.

2. Given that the answers to the Top Hat question are given immediately after they are given, there is no way to redo a Top Hat question if you miss it. (It would be unfair to the other students if you got to do the question after the answers were already shown to the class.)

Consequently, there are no Makeup Top Hat questions. However, your mark is based on the best 6 of 10 of these questions, so that means if you miss a question, just consider it as one of the 4 Top Hat questions that you will drop. In addition, in the 2 last weeks of class there will be BONUS Top Hat questions, so if something went wrong, you will have a chance to recover. That means that you will have the best of 6 of 12 Top Hat questions.

Final examination date and time: Monday, April 11, 7 – 9 pm.

Final exam weighting: 30%

Course Resources

Required Texts:

Geher, Glenn, & Hall, Sara (2014). *Straightforward Statistics: Understanding the tools of research*. Oxford University Press. Printed in the USA.

There are copies of the text on reserve in the library (these can be used while in the library). This text was used last 2 years terms so you should be able to get copies second hand from the used book store. There are soft cover versions as well.

***Please notice:** This text should be regarded as a secondary source. The information in this course comes primarily from the lecture. The text does not cover the material in adequate detail and it does some things in odd/ questionable/ unnecessarily complicated ways, so the lecture is a better source of information about what will be expected on exams. The text is just a back-up. So, the bottom line is that will need to go to lecture to do well in this class. (I chose the text primarily because it did not demand excessive amounts of reading. I was having trouble in that students were spending so much time doing the reading that they were not doing the practice exercises, and practice is critical in statistics.)

Recommended Texts: None

Lab Manual: None

Other Resources:

1. Courselink website. Online materials (diagrams, exercises, quizzes) will be provided on the Courselink website (D2L website).

2. TopHat software. We will be using the [Top Hat](http://www.tophat.com) (www.tophat.com) classroom response system in class. You will be able to submit answers to in-class questions using Apple or Android smartphones and tablets, laptops, or through text message.

You can visit tinyurl.com/TopHatStudentGuide for the Student Quick Start Guide 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. An email invitation will also be sent to your school email account. If you don't receive this email, you can register by visiting the course website

tophat.com/e/754278

(The full URL is <https://app.tophat.com/e/75428>)

If asked, note that the 6-digit join code they are ask about to is **754278** for this class.

Top Hat will require a paid subscription (see below), and the standard pricing for the cheapest option is \$24 for 4-months of unlimited access. For a full breakdown of all subscription options available please visit www.tophat.com/pricing.

Additional Costs:

Top Hat Software: single semester, one course cost = \$24. If you are using Top Hat In more than 1 course you can get a special deal where the subscription is \$36 and it covers the cost of all your courses for a year. For more information, see attachment on TOP HAT (www.tophat.cm/pricing).

*It would be better if you did without the text (it is on reserve in the library) than if you did without TopHat.

Course Policies

Attendance: Regular attendance at lectures is expected and it will be impossible to do well in the course if you do not attend lectures. That is because a good deal of the lecture material is not covered in the text and there will be many questions from lecture on exams. It is your responsibility to be there and take notes. Students are much more likely to retain information through active learning – when you sit passively listening information often goes in one ear and out the other. In contrast, if you have to engage with it – decide whether it is important, note it down, you are more likely to be able to retain it later, an ability is part of the ability to learn through listening. Note-taking is an important skill, one that will serve you well in other courses and later in life. (Employers value this skill.) The ability to determine what is relevant “on the fly” as you listen, to record things as you go, in such a way that you understand your own writing, is essential to future success in other domains. One goal for this course is to improve your note-taking skills. If you aren't there, you can't improve your skills. Consequently, you are

each responsible for acquiring your own notes (under no circumstances will notes be provided for you). However, if you have trouble understanding your notes, or if you have difficulties understanding the material or determining what is important in the lecture or text, the instructor will be happy to go over your notes with you. During that time, you can work together with her to develop strategies to help you improve your note taking skills.

1. Be sure to bring your calculator to every class. (The best type of calculator is a simple inexpensive non-programmable calculator with add, subtract, multiply, divide, and square root.)
2. Notice that in many classes there will be Online questions given with the TopHat software. To answer these questions you will need a cellular phone or Lap Top. (This is a way for you to earn marks without some of the stress associated with quizzes and exams).

Grading Policies

1. **Quizzes.** The quizzes are designed to encourage you to keep up and they also will help prepare you for the type of question that they will experience on the exams. Three of these quizzes will occur in class and three will be on line. Your overall quiz grade will be based on the best 4 of 6 quiz marks. In-class and online quizzes must be done on the days assigned (there will be no makeup quizzes). If you miss a quiz, just consider it one of the 2 quiz marks you drop (it is the best 4 of 6).

2. **Top Hat in-class exercises.** On designated dates (see the course outline) you will be asked a question during lecture and you will be required to answer online (using your cellular phone) using the Top Hat software. Many students like this option because it gives them a way to earn marks other than by doing quizzes and exams, which can be nerve-wracking. If you miss a Top Hat question, you cannot make it up. However, you can miss up to 4 Top Hat questions without it affecting your mark. (Your mark is based on the best 6 of 10 Top Hat Questions.)

3. **Research participation and design assignments.** One of the best ways to learn about research is to participate, and in particular, there are special benefits for quantification students because participation will give you a chance to see how the concepts of this course are applied in actual research projects that are being carried out at the University of Guelph. Furthermore, if you choose to continue on in Psychology, you may one day be carrying out your own research as part of an undergraduate honours thesis, research internship, or research project. Consequently, you may enjoy talking to more senior students in the Psychology program, either upper year undergraduates students, graduate students, or research interns/assistants. In this course, you may learn up to 5% for participating in the psychological studies occurring in the department (these are advertised in the SONA network). Your assignment is to participate in this experiment, and afterwards you will need to read the debriefing sheet to find out the answers to the following questions:

- a. What is the research question for this study? Why is it important to know about this? (For example, what are the real-life ramifications of this study?)
- b. What variables are the researchers investigating? (List the independent and dependent variables or in correlational designs, the measured variables.)
- c. What type of design does this study have? (True experiment, quasi-experiment, correlational design)

Notice: If you participate in a study, you do not have write anything or turn it in. I would just like you to think about these issues as you do the study so you can benefit from your experience maximally. (The experience of being in a study should give you some real-life experience with some of the concepts we are discussing in class.)

There are also options for those who choose not to participate in a study. If you are not interested in participating in a study or if there are no studies available on the SONA network, you may also choose the option of reading published journal articles that will be made available on the SONA website (address listed below). Specifically, for each of the 5 credits participation time, you will need to read one of the articles on Courselink and write summary for each in the format described under “Alternative Assignment” tab on the SONA website, making sure that in your summary you **also** mention the answers to each of the four questions listed above. Note: These must be written in your own words, not ones from the article or ones written by your classmates. Plagiarism and cheating are regarded as academic misconduct. For further information, see the section on academic misconduct.

Thus, there are two types of research participation and design assignment: those based on actual research participation and those based on reading published articles on Courselink and writing the required summary. Many of you will find that you end up doing both types of assignment to make up your 5% for the Research Participation and Design Assignment mark. For example, you may have 3% based on participation in 3 hours worth of experiments and another 2 % on summaries from 2 of the articles posted on the SONA website. All research participation and design papers are due by no later than April 8 (midnight on the last day of scheduled classes). It is a good idea to spread these out over the term to prevent yourself from being overwhelmed at the end of the year. (This is where planning and time management enters in.)

To sign up to participate in an experiment, check the SONA system website (<https://www.uoguelph.ca/psychology/research/sona>). There is information there on that website about how to get into a SONA experiment and there is also information about the articles and how to hand in the alternative assignments (the written summaries of the articles).

4. Homework: There will be 3 recommended homework assignments, one for each exam. Homework assignments will include practice questions from the text as well as short-essay definition questions and problem questions much like the ones you will have on your exam. The best way to use the homework is to complete the questions just after the material is covered in lecture or just after you have also read the material in your text. Generally students who do the homework (understanding the material and coming up with their own answers rather than just copying down what someone else has said) achieve better marks and they are much more likely to remember the information after they complete the course. The answers to the homework questions will be posted online at midnight on the night the assignment is due. Although the homework is not marked, the benefits of doing the homework will be evident on the exams and quizzes. (Those who have done the homework will be able to answer the questions.) You will find that your performance on exams will be better if you actually DO the homework rather than just waiting until the answers come out. That is because Psych 1010 is a process course – it is teaching you a skill. The ability to carry out statistical procedures is a skill that you develop in the same way as you develop skills when skating: You learn by direct practice. You can't learn to skate by watching "Hockey Night in Canada" and similarly, you can't learn to do statistics by just reading the answers. If you do not actually get in there and try it, you will find that you cannot perform when you need to on exams.

5. Exams: Exams will be part multiple-choice, part calculation, and part short essay. All exams will be cumulative insofar as the chapters build on one another, but there are only so many questions that can be asked in a specific exam, so when studying it makes sense to place slightly more emphasis on the chapters presented in that exam period. When studying for exams, be aware that you will be responsible for both the information presented in lecture and that presented in text. Note that each student must take all three exams. In the event that you miss an exam due to illness or serious personal issues, a makeup exam will be rescheduled for you. (It is your responsibility to inform the instructor if you miss an exam and she will then make the arrangements for the makeup exam.) Generally make-up exams occur during her office hours the week following the exam). If you feel that an exam question has been mis-marked, the instructor would be happy to mark the exam again for you if you ask. (Your mark may not necessarily go up but she will provide detailed comments to explain what went wrong in efforts to help you for next exam.) If you are having trouble with exams, it is strongly recommend that you come see the instructor. She will go over your exam point-by-point with you and together you can work out a strategy to help you do better in future exams.

Course Policy on Group Work:

Each student is expected to complete quizzes, exams, and Top Hat questions on his or her own. There is little benefit to parroting the answer of some other student word-for-word (or for that matter the textbook or another source) and if there is evidence that students are doing this it will be dealt with as per the regulations on Academic Misconduct. Similarly, if students work together on quizzes or share quiz answers (over the internet, email, or by any other mean) that will be treated as Academic Misconduct and dealt with as specified below. However, that does not mean that students cannot form study groups. Some students find it enjoyable and motivating to work with others. However, it is important that everyone in the end does his or her own work so that each of you can perform well on the exams.

Course Policy regarding use of electronic devices and recording of lectures:

Electronic recording of classes is expressly forbidden without consent of the instructor. When recordings are permitted they are solely for the use of the authorized student and may not be reproduced, or transmitted to others, without the express written consent of the instructor.

University Policies

Academic Consideration

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons, please advise the course instructor in writing, with your name, id#, and e-mail contact. See the academic calendar for information on regulations and procedures for

Academic Consideration:

[Academic Consideration, Appeals and Petitions](#)

Academic Misconduct

The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community, faculty, staff, and students to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring.

University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection. Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before

submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

The Academic Misconduct Policy is detailed in the Undergraduate Calendar:

[Academic Misconduct Policy](#)

Accessibility

The University of Guelph is committed to creating a barrier-free environment. Providing services for students is a shared responsibility among students, faculty and administrators. This relationship is based on respect of individual rights, the dignity of the individual and the University community's shared commitment to an open and supportive learning environment. Students requiring service or accommodation, whether due to an identified, ongoing disability or a short-term disability should contact the Centre for Students with Disabilities as soon as possible.

For more information, contact CSD at 519-824-4120 ext. 56208 or email csd@uoguelph.ca or see the website: [Student Accessibility Services Website](#)

Course Evaluation Information

Please refer to the [Course and Instructor Evaluation Website](#) .

Drop date

The last date to drop one-semester courses, without academic penalty, is Friday, March 11. For regulations and procedures for Dropping Courses, see the Academic Calendar:

[Current Undergraduate Calendar](#)

Additional Course Information: See CourseLink Website.