

**University of Waterloo
Department of Psychology
Psych 391
Advanced Data Analysis
Fall 2014
Mondays and Wednesdays 2:30 - 3:50, AL113**

Instructor and T.A. Information

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Teaching Assistants

Martyn Gabel
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Lab: 101 (Wednesday 5:00-5:50)

Elsa Labuschagne
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Lab: 105 (Friday 12:30-1:20)

Hanna Negami
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Tianwei Liu
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Lab: 103 (Thursday 8:30-9:20)

Caitlin Wright
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Lab: 104 (Thursday 5:30-6:20)

Course Description

This course builds from the material covered in Psychology 292. Topics that will be covered include: t-tests, Power, ANOVA, factorial ANOVA, repeated measures and mixed designs, and multiple comparisons associated with those designs. The primary goal of the course is to provide students with a solid understanding of both the logic and computations underlying many of the statistical procedures that psychologists use when analyzing data collected from experiments. An additional goal for this course is that students will learn to perform these statistical analyses using SPSS.

Course Goals and Learning Outcomes

Upon completion of this course, students should be able to:

- A. Look at a large range of statistical problems, and be able to determine:
 - what the independent and dependent variables are
 - which statistical analyses would be appropriate
- B. Accurately conduct (by hand and using SPSS) the appropriate:
 - Power analysis for simple 2-level designs
 - Descriptive and Inferential statistics for simple 2-level and complex (multi-factorial) designs
- C. Report all of the analyses in APA format

Optional Text

Howell, D. C. (2014). *Fundamental Statistics for the Behavioral Sciences*. Thomson.

I will also provide a number of supplemental reading materials on LEARN

Information Available on LEARN

The course web page can be found on [LEARN](#). Here, you will find links to the syllabus, my lecture slides, lab assignments, practice questions (i.e., previous tests), and to important announcements. I will try my best to have the lecture slides for the upcoming lecture up at least 24 hours in advance of class time.

Course Requirements and Assessment

There will be three tests, each worth 25% of the final grade and three lab assignments cumulatively worth 25% of the final grade (see due dates below). All tests and labs will be based on material presented in the lectures and the lab tutorials.

Assessment	Date of Evaluation	Weighting
Test #1	October 6 th , 2014	25%
Test #2	November 5 th , 2014	25%
Test #3	Final Exam Period	25%
Lab Assignments (N=3)	October 1 st (5%), November 10 th (10%), and December 1 st (10%)	25%
Research Participation		4%
Total		104%

Tests (75%):

In total, there will be three tests in this course. The dates for these tests can be found on the course outline. The content of the tests will be a combination of short answer and long answer, and will involve both conceptual and computational material.

Lab Assignments (15%)

There will be three lab assignments in this course. The first lab assignment will be worth 5%, and the remaining two will be worth 10% of your final grade each. As with all work in this course, you are to complete the assignments on your own. It is important that you show all of your work for each assignment (i.e., all calculations). All assignments will be due at the start of class and all late assignments will be penalized. For every class that an assignment is late, 25% will be deducted from your assignment grade. For example, if you received 100% on lab assignment 1 but handed it in one class late you would receive 75% on the assignment.

Lab Tutorials:

Each student should be registered in a lab section. Labs are intended to provide students with hands on experience with SPSS. For the most part, we will spend class time discussing the logic and rationale behind the statistical procedures covered in this course. The lab schedule is posted on page 3 of this syllabus.

Nexus Accounts

Because you will be required to complete portions of your lab assignments with SPSS, it is important that you obtain a NEXUS account. A NEXUS account will give you access to e-mail, the internet, and a host of different software packages (including SPSS which you will need for the lab assignments). The only cost incurred with a NEXUS account is printing. You can purchase printing at PAS 1080 using your WATCARD. It is strongly recommended that you activate your NEXUS account, find the SPSS statistical package, and become familiar with it before the first lab. You can obtain a NEXUS account by: (a) going to a NEXUS computer (e.g., one located in PAS 1237), (b) clicking on the link in the bottom-left corner of the login browser, and (c) following the instructions as they are given on the screen.

Lecture Schedule

Days	Topic	Readings	Labs
Sept 8	Introduction to course		
Sept 10	Review of Basic Concepts	Chap: H 1, 2, 4, 5, 6, 8	
Sept 15	Hypothesis Testing, T-tests (Handout L1)	Chap: H 12-14	
Sept 17	Power	Chap: H 15	Lab1
Sept 22	ANOVA	Chap: H 16	
Sept 24	ANOVA	Chap: H 16	Lab2
Sept 29	ANOVA	Chap: H 16	
Oct 1*	ANOVA + Mid-term Review (L1 Due)		
Oct 6*	Test #1		
Oct 8	Multiple Comparisons: Planned comp		
Oct 13	No Class – Thanksgiving Day		
Oct 15	Multiple Comparisons: Planned comp	Chap: Sup 1	Lab3
Oct 20	Multiple Comparisons: Post Hoc (Handout L2)	Chap: Sup 1	
Oct 22	Multiple Comparisons: Post Hoc	Chap: Sup 1	Lab4
Oct 27	Factorial ANOVA	Chap: Sup 1	
Oct 29	Factorial ANOVA	Chap: H 17	Lab5
Nov 3	Factorial ANOVA & Midterm Review	Chap: H 17	
Nov 5*	Test #2		
Nov 10*	Repeated Measures (Handout L3, L2 Due)	Chap: H 18, Sup 2	
Nov 12	Repeated Measures	Chap: H 18, Sup 2	Lab6
Nov 17	Mixed Designs	Sup 2	
Nov 19	Mixed Designs	Sup 2	Lab7
Nov 24	Factorial Repeated Measures	Sup 2	
Nov 26	Factorial Repeated Measures (3-Factor Experiments)	Sup 2	Lab8
Dec 1*	Final Review (L3 due)	Sup 2	

H - Refers to the Howell (2014) text entitled “*Fundamental Statistics for the Behavioral Sciences*”

Sup - Refers to two chapters from supplemental readings.

L1-L3: Refers to the three lab assignments

Lab Tutorial/Review Schedule

Lab#	Date	Objective
No Lab	Week of Sept 8 th	----
Lab 1	Week of Sept 15 th	Intro to SPSS, t-tests
Lab 2	Week of Sept 22 nd	One-way ANOVA
No Lab	Week of Sept 29 th	----
Review Session	Friday Oct 3 rd	Available for questions on Friday before Test #1 (location and time TBA)
No Lab	Week of Oct 6 th	----
Lab 3	Week of Oct 13 th	Multiple Comparisons: A Priori
Lab 4	Week of Oct 20 th	Multiple Comparisons: Post Hoc
Lab 5	Week of Oct 27 th	Factorial ANOVA with post hoc
No Lab	Week of Nov 3 rd	----
Review Session	Tuesday Nov 4 th	Available for questions on Tuesday before Test #2 (location and time TBA)
Lab 6	Week of Nov 10 th	Repeated Measures ANOVA with post hoc
Lab 7	Week of Nov 17 th	Mixed Factorial ANOVA with post hoc
Lab 8	Week of Nov 24 th	Factorial Repeated Measures ANOVA with post hoc
Review Session	TBA	Available for questions on day before Test #3 (location and time TBA)

Research Experience Marks

Information and Guidelines: Experiential learning is considered an integral part of the undergraduate program in Psychology. Research participation is one example of this, article review is another. A number of undergraduate courses have been expanded to include opportunities for Psychology students to earn grades while gaining research experience.

Since experiential learning is highly valued in the Department of Psychology, students may earn a **"bonus" grade of up to 4%** in this course through research experience. Course work will make up 100% of the final mark and a "bonus" of up to 4% may be earned and will be added to the final grade if/as needed to bring your final grade up to 100%. The two options for earning research experience grades (participation in research and article review) are described below. Students may complete any combination of these options to earn research experience grades.

Option 1: Participation in Psychology Research: Research participation is coordinated by the Research Experiences Group (REG). Psychology students may volunteer as research participants in lab and/or online (web-based) studies conducted by students and faculty in the Department of Psychology. Participation enables students to learn first-hand about psychology research and related concepts. Many students report that participation in research is both an educational and interesting experience. Please be assured that all Psychology studies have undergone prior ethics review and clearance through a University of Waterloo Research Ethics Committee.

Educational focus of participation in research: To maximize the educational benefits of participating in research, students will receive feedback information following their participation in each study detailing the following elements:

- Purpose or objectives of the study
- Dependent and independent variables
- Expected results
- References for at least two related research articles
- Provisions to ensure confidentiality of data
- Contact information of the researcher should the student have further questions about the study
- Contact information for the Director of the Office of Research Ethics should the student wish to learn more about the general ethical issues surrounding research with human participants, or specific questions or concerns about the study in which s/he participated.

Participation in LAB studies is worth 0.5 participation credits (grade percentage points) for each 30-minutes of participation. Participation in ONLINE studies is worth .25 credits for each 15-minutes of participation. Researchers will record student's participation and will advise the course instructor of the total credits earned by each student at the end of the term.

How to participate?

Study scheduling, participation and grade assignment is managed using the SONA online system. All students enrolled in this course have been set up with a SONA account. You must get started early in the term.

[INSTRUCTIONS/DATES/DEADLINES: How to log in to Sona and sign up for studies](#)

***** Please do not ask the Course Instructor or REG Coordinator for information unless you have first thoroughly read the information provided on this website. *****

More information about the REG program is available at: [REG Participants' Homepage](#)

Option 2: Article Review as an alternative to participation in research: Students are not required to participate in research, and not all students wish to do so. As an alternative, students may opt to gain research experience by writing short reviews (1½ to 2 pages) of research articles (i.e., scientific journal articles) relevant to the course. *You must contact your TA to get approval for the article you have chosen before writing the review.* Each review article counts as one percentage point. To receive credit, you must follow specific guidelines. The article review must:

- **Be submitted before the last lecture. Late submissions will NOT be accepted under ANY circumstances.**
- Be typed
- Fully identify the title, author(s), source and date of the article. A copy of the article must be attached.
- Identify the statistical concepts in the article and critically evaluate the application or treatment of those concepts in the article. If inappropriate or incorrect, identify the error and its implications for the validity of the article. You may find, for example, misleading headings, faulty research procedures, alternative explanations that are ignored, failures to distinguish factual findings from opinions, faulty statements of cause-effect relations, errors in reasoning, etc. Provide examples whenever possible.
- Clearly evaluate the application or treatment of those concepts in the article.
- Keep a copy of your review in the unlikely event we misplace the original.

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.

Concerns About the Course or Instructor (Informal Stage)

We in the Psychology Department take great pride in the high quality of our program and our instructors. Though infrequent, we know that students occasionally find themselves in situations of conflict with their instructors over course policies or grade assessments. If such a conflict arises, the Associate Chair for Undergraduate Affairs (Dr. Richard Eibach) is available for consultation and to mediate a resolution between the student and instructor. Dr. Eibach's contact information is as follows: Email: reibach@uwaterloo.ca, Phone: 519-888-4567, x38790. 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. See Policy 70 and 71 below for further details.

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)