

PSY 302 | Statistical Methods in Psychology | Summer 2015

Core Info

Class Meetings

Component	CRN	Days	Time	Room
Lecture	41884	Monday, Tuesday, Wednesday, Thursday	10:00-10:50	301 Condon
Lab	42222	Friday	11:00-11:50	006 Straub
Lab	41886	Friday	10:00-10:50	006 Straub

Instructors and Office Hours

Name	Role	Office	Office Hours
Smrithi Prasad	Lab instructor	Straub 461	Tuesdays 10-12
Jason Wallin	Lecture instructor	Straub 432	Wednesdays 11-1, and by appointment

Introduction

Does early adversity relate to later risky decision making? Is emotional development different for children of peaceful marriages compared to those of marriages marked by conflict? Do we more easily process scenes about actions with which we are expert than those with which we are novices? Can an eight-week parent training program change children's ability to sustain their attention? Do atheists and theists differ in their social behaviors? Does having an imaginary friend influence cognitive development?

Psychologists want to find out answers to questions like these and countless others. To do so, we often study just a handful of individuals, couples, or organizations—a sample. While we spend some time describing the performance of this sample, ultimately we want to draw conclusions from this small group to many more people, people who we will never have a chance to measure—a population. How can we do this? How can we make decisions with incomplete information?

In this class, you will learn the basics of frequentist statistics, which is one approach to solving this problem. Statistics are the lingua franca of the sciences, an essential skill for graduate study, and an important tool for a lifetime of careful, critical thought.

Over the next 10 weeks, you will learn graphing and tabling techniques to display sets of data. You will calculate descriptive and inferential statistics by hand and using statistical computing package popular in psychological research. Most importantly, you will understand the results of those calculations, how to interpret the output of the by-hand and computer algorithms that you are learning, and how to select statistical techniques appropriate to a variety of research questions.

Using the knowledge you gain in this class, you will be better equipped to evaluate statistical information reported in popular media as well as in primary research articles. You will also gain skills that will help you analyze and understand data in your own studies in PSY 303.

Students can enter their first statistics course thinking the topic intimidating. By the end of our time together, I hope you find it a little less so, and (dare I say?) even a little interesting.

Basic Structure

You will learn some math in this class, but 302 isn't really a math class. It's perhaps more similar to an engineering course than it is like many traditional math courses you might have taken. That is, we will focus on applications and understanding--on getting stuff done with math--rather than simply crunching numbers.

So, while we will work through formulae together, our intent is not that you can mindlessly step through some algorithm, getting the right answer when you plug numbers into an equation. Instead, our focus is on conceptual understanding of statistics. How do formula "behave?" What do the outcomes mean? What do they tell us about our question of substantive interest?

This course employs traditional lectures and weekly lab meetings. To succeed, you should plan on frequently attending all lecture and lab sessions. Be engaged. Ask questions. Take great notes. Go to office hours.

Come prepared to lectures and labs. Read the assigned chapters and assignments before class and take notes (don't just highlight!) on things you want to remember, and on those things that don't make sense to you. Ask your instructors about your readings.

A most important point: Do not get behind in this class! Each chapter, each lecture, each assignment builds on knowledge and skills from those preceding. If you are struggling early on, it is going to be very difficult to catch up. Talk to your instructors earlier, rather than later. If you're waiting until the end of the term, it's probably too late.

Check your e-mail and the Canvas site often, as we will be frequently posting important information using each.

This is a four-credit course. According to University principles governing credit and contact hours, each credit should be associated with about 30 hours of work over the term. That means you should plan on about 120 hours (15 hours a week) of work dedicated to this course. This includes 5 hours a week of lecture and lab, plus 10 hours a week of reading, homework, etc.

Graded Components

Component	Weight	Details	Deadlines	Notes
Aplia assignments	24.5%	7 weekly assignments (1-3 chapters each), each weekly assignment is worth 3.5%	Due every Friday at noon, weeks 2-8. No late submissions.	<p>You can submit each chapter up to three times. Your chapter score will be the average (mean) of your submissions. Second and third submissions will only be counted if they help your score.</p> <p>If a weekly assignment includes more than one chapter, your assignment total will be the average (mean) of the percentages from individual chapters. (That is, each chapter will be equally weighted toward that week's assignment total.)</p> <p>Aplia assignments are graded automatically by the Aplia software. You should get feedback on your performance right away.</p>
Lab (SPSS) homework	10.5%	6 weekly assignments, each is worth 1.75%	Due every Friday at noon, weeks 2, 4-8. No late submissions.	Lab homework is graded by lab instructors. Allow a week for feedback after you've submitted your assignment.
Midterm I	15%	Multiple choice items, computations, short answer items.	Thursday week 3 in lecture	Material on midterms will be drawn from lecture, readings, and lab materials. This exam will cover chapters 1-7.
Midterm II	15%	Multiple choice items, computations, short answer items.	Thursday, week 6 in lecture	Material on midterms will be drawn from lecture, readings, and lab materials. This exam will be semi-cumulative. It will focus on material from chapters 8-12. However, it will also probe overall themes that might have been introduced during the first midterm exam.
Final Exam	25%		Thursday, week 10 in lecture (8:00-10:00)	The final exam will have a semi-cumulative component, focusing on the lecture material since the last midterm. Additionally, it will include a cumulative component, covering major themes from the entire course, with particular emphasis on your ability to select the right statistical test for a given research

				question or collection of data.
Participation	10%	Attendance, answering when I call on you, out-of-class activities, pop quizzes (only if attendance and attention start to lag!)		I will grade participation on a curve--generally, I consider the the participation score for the top student(s) to be 100% and scale others' scores relative to this value.
Extra credit	Up to 2%		<p>First summary deadline: Friday, Week 4</p> <p>Second deadline: Friday, Week 8</p>	<p>You have two options for extra credit. You may choose only one option, for up to 2% extra credit.</p> <p>Article summaries: If you are submitting article summaries (see below), you may submit one or two during weeks 1-4, but you may only submit ONE during weeks 5-8.</p> <p>Research participation: You may participate in studies at any time during Weeks 1-8 for credit.</p>

On Testing

I consider testing to be an opportunity for teaching, so come ready to challenge yourself, to learn something new. Do not expect the exams to be 100% regurgitation, but to ask you to stretch, to apply your knowledge in novel ways.

Midterms and the final exam will be rescheduled a) only for valid reasons, typically university-related academic or athletic events; and b) only with adequate notice, at least one week (but the first week of the term is best). Documented medical emergencies will be considered on a case by case basis, and must be supported by adequate documentation.

Extra Credit

You have two options for extra credit. These might allow you to raise your overall grade by as much as 2%. You may choose only one option; you cannot get credit for both, nor for any combination of the two.

Extra credit option 1: Summary of methods from a published empirical report. You can summarize up to two research articles for extra credit. Each summary must be double spaced, with 1-inch margins, using 12-point Times (or Times New Roman). You must select a peer-reviewed journal article (no newspaper or magazine accounts, no book chapters) that reports empirical findings in psychology or a closely related discipline (e.g. cognitive linguistics, anthropology). An empirical report usually includes an introduction, method, results, and discussion section. Review articles, theoretical papers, meta-analyses, book reviews, and other types of articles are not appropriate. See me during office hours, if you need help.

The primary substantive question in the paper must be addressed with one of the statistical tests we cover this quarter: z-test, t-test, ANOVA, correlation, linear regression, or chi-square.

Your summary must include:

- An APA-formatted reference for the article. Here's a link with info on formatting:
<https://owl.english.purdue.edu/owl/resource/560/07/>
- A coherent paragraph that summarizes the background and motivation for the investigation you read about. Here's one way you might approach this. Begin with the primary research question, in one sentence. Write two sentences about what the field already knows about this topic. Write one sentence about the "hole" in the literature that the investigation is trying to fill: what was still unknown or what was still in disagreement. Write one sentence that is the hypothesis for the study--what outcomes did they predict--and another sentence making it clear how this prediction fills the "hole" you identified.
- A coherent paragraph that quickly summarizes the approach, findings, and significance. Again, here's one way you might approach this. Begin with one or two well-crafted sentences that describe the research in very broad strokes. In another sentence, describe the major findings from the hypothesis test. Then, in one or two sentences, summarize why this is important. How

did it relate to the original research question? What do we know now that we didn't know before?

- Finally, you will pay special attention to the reporting of statistics in the paper. You will copy and paste statistical information from the article--this will include both descriptive statistics and inferential statistics that relate to the primary hypothesis test. Then, you will annotate this statistical reporting with your own interpretations--you will do your best to explain to me what the statistics are and what they mean. I am happy to walk you through this process during office hours.

Extra credit option 2: Research Participation. You can participate in Psychology Department research through the Psychology Department Human Subjects Pool. For each credit of participation assigned to Psych 302, you can earn a 1% improvement to your final grade, for up to 2%.

Quarter Letter Grades

A+	97% or more	B+	87-89.9%	C+	77-79.9%	D+	67-69.9%	F	59.9% or less
A	93-96.9%	B	83-86.9%	C	73-76.9%	D	63-66.9%	P	70% or higher (only for P/NP option)
A-	90-92.9%	B-	80-82.9%	C-	70-72.9%	D-	60-62.9%	N	less than 70% (only for P/NP option)

Some Policies

All students. The University of Oregon is working to create inclusive learning environments. Please notify me if there are aspects of the instruction or design of this course that result in disability-related barriers to your participation. You are also encouraged to contact the Accessible Education Center (formerly Disability Services) in 164 Oregon Hall at 541-346-1155 or uoac@uoregon.edu.

If you are repeating this class, or if you are a student with children, a job, or have other circumstances that might affect your ability to devote time to the class, please let me know now so we can discuss strategies to promote your success in this course. If you wait until you have problems in the course it may be too late to salvage your grade, but planning ahead will likely lead to success

Student athletes. You must let me know during the first week of classes if you will miss class due to travel with a UO athletic team and require accommodation. Requirements for the course will not be relaxed for student athletes, however minor scheduling accommodations may be made (e.g., taking a quiz a few hours early) if planned well ahead of time.

Academic integrity. We take academic integrity seriously. Cheating is defined as providing or accepting information on an exam, plagiarism or copying anyone's written work, or allowing someone else to copy your work. In addition, lying to try to get points (e.g., lying about having turned in an assignment on-time) is considered academic dishonesty and will be treated as cheating. Discovery that a student has cheated will lead to a grade of F in the course for that student, and we will inform UO's student conduct coordinator. We retain the right to assign seats for tests, to change an individual's seating for test security purposes, and to require and check ID for admission to tests.

Collaboration. We strongly encourage collaborative learning, but you must produce (and we must

assess) individual work. Discussing homework with other students and instructors is encouraged, as are homework and study groups. Talking over problems and reworking them when you get different answers promotes deeper understanding of concepts. However, each student must submit a separate homework which was written independently (no word-for-word copying), and you must show your work for hand calculations. Thus, while you should work together to solve problems and check answers, the actual writing of answers needs to be done independently.

Your work on any exams must be your own. Copying the work of others on these is cheating, and will lead to an F for the course. The University may impose additional penalties in accordance with the student conduct code. Exams are a reflection of individual work--rely on your own knowledge only.

How to Do Well in PSY 302

1. **Keep up and keep trying.** Read assigned chapters early and often. Keep slogging through even if you only understand half of what you read. Persistence really will pay off – concepts will sink in. Come to lecture and lab. Start homework immediately so you finish in time to compare with others. Turn it in on time.
2. **Work hard on understanding early material.** If you get the concepts in the first half of the term, the second half will deepen your understanding. If you don't grasp concepts in the first half, the second half may seem like a maze of confusing techniques. Seek help early if you are feeling lost.
3. **Stay in touch and speak up.** We want you to do well! Ask questions in class and lab. Forming a clear question helps you discover what you do and do not understand, which is vital to mastering this subject.

How to Do Poorly in PSY 302

1. **Conclude that struggling in the course means you don't/can't get statistics.** This course draws on more than one type of skills – math plus conceptual understanding. Almost every student struggles with some element of the course. Failing on something is an indicator that you need to put in more effort – not that you aren't smart enough. We do our best to teach in a way that meets your needs—if you let us know when you don't understand something, we can better understand what those needs are.
2. **Be passive when listening and reading.** You should be writing, drawing, figuring, asking questions in the margins. Think with a pencil in hand. Turn the concepts into something you do. To succeed, you must be able to explain and execute.
3. **Relying on beginner's luck.** Doing it right once doesn't mean you can repeat the trick. Getting it wrong helps you understand how the process works. Mistakes help you learn.
4. **Cram.** You can cram content, but skills don't compress. Don't fall behind; it's very hard to catch up.
5. **Give up because you get stuck.** Everyone gets stuck. Math is all about getting stuck and unstuck. When this happens, play around. Try a new tactic. Ask for help.

6. **Confuse spectator overconfidence with practiced skill.** Watching someone go through the steps is a starting point, but you have to get in the pool to learn how to swim.

Rationale and Student Outcomes

Rationale

PSY 302 is aligned with a primary mission¹ of the University of Oregon: a "commitment to undergraduate education, with a goal of helping the individual learn to question critically, think logically, communicate clearly, act creatively, and live ethically".

Additionally, PSY 302 is aligned with the American Psychological Association's Guidelines for the Undergraduate Major.² The second goal of those guidelines relates to scientific inquiry and critical thought, including the ability to 'interpret, design, and conduct basic psychological research."

In 302, you will acquire a set of tools to aid your critical inquiry, contribute to a reasoned life, and help you make the best use out of the findings of psychological science.

Finally, PSY 302 aligns with one of the basic learning goals³ that the UO Psychology Department has for all psychology majors. The department holds that all majors should be able to "choose appropriate basic statistical analysis techniques for a specific research question and set of data, complete basic data analyses, and summarize the results in an APA-style report."

Outcomes

Students of PSY 302 learn a variety of statistical terms and procedures. To successfully apply their knowledge to new situations and master the content of Psychology 303 (Research Methods), students also need to acquire a more abstract level of understanding that underlies specific skills.

Here we specify both these abstract principles and the more specific skills:

Principle 1. One goal of statistics is measuring the strength of a potential effect, such as the size of any difference between groups/conditions or the relationship among variables. This is done by assessing the size of an effect in a sample (e.g., the difference between two groups) in relation to the total variability in the sample (e.g., the standard deviation around means). Students need to understand how this principle applies to different designs and data sets (e.g., correlation, analysis of variance).

Principle 2. Inferential statistical tests allow us to make yes/no decisions about hypotheses by identifying the "range of data situations" that is plausible if the null hypothesis (i.e., no difference among groups or relationship among variables) is correct. For example, under the null hypothesis the distribution of sample differences between two groups has a mean of zero with a standard error determined by variance and sample size. For an analysis of variance the null hypothesis sampling distribution is defined by the ratio of between- group and within-group variance.

Skill 1. Upon reading the description of a study, infer the research question, hypotheses, and study

design, and identify the nature of variables involved (dependent vs. independent, scales of measurement)

Skill 2. Determine which statistical tests are appropriate for a given research question and data structure.

Skill 3. Complete statistical analyses in SPSS, including entering data in the appropriate format, selecting options to get the data needed, and running appropriate tests.

Skill 4. Extract key information from the output of SPSS analyses to assess the plausibility of test assumptions, make decisions about hypotheses, and create tables or figures to illustrate the results.

Skill 5. Summarize the results of data analyses within an APA-style report, using appropriate statistical terminology and providing an interpretation in light of the research question. This includes presenting the results of hypothesis tests along with appropriate measures of effect size or confidence intervals and relevant descriptive statistics.

1 <http://pages.uoregon.edu/uosenate/UOmissionstatement.html>

2 <http://www.apa.org/ed/precollege/about/psymajor-guidelines.pdf>

3 <http://cas.uoregon.edu/learning-outcomes/>

Tentative Calendar

Week	Topics	Readings	Items Due
1	Introduction, variables, visualizing univariate and bivariate distributions, central tendency	Chs. 1-3	None
2	Variability, z-scores, probability	Chs. 4-6	Aplia due Friday Lab HW due Friday
3	Sampling distributions, hypothesis testing	Chs. 7 & 8	Aplia due Friday No Lab HW Midterm I on Thursday
4	t-tests (single sample, independent samples, paired)	Chs. 9-11	Aplia due Friday Lab HW due Friday First EC deadline on Friday
5	ANOVA: Introduction, one-way independent	Ch. 12	Aplia due Friday Lab HW due Friday
6	ANOVA: Factorial and repeated measures	Ch. 13	Aplia due Friday Lab HW due Friday Midterm II on Thursday
7	Correlation & regression	Ch. 14	Aplia due Friday Lab HW due Friday
8	Chi-square & review for final	Ch. 15	Aplia due Friday Lab HW due Friday Final on Thursday Second EC deadline on Friday

Academic Deadlines (from DuckWeb)

Deadline	Last day to:
June 25:	Drop this course (100% refund, no W recorded)
June 28:	Drop this course (75% refund, no W recorded)
June 30:	Last day to change to or from audit
June 30:	Add this course
July 1:	Withdraw from this course (75% refund, W recorded)
July 7:	Withdraw from this course (50% refund, W recorded)
July 13:	Withdraw from this course (25% refund, W recorded)
July 29:	Withdraw from this course (0% refund, W recorded)
July 28:	Change grading option for this course