
	<p><b>Psychology 391</b></p> <p><b>Advanced Data Analysis</b></p> <p><b>Fall, 2010</b></p>	
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**\*UPDATED SEPTEMBER 13<sup>th</sup> 2010\***

**Class Time:** Mondays & Wednesdays 2:30 - 3:50  
**Place:** AL 113  
**Instructor:** Jonathan Fugelsang  
**Office:** PAS 4055  
**Office Hours:** Monday & Wednesday 4:30 - 5:30, and by appointment.  
**Phone:** 888-4567 x37197  
**Email:** [jafugels@uwaterloo.ca](mailto:jafugels@uwaterloo.ca)

**Teaching Assistants:**

Justin Deonarine  
Office: PAS 4211  
Office Hour: Tuesday 1:00-2:00  
Email: [jdeonari@uwaterloo.ca](mailto:jdeonari@uwaterloo.ca)  
Tutorial: 102 (Thursday 12:30 - 1:20)


Amandine Lassalle  
Office: PAS 2248  
Office Hour: Friday 1:30-2:30  
Email: [alassall@uwaterloo.ca](mailto:alassall@uwaterloo.ca)  
Tutorial: 105 (Friday 12:30 - 1:20)

Jesse Langstaff  
Office: PAS 4049  
Office Hour: Wednesdays 5:30-6:30  
Email: [jlangsta@uwaterloo.ca](mailto:jlangsta@uwaterloo.ca)  
Tutorial: 101 (Wednesday 4:30-5:20)

Olivia Lin  
Office: PAS 4043  
Office Hour: Thursday 6:30-7:30  
Email: [y39lin@uwaterloo.ca](mailto:y39lin@uwaterloo.ca)  
Tutorial: 104 (Thursday 5:30 - 6:20)

Gordon Pennycook  
Office: PAS 4043  
Office Hour: Thursday 9:30-10:30  
Email: [gpennyco@uwaterloo.ca](mailto:gpennyco@uwaterloo.ca)  
Tutorial: 103 (Thursday 8:30 - 9:20)

**Text:**

	<p>Howell, D. C. (2008). <i>Fundamental Statistics for the Behavioral Sciences</i>. Thomson.</p> <p><i>*I have also provided a number of supplemental reading materials on UW-ACE*</i></p>
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**Course Objectives:**

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 Requirements:**

Requirement	Date	Value
Test #1	October 13th	25%
Test #2	November 10 <sup>th</sup>	25%
Test #3	Final Exam Period	25%
Graded Labs (N=3)	October 6 <sup>th</sup> (5%), November 3 <sup>rd</sup> (10%) and December 6 <sup>th</sup> (10%)	25%
Research Participation (or assignment)		4%

### TENTATIVE LECTURE SCHEDULE

Days	Topic	Readings	Tutorials
Sept 13	Introduction to course		
Sept 15	Review of Basic Concepts	Chap: H 1, 2, 4, 5, 6, 8	
Sept 20	Hypothesis Testing, T-tests ( <b>Handout L1</b> )	Chap: H 12-14	
Sept 22	Power	Chap: H 15	<b>Tut1</b>
Sept 27	ANOVA	Chap: H 16	
Sept 29	ANOVA	Chap: H 16	<b>Tut2</b>
Oct 4	ANOVA	Chap: H 16	
<b>Oct 6</b>	ANOVA & Mid-term Review ( <b>L1 Due</b> )		
Oct 11	<b>No Class: Thanksgiving Day</b>		
<b>Oct 13</b>	<b>Test #1</b>		
Oct 18	Multiple Comparisons: Planned comp ( <b>Handout L2</b> )	Chap: Sup 1	
Oct 20	Multiple Comparisons: Planned comp	Chap: Sup 1	<b>Tut3</b>
Oct 25	Multiple Comparisons: Post Hoc	Chap: Sup 1	
Oct 27	Multiple Comparisons: Post Hoc	Chap: Sup 1	<b>Tut4</b>
Nov 1	Factorial ANOVA	Chap: H 17	
Nov 3	Factorial ANOVA ( <b>L2 due</b> )	Chap: H 17	<b>Tut5</b>
<b>Nov 8</b>	Factorial ANOVA & Midterm Review		
<b>Nov 10</b>	<b>Test #2</b>		
Nov 15	Repeated Measures ( <b>Handout L3</b> )	Chap: H 18, Sup 2	
Nov 17	Repeated Measures	Chap: H 18, Sup 2	<b>Tut6</b>
Nov 22	Mixed Designs	Sup 2	
Nov 24	Mixed Designs	Sup 2	<b>Tut7</b>
Nov 29	Factorial Repeated Measures	Sup 2	
Dec 1	Factorial Repeated Measures	Sup 2	<b>Tut8</b>
<b>Dec 6</b>	Final Review Day ( <b>L3 due</b> )	Sup 2	

**H** - Refers to the Howell (2011) text entitled “*Fundamental Statistics for the Behavioral Sciences*”

**Sup** - Refers to two chapters from supplemental readings.

**L1-L3**: Refers to the three lab assignments

### TENTATIVE TUTORIAL/REVIEW SCHEDULE

Tutorial #	Date	Objective
No Tutorial	Week of Sept 13 <sup>th</sup>	----
<b>Tutorial 1</b>	Week of Sept 20 <sup>th</sup>	Intro to SPSS, t-tests
<b>Tutorial 2</b>	Week of Sept 27 <sup>th</sup>	One-way ANOVA
No Tutorial	Week of Oct 4 <sup>th</sup>	----
<b>Review Session</b>	Tues October 12 <sup>th</sup>	Available for questions on Tuesday before Test #1 (location and time TBA)
No Tutorial	Week of Oct 11 <sup>th</sup>	----
<b>Tutorial 3</b>	Week of Oct 18 <sup>th</sup>	Multiple Comparisons: A Priori
<b>Tutorial 4</b>	Week of Oct 25 <sup>th</sup>	Multiple Comparisons: Post Hoc
<b>Tutorial 5</b>	Week of Nov 1 <sup>st</sup>	Factorial ANOVA with post hocs
No Tutorial	Week of Nov 8 <sup>th</sup>	----
<b>Review Session</b>	Tues Nov 9 <sup>th</sup>	Available for questions on Tuesday before Test #2 (location and time TBA)
<b>Tutorial 6</b>	Week of Nov 15 <sup>th</sup>	Repeated Measures ANOVA with post hocs
<b>Tutorial 7</b>	Week of Nov 22 <sup>nd</sup>	Mixed Factorial ANOVA with post hocs
<b>Tutorial 8</b>	Week of Nov 29 <sup>th</sup>	Factorial Repeated Measures ANOVA with post hocs
<b>Review Session</b>	TBA	Available for questions on day before Test #3 (location and time TBA)

### **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.

### **Labs (15%):**

There will be three lab assignments in this course. The first lab 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. Any assignments handed in after the start of the class in which it is due will be penalized as if it was one class late. For every class that an assignment is late, 25% will be deducted from your assignment grade. For example, if you received 100% on assignment 1 but handed it in one class late you would receive 75% on the assignment.

### **Tutorials:**

Each student should be registered in a tutorial section. Tutorials are intended to provide students with an opportunity to work through the mechanics of the statistical procedures with a TA in a smaller group setting, as well as give 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 tentative tutorial schedule is posted on page 2 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. 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.

### **Helpful suggestions to ensure your success in this (or any) class:**

1. Read the chapter before coming to class.
2. Look over the lecture notes before coming to class.
3. Take additional notes to supplement the class notes that are provided (note: I often supplement the text and class note materials with examples that will only be provided during lectures).
4. If you have questions, please ask.
5. Be aware of the due dates.
6. After a chapter has been covered, see if you can complete the exercises at the end of the chapters.
7. Come by and visit one of the TA's or me during office hours.

### **Research Experience - Guidelines for Psychology 391:**

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" 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 the Office of Research Ethics.

### **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 is worth 0.5 participation credits (grade percentage points) for each half-hour 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. Study scheduling, participation and grade assignment is managed online on the SONA website.

Detailed instructions on how to use SONA to participate in studies can be found at <http://www.arts.uwaterloo.ca/~regadmin/regparticipant/sonainfo/#SonaSignUp>

More information about the REG program is available at: <http://www.arts.uwaterloo.ca/~regadmin/regparticipant/>

### **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 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 psychological concepts in the article and indicate the pages in the textbook that are applicable. 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.

### **The Official Version of the Course Outline:**

If there is a discrepancy between the hard copy outline and the outline posted on ACE, the outline on ACE will be deemed the official version. Outlines on ACE may change as instructors develop a course, but they become final as of the first class meeting for the term.

### **Accommodations for Students with Disabilities:**

The Office for Persons with Disabilities (OPD), 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 OPD 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. Colin Ellard) is available for consultation and to mediate a resolution between the student and instructor. Dr. Ellard's contact information is as follows:

Email: [cellard@uwaterloo.ca](mailto:cellard@uwaterloo.ca)

Ph 519-888- 4567 ext 36852

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 Offenses, Grievance, and Appeals:**

To protect course integrity, as well as to provide appropriate guidance to students, course outlines in the Faculty of Arts must include the following note on avoidance of academic offenses:

Academic Integrity: In order to maintain a culture of academic integrity, members of the University of Waterloo community are expected to promote honesty, trust, fairness, respect and responsibility. [Check <http://www.uwaterloo.ca/academicintegrity/> for more information.]

Discipline: A student is expected to know what constitutes academic integrity [check <http://www.uwaterloo.ca/academicintegrity/>], to avoid committing academic offenses, and to take responsibility for his/her actions. A student who is unsure whether an action constitutes an offense, or who needs help in learning how to avoid offenses (e.g., plagiarism, cheating) or about 'rules' for group work/collaboration should seek guidance from the course instructor, 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](http://www.adm.uwaterloo.ca/infosec/Policies/policy71.htm) - Student Discipline, <http://www.adm.uwaterloo.ca/infosec/Policies/policy71.htm>

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](http://www.adm.uwaterloo.ca/infosec/Policies/policy70.htm) - Student Petitions and Grievances, Section 4, <http://www.adm.uwaterloo.ca/infosec/Policies/policy70.htm>

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](http://www.adm.uwaterloo.ca/infosec/Policies/policy72.htm) - Student Appeals, <http://www.adm.uwaterloo.ca/infosec/Policies/policy72.htm>

**Academic Integrity website (Arts):** [http://arts.uwaterloo.ca/arts/ugrad/academic\\_responsibility.html](http://arts.uwaterloo.ca/arts/ugrad/academic_responsibility.html)

**Academic Integrity Office (UW):** <http://uwaterloo.ca/academicintegrity/>