



# Psychological Statistics

Spring, 2015  
Psychology 103



# Psychological Statistics

## Psychology 103: Spring, 2015

**Class Meetings:** TTh 9:35-11:20 (Steele 229)

**Problem Sessions (Optional):** W 8-9 (Steele 229)

*[Note: Lecture and Laboratory, formerly separate, are now combined.]*

*The primary goal of this course is for you to become a competent applied statistician; to be good at answering questions of two different kinds. The first is: Is A different from B?. For example, “Are people who use condoms less likely to contract AIDS than people who don’t?” or “Are people who lost a parent during childhood more likely to suffer from depression as adults than people who didn’t?”. A and B can be people, or entire countries, or whales, or television channels or whatever. The fundamental principle is that no two people (or countries or whales) are alike, even when no extraneous source of differences has been introduced. Worse yet, the same person is different from one time to the next. So the statement that A is different from B is a probabilistic statement: Some people who use condoms will still contract AIDS, although most won’t. The goal is to be skilled at assessing how likely it is, given how different A and B appear to be, that they really, truly are different. The second kind of question is: Is A related to B? as in “Is cigarette smoking related to cancer?”, “Is the incidence of child abuse related to family income?”, or “Is creativity related to madness?”. You will learn the prerequisites, pleasures, and pitfalls of answering those questions too.*

### **Instructor**

Alan Hartley

Office: Steele 118 E-mail: alan@scrippscollege.edu

Office Hours: 11:30-1:00 TTh (or email to set up an appointment)

### **Course Assistant and Tutor**

Rebekah Novom

RNovom6628@scrippscollege.edu

### **Text**

*It is strongly suggested but not required that you have a copy of the text. You will need to have access to statistical tables for quizzes.*

*James Jaccard & Michael Becker. **Statistics for the Behavioral Sciences (2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup>, or 5<sup>th</sup> Editions are all acceptable).** Cengage Learning. Available through Huntley Bookstore or online. A Study Guide for this text is also available.*

## *Organization of the Course*

The course is organized to provide very strong incentives for you to really master the skills of a statistician, not just to get a grade in a statistics course. You'll get lots of practice with the concepts, you'll be quizzed on your knowledge often, and you will always have a second chance to show that you have mastered something you hadn't mastered the first time out.

A **homework assignment** will be due *in class* every Thursday except as noted below. Papers showing perfect work will receive 10 points; others will receive no points. You may resubmit (once) assignments on which your work was less than perfect. Papers will be returned on Tuesday; revisions are due Thursday of the same week. Revisions will be graded using the full 0 to 10 scale. You must submit both the original assignment and the revisions. *(If a revision is requested but not resubmitted, the homework will receive 5 points if there were only a few corrections; 0 points if there were major errors or omissions.)* **Late assignments will be accepted up through the Thursday class following the original due date, but they will receive at most 5 points and may not be resubmitted.**

There will be a computer-based laboratory exercise or activity in almost every class. Each successfully-completed exercise will receive 10 points. If you miss an exercise, it will still count if you submit it before the next class (the exercises will be available on Sakai).

There will be three in-class **quizzes** during the semester, each with a maximum of 100 points: **Thursday, February 12; Thursday, March 12; Thursday, April 23**. All quizzes are open-book, open-notes, open-calculator, open-computer. If you wish to raise your grade on a quiz, you may take a similar but not identical quiz on the Friday of the week following the original quiz. **The make-up quizzes are not given in class (since most people will not be taking them), but instead at a special time: Friday, 10:30-1:30. This is the only time make-up quizzes will be given. If you cannot come during this time but would expect to be taking make-up exams, you should probably not be in this class. Make-up quizzes are given in Steele 229. The higher of the grades you receive on the original and make-up quizzes will be the one that counts toward your final grade.** Notice that, if you should miss an original quiz for any reason (e.g., illness, athletic participation, family issues), you will still be able to take the make-up. All quizzes and make-ups are given under the guidelines of the Scripps Code of Conduct (see the *Guide to Student Life*). *You may use books, notes, and computers but may not consult any person other than the instructor.* There will normally be a *Quiz Review* before each original quiz.

There will be a cumulative laboratory **examination** worth up to 100 points on **TUESDAY, May 5**. The examination will cover SPSS laboratory material from the exercises and activities for the entire semester, asking you to determine what statistical technique is appropriate for a particular research question and to apply the technique. A make-up for this examination may be taken **Friday, May 8** (during Reading Days).

There will be a **project** comprising a small study in which you collect and analyze data, testing some hypothesis about two (or more) different groups of people or about the same group of people in two (or more) different circumstances. Here are some examples of projects from prior semesters:

- ♦ "Do men interrupt women in conversation more often than women interrupt men?"
- ♦ "Do women fake orgasm more often than men?"
- ♦ "Do US cities with higher average age have higher average income?"
- ♦ "Are athletic performances worse on days with heavy smog than on days with little or no

- ◆ smog?
- ◆ "Do people write longer term papers as seniors than they did as freshmen?"
- ◆ "Are vegetarians more common among women than men?"
- ◆ "Does more exercise mean a better mood?"
- ◆ "Do cello, violin, and viola players differ in the average time they spend practicing?"

Typically, you should obtain data for at least 10 persons in each of your groups. The term *person* is not intended to be restrictive; units of observation from intergalactic gas clouds to neurodendritic protuberances are equally acceptable. The data must be actual observations; fabricated data are not acceptable. You must use SPSS for the analysis. Evaluation is based on correct choice and application of a statistic rather than the theoretical importance of the question. The report of the project is due in class **April 30** and may be awarded up to 60 points. The report should consist of a paragraph presenting your hypothesis and research in terms understandable to the intelligent layperson and a paragraph reporting the results, following the format specified by Jaccard and Becker. The report should be accompanied by a printout of your SPSS data file (the spreadsheet) and your SPSS output.

***Final Examination: There is no final examination in this course.***

### ***Grades***

Grades are based on the total number of points accumulated during the semester (out of 400 possible for quizzes and 300 possible for homeworks, labs, project):

	Quizzes & Exam (/400)	Homeworks, Labs, Project (/300 <sup>1</sup> )
Lowest	At least	At Least
A	380 pts (95%)	290 pts
B	350 pts (87.5%)	280 pts
C	320 pts (80%)	260 pts
D	240 pts (60%)	240 pts

"Plus" and "minus" grades will be awarded as appropriate.

---

<sup>1</sup> The total number of points will be adjusted to reflect the number of homework and lab exercises actually assigned.

*Tentative Schedule of Classes*

<b>Week of (Tues)</b>	<b>Assignment</b>	<b>Topics</b>
Jan 20 & 27	<i>Descriptive Statistics</i> JB Chs. 1, 3, 4 <i>Homework: 1/22 &amp; 1/29</i>	Mathematical Preliminaries Measures of Central Tendency & Variability Percentiles, Standard Scores
Feb 3 & 10	<i>Frequency Distributions &amp; the Normal Curve</i> JB Chs. 2, 7 <i>Homework: 2/5 &amp; 2/12</i> <b>Quiz: THURSDAY, 2/12</b>	Frequency Distributions The Normal Distribution Distribution of Sample Means Estimation
Feb 17 & 24, Mar 3	<i>Hypothesis Testing: z and t Tests</i> JB Chs. 8, 9, 10, 11 <i>Homework: 2/26 &amp; 3/5</i>	Hypothesis Testing Independent-samples t Test Differences t Test
Mar 10 & 24	<i>Vacation: Mar 16-20</i> <i>Analysis of Variance</i> JB Ch. 12 <i>Homework: 3/12</i> <b>Quiz: THURSDAY, 3/12</b>	Independent-groups ANOVA
Mar 31	<i>Repeated-measures Analysis of Variance</i> JB Ch. 13 <i>Homework: 4/2</i>	Repeated-measures ANOVA
Apr 7	<i>Correlation &amp; Regression</i> JB Chs. 5, 14 <i>Homework: 4/9</i>	Correlation Coefficient Simple Linear Regression
Apr 14 & 21	<i>Nonparametric Statistics: Nominal Data</i> JB Ch. 15 <i>Homework: 4/16 &amp; 4/23</i> <b>Quiz: THURSDAY, 3/23</b>	Chi-square Tests Cochran's Test
Apr 28	<i>Nonparametric Statistics: Ordinal Data</i> JB Chs. 16.1-.3, 16.6-.8 <b>Project Report: 4/30</b>	Kruskal-Wallis Test Friedman's Test Spearman's Test
May 5	<b>Laboratory (SPSS) Examination</b> <b>TUESDAY, 5/5</b>	

Abbreviations: JB = Jaccard & Becker The reading assignments are based on the 5<sup>th</sup> edition, but are mostly the same in prior editions.

### ***Tutors & Problem Sessions***

The tutor/course assistant is available, at no cost to you, to help you in mastering the material in the course. The tutor will run group **Problem Sessions in Steele 229** each week (Wed 8-9 PM) in which she works through additional examples of the statistics that are being covered in lectures and answer student's questions. If you feel you would profit from more personal tutoring, either one-on-one or in a small group, do not hesitate to contact the course assistant. Keep in mind that the tutor is a student, too, with her own responsibilities. Be thoughtful of her. Email well in advance to schedule appointments and don't expect the tutors to drop what she is doing and devote the night before a quiz to you. You should not expect the tutor to provide a substitute for regular class attendance and keeping up with assignments.

### ***Lecture Notes***

Copies of the projected materials used in the class will be available on the Sakai site for this course. Copies of the syllabus, most handouts, and all laboratory exercises will be also be available. I typically post the material on Sakai within 24 hours of the class, but sometimes need to be reminded. If there is something you'd like to have on Sakai that isn't, just ask me.

### ***Competencies [Learning Objectives]***

When you complete this course, if you have mastered the material, you will be able to select and carry out the appropriate statistical analysis for most applications in social or biological science research, private or public sector policy analysis, and many marketing and commercial activities. You will have command of methods for numeric (interval), ordinal, and nominal data including descriptive statistics as well as inferential tests of difference and relationship. Descriptive statistics will include measures of central tendency, variability, and location. You will have working familiarity with inferential tests such as the *t test*, *ANOVA*, parametric and nonparametric *correlation*, *chi square*, *Cochran's test*, *Kruskal Wallis test*, and *Friedman's test*. You will gain experience with the use of computer programs to carry out these tests. (We shall use the **Statistical Package for the Social Sciences for Windows [SPSS]**, an easy to use but very powerful package for statistical analysis. This package is widely used in business and industry and is almost universally used in graduate programs in social and natural science.) You should consider noting these competencies in your resume or vita. Put very simply, you will be a skilled applied statistician. There are not many of those and these days they command attractive salaries.

### ***This is not a mathematics course; it is an applied statistics course.***

That is to say, we shall not concentrate on studying the mathematical foundations for statistics and we shall not develop formal proofs of the theorems that show the statistics do what it is claimed that they do. If your interest lie along these lines, you should consider a course in Mathematical Statistics. Instead, we shall work to achieve an intuitive understanding of statistics: We shall discover that a common sense statement of what we need to accomplish will translate fairly directly into a statistic to achieve it. We shall see that the formulas are actually a set of instructions about how to do what needs to be done. Also, this course may not be the most appropriate one for some people whose interests are in econometrics or the more mathematical parts of sociology. Math 57 (PO) or Econ 125, that place greater emphasis on probability and stochastic processes and on regression and other correlational techniques, may better suit your needs if you are one of those people.

## *Course Policies and Expectations*

- Official notices for the course—which will include homework assignments, changes in the syllabus, etc.—will be sent via SAKAI announcements in email to the address you have listed with the registrar of your college. Be sure that mail sent to that address will go or be forwarded to you. Be sure that you read your SAKAI announcements.
- Regular attendance at class is essential for most students for success in the course. Attendance is not “required” (in the sense that there is no penalty for missing class), although completion of the in-class exercises and activities is required. ***You are responsible for everything that is communicated in class, including lectures, assignments, returned papers, changes in the syllabus voted by the class, and so forth. You are also responsible for picking up returned work (which normally occurs on Tuesdays). A surprisingly common problem is that students miss the opportunity to make up homeworks or quizzes because they never pick up the graded originals.***
- Most times I have offered this course as many as 2000 (!) pieces of work were read, graded, and returned. Even though we keep two completely independent sets of records and even though we have been 99% accurate or better in recent years, this still means that there will be some recording errors. To guard against this possibility, ***keep every piece of graded work that is returned to you until you receive your grade for the course. Do not throw anything away!*** We hope to be able to post your grades so that you can check them confidentially on the course website. Please check the site regularly and bring any discrepancies to our attention immediately.
- The make-up quizzes not only provide a chance to improve your grade, they also allow for quizzes missed due to illnesses, extracurricular activities, or athletic events. No special make-ups (or make-ups for missed make-ups) will be given for any reason, except a verified hospitalization that extends over the dates of both the quiz and the make-up. For absences due to organized Scripps College activities (such as athletic trips), arrangements will be made for your supervisor to administer the quiz while you are away. ***All of the due dates for the semester are given in the syllabus. Please do not ask to be excused because you choose to begin a vacation early or to extend a vacation. Keep these dates in mind when you (or your parents) are making travel arrangements.***

## *Alternative Grading Procedure*

This course is designed to provide every assistance and every incentive to learn and master statistics piece by piece. That simply doesn't work if you don't keep up. Every semester a few students fall badly behind in their work and are very likely to fail the course. They ask to have the requirements adjusted for them or to take an Incomplete in the course. Neither of these is feasible or fair to other students. As a result, there is an ***Alternative Grading Procedure***. Under this option your grade will be determined much as it would be in conventional course. Your grade will be based on the three quizzes and the laboratory examination (weighted equally). ***YOUR GRADE WILL BE BASED ON THE INITIAL QUIZZES ONLY; MAKE-UP QUIZZES WILL NOT BE COUNTED.*** (Conventional courses, of course, do not allow make-ups!) ***HOMEWORKS AND THE PROJECT WILL NOT COUNT TOWARD YOUR GRADE.*** Also there is no penalty for missed classes and exercises. Under this option there are 400 possible points; 90% or more (360 points) earns an A; 320-359, a B; 280-319, a C; 240-279, a D; and below 240, an F. Plusses and minusses are awarded as appropriate. ***You do not have to ask for the alternate grading procedure. I will automatically calculate your grade both ways and give you whichever is higher.***