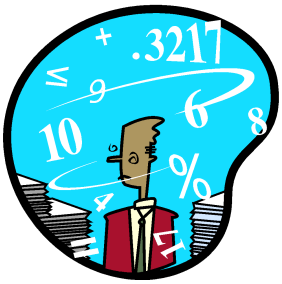
Psychology 10:
Experimental Design, Methodology, and Data Analysis Procedures
(Fall, 2013)

Instructor
John Pfister
Office**:** 347 Moore
Hours: **M**, 11-noon, **WF**, 10am-11am
Th, 10-noon
"Tuesdays in Moore," 7:30pm

Teaching Assistant
Zhengang Lu
Hours: TBA



Class Schedule: MWF 8:45-9:50am (9L), X-hour: Th 9-9:50am

Course goals

This course is designed to introduce students to basic statistical methods for the design and analysis of psychology experiments. Subject areas include: measurement, graphs, descriptive statistics (e.g., mean, median, mode, variance, standard deviation), elementary probability, simple correlation and regression, distributions (e.g., normal, *t*, Chi-square, *F*), and inferential statistics (e.g., hypothesis testing, criterion, sources of error, power, effect size, and an introduction to analysis of variance and factorial designs).

Learning Objectives

By the end of this course, you should be able to:

- Be able to analyze, both by hand and with the use of the computer program, SPSS, data sets similar to those seen in psychological experiments published in psychological journals;
- Be able to demonstrate proficiency in the computer program SPSS and use it in future courses;
- Be able to read journal articles and identify the type of statistical analysis used and how the authors interpreted their results;
- Be able to identify which statistical analysis is appropriate for a given experimental outcome.

Prerequisites

You must have taken, or be taking concurrently, PSYCH 1: Introductory Psychology or PSYCH 6: Introduction to Neuroscience in order to enroll in this class. Very few exceptions are made for non-Psychology majors, but for those

interested in taking statistics to fulfill another requirement, MATH 10 is a very suitable choice.

Your Text

- Your **textbook** is Chris Spatz's Basic Statistics (10th ed). It is actually a pretty nice book, and I have put a copy of the 9th edition on reserve in the library if you get in a jam. There is not much difference, but it is nice to have a good book for the future.
- I have also selected an additional optional text, Zealure (is that a great name or what??!!) Holcomb's SPSS BASICS (3rd ed.). It is a wonderful manual for using the program and you might want to hang on to it for reference in the future. The bookstore has some copies for you to purchase and I have already placed some chapters on our Canvas site for you to examine. Copies will be on reserve.
- You may also like to use a **scientific calculator** and it should contain statistical functions and memory. While this is not to be considered an endorsement, I have done well with a simple TI-25 or TI-30X (a good multiple function calculator can be purchased for around $20). More sophisticated calculators are also welcome, but are useless unless you know how to get simple information out of them. It is your responsibility to learn how to use your calculator to compute simple statistical functions. Please bring a calculator to the quizzes.

  And, no, your cell phone does not count as a calculator. You are **not** allowed to use your cell phone for any purpose during the in-class quizzes.

Tools for Data Analysis

Ask a statistician about her or his favorite program for doing statistics and you will get a whole host of answers: EXCEL for those on a budget, R for the young whipper-snappers, MathLab for those who like to keep a secret or STATA for those who like tinkering with something a little different. This term, the Psychology Department has asked us to try to teach every student how to use **Statistical Package for the Social Sciences (SPSS**). This particular program is the industry standard for most of the social sciences and should probably be on your list of things to know for the future. You will also need this program for Psychology 11. Although SPSS is available on some computers around campus (e.g., the second floor of Berry), I strongly encourage you to get your own copy.

A six month subscription to SPSS is available through E-academy at: http://www.onthehub.com/spss/ . Click on the "Buy Now" button for the IBM SPSS Statistics Base GradPack 21. The "Windows" pulldown menu on the next page is open. If you have a Mac, scroll down to the Mac pulldown menu toward the bottom of the page. In both cases, go to the "Download" section and click on the "Base GradPack 21" 6 month rental in blue type. Read the operating system requirements. If your computer meets the operating system

requirements, purchase the program for $36 (plus about $4.99 download fee). You will need to register for an account. Then download according to instructions.

Statistical analyses for homework and take home portions of quizzes will require access to this software. Not having access to the public copies will *not* be accepted as an excuse for late assignments or quizzess.

Please Go To Canvas!

This course is participating in Dartmouth' fall term Canvas Early Adopter program. In this course, you will be testing out Canvas. Log into Canvas with your regular Dartmouth username and password at this URL:

HYPERLINK "https://dartmouth.instructure.com/" \t "_blank" https://dartmouth.instructure.com/

We will be gathering feedback about Canvas from both faculty and student participants. If you have any questions or comments, you can also contact canvas.pilot@dartmouth.edu at any time.

If you'd like to learn more about the evaluation project in general, please visit HYPERLINK "http://sites.dartmouth.edu/learning21" \t "_blank" http://sites.dartmouth.edu/learning21. Thanks for participating in the Canvas. We look forward to your feedback!

<u>This is how you are going to be assessed during the course</u>

Your final grade for Psychology 10 will be: A minimum of 20 homework exercises (10% of your grade), 4 quizzes (70% of your grade), a final exam (15% of your grade) and an SPSS practicum (5% of your grade).

<u>Quizzes:</u> Quizzes involve two portions: 1. a take-home portion handed out in the class prior to the in-class quiz and due on the morning of the quiz, and 2. an in-class portion. These quizzes will cover both the class meetings and the readings and are cumulative. In order to promote learning through working with each other, you are allowed to collaborate with others on the take-home portion of the quiz **ONLY**. CAUTION: There is a difference between getting help from someone on a quiz and just copying their answers. The former is a great place to learn, while the latter is a breach of the Honor Principle. It is your job to know the difference and if you do not know the difference, ASK!

Policy for missed quizzes is very stringent. For those few individuals who have legitimate reasons (illness, etc.) for not being able to take a quiz at the scheduled time, arrangements for the taking of the exam prior to its scheduled time must be made with me <u>as soon as you know that you cannot make the quiz.</u> If you miss a quiz without an excuse, a grade of zero will result.

Homework: After each class, a small set of homework problems will be posted on our Canvas site and you are to complete this assignment by midnight (usually) on the day of the next class.[1] Homework assignments are short and to the point, so don't let them slip by without giving them a try. Homeworks are only counted and not graded, but we do spot check each homework to make sure that people are not just handing in junk. If you are handing in blank pages or junk, we reserve the right to drop that homework from your total number of homeworks. There are a total of 21 possible homeworks and each homework is worth 1/2 of a point, so you can choose not to do a homework and STILL get full credit for this portion of the course. The maximum you can earn for completing each assignment is 10 points, but if you complete ALL 21 homeworks, I will add THREE points to your final exam (prior to the calculation of the actual percentage).

SPSS Practicum: This course will require you to demonstrate proficiency in the statistical program SPSS. In order to do so, you will be asked to complete the exercises at the end of each chapter in Holcomb's SPSS BASIC to the appropriate Canvas page. THIS PART OF THE COURSE IS ENTIRELY SELF-PACED. We will post the answers for you to view at any time, but will ask that you demonstrate your proficiency by taking a practicum. This practicum will be a short set of data for you to analyze using SPSS and you can do one of two things to demonstrate your proficiency: OPTION ONE: You can take two small practicums, one after OCTOBER 11 and the other after NOVEMBER 15. If you do not pass the first version, you can take a larger version later in the term to redeem yourself. OPTION TWO: You can take one large practicum after NOVEMBER 15. Keep in mind that this portion of the course is yours to do at your own speed. All that you need to do to demonstrate proficiency (and obtain an easy 5% of your grade) is to work on SPSS from time to time and just pass the practicum. We will be doing this in conjunction with your homeworks, but this provides a blow-by-blow account of how to do statistical analyses with SPSS.

Alternative Abilities.

I truly encourage those students with disabilities (as defined by the Academic Skill Center), including "invisible" disabilities like chronic diseases and learning disabilities, to discuss with me after class or during my office hours appropriate accommodations that might be useful to them. Any student with a documented disability needing academic adjustments or accommodations is requested to speak to me by the end of the second week of the term. All discussions will remain confidential, although the Student Disabilities Coordinator may be consulted to verify the documentation of the disability.

Honor Principle

[1] We will operate by the midnight to midnight rule. That is, if I do not post the homework by midnight on the day of class, I will count that homework as done by everyone that day. Fair is fair, I suppose…

All activities and performances in this course are governed by the Honor Principle. I invite students to work with one another on homeworks, but there is a fine line between working together and copying someone else's work. If you are caught copying a homework from another student or looking at an answer key before your homework is completed, you will be reported for violating the Honor Principle.

While working on homework and your pre-quiz take-home together is allowed, no collaboration is permitted on any portion of the in-class quiz. I repeat: IT IS A VIOLATION OF THE HONOR PRINCIPLE TO *COLLABORATE ON* OR TO *RECEIVE ASSISTANCE* ON THE INCLASS PORTIONS OF QUIZZES OR ON THE SPSS PRACTICUM. THIS *INCLUDES* ASSISTANCE IN THE FORM OF OBTAINING EXAMPLES OF EXAMS FROM STUDENTS WHO TOOK THIS COURSE IN THE PAST.

Course Schedule[2]

Dates	Topic
9/16	Introduction and greetings. The language of science, numbers, and the systematic study of data. (Homework 1)
9/18	The art of the visual display of numbers and how to describe distributions (BS: Chapters 1and 2; Homework 2)
9/19	**MANDATORY X-hour workshop**: What is Canvas and how does it differ from Blackboard? What is SPSS and why do I have to know about it? What is the question of the week?[3]
9/20	How to talk about data: Measures of center (BS: Chapter 3; Homework 3).
9/23	How to talk about data: Measures of spread (BS: Chapter 4; Homework 4).
9/25	Other ways to talk about data: Cohen's *d* and the IQR (BS: Chapter 5; Homework 5).
9/26	X-hour workshop: More on SPSS (now that you have seen it in action). What is the question of the week?
9/27	The relationship between numbers: Correlation (BS: Chapter 6; Homework 6).

[2] OK, I have to be honest…this is a tentative schedule. I occasionally get carried away with one or two particular topics and have too much of a good thing. Stay flexible, give good feedback about how you are handling the workload, and we'll both have a good time.

[3] Each week, we offer the opportunity for you to submit a question for us to review in an x-hour. If no one submits a question, we do not have much to do. We occasionally do a question from an exam, just to let everyone see what they might have struggled with so they can move on to newer material.

9/30 The relationship between numbers: Regression (BS: Chapter 6; Homework 7 due 4/12).

10/2 **QUIZ 1 (Chapters 1-5 in Spatz)**

10/3 X-hour workshop: Correlation and Regression in SPSS. What is the question of the week?

10/4 Moving from data to distributions: The normal distribution (BS: Chapter 7; Homework 8).[4]

10/7 Sampling distributions and how to estimate with confidence (BS: Chapter 8; Homework 9).

10/9 Hypothesis testing I: One sample designs (BS: Chapter 9; Homework 10).

10/10 X-hour workshop: Some practice with hypothesis testing. What is the question of the week?

10/11 Hypothesis testing I: How to know your Type I from your Type II errors (BS: Chapter 9, Homework 11).

*******FIRST SPSS PRACTICUM AVAILABLE*******
LEVELS OF MEASUREMENT TO LINEAR REGRESSION

10/14 Catching up, catching our breath, reviewing, and reflecting

10/16 **QUIZ 2 (Chapters 6-8 in Spatz)**

10/17 X-hour workshop: Doing statistical analyses in SPSS. What is the question of the week?

10/18 Hypothesis testing II: Two-sample designs (BS: Chapter 10; Homework 12).

10/21 Analysis of Variance I: One-way Classification (BS: Chapter 11; Homework 13).

10/23 Analysis of Variance I (continued): One-way Classification (BS: Chapter 11; Homework 14).

10/24 X-hour workshop: Doing ANOVA in SPSS. What is the question of the week?

[4] NOTE: Unlike some traditional courses in statistics, we will not spend a great deal of time on the formal laws of probability.

10/25 Analysis of Variance II: Repeated measures (BS: Chapter 12; Homework 15).

10/28 Catching up, catching our breath, reviewing, and reflecting about ANOVA.

10/30 **QUIZ 3 (Chapters 9-10 in Spatz).**

10/31 X-hour workshop: Open date

11/1 Analysis of Variance III: Factorial designs (BS: Chapter 13; Homework 16)

11/4 Catching up, catching our breath, reviewing, and reflecting about ANOVA. (Homework 17).

11/5 THIS IS THE LAST DAY TO DROP THIS CLASS (Not that you need to do this, but you never know…).

11/6 Catching up, catching our breath, reviewing, and reflecting about ANOVA. (Homework 18).

11/7 X-hour workshop: Factorial ANOVA in SPSS

11/8 More catching up, catching our breath, reviewing, and reflecting before wrapping up ANOVA.

11/11 **QUIZ 4 (Chapters 11-13 in Spatz).**

11/13 Chi-square test I: Tests of independence (BS: Chapter 14; Homework 19).

11/14 X-hour workshop: Can you do chi-square in SPSS? Let's find out!

11/15 Chi-square test II: Goodness-of-fit models (BS: Chapter 14; Homework 20).

*******SECOND SPSS PRACTICUM AVAILABLE*******
t-TEST FOR A SINGLE MEAN TO CHI-SQUARE TEST OF INDEPENDENCE

11/18 How do you choose a statistical test? Some comments on statistics without the math. Catching up, catching our breath, reviewing, and reflecting. Our last day of class! (BS: Chapter 16; Homework 21).

11/24 **8am: COMPREHENSIVE FINAL EXAM**

This course is dedicated to my mother.
You always taught me that curiosity was a virtue
And never failed to keep me asking "Why?"