

Psychology 302 – Statistical Methods in Psychology

Fall 2009

Lecture: Mondays and Wednesdays 8:30am-9:50am in 146 Straub Hall

Labs are held in 180 Straub Hall at the designated times (see “lab instructors” section)

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Lab **Janet Ng, M.S.**

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Office Hours: Mondays 12-1pm

Dan Jaster

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Brandon Gibson

Friday lab: 12-1:20pm

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Office Hours: Tuesdays 12:30-1:30pm

Straub Computer Lab rooms are open **Monday through Friday (times are posted on lab doors).**

OVERVIEW OF COURSE STRUCTURE

Course Objectives: At the end of this course you will be able to read a description of a research study and then identify the appropriate statistical technique needed to answer the research question. Using hypothesis testing procedures, you will also be able to conduct this test (both by hand and using statistical computing software) and draw a conclusion (written in APA style) based on your analyses.

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, and improve your ability to understand and evaluate the statistical information reported in primary research articles.

This class both is and is not really a math class. Although you will be learning how to do statistical calculations by hand, this course is very different from courses taught in mathematics departments. The focus in this class is on conceptual understanding of statistics. In the past, most students have found that the actual “number crunching” in this class is relatively easy. It is the conceptual understanding of statistical methods that is more difficult. Once you understand the concepts, you will probably have little trouble doing calculations. Quizzes will be focused on conceptual understanding, while homeworks will apply concepts to actual problems. Please keep this in mind as you approach this course.

Course Design: The course promotes active learning — through discussion, solving problems, and computer exercises. The instructors and TA are guides, cheerleaders, and coaches. The course encourages teamwork among students, instructor, and TA. *Although quizzes are to be completed individually, students are encouraged to work together on homework.*

Responsibilities: If you complete this course, you will earn 4 credits toward your degree. According to University

principles governing credit and contact hours, each credit is equivalent to 30 hours of work. Your 4 credits for this course are equivalent to 120 hours of work over 10 weeks, which is 12 hours per week. You will spend about 4 hours in class and lab each week and should expect to spend up to 8 hours engaged in reading, studying, and/or completing homework assignments outside of class each week.

COURSE REQUIREMENTS

- 1. Participation.** Participation includes in-class group activities. Participation points can only be gained from in-class exercises. Credit is based not at all on whether you got the right answer, but only on whether you tried.
- 2. Homework.** Homework assignments are due **in lab each week beginning week 2** (at the beginning of your lab session). Some problems will be completed “by hand”, some using SPSS, and some using both methods. **Turn homework in on time!** Late homework, which is any assignment turned in after the beginning of your lab on the day it is due, earns *no* credit. You may drop your lowest homework score. If you miss an assignment you will receive a 0 and that will count as your lowest score. However, you must complete *all* homework assignments (and turn them in on time) in order to earn 5% of your total course grade.
- 3. Quizzes.** Be on time!! Quizzes will cover all material since the previous quiz. Quizzes are closed book and are completed individually. Calculators are okay but probably unnecessary as quizzes will test your knowledge of conceptual material rather than your ability to perform calculations.
- 4. Books & Calculator.** The required text is Gravetter & Wallnau, *Essentials of Statistics for the Behavioral Sciences*, 6th edition. Read assigned chapters **before** class and do Learning Checks as you encounter them. **Reread** if you encounter trouble on a Learning Check. The second time, you will understand more. You will also need a hand-held **calculator** that can do single variable statistics. No need for graphing calculators. **Bring calculator & text to class.**

SPECIAL NEEDS

Students with Disabilities: If you have a documented disability and may need accommodations, contact us ASAP. Please let us 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). Students who are experiencing learning difficulties are encouraged to consult Disabilities Services (164 Oregon Hall; 346-1155; <http://ds.uoregon.edu/>). Without documentation, accommodations are not guaranteed and are to be made at the discretion of the instructor.

Other Students: If you are repeating this class, or have other circumstances that might affect your ability to devote time to the class, please let us 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.

COLLABORATION

Collaborative Learning:

Discussing homework with other students and your instructors is encouraged, as are homework and study groups for quizzes and exams. Talking over the problems and reworking them when you discover that others got different answers promotes deeper understanding of concepts. However, each student must submit a separate homework which was *written independently* (no photocopies or word-for-word copying), and you must show your work for all by

hand calculations. More explicitly, you may work together to solve problems and check your answers on homeworks with each other, but preparing those answers for your homework and the actual writing of **any** verbal answers need to be done independently.

Individual Work (when Collaboration = Cheating):

Your work on the **Quizzes** must be your own. Copying the work of others on these elements is cheating, and will earn you an F or N for the course. (The University may impose additional penalties in accordance with the student conduct code.) Quizzes are a reflection of individual work (closed book, closed notes) - rely on your own memory and calculator only.

TOP SIX SUCCESS STRATEGIES

1. **Read 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.
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 SPSS, 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 we will know when we are 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 are different from homeworks!** Homeworks typically test your ability to perform analyses and apply concepts, whereas quizzes test your understanding of those concepts on a deeper level without asking you to perform analyses.

TOP FIVE PITFALLS

1. **Concluding that struggling in this course means you just can't get statistics.** This course draws upon several different types of skills – math skills as well as conceptual understanding skills. It is unusual for any given student to sail through without struggling with at least some element of the course. Failing is only an indicator that you need to put forth more effort – not that you aren't smart enough to do it! We will do our best to teach in a way that meets your individual needs, but we don't know what those needs are until you tell us. So speak up when you don't understand something!

2. **Passive listening and reading.** Write, draw, figure. Think with a pencil to learn. Turn the concepts into something you do. To succeed, you must be able to explain and execute.
3. **Beginner's luck.** Doing it right once doesn't mean you can repeat the trick. Get it wrong to understand how the process works. Mistakes help you learn.
4. **Trying to cram.** You can cram content, but skills don't compress. Don't fall behind; it's too hard to catch up.
5. **Giving 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. **Spectator overconfidence.** Watching someone go through the steps is a starting point only. You have to get in the pool to learn how to swim.

GRADING

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

- 45% Score on the 9 homework assignments (lowest score is dropped), each worth 5%
- 45% Score on 5 quizzes/exams, each worth 9%.
- 5% For turning in *all* homework assignments. These are “all or none” points, earned if you turn in all assignments, and not earned if you do not. They are an added incentive for completing all homeworks.
- 5% Participation in in-class exercises

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

Course grades based on percentage of points			
	Percent		Percent
A	93-100	C-	70-72.9
A-	90-92.9	D+	67-69.9
B+	87-89.9	D	63-66.9
B	83-86.9	D-	60-62.9
B-	80-82.9	If taking Pass/Fail	
C+	77-79.9	N	< 70
C	73-76.9	P	70

COURSE SCHEDULE

**Schedule, homework due dates and quiz dates subject to change*

Date	Topic	Readings	Quizzes/Assignments
9/29,10/1,10/2	Lab 1		
9/30	Course Introduction, Scaling	Ch. 1-2	
10/5	Central Tendency and Variability	Ch. 3-4	
10/6,10/8,10/9	Lab 2		HW 1 Due
10/7	Z-Scores and the Normal Distribution	Ch. 5-6	
10/12	Probability and the Normal Distribution		Quiz 1
10/13,10/15,10/16	Lab 3		HW 2 Due
10/14	Distribution of Sample Means	Ch. 6-7	
10/19	Hypothesis Testing with z	Ch. 8	
10/20,10/22,10/23	Lab 4		HW 3 Due
10/21	The one-sample t-test	Ch. 9	Quiz 2
10/26	Independent samples t-test	Ch. 10	
10/27,10/29,10/30	Lab 5		HW 4 Due
10/28	Related samples t-test	Ch. 11	
11/2	Intro to ANOVA	Ch. 13	
11/3,11/5,11/6	Lab 6		HW 5 Due
11/4	One-way ANOVA		Quiz 3
11/9	Factorial ANOVA	Ch. 14 (392-417)	
11/10,11/12,11/13	Lab 7		HW 6 Due
11/11	Repeated ANOVA, ANOVA Review	Ch. 14 (379-391)	
11/16	Correlation	Ch. 15 (423-449)	
11/17,11/19,11/20	Lab 8		HW 7 Due
11/18	Regression	Ch. 15 (449-467)	Quiz 4
11/23	Chi-Square	Ch. 16	

11/24,11/26,11/27	Lab 9 Cancelled due to Thanksgiving week	
11/25	More Chi-Square	HW 8 Due *in lecture*
11/30	Which Test?, Review and Recap	Pages 556-564
12/1,12/3,12/4	Lab 10	HW 9 Due, Last day to turn in late HWs
12/2	Quiz 5, make-up quiz	Quiz 5, Makeup Quiz

HOMEWORK ASSIGNMENTS

**Homework assignments subject to change*

Put your name and your TA's name on all homework, and please staple. If unstapled, you must put your name on every sheet. All work must be neat and legible. If we can't read it we can't grade it!

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. **Annotate** SPSS 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 extra practice or to check your work.

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

- Ch 1: problems 2, 4, 12 and 18.
- Ch 2, problem 18: You may do chapter 2 problem 18 either using SPSS or by hand. **For part b of chapter 2 problem 18, sketch a histogram instead of a polygon.** Label your axes, and include a title! If you use SPSS for this problem, be sure to include the output, clearly identify which parts of the output go with the homework question, and don't forget part c of the question.

Homework 2: Central Tendency, Variability, and z-scores (15 pts).

- Ch 3, problems 8, 10, and 26. For Ch. 3 problem 26 use SPSS (don't do #26 by hand).
- Ch 4, problems 9, 15, 22, & 26. Ch. 4 problem 22, complete the problem 3 times—once using the computational formula, once using the definitional formula, and once in SPSS.
- Ch. 5, problems 4 & 22

Homework 3: z-scores and the Normal Curve, Distribution of Sample Means (15 pts)

- Ch 6, problems 4, 8, 12, 16, 23
- Ch 7, problems 12, 20, 24. No SPSS homework this week.

Homework 4: z-test and t-test (15 pts)

- Ch 8, problems 2, 6, 8, 16, & 19.
- Ch 9, problems 2, 10, & 24. Be sure to show all work and explain answers fully. For Ch. 9 problem 24, do the problem by hand and in SPSS. Use all steps of hypothesis testing and calculate Cohen's d when doing

the problem by hand. For SPSS problems, annotate printout by circling the key elements in the output and explaining what the output shows.

Homework 5: t-test with independent samples and related samples (15 pts)

- Ch 10, problems 2, 3, 4, 14a (by hand) and 21a (in SPSS). On 14a and 21a use all steps of hypothesis testing. For SPSS in problem 21a, annotate printout by circling the key elements in the output and explaining what the output shows.
- Ch 11, problems 2, 3, and 17(both by hand and on SPSS). On 17 use all steps of hypothesis testing. For SPSS part of 17, annotate printout by circling the key elements in the output and explaining what the output shows.

Homework 6: One-Way ANOVA (15 pts)

- Ch 13, problems 2, 3, 14, 15 (by hand and in SPSS), 22. For the by hand version of problem 15 use all steps of hypothesis testing and compute eta-squared. In the SPSS version, 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, 21, 24, and 28 (by hand and in SPSS). For the by hand version of problem 28 use all steps of hypothesis testing. In the SPSS version, annotate output.

Homework 8: Correlation and Regression (15 pts)

- Ch 15, problems 4, 8 (by hand and in SPSS), 18, and 22. For the by hand version of problem 8, use all steps of hypothesis testing. For the SPSS version of problem 8, after finding the correlation for the data in the book (*EXTRA STEP*), 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. 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 problems by hand, and in SPSS. For by hand version use all steps of hypothesis testing. For SPSS versions, annotate output.