# University of Waterloo
# Department of Psychology
# Psychology 292
# Basic Data Analysis
# Winter 2015

## Lectures

Tuesdays and Thursdays, 10:00 – 11:20am, AL 116

## Course Description

In this course, you will learn the basics of using descriptive and inferential statistics in the analysis of psychological data. This course emphasizes an understanding of fundamental statistical principles rather than "cookbook" application of statistical formulas. The principles provided in this course will serve as a foundation for more advanced statistical techniques that you may study in later courses. An appreciation of basic statistical principles, furthermore, can help you to be a more critical "consumer" of reported research findings.

## Instructor Information

Instructor: Derek Koehler
Office: PAS 4050
Office Hours: by appointment
Email: dkoehler@uwaterloo.ca

## TA Information

| T.A. | Email (@uwaterloo.ca) | Office | Office Hours | Tutorial |
|---|---|---|---|---|
| Timothy Dunn | t2dunn | PAS 4211* | Mondays, 11:00 AM – 12:00 PM | 102 |
| Candice Graydon | candice.graydon | PAS 2249* | Mondays, 5:00 PM – 6:00 PM | 101 |
| Melissa Meade | mmeade | PAS 4219* | Thursdays, 11:30 AM – 12:30 PM | 106 |
| Shaylene Nancekivell | shaylene.nancekivell | PAS 4017 | Wednesdays, 4:00 PM – 5:00 PM | 105 |
| Hanna Negami | hnegam | PAS 2235* | Tuesdays, 1:00 PM – 2:00 PM | 103 |
| Adriy Struk | astruk | PAS 2245 | Wednesdays, 1:30 PM – 2:30 PM | 104 |

*Note: You will need to go through an unlocked door marked "lab personnel only" to reach this office.

## Tutorials

| Section 101: | Tuesdays | 2:30 – 3:50 PM | PAS 1241 |
|---|---|---|---|
| Section 102: | Wednesdays | 2:30 – 3:50 PM | HH 2107 |
| Section 103: | Wednesdays | 10:00 AM – 11:20 AM | HH 1106 |
| Section 104: | Wednesdays | 11:30 AM – 12:50 PM | DWE 3517 |
| Section 105: | Tuesdays | 5:30 PM – 6:50 PM | PAS 1241 |
| Section 106: | Wednesdays | 8:30 AM – 9:50 AM | PAS 1241 |

## Waterloo LEARN (D2L) for Psychology 292

I will be using the University of Waterloo's LEARN system to post the course syllabus, lecture notes, tutorial materials, problem sets, grades, and and other resources you may find useful. Course announcements, and answers to frequently asked questions will also be posted on LEARN. Please be

sure you check your LEARN account regularly to stay on top of the material in the course and any announcements.

## Required Text

In lieu of a traditional textbook, students will be asked to subscribe to an online "course" called Statistical Reasoning, which is part of the Open Learning Initiative (OLI) at Carnegie Mellon University. To register, please follow the following instructions:

- Go to OLI's website (http://oli.cmu.edu/), and "sign up" (top right corner)
- Enter your full first name and last name, as they appear on LEARN
- **Important:** Enter your uWaterloo email address as your "Account ID". If you do not, we will not be able to match your records across the OLI and LEARN systems, **and you will not receive grades for your assignments.**
- Once you have finished signing up, a page called "My Courses" will appear. Under my academic courses, enter the following course key: **3362LEC001**

## Course Requirements and Assessment

| Assessment | Weighting | |
|---|---|---|
| 14 Checkpoints | 10% | (online, average of 12 best scores) |
| 3 Unit Tests | 60% | (held in class, collectively worth 60%) |
| Final Exam (Cumulative) | 30% | (held during final exam period) |
| **Total** | **100%** | |

## Online Checkpoints (10%)

You will be asked to complete these relatively brief, online assessments through OLI's website (http://oli.cmu.edu). The checkpoints are intended to check your comprehension of and keep you on track with the assigned reading.  There are 14 assigned checkpoints in total. If necessary, you can miss two as final marks are based on the best 12 of 14 checkpoint scores. You are allowed up to two attempts at each checkpoint and will receive feedback on each attempt. Your final score for each checkpoint will be determined by the percentage of correctly answered items from your best-scoring attempt.

| Checkpoint(s) | Due Date | Topic |
|---|---|---|
| 1 | January 16 | Examining Distributions 1 |
| 2 | January 23 | Examining Distributions 2 |
| 3 | February  6 | Random Variables |
| 4 **and** 5 | February 13* | Sampling Distributions 1 and 2 |
| 6 | February 27 | Estimation |
| 7 **and** 8 | March 6* | Hypothesis Testing for population Proportion and Population Mean |
| 9 **and** 10 | March 13* | Two Independent Samples and Matched Pairs |
| 11 | March 20 | Examining Relationships 1 |
| 12 | March 27 | Examining Relationships 2 |
| 13 **and** 14 | April 6* | Case C -> C and Q -> Q and Inferences for Relationships |

*Please note that there are two checkpoints due on these dates

**Unit Tests (60%)**

Three unit tests will be held in class. You will have 60 minutes to complete each test. Technically, the three tests are non-cumulative, but topics covered in this course naturally build on one another. For example, to carry out a t-test (covered on Test 3), you need to know how to calculate a standard deviation (covered on Test 1). All unit tests are closed-book, but sheets with relevant statistical formulas and tables will be provided so you won't have to memorize them. You can preview the formula sheets on LEARN.

The three unit tests, taken together, will account for 60% of your final mark. Your highest test score will count for 25% and your lowest for only 15%, with the intermediate score counting for 20%. This should help to offset, at least somewhat, the effects of a having "bad day" on one of the unit tests. Out of fairness to other students, please note that the instructor cannot offer any further changes in the weighting of the unit tests and final exam, or additional work for extra credit.

If you have a concern about how an item on a unit test was marked, please first have a look at the answer key (posted on LEARN for Psych 292). If the answer key does not address your concern, please arrange to discuss the matter further with the TA who marked the item. (The answer key will indicate who marked each item.) If you still feel that your concern has not been addressed, please put it in writing and submit it to the instructor, who will then discuss it with the TA and make a final decision.

**Final Exam (30%)**

The final exam is closed-book and cumulative. For the final exam, sheets with relevant statistical formulas and tables will be provided so you won't have to memorize them. Students may also bring and use one additional (double-sided) page of their own notes. This sheet may be hand-written or typed.

**Missed/Late Work**

***Missed Checkpoints***

Online checkpoints are due by 23:59 (11:59 PM) on their designated due dates. Students will not be able to submit checkpoints after this time. Missed checkpoints will receive a grade of zero (no exceptions).

***Missed Unit Tests***

Unit tests or exams can only be rescheduled in the case of illness (or other medical problems); circumstances of serious distress due to a family emergency or personal crisis; or (for those students who commute) adverse weather on the day of tests. Documentation is required in order to reschedule a test or exam. In the case of illness, a UW verification of illness form is required.

It is important to be aware that, in such cases, the only accommodation that can be offered is rescheduling the test or exam.  Once the test or exam has been completed, poor performance due to circumstances such as those outlined above cannot be used as a basis for requesting re-weighting the contribution of the test or exam to the student's final course mark.

A rewrite session will be scheduled for each unit test for those students who were unable to take it at the scheduled time and can provide valid documentation. Scheduled rewrite sessions will be posted on LEARN; **please email the TA who will be administering the session (as indicated on LEARN) to confirm that you will be attending the rewrite session**. All students who missed the originally scheduled unit test are expected to attend the rewrite session. Exceptions will be granted only if additional documentation is provided covering the date of the rewrite session; decisions about how to proceed then will be made by the instructor on a case-by-case basis.

## Tutorials

Each week in tutorial sessions, your TA will guide the group through solutions to a set of target exercises. These target exercises are drawn from unit tests given in previous years. The target exercises to be covered each week will be posted in advance. You will likely find the tutorials to be more helpful if you have attempted to solve the problems for yourself prior to each meeting. Although attending tutorials is optional, many students find the tutorials to be the most helpful feature of the course.

## Sending Questions by E-mail

This is a large course, and as a result we typically receive lots of e-mail from students with questions about course content, assignments, unit tests and exams, etc. We are happy to receive questions by e-mail and will do our best to answer them promptly. To manage all this e-mail, however, we ask that whenever possible you direct your e-mail questions to your tutorial TA. The TA will either answer your question or forward it to the instructor as appropriate. For basic questions about the course content and scheduling, please be sure to read through the syllabus and announcements on LEARN before sending e-mail, as often the answers to questions we receive can be found there.

## How to do well in this course

Here are some things you can do to more effectively learn the material and enjoy the course:
- carefully complete assigned readings each week *before* the lecture
- complete the "Learn by Doing" and "Did I Get This?" activities as you encounter them while doing the assigned reading in the online textbook
- test yourself on problems from the four problem sets, from the previous years' unit tests and from the example final exam (all downloadable from LEARN)
- ask questions, in lectures and tutorials, if you don't understand something
- see the instructor and/or your TAs during office hours if you need additional help
- See the Psychology Undergraduate website "Student Success" section "[Psych 292 or Psych 391 – tips for success](https://uwaterloo.ca/psychology/current-undergraduate-students/student-success#Psych292-391-Success)" (https://uwaterloo.ca/psychology/current-undergraduate-students/student-success#Psych292-391-Success)

If you find that you are having trouble with the material and need more help than a TA can provide during tutorial and office hours, you might consider getting help from a tutor. A list of students who recently took the class, did well, and have expressed a willingness to offer tutoring services (either for pay or on a voluntary basis) is available on the course LEARN site. It is left to you to contact and make arrangements directly with a tutor, and obviously it cannot be guaranteed that every student will benefit from tutoring, but working with a tutor may be a useful supplement to the course for those needing a little extra help.

### *Calculators*

For the tutorial exercises, unit tests, and final exam, you will find it helpful to have a calculator, ideally with basic statistical functions (e.g., standard deviation). Please bring your calculator to every class meeting and every tutorial. For tests, students are not permitted to use smartphones or other internet-enabled devices instead of a calculator.

## Attendance Policy

While highly recommended, lecture and tutorial attendance is not mandatory.

**INSTITUTIONAL-REQUIRED STATEMENTS**
*Institutional-required statements for undergraduate course outlines approved by Senate Undergraduate Council, April 14, 2009*

### Cross-listed course

Please note that a cross-listed course will count in all respective averages no matter under which rubric it has been taken. For example, a PHIL/PSCI cross-list will count in a Philosophy major average, even if the course was taken under the Political Science rubric.

### Academic Integrity

*Academic Integrity:* In order to maintain a culture of academic integrity, members of the University of Waterloo are expected to promote honesty, trust, fairness, respect and responsibility.

*Discipline:* A student is expected to know what constitutes academic integrity, to avoid committing academic offences, and to take responsibility for his/her actions. A student who is unsure whether an action constitutes an offence, or who needs help in learning how to avoid offences (e.g., plagiarism, cheating) or about "rules" for group work/collaboration should seek guidance from the course professor, academic advisor, or the Undergraduate Associate Dean. When misconduct has been found to have occurred, disciplinary penalties will be imposed under Policy 71 – Student Discipline. For information on categories of offenses and types of penalties, students should refer to Policy 71 - Student Discipline.

*Grievance:* A student who believes that a decision affecting some aspect of his/her university life has been unfair or unreasonable may have grounds for initiating a grievance. Read Policy 70 - Student Petitions and Grievances, Section 4.

*Appeals:* A student may appeal the finding and/or penalty in a decision made under Policy 70 - Student Petitions and Grievances (other than regarding a petition) or Policy 71 - Student Discipline if a ground for an appeal can be established. Read Policy 72 - Student Appeals.

### Other sources of information for students

Academic integrity (Arts) Academic Integrity Office (uWaterloo)

### Accommodation for Students with Disabilities

*Note for students with disabilities:* The AccessAbility Services Office, located in Needles Hall Room 1132, collaborates with all academic departments to arrange appropriate accommodations for students with disabilities without compromising the academic integrity of the curriculum. If you require academic accommodations to lessen the impact of your disability, please register with the AS office at the beginning of each academic term.

**Course Outline**

| Lecture | Date | Lecture Topic | OLI module(s) | Covered on Test | Tutorial |
|---------|------|---------------|---------------|-----------------|----------|
| 1 | Tuesday, January 6 | Introduction, Course Information | 1 (through measures of center) | Test # 1 | No Tutorial |
| 2 | Thursday, January 8 | Displaying data, measures of center | 1 (through measures of center) | Test # 1 | Tutorial # 1 Jan 13/14 |
| 3 | Tuesday, January 13 | Measures of spread | 1 (from measures of spread) | Test # 1 | Tutorial # 1 Jan 13/14 |
| 4 | Thursday, January 15 | probability | 5 | Test # 1 | Tutorial # 2 Jan 20/21 |
| 5 | Tuesday, January 20 | Random variables | 6 (Discrete Random Variables) | Test # 1 | Tutorial # 2 Jan 20/21 |
| 6 | Thursday, January 22 | Normal distribution 1 | 6 (Continuous Random Variables) | Test # 2 | Tutorial # 3 Jan 27/28 |
| Unit Test 1 | Tuesday, January 27 | | | | |
| 7 | Thursday, January 29 | Normal Distribution 2 | 6 (Continuous Random Variables) | Test # 2 | Tutorial # 4 Feb 3/4 |
| 8 | Tuesday, February 3 | Sampling Distributions 1: Expected Value (EV) and Standard Error (SE) | 7 | Test # 2 | Tutorial # 4 Feb 3/4 |
| 9 | Thursday, February 5 | Sampling Distributions 2: Central Limit Theorem | 7 | Test # 2 | Tutorial # 5 Feb 10/11 |
| 10 | Tuesday, February 10 | Confidence Intervals 1: population mean | 8 and 9 | Test # 2 | Tutorial # 5 Feb 10/11 |
| 11 | Thursday, February 12 | Confidence Intervals 2: population proportion | 8 and 9 | Test # 2 | Tutorial # 6 Feb 24/25 |
| 12 | Tuesday, February 24 | Hypothesis testing: one-sample tests | 10 (Except type 1 and Type II errors) | Test # 3 | Tutorial # 7 Mar 3/4 |
| Unit Test 2 | Thursday, February 26 | | | | |
| 13 | Tuesday, March 3 | Hypothesis testing: related samples | 11 (Matched Pairs) | Test # 3 | Tutorial # 7 Mar 3/4 |

| Lecture | Date | Lecture Topic | OLI module(s) | Covered on Test | Tutorial |
|---|---|---|---|---|---|
| 14 | Thursday, March 5 | Hypothesis testing: independent samples | 11 (Independent samples) | Test # 3 | Tutorial # 8 Mar 10/11 |
| 15 | Tuesday, March 10 | Hypothesis testing: effect size and power 1 | 10 (Type I and Type II Errors) and Power Module available online on the WISE website (http://wise.cgu.edu/powermod) | Test # 3 | Tutorial # 9 Mar 17/18 |
| 16 | Thursday, March 12 | Hypothesis testing: effect size and power 2 | 10 (Type I and Type II Errors) and Power Module available online on the WISE website (http://wise.cgu.edu/powermod) | Test # 3 | Tutorial # 9 Mar 17/18 |
| 17 | Tuesday, March 17 | correlation | 2 (pp. 42 – 51) | As part of cumulative final | Tutorial # 10 Mar 24/25 |
| 18 | Thursday, March 19 | Regression 1 | 2 (pp. 52 – end) 12 (Case Q -> Q) | As part of cumulative final | Tutorial # 10 Mar 24/25 |
| **Unit Test 3** | Tuesday, March 24 | | | | |
| 19 | Thursday, March 26 | Regression 2 | 2 (pp. 52 – end) 12 (Case Q -> Q) | As part of cumulative final | Tutorial # 11 Mar 31/Apr 1 |
| 20 | Tuesday, March 31 | Chi-Square | 2 (Case C -> C), 12 (Case C -> C) | As part of cumulative final | Tutorial # 11 Mar 31/Apr 1 |
| 21 | Thursday, April 2 | Test selection (review) | 12 (Wrap-Up: Inference for Relationships) | As part of cumulative final | No Tutorial |