Psychology 302: STATISTICAL METHODS

208 Deady Hall, MW 14:00-15:20 (Mondays & Wednesdays, 2-3:20 pm)
Labs: Mondays 4-5:20pm, Tuesdays 8:30-9:50am, 10-11:20am, and 12-1:20pm, 180 Straub Hall

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Office Hours: TBA
Course web page: Blackboard
Text: Gravetter, F. J., & Wallnau, L. B. (2010). Essentials of statistics for the behavioral sciences (7th edition). Belmont, CA: Thomson/Wadsworth.

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Course Description

This course will introduce you to descriptive and inferential statistics, teach you how to calculate statistics and analyze data using a computer statistics package (PASW), and improve your ability to understand and evaluate the statistical information reported in primary research articles. Although the material covered applies to many sciences, this class is most useful for psychology majors, as many examples and problems will come from psychological research. While you will be learning how to do statistical calculations, this course is very different from those taught in mathematics departments. The focus of this class is on **conceptual understanding of statistics**, rather than mathematical procedures and formulas. In the past, most students have found that the actual "number crunching" in this class is relatively easy, while the conceptual understanding of statistical methods is more difficult. **Quizzes will focus on conceptual understanding, while homeworks will apply concepts to actual problems** (more calculations by hand and in PASW). Please keep this in mind as you approach this course.

Requirements

1. **Participation** credit is gained from in-class exercises, which you will turn in during class. Credit is based on whether you tried, not on whether you got an answer right. If you attend every class and do the exercises, you will get full credit. In-class exercises will not occur on a fixed schedule and will not be part of every class, so attending every class is the only way to get full credit.

2. **Homework** assignments are listed at the end of this syllabus. They will be discussed in lab each week, and will be due by **the beginning of lab each week on the following Monday/Tuesday**, beginning week 2. **No late homeworks will be accepted for credit**. However, even if you fail to turn in a problem set on-time, you are required to turn in all homework assignments **by the last day of class** in order to get 5% of the course grade and earn one homework score replacement (drop your lowest homework score and replace it with your highest homework score). A missed homework assignment will count as a 0, but you must turn it in eventually to replace this low score and earn 5% of the course grade. If you turn in all of your assignments (even late, but before the December 1st deadline) you earn the full 5%. If you are missing one or more by the last day, you get no credit for missed assignments and you will not be able to replace your lowest score.

3. **Quizzes** will take place on 5 Wednesdays throughout the term. A short lecture will follow all quizzes, except on December 1st. The quizzes will consist of 20 multiple choice questions, **and will be primarily conceptual**, meaning that **quizzes and homeworks will cover different material**. All quizzes will *focus* on material presented since the previous quiz, but will require knowledge from throughout the course (making the quizzes cumulative). The quizzes are closed book, though formulas will be provided for simple calculations. At the end of the term, you will have the option of taking a "make-up" quiz, which will replace the lowest of your 5 quiz scores. Therefore, if you miss a quiz (and have a score of 0 for that quiz) the makeup quiz can be used to replace that. **This is the only option for making up missed quizzes – no exceptions*!**

What Do Students Need to Do to Succeed in This Class?

1. **Read the assigned material**. That includes following the numeric examples closely and writing down questions about anything not entirely clear. *You <u>are</u> expected to read the text*, in full.
2. **Complete the homework assignments (and turn them in on time).** Nearly all students who fail this course fail primarily because they either do not complete their homework assignments, or do not complete them on time. I do not know of a single student who has failed who has also turned in all completed homework assignments on time.
3. **Attend the class sessions.** If you must miss a class, it is *your* responsibility to come to my office hours, or your TA's office hours, and find out what you've missed. Missing class, for whatever reason, does not entitle you to any special treatment or relaxed deadlines. *Do not fall behind!*
4. **Attend your lab section.** Lab sections are ***not*** optional. In order to complete the homework problems, you will need to learn how to use the computer program PASW, which will only be covered in lab. If you know you will have to miss a lab, let your TA know and try to attend a different lab section.
5. **Ask questions.** This is an *introduction* to statistical methods in psychology. You are not expected to know anything about this topic yet. Therefore, no question is a "dumb" question. If you don't understand something, speak up! This is the only way I will know when I am not explaining something clearly. You can ask questions in class, by e-mail, and in office hours.
6. **Study for quizzes.** The quizzes will focus on your conceptual understanding of course material covered in lecture, labs, and readings. The best way to study for quizzes is to attend all classes/labs, complete all assignments, do all your reading, and ask questions when you don't understand something. **Quizzes will cover different material from what is on HWs!**

Grading

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

45% Scores on the **9 homework assignments**, each worth 5%**

45% Scores on **5 quizzes**, each worth 9%**

5% **For turning in *<u>all</u>* homework assignments**. These are "all or none" points, received if you turn in all assignments, not received if you do not. They are an added incentive for completing all homeworks. *Note: you can receive these points even if some assignments are handed in late, as long as all assignments are handed in by the last day of class.*

5% **Participation** in in-class exercises

**Note: Random Extra Credit assignments will pop up on occasion. These points can only be applied to scores within a particular assignment type, up to a score of 100% for that assignment type (i.e. homework extra credit points apply only to homework grades until you have all perfect homework grades; extra quiz points apply only to quizzes until you have perfect quiz scores).

Final grades will be based on percentage of total possible points earned, and distributed as follows:

A+	*Reserved for exceptional performance*		
A	93-100	D+	67-69.9
A-	90-92.9	D	63-66.9
B+	87-89.9	D-	60-62.9
B	83-86.9		
B-	80-82.9	N	less than 70***
C+	77-79.9	P	70 or higher***
C	73-76.9		
C-	70-72.9		***If taking pass/fail

Rules and Policies

No late homeworks will be accepted. No makeup quizzes will be given, other than the one final make-up quiz at the end of the term. It is your responsibility to stay on top of things, plan ahead, and leave some wiggle room in case an unexpected emergency comes up. You have the option of dropping **one** homework score (if submitted late) and replacing **one** quiz score with the makeup quiz. If unexpected circumstances come up that cause you to miss more than one homework assignment and more than one quiz, it is suggested that you talk to me to determine the best course of action (i.e., withdrawing and retaking class versus being graded on current performance). **No exceptions will be made to this policy*.** **Except if something catastrophic occurs – please see me!*

Collaborative learning is encouraged! If you want to discuss the problems with other students, feel free to do so. Talking over the problems and reworking them when you discover that others got different answers promotes deeper understanding of concepts and gives you more practice in applying skills. However, **each student must submit separate homeworks**, and you must show your work (**no photocopies or word-for-word copying**). This is also the case for PASW problems – you may work together to get the PASW output, but then each person must interpret and annotate the output individually. Violation of this policy will constitute cheating, and will impact your grade!

The TAs and the instructor take academic integrity seriously. **Cheating** is defined as providing or accepting information on a quiz or 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. Students caught cheating will be given an "**F**" for the course, and UO's student conduct coordinator will be informed. The instructor retains the right to assign seats for tests, to change an individual's seating for test security purposes, to require and check ID for admission to tests.

A note on A+ grades: A+ grades are reserved for outstanding or exceptional performance that **stands out** from the rest of the class, and will be given to a *maximum* of 1-2 students in a class this size. For your own sanity—please do not "go for" an A+; it is not worth it. Also, recently most graduate schools have adopted a policy of requiring applicants to recalculate their GPA's without A+ grades included, meaning A+ grades usually carry the same weight as good old regular A grades.

SPECIAL NEEDS

Students with Disabilities: If you have a documented disability and may need accommodations, contact me ASAP. Please let me know in advance even if you are not sure that your disability will require accommodation (for example, if you have a physical disability that may require you to miss class, but you aren't sure it will). With advance planning, adjustments can be made. Last minute changes are problematic.

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.

Other Students: 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.

CLASS SCHEDULE

This is an outline for the course, subject to change at any time. Updates to this schedule will be discussed in class, so please attend. Being unaware of a change due to missing class is not an excuse for being unprepared.

Date	Topic	Readings	Quizzes/Assignments
9/27	Course Introduction		
9/27-28	Lab 1 - Intro to Variables in PASW		
9/29	Variables: Scale, Frequency, Histograms	Ch. 1-2	
10/4	Distributions & Variance	Ch. 3-4	
10/4-5	Lab 2 - Variability		**HW 1 Due**
10/6	Z-Scores and the Normal Distribution	Ch. 5	**Quiz 1 (Ch 1-4)**
10/11	Probability and the Normal Distribution	Ch. 6	
10/11-12	Lab 3 - Z-scores and Probability		**HW 2 Due**
10/13	Distribution of Sample Means, CLT	Ch. 7	
10/18	Hypothesis Testing with Z	Ch. 8	
10/18-19	Lab 4 - CLT, Hypothesis Testing		**HW 3 Due**
10/20	Hypothesis Testing with T	Ch. 9	**Quiz 2 (Ch 5-8)**
10/25	t-Tests: Two Independent Samples	Ch. 10	
10/25-26	Lab 5 - Independent and Related t-Tests		**HW 4 Due**
10/27	t-Tests: Independent, Related	Ch. 11	
11/1	Intro to ANOVA	Ch. 13	
11/1-2	Lab 6 - One-way ANOVA		**HW 5 Due** *(and Vote!)*
11/3	More ANOVA	"	**Quiz 3 (Ch 9-11)**
11/8	Factorial ANOVA	Ch. 14	
11/8-9	Lab 7 - Factorial ANOVA		**HW 6 Due**
11/10	More Factorial, RM ANOVA	"	
11/15	Correlation	Ch. 15	
11/15-16	Lab 8 - Correlation and Regression		**HW 7 Due**
11/17	Regression	"	**Quiz 4 (Ch 13, 14)**
11/22	Chi Square	Ch. 16	
11/22-23	Lab 9 - Chi-Square		**HW 8 Due**
11/24	***No Class!*** *(You're probably flying home)*		*Eat Turkey/Tofurkey!*
11/29	More Chi Square, "Which Test?" Review	pp 556-564	
11/29-30	***No Lab this week!***		
12/1	***Last Day of Class:*** Quiz 5 & Make-up Quiz HW 9 & Late HW Due		**Quiz 5 (Ch 15, 16, Which Test?) and Make-up Quiz HW 9 and all Late HW Due**
12/8 *(3:15pm)*	***No Final Exam!***		*Do something else!*

HOMEWORK ASSIGNMENTS

**Put your name and your TA's name on all homework.*

Problems are at the end of each chapter. **Turn homework in on time! To earn full credit, *show and explain all work*.** For problems completed by hand, show all steps. **When appropriate, **Annotate** PASW output to receive full credit**: Circle the most important numbers and explain (write or type directly and legibly on the output) what they mean. You must demonstrate that you are able to read and understand what you have produced. **In addition, for any problem that includes hypothesis testing, you must include all steps of hypothesis testing including an APA style summary of your results**. The book has answers to odd-numbered problems in the back. Use these for practice or to check your work.

Homework 1: Concepts, Scaling, Frequency Tables and Histograms (15 pts)

Ch. 1: problems 1, 10, 15 & 18;
Ch. 2: problems 11 & 18bc. You may do problem 11 **either** using PASW **or** by hand. Label your axes! If you use PASW for problem 11, be sure to include the output, clearly identify which parts of the output go with the homework question. For question 18, you only need to do parts B and C.

Homework 2: Central Tendency & Variability (15 pts)

Ch. 3: problems 6 & 8;
Ch. 4: problems 16 (by hand only), **19 (using PASW only), & 20ac (by hand only)**.
For Part C of problem 20, use the definitional formula, and do not worry about the estimate question;
For problem 16 use the computational formula.
Extra Credit: Go back to problem 20. 1) Use PASW to find the mean, sample variance, and standard deviation for the original data. 2) The answers you obtain will differ from the by-hand calculations. Ask your TA why this is and write down the answer. 3) Again using PASW, change the original numbers from the problem around until you have a data set with the SAME mean and n, but twice the sample variance compared to what you obtained in Part 1 (use trial and error method, and the definition of variance to help you!). Include output from PASW showing the mean, variance, & sd for original and altered data sets, annotate to clarify which parts of the printout go with steps 1 & 3, and include the numbers in the altered data set you created for step 3.

Homework 3: z-Scores & the Normal Curve (15 pts)

Ch. 5: problems 2, 4ab, 14, 22ac (for question 22 a & c, be sure to **explain** your answer);
Ch. 6: problems 8ac, 10, 20bc. No PASW homework this week. Hint: Make drawings for problem 10.

Homework 4: Distribution of Sample Means, z-test & t-test (15 pts)

Ch 8: problems 2, 4, 6, 8, & 22;
Ch 9: problems 8, 10, 23a. Be sure to show all work and explain answers fully.
Do Ch. 9 problem 23a both by hand and in PASW. Use all steps of hypothesis testing when doing the problem by hand. For the PASW version of the problem, annotate printout by circling the key elements in the output and explaining what the output shows.

Homework 5: t-Tests with Independent Samples and Related Samples (15 pts)

Ch. 10: problems 2, 3, 4, 5, 15a (by hand only) & 22 (in PASW only).
Ch. 11: problems 2, 3, & 15 . Do Ch 11 problem 15 both by hand and in PASW. On the by-hand versions, state the research question, follow step-by-step hypothesis-testing method, and end with answer to research question; also, *show all work!* For the PASW version, annotate printout by circling the key elements in the output and explaining what the output shows. Finish both problems with one APA style summary (using info from PASW printout).
For Ch. 10, problems 15a and 22, use all steps of hypothesis testing. **For PASW in problem 22,** annotate printout by circling key elements in the output and explaining what the output shows.
For Ch. 11, problem 15: When completing by hand, use all steps of hypothesis testing. When completing in PASW, annotate printout by circling key elements in the output and explaining what the output shows.

Homework 6: ANOVA (15 pts)

Ch. 13: problems 2, 3, 11a & 13. Do problem 11a both by hand and in PASW
For problem 11a: When completing by hand, use all steps of hypothesis testing. When completing in PASW do both Scheffé and Tukey post-hoc tests. Annotate output, including explaining results (what did you find?).

Homework 7: Advanced ANOVA (15 pts)

Ch. 14: problems 1, 12, 18, 22, & 25. Do problem 25 both by hand and in PASW.
Show all work involved (i.e. for each SS, MS, etc.) except for *df* for other problems.
For problem 25: When completing by hand, use all steps of hypothesis testing. When completing in PASW, annotate printout by circling key elements in the output and explaining what the output shows.

Homework 8: Correlation & Regression (15 pts)

Ch. 15: problems 5, 8, 18, & 22. Do problem 8 by hand, in PASW, and also complete Extra STEP.
For problem 8: Set alpha at .05, two-tailed. When completing by hand, use all steps of hypothesis testing.
Extra STEP for problem 8: after finding the correlation for the data in the book, change the correlation substantially by adding an outlier (make up the data for this person). Hand in annotated printouts for both original and modified data sets (identify which is which, and write down the data for the outlier you added), including an explanation of results (APA-style summary). Also explain on the modified printout what you learned from the exercise about the possible impact of a single case on correlation.

Homework 9: Chi-Square (15 pts)

Ch. 16: problems 2, 8, & 18 Do ALL THREE problems both by hand and in PASW When completing by hand, use all steps of hypothesis testing. When completing in PASW, annotate printout by circling key elements in the output and explaining what the output shows.