

# **PSYC\*1010 Section 01, Course Outline: Fall 2017**

## **General Information**

**Course Title: Making Sense of Data in Psychological Research**

### **Course Description:**

This course introduces research designs and quantitative approaches used in psychological science, with an emphasis on conceptual understanding. Specific topics include distributions, meta-analysis, confidence intervals and p-values, effect size, and regression, as well as the differences between descriptive, correlational, and experimental research designs.

This course has two main goals: 1) to provide sufficient knowledge of statistics so that you may critically evaluate claims based a statistical argument; 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).

**Credit Weight: 0.5**

**Academic Department (or campus): Psychology**

**Semester Offering: F17**

### **Class Schedule and Location:**

Tuesday, Thursday  
01:00PM - 02:20PM  
[MCLN](#), Room 102

## **Instructor Information**

Instructor Name: Harvey H. C. Marmurek  
Instructor Email: hmarmure@uoguelph.ca  
Office location and office hours:  
4019 MacKinnon Extension  
Tuesday, Thursday 11:00 am- 12:00 pm or by appointment

## **GTA Information:**

GTA Name:

GTA Email:

GTA office location and office hours:

## **Course Content**

### **Specific Learning Outcomes:**

#### A. Critical and Creative Thinking

##### 1. Depth and Breadth of Knowledge

- Describe core concepts in the scientific method, research methods and statistics, and indicate how these ideas work together in the scientific method
- Understand and apply key concepts in research methods and statistics as it relates to the scientific method

##### 2. Inquiry and Analysis

- formulate questions about psychology. Know how to find relevant evidence.
- evaluate hypotheses based on data
- recognize the importance of supporting statements with evidence

##### 3. Problem Solving

- identify issues and create a plan to address the problem using knowledge of research methods and statistics

#### B. Literacy

##### 1. Methodological literacy: The ability to understand, evaluate, and apply appropriate methodologies for rigorous psychological science

- Recognize and describe basic research methodologies (e.g., random assignment, random sampling)

## 2. Quantitative literacy

- understand the use of numerical data
- demonstrate the ability to interpret data (including formulas).
- demonstrate the ability to analyze data (perform calculations) and interpret data to test a claim

## 3. Visual literacy:

- create and interpret graphs and tables
- evaluate images and their source (e.g., discerning when a graph is misleading).

## C. Communication

### 1. Reading Comprehension (e.g., reading the text materials)

- read at a university level, acquiring psychological information
- understand sophisticated theoretical and empirical writing in psychology

### 2. Listening skills (a component of Oral communication).

- determine the key points in an auditory presentation
- summarize information in a clear and concise way so that you can later access the information
- ask questions of the speaker when you require clarification.

### 3. Written Communication.

- present ideas in a logical order, using concrete examples including graphs and tables
- write using the appropriate vocabulary, presenting statistical results in APA (American Psychological Association) format

## D. Personal and ethical behaviour

### 1. Ethical issues in research

- describe ethical principles in conducting research as it relates to the accurate (non-misleading) presentation of research results

### 2. Personal organization/ time management

- recognize the importance of planning for completion of tasks
- deal with intense time pressures, prioritize and complete important or urgent tasks to schedule.
- cope with time pressures by being strategic, and determining a way to get the best results in a limited amount of time.
- demonstrate personal accountability and responsibility

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

- A. Identify and describe key concepts in quantitative psychology, including those relating to the scientific method, research design, and inferential and descriptive statistics. Apply these concepts when solving problems (Learning outcomes: A1-3; B1-3; C1-2; D2)
- B. Describe the stages involved in scientific reasoning and specify the role and importance of quantification in the scientific method. (Learning outcomes: A1-3; B1-3; C1-3; D2)
- C. 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 graphical presentation (Learning outcomes: A1-3; B1-3; C1-3; D1-2)
- D. 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. (Learning outcomes: A1-3; B1-2; D2)
- E. Identify the independent and dependent variables in a research study. Provide operational definitions of variables. (Learning outcomes: A1-3; B1-2)
- F. Describe the differences between descriptive and inferential statistics. Determine the appropriate statistical analysis for simple experiments. (Learning outcomes: A1-3; B1-2)
- G. Calculate measures of central tendency (mean, median, mode) and variability (e.g., range, standard deviation, variance). (Learning outcomes: A1; B1-2; D2)
- H. Interpret information presented in graphical format (graphs) for frequency distributions, experiments, and correctional studies. (Learning outcomes: B3)
- I. Explain what hypothesis testing is, indicating its purposes, the processes involved, and the places where error can enter into the process. Indicate the role of probability in hypothesis testing and inferential statistics. (Learning outcomes: A1-3; B1-2; C1-3)
- J. Carry out hypothesis testing using z-tests, t-tests, correlation and simple linear regression. (This involves calculating the appropriate statistic, using that statistic to make a statistical decision, and reporting the result in writing in APA format). Calculate measures of effect size

(e.g., Cohen's  $d$ ,  $r^2$ ). Indicate how effect size and statistical power relate to statistical significance. (Learning outcomes: A1-3; B1-3; C1-3; D2).

**Lecture Content:**

The table below lists the content of the lectures and the associated readings from the text. Please make sure to check the course website on Courselink for notices regarding any changes to the readings and material required for a given exam or quiz.

| Date                                 | Readings: Essentials of Statistics for the Behavioural Sciences (Nolan & Heinzen 3 <sup>rd</sup> edition) | Graded Homework/quizzes  |
|--------------------------------------|---|--|
| Sept. 7,12,14                        | Chapter 1: Introduction to Statistics and Research Design   | Appendix A (Math Review)<br>Learning Curve<br>Quiz 1<br>Due Sept. 17             |
| Sept. 19, 21                         | Chapter 2:<br>Frequency Distributions   | Learning Curve<br>Quiz 2<br>Due Sept. 24   |
| Sept. 26, 28                         | Chapter 3:<br>Visual Displays of Data   | Learning Curve<br>Quiz 3<br>Due Oct. 1   |
| Oct. 3, 5                            | Chapter 4:<br>Central Tendency and Variability  | Learning Curve<br>Quiz 4<br>Due Oct. 8   |
| Oct. 12<br>Note:<br>NO CLASS OCT. 10 | Chapter 5:<br>Sampling and Probability  | Learning Curve<br>Quiz 5<br>Due: Oct. 15   |
| Oct. 17, 19                          | Chapter 6:<br>The Normal Curve,<br>Standardization, and z Scores  | Learning Curve<br>Quiz 6<br>Due Oct. 22  |
| Oct. 24, 26                          | Chapter 7:<br>Hypothesis Testing with z Tests   | October 24: Midterm 1<br>Chapters 1-6<br>Learning Curve<br>Quiz 7<br>Due Oct. 29 |

|                 |   |  |
|-----------------|---|--|
| Date            | Readings: Essentials of Statistics for the Behavioural Sciences (Nolan & Heinzen 3 <sup>rd</sup> edition) | Graded Homework/quizzes  |
| Oct. 31, Nov. 2 | Chapter 8:<br>Confidence Intervals, Effect Size, Statistical Power  | Learning Curve<br>Quiz 8<br>Due Nov. 5   |
| Nov. 7, 9       | Chapter 9:<br>The Single-Sample <i>t</i> Test and the Paired-Samples <i>t</i> Test                        | Learning Curve<br>Quiz 9<br>Due Nov. 12  |
| Nov. 14, 16     | Chapter 10:<br>The Independent-Samples <i>t</i> Test  | Nov. 14: Midterm 2<br>Chapters 7-9<br><br>Learning Curve<br>Quiz 10<br>Due Nov. 19 |
| Nov. 21, 23     | Chapter 13:<br>Correlation  | Learning Curve<br>Quiz 11 (chapter 13)<br>Due Nov. 26                              |
| Nov. 28, 30     | Chapter 14:<br>Regression   | Learning Curve<br>Quiz 12 (chapter 14)<br>Due Dec. 3                               |
|                 | Cumulative final exam with emphasis (75%) on chapters 13 and 14.  |  |

**Labs: None**

**Seminars: None**

**Course Assignments and Tests:**

| Assignment or Test   | Due Date  | Contribution to Final Mark (%)              | Learning Outcomes Assessed |
|--|---|---|----------------------------|
| Learning Curve on Launchpad for Nolan & Heinzen, 3 <sup>rd</sup> edition | Weekly assignments due by 11:59 pm on Sunday of the corresponding week. | 10@1% = 10% (based on the 10 best scores)   | A1-3; B1-3; C1-3; D1-2     |
| Quizzes on Launchpad for Nolan & Heinzen, 3 <sup>rd</sup> edition        | Weekly assignments due by 11:59 pm on Sunday of the corresponding week. | 10@1.5% = 15% (based on the 10 best scores) | A1-3; B1-3; C1-3; D1-2     |

|   |   |     |                      |
|---|---|-----|----------------------|
| Research Participation (any combination of credits for SONA research participant pool or written summary of up to 5 research articles). | Last week of class (See SONA information on Courselink) | 5%  | A1-3; B1-2; C3;D1-2  |
| Midterm 1   | Tuesday Oct. 24 (during class)<br><br>Chapters 1-6      | 20% | A1-3; B1-3; C1-3; D2 |
| Midterm 2   | Tuesday Nov. 14 (during class)<br><br>Chapters 7-9      | 20% | A1-3; B1-3; C1-3; D2 |

**Final examination date and time: Wednesday December 6, 19:00-21:00**

**Final exam weighting: 30%**

[Examination Regulations](#)

### **Course Resources**

#### **Required Texts:**

Nolan, S. A., & Heinzen, T. E. (2016). *Essentials of Statistics for the Behavioral Sciences*, 3rd edition. Worth Publishers, New York. Custom loose-leaf version is available with Launchpad.

Note: An e-book with Launchpad is also available.

**Recommended Texts: None**

**Lab Manual: None**

#### **Other Resources:**

1. Courselink website . Lecture slides will be provided on the Courselink website.
2. Launchpad software (included with the Nolan & Heinzen text) is used to provide the Learning Curve exercises and quizzes that are graded.

The access code for Launchpad appears on the inside cover of the textbook. Instructions on how to access Launchpad are provided on Courselink.

We will walk through the instructions in class on September 12.

**Field Trips: None**

**Additional Costs: None**

## **Course Policies**

Attendance: Regular attendance at lectures is strongly recommended. Although lectures will closely follow the presentation in the textbook, many students find the material challenging. Lectures will include discussion of end of chapter Exercises for which answers are not provided in the textbook. My goal is to communicate key concepts in a clear and uncomplicated fashion so that students are not intimidated by the statistical underpinnings of research in psychology. To that end, **students are permitted to bring to the in-class examinations and the final examination a single double-sided 8x11 sheet of prepared notes including formulas.** Several topics covered in the course entail numerical calculations. You are encouraged to bring a stand-alone calculator (not a phone app) to class, midterms, and the final examination.

To succeed in this course, it is essential that you keep up with the readings and homework. Effective time management is critical. The grade assessments include online homework and quizzes, in addition to two midterm exams and a final exam. Online materials include graded adaptive learning exercises and assessment quizzes that are accessible via the LaunchPad link on the course homepage. You should take a disciplined approach, attend lectures, keep up with the readings in the textbook, complete the LaunchPad assignments, and make sure to ask the professor questions when you are struggling.

## **Grading Policies**

1. Weekly Launchpad Learning Curve Assignments. To succeed in this course, you must do the assigned textbook readings and complete the assessments. You should plan to spend at least 7 hours in addition to class time doing your readings and assessments. The Launchpad Learning Curve program provides an adapted learning opportunity to test your knowledge of the material in the textbook. You may proceed through the exercises at your own pace until you achieve mastery. The deadline to receive grades on the Learning Curve assignment is 11:59 pm on the Sunday at the end of the assigned week. Your 10 best scores will each count toward 1% of your final grade. That is, this assignment counts toward 10% of the final grade.

2. Weekly Launchpad Quizzes. There is a multiple-choice quiz for each assigned chapter in the textbook. Similar questions will also appear on the midterms and final exam. You should not begin a quiz until you have mastered the corresponding Learning Curve assignment. Each quiz has a time limit of 30 minutes, and you may attempt a quiz for a specific chapter twice. The quiz attempt must be completed by 11:59 pm of the corresponding week. Your overall quiz grade will be based on the best 10 per chapter quiz marks. Each of the 10 best quiz marks will count toward 1.5% of the final grade for a total contribution of 15%.

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 for yourself 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? (experiment; correlational design)

Notice: If you participate in a study, you do not have to write anything or turn it in. I would just like you to think about these issues so you can benefit from your experience. 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 a summary for each in the format described under "Alternative Assignment" tab on the SONA website.

Thus, there are two types of research participation 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 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 papers are due by no later than 11:59 on the last day of scheduled classes. It is a good idea to spread these out over the term so that you are not overwhelmed at the end of the year.

For specific details about this assignment, go to:  
(<https://www.uoguelph.ca/psychology/research/sona>).

4. Exams: The two midterm exams and the final exam will include a mixture of multiple-choice questions similar to those on the weekly quizzes, and problem questions similar to the end of

chapter exercises. Note that each student must take all three exams. In the event that you miss a midterm exam due to documented medical, psychological or compassionate reasons, then the score on that missed midterm will be calculated as the average percentage grade of your completed midterm and final exam.

**There will be NO makeup midterm exams.**

### [Undergraduate Grading Procedures](#)

#### **Course Policy on Group Work:**

Each student is expected to complete Learning Curve assignments, online quizzes, and exams on his or her own. If there is evidence that students are collaborating while completing online assessments, then those cases will be dealt with as per the regulations on Academic Misconduct. However, students are encouraged to form study groups in preparation for the graded assessments.

#### **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 [Student Accessibility Services](#) as soon as possible.

For more information, contact SAS at 519-824-4120 ext. 54335 or email [accessibility@uoguelph.ca](mailto:accessibility@uoguelph.ca) or the [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, November 3, 2017.

For regulations and procedures for Dropping Courses, see the [Schedule of Dates in the Academic Calendar](#), [Current Undergraduate Calendar](#)