

**Psychology 302: STATISTICAL METHODS**

242 Gerlinger Hall, MW 14:00-15:20 (2-3:20 pm)

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**Office Hours:** Mondays 11-11:30 am, Thursdays 9:30 - 11 am, or by appointment

**Teaching Assistants:** Bill Schumacher, 320 Straub, 346-4990, [wms@uoregon.edu](mailto:wms@uoregon.edu), Jordan Miller-Ziegler, 323 Straub, 346-4902, [jmillerz@uoregon.edu](mailto:jmillerz@uoregon.edu)

**TA Office Hours:** Bill's are Mondays 1-2 pm, Tuesdays 2-3 pm. Jordan's are Tuesdays and Fridays 12-1 pm

**Text:** Nolan, S. A., & Heinzen, T. E. (2011). *Essentials of statistics for the behavioral sciences*. New York: Worth.

**Course Objectives (or, what's the purpose of this course?)**

Welcome to Psychology 302. Statistical methods are a crucial part of research in many sciences, including psychology. Statistical analyses help scientists (and everyday people) discern patterns in phenomena, determine the relative generalizability of these patterns, and estimate how high is the probability that these patterns have real existence -- rather than being merely reflecting someone's imagination or ideology or wishful thinking. And statistics is an important *conceptual* structure for thinking in a rational and scientific way about phenomena, helping people make good sense of the world -- and stay in touch with reality! This course is designed to help you gain:

1. The ability to understand and explain to others the statistical analyses and statistical concepts in reports of social and behavioral science research.
2. Preparation for learning about research methods, and about more advanced statistical methods.
3. Ability to identify the appropriate statistical procedure for many basic research situations and to carry out necessary computations, whether by hand or computer.
4. Further development of your quantitative and analytic thinking skills and reasoning ability.

Reasoning in a logical manner is more important to understanding of psychological statistics than is manipulating complex equations. Inescapably, the course involves numbers, but if you have basic arithmetic and algebra skills, the mathematical part of the course is straightforward. Much concerns conceptual approaches for "critical thinking" about observations (about data), how to describe these observations, and how to make proper inferences from them.

**What Methods Are Used for Learning?**

1. Reading the assigned material. That includes following the numeric examples closely and writing down questions about anything not entirely clear. *You are expected to read the text*, in full. In this course, the first reading assignments are long, but their pace slows down especially in the last part of the course when the material becomes more advanced.
2. Completing the assigned homework practice problems (and turning them in on time). Statistics involves learned SKILLS, so it necessary to do statistics, not just read and understand.
3. Attending the class sessions, listening closely, asking questions -- be sure to have done the reading *first*. *Do not fall behind!*
4. Studying for, taking, and reviewing answers for quizzes.
5. Attending your lab section, which is a kind of "using statistics" practicum. Be sure to bring questions from the reading with you. Lab sessions are a great chance to get real help with

what is not completely clear, to pursue deeply whatever has excited your interest, and to develop some computer data-analysis experience.

The class format is mainly prepared presentations (i.e., lecture) with response to questions, but there will be some in-class exercises and student participation in work teams. Whereas lab sessions are especially oriented toward homework problems that emphasize calculations, class sessions have more emphasis on a conceptual comprehension of statistical methods and are more directly oriented toward the content of quizzes. This is a very important difference in emphasis: Class and lab sessions are in good part independent and autonomous from each other, though complementary.

### **Summary of Basis for Evaluation**

Your ***final course grade*** is based on the following components:

38% Score on the homework assignments (sometimes called problem sets)

*Note: 35% based on average score on problem sets, 3% is bonus for turning all of them in*

4% Responses to reading (you need to send in two, including at least one by November 2)

4% Sufficient participation in in-class exercises (groups and EFOs, see below) and potentially in lab sections also

4% Score on the half-hour “small quiz” given on October 5

10% First midterm-quiz score

15% Second midterm-quiz score

25% Score on the final quiz (exam)

This final percentage is then converted into a grade. **A** range is 90% to 100%, **B** range is 80% to 90%, **C** range 70% to 80%, **D** range 60% to 70%, with ‘+’ and ‘-’ being assigned if the percentage is within the top or bottom 1/3, respectively, of each of these ranges. **F** is 59.99% or lower (there is, of course, no F+ or F-). Note that there is no grade for class attendance *per se*, but if you miss most of the class sessions that obstructs your “sufficient participation” credit.

### **Lectures and Laboratories**

At the end of the syllabus is a list of lecture topics and reading assignments. Please read the relevant section of the text before the lecture to which it corresponds. Note also that lecture notes will be available on the Blackboard web site (see below) by 10 am, 4 hours prior to each class. To avoid copying down the content on class slides, you can bring these notes to class. In addition to attending lectures, you must also enroll in and attend one of the 4 weekly statistical laboratories run by the class TAs. The labs will be held in 180 Straub, the Psychology Department’s computer lab (open 8am-9pm Monday through Thursday, and 8-5 Friday). The labs will provide an opportunity to gain hands-on computing experience relevant to concepts discussed in lectures. The statistical software for this course is a recent version of SPSS for Windows (sometimes labeled PASW) that is installed on the computers in 180 Straub. The labs will also involve discussion of the weekly homework, going over quizzes, as well as allowing you the chance to raise any questions you have concerning lectures or the textbook. Labs begin in Week 1 including an introduction to the SPSS computer package and to frequency tables. The follow-up course to 302 is 303 (Research Methods in Psychology), and computer stats are usually a major part of 303. They’re also very useful in the world of work beyond the University.

### **Components of Your Performance in Psychology 302**

In order to give ongoing performance feedback, and help students keep focus on the important subject matter of this course (a prerequisite to upper division courses in psychology), the course does have quizzes. The quizzes include a “small quiz” at the end of week 2, two midterm quizzes and a final quiz (i.e., exam). These quizzes consist of a combination of “problem” items, multiple-choice, fill-in-the-blank, and mini-essay items. *Compared to homework, quizzes place far more emphasis on conceptual understanding and less on calculations.* The midterms will begin approximately 10 minutes into the class session (i.e., at 2:10 pm) on the day scheduled for each quiz; the first 10 minutes of these midterm class-sessions will be devoted to presentation or review of material that will make up part of the quiz, so it makes sense to come to class on time that day (like every day). If you *must* miss a quiz, talk to the instructor, as it may be possible (e.g., with a signed medical excuse) to arrange a make-up quiz (different version than the one given earlier in class) on the first day of the final exam period; there will be no make-up quizzes prior to the final-exam period.

All quizzes are cumulative, but all have an emphasis on more recent material, and are closed-book. Because comprehension rather than memorization is the goal, we will provide a list of mathematical formulas on the quiz form; your job will be to know what formula is relevant to a particular problem and how to use it correctly. It will be helpful to have a calculator for the quizzes but to receive credit for calculation problems you will need to show each step of your calculations; do not rely on advanced calculators that directly compute complex formulas. Individuals may submit written challenges to their quiz grade immediately after quizzes are administered. Grades will be adjusted only if the challenge is successful and ONLY for the individual that submitted the challenge.

Sufficient participation credit is gained from in-class exercises, which are of two major kinds. First, we will have in-class groups to carry out learning-focused exercises during class sessions. These groups will often be responsible for producing a written product/report when they meet, and your credit for “sufficient participation” will be based on how often you are around to sign these products/reports, and on your being reasonably cooperative with other group members. EFO (early feedback opportunity) exercises are essentially “one-minute tests” designed not so much to evaluate your performance as to enable you to check how well you understand key course material, providing valuable performance feedback. Credit on these EFOs is based not at all on whether you got the right answer, but only on whether you put in effort to see how well you could do. Consistent inattendance at lab sections may also factor into sufficient participation credit.

Like sufficient participation credit, the purpose of responses to readings is to give students incentive for putting themselves in a position to learn something (via reading and attending class). Two responses to readings are due overall. They can be submitted prior to any class session except those with quizzes or exams or those with no new reading assignment. At least one must be submitted by November 2, the other one can be at any point in the term. You are assigned to **send by e-mail to the instructor** (with a cc to your lab instructor) **by 10 am** (four hours before class) a response to the assigned chapter(s) for that day. Please begin the subject line of the e-mail with the number “302.” To get credit, responses must be on time and do one of the following: (1) state one specific question you would like answered, or (2) describe one topic or specific point about which you are confused and would like to get some clarification, or (3) give a summary of what you think are the three most important points in the reading for that session (use this option if you can’t think of a question or unclear point). Refer to specific page numbers. Keep responses short, no longer

than 1 page if it were printed. To get credit, *an RTR **cannot** be late (after 10 am on day of assignment)*! Example of a good specific RTR question: "On page 1357, it says that the Scheffe test is extremely cautious and safe. Does this mean it is better than the Tukey test on page 1356? If not, how do we choose?" Example of a vague non-question "I don't understand chapter 13." Always identify what *specifically* you don't understand. *Note:* Questions about reading material are welcome any time, by any communication medium, not just via the RTR assignment for credit!

Statistics is a skill and not a spectator sport -- you must *do it* to *learn it*, you must get in the pool to learn to swim. To help you get yourself into the pool, homework assignments – take-home problem sets -- will be assigned most weeks. Assignments will be due at the beginning of your lab-section class (either on Monday afternoon or Tuesday) , except that students get three extra days for the last homework, which is due on Friday, Dec. 2 at 10 am at the Psychology Office (131 Straub Hall) or in-person (only) to your lab instructor; no credit will be given if the Dec. 2 homework is turned in late. *Be sure to put your name and your lab instructor's name on all homework when handing in.* The homework will be graded on a 10 point scale (0-10). Except for the Dec. 2 homework, late homeworks get ½ of their earned points if turned in by the succeeding Friday at 3 pm, but after Friday 3 pm no points can be obtained (we don't grade these really-really late ones, though we will check them). However, all hope (and all credit) is not lost if you fail to get a homework in on time – you are required to turn in all homework assignments by the last class session in order to get full-completion-bonus credit (3% of the course grade). Even homework that was very late and thus got no grade counts toward this bonus credit.

If you have difficulties with the problems, please consult with the TAs or with the instructor. Collaborative learning is encouraged: If you want to discuss the problems with other students, feel free to do so. Homework helps you learn skills by practicing. Talking over the problems and reworking them when you discover that others got different answers allows deeper understanding of concepts and more practice in applying skills. However, *each student must submit separate homework*, and you must show your work (no photocopies or word-for-word copying). In other words, the answers you turn in should be written independently. If not, it's plagiarism (see below).

You are strongly encouraged to use a **calculator** for doing your assignments. You are permitted to use a calculator during tests, though one is not required. *A simple calculator that adds, subtracts, divides, multiplies, and takes square roots* should be of great help. Since you must show your work on all assignments and quizzes (and too fancy a calculator might prevent your doing this), calculators that also do complex statistical calculations are not of real help. No pressure to spend a lot of money: less than \$10 should do. Solar calculators are environmentally friendly.

### **Academic Integrity**

This instructor takes academic integrity seriously. Insuring the "validity" of grades requires seeing that they reflect honest work and learning rather than cheating. **Cheating** is defined as providing or accepting information on an quiz or exam, as well as plagiarism or copying anyone's written work. Students caught cheating will be given an "**F**" for the course, and UO's student conduct coordinator will be informed. This instructor does have a record of failing students for cheating. The instructor retains the right to assign seats for tests, to change individual's seating for test security purposes, to require and check ID for admission to tests.

### **Top Five Suggestions for Doing Well in This Course**

1. Be an active learner, keep a pen/pencil moving, don't become passive, keep trying things...

2. Don't rely on cramming in a statistics course, where *gradually developed* skills are so important
3. Ask for help if you get stuck (as everyone does get at some point in this course)
4. Work hard even in the early part of the course – that material is a necessary foundation...
5. Find something that is to you interesting or fun in statistics (find a bit of intrinsic motivation)

**PSYCHOLOGY 302 SCHEDULE: *What Happens When***

Date	Topic	Text Reading	HW due...
Sept. 26 *	Introduction to course		[HW=homework]
Sept. 28	Populations and samples; frequency distributions	chs. 1 & 2	
Oct. 3	Central tendency and variability; graphs	chs. 3 & 4	@ lab meeting
Oct. 5	Sampling, probability, types of error; “small quiz”	ch. 5	
Oct. 10	Standardized distributions, z-scores	ch. 6:117-132	@ lab meeting
Oct. 12	Central limit theorem, distribution of means	ch. 6:132-141	
Oct. 17	Hypothesis testing with $z$ test	ch. 7	@ lab meeting
Oct. 19 *	<i>Midterm 1</i> (focuses on chs. 1-7)		
Oct. 24	Effect size, confidence intervals, statistical power	ch. 8	@ lab meeting
Oct. 26	The $t$ statistic; single- and paired-sample $t$ tests	ch. 9	
Oct. 31	The $t$ test for two independent samples	ch. 10	@ lab meeting
Nov. 2	Comparing $t$ and F distributions; logic of ANOVA	ch. 11	
Nov. 7 *	One-way ANOVA (analysis of variance)	No new reading	@ lab meeting
Nov. 9	Two-way (factorial) ANOVA	ch. 12	
Nov. 14	ANOVA, effect size, and correlation	ch. 13	@ lab meeting
Nov. 16 *	<i>Midterm 2</i> (focuses on chs. 8-13)		
Nov. 21	Correlation ( $r$ ) and simple regression	ch.14:365-377	@ lab meeting
Nov. 23	Multiple regression; interpretation and prediction	ch.14:377-391	
Nov. 28	Nonparametric, especially chi-square, tests	ch. 15	

Nov. 30 *	Chi-square tests; phi coefficient; integration	No new reading	by 10 am, Dec. 2 (no credit if late)
Dec. 6*, Tuesday 3:15 pm	<i>Final quiz/exam</i> (mostly cumulative of whole course, but about 1/3 of it will focus on chs. 14-15)		

\* - One of the days for which you cannot submit an RTR (because there's no [new] reading assigned)