Psychology 302 – Statistical Methods in Psychology

Fall 2010
Lecture: Tuesdays and Thursdays 4-5:20PM in 112 Lillis
Labs are held in 180 Straub Hall at the designated times (see "lab instructors" section)

Instructor: **Melissa Platt**

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Office Hours: Tuesday 5:30-7:30pm

Lab Instructors:

Joe Ferrero	**Lindsey Butler**	**Alex Khounlavouth**
Wednesday 8:30-9:50 lab	**Wednesday 10-11:20 lab**	**Wednesday 12-1:20 lab**
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Office: Straub 4__	Office: Straub 323	Office: Straub 353
Office Hours:	Office Hours:	Office Hours:
Mondays 11am-1pm	Tuesdays 10am-11am	Tuesday 12:30pm-1:30pm & Thursdays 12:30pm-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 and Blackboard surveys. Credit is based not at all on whether you got the right answer, but only on whether you tried. If you are sick and miss an in-class participation point you may email me for an alternative assignment. Do not wait until the end of the term to contact me about missed participations points.

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 PASW, 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 in order to earn 5% of your total course grade.

3. Quizzes. You will have 40 minutes to complete each quiz (half of a lecture period). Be on time!! Quizzes will cover all material since the previous quiz and will be primarily multiple choice and T/F format. Quizzes are closed book and are completed individually. Calculators are unnecessary as quizzes will test your knowledge of conceptual material rather than your ability to perform calculations. On quiz days, we will have a half lecture for 40 minutes following the quiz. You may sit quietly or leave and return if you finish a quiz early but you may not leave the room until I have your scantron form. Absolutely no texting or other use of electronic devices during scheduled quiz time. On the final day of lecture, you will have 35 minutes to complete quiz 5, followed by 35 minutes to complete the make-up quiz.

4. Books & Calculator. The required text is Gravetter & Wallnau, *Essentials of Statistics for the Behavioral Sciences*, 7th 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 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 knowledge 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 with the exception of chapter 12 which we will skip due to time constraints.
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 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, but complementary to 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 dropped), each worth about 5.6% after lowest dropped
45%   Score on 5 quizzes/exams, each worth 9% (lowest score replaced with make-up quiz score).
 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
9/28	Course Introduction, Some Key Terms		
9/29	Lab 1		
9/30	Scaling, Histograms, Frequency Tables	Ch. 1-2	
10/5	Central Tendency and Variability	Ch. 3-4	
10/6	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	Lab 3		HW 2 Due
10/14	Distribution of Sample Means	Ch. 6-7	
10/19	Hypothesis Testing with z	Ch. 8	
10/20	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	Lab 5		HW 4 Due
10/28	Related samples t-test	Ch. 11	
11/2	Intro to ANOVA	Ch. 13	
11/3	Lab 6		HW 5 Due
11/4	One-way ANOVA		**Quiz 3**
11/9	Factorial ANOVA	Ch. 14 (428-447)	
11/10	Lab 7		HW 6 Due
11/11	Repeated ANOVA, ANOVA Review	Ch. 14 (414-428)	
11/16	Correlation	Ch. 15 (466-497)	
11/17	Lab 8		HW 7 Due
11/18	Regression	Ch. 15 (498-511)	**Quiz 4**
11/23	Chi-Square	Ch. 16	
11/24	Lab 9		HW 8 Due
11/25	Thanksgiving Holiday: No class		
11/30	Which Test?, Review and Recap	Pages 614-623	
12/1	Lab 10		HW 9 Due
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** 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, when instructed to do so, 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 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), 19 (using PASW), & 20ac (by hand).

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: z-test and 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. For Ch. 9 problem 23a, do the problem 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-test with independent samples and related samples (15 pts)

Ch 10, problems 2, 3, 4, 5, 15a (by hand) and 22 (in PASW only). On 15a and 22 use all steps of hypothesis testing. For PASW in problem 22, annotate printout by circling the key elements in the output and explaining what the output shows.

Ch 11, problems 2, 3, and 15(both by hand and on PASW). For the by hand part of 15 use all steps of hypothesis testing. For PASW part of 15, 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, 11a (both by hand and in PASW), and 13. For the by hand version of problem 11a use all steps of hypothesis testing. In the PASW version, do both Scheffé and Tukey post-hoc tests. Annotate output, including explaining results (what did you find?).

Homework 7: Advanced Analysis of Variance (15 pts)

Chapter 14: 1, 12, 18, 22, 25. Show all work involved (i.e. for each SS, MS, etc.) except for df. Problem 25 do by hand and in PASW. In the by hand version, do all steps of hypothesis testing. In the PASW version, annotate output.

Homework 8: Correlation and Regression (15 pts)

Chapter 15: 5, 8, 18, 22. For problem 8 do by hand and in PASW, set alpha at .05, two-tailed. For by hand version of problem 8, use all steps of hypothesis testing. For the PASW 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. On the modified printout, explain what you learned from the exercise about the possible impact of a single case on correlation.

Homework 9: The Chi-Square Statistic – Tests for Goodness of Fit and Independence (15 pts)

Chapter 16: 2, 8, 18. Do all problems by hand and in PASW. For by hand versions use all steps of hypothesis testing. For PASW versions, annotate output.