

CALIFORNIA STATE POLYTECHNIC UNIVERSITY, POMONA  
Psychology and Sociology Department, C.L.A.S.S.

**STATISTICS FOR THE BEHAVIORAL SCIENCES**

**Summer 2004**

CRN	Subject	Course	Section	Day	Time	Building	Room	Instructor:
51046	BHS	307	01	TR	10-11:15am	5	122	Dr. David Horner
51047	BHS	307A	01	TR	12-12:50pm	5	122	Phone: 869-3893

**Office Hours in 5-129:** Tuesday 12:10-1:30, or by appointment.

**E-mail:** drstatistical@yahoo.com

**Course Web Page:** Go to <http://www.csupomona.edu/~dhorner/> and click BHS307. NOTE: Type in the address *exactly*, including punctuation and upper and lower case letters.

**Why should you take this course?** There are many reasons to take this course beyond the fact that it is a required core course for your major. First, you will learn how to think critically about handling quantitative information and interpreting numerical data. Second, you will learn how to make inferences about what is happening in a population of individuals based on information coming from relatively few individuals. Third, any future research projects you conduct (such as in Experimental Psychology, PSY433) will benefit from the information you learn in this course. Fourth, if you are headed to graduate school, this will serve as an excellent preparation. Fifth, I have spoken with alumni who tell me they got good jobs because they had taken statistics classes (not a guarantee, but, hey, it could happen!). Finally, the course will enhance your ability to evaluate scientific and pseudo-scientific claims made by other researchers and by the popular media.

**Who is this nerd?** I was born the youngest of 3 in Cleveland, but raised in San Diego. My father is a retired Lutheran minister and my mother is a retired teacher. My wife is the most beautiful Canadian in the world. My other hobbies include basketball, movies, and telling bad jokes. I am, unfortunately, truly a child of the seventies. I received my BA in psychobiology from UC Santa Cruz and my Ph.D. in psychology from Indiana University. I taught at Truman State for 3 years and at UW Oshkosh for 9. I have authored 8 articles, 7 small grants, and 31 conference papers. I belong to 5 professional organizations. I research the factors influencing how humans process visual and tactile information. At the undergraduate level, I teach Experimental Psych, Statistics, Sensation & Perception, Methods in Behavioral Science 1, and Mind, Brain, and Behavior.

**How does this guy teach?** I enjoy teaching and I believe that learning should be fun, challenging, and rewarding. In this class, I stick fairly closely to the topics in the textbook (read these carefully before coming to class), and class time is used to explain these topics more fully, to demonstrate statistical reasoning, to elaborate statistical concepts with detailed examples, and to learn how to use the computer program SPSS to analyze data.

### READINGS

**Required:** McCall, R. B. (2001). *Fundamental Statistics for Behavioral Sciences*. Eighth Edition. Wadsworth. Belmont, CA. [\$82.75 in the campus bookstore (c.b.)]

**Recommended:** Study Guide for McCall's *Fundamental Statistics for Behavioral Sciences* [\$25.35 in c.b.]  
Statistics workshops at <http://psychology.wadsworth.com/workshops/workshops.html>  
SPSS tutorial at <http://www.csub.edu/ssricrem/spss/spsfirst.htm>

## OBJECTIVES

This course discusses the principles, theories, and strategies for conducting statistical analyses in the behavioral sciences and provides a clearer understanding of what is involved in analyzing data. Class meetings are designed to supplement, illustrate, and clarify information presented in the textbook, and to provide an opportunity for hands-on experience and discussion of statistical techniques. A heavy emphasis will be placed on how to critically analyze data from experiments. After taking this course, students should:

<b>Understand:</b>	<b>And be able to:</b>
Why statistics is important	Differentiate between descriptive and inferential statistics
Frequency distributions	Create frequency distributions and graphs of scores on a variable.
Characteristics of a distribution of scores	Measure central tendency and variability within distributions
What relative standing means	Use a standardized normal distribution.
What regression and correlation means	Compute standard errors of estimate and correlation coefficients
Sampling distributions	Compute standard errors of the mean
Theories & techniques of hypothesis testing	Test for differences between means and correlations
The simple analysis of variance	Compute F statistics and comparisons of means
Non-parametric statistical techniques	Use and interpret the outcomes of non-parametric tests

## SUMMARY OF ASSIGNMENTS AND DUE DATES

-----	Lab Assignments	As announced, throughout the quarter	5 points each
July 8	Homework set 1	(covering chapters 1, 2, 3, and 5)*.	20 points
July 8	Exam 1	(covering chapters 1, 2, 3, and 5)*.	100 points
Aug 3	Homework set 2	(covering primarily chapters 6, 7, 8, and 9)*.	20 points
Aug 3	Exam 2	(covering primarily chapters 6, 7, 8, and 9)*.	100 points
Aug 31	Homework set 3	(covering primarily chapters 10, 11, 14, and 16)*.	20 points
Aug 31	Final Exam <b>at 9:10am</b>	(covering primarily chapters 10, 11, 14, and 16)*.	100 points

\* Exams, although cumulative, emphasize material since the last exam and cover only the pages in the tentative class schedule

## POLICIES

1. This course syllabus contains specific guidelines for how section 01 of the course “Statistics for the Behavioral Sciences (BHS 307)” will be taught during the Summer quarter of 2004. These guidelines are independent of any other course or section taught during this quarter or any previous quarter, despite any apparent similarities.
2. Dropping the course, should the need arise, is your responsibility. To officially drop the course, use the Voice Registration System (909-468-5020) before the drop date published in the Academic Calendar. My signature is not required to drop the class at the beginning of the quarter.
3. Cheating will not be tolerated. Cheating involves submitting work that is not a product of your own effort. Some examples of cheating are; copying from others, crib notes, and plagiarism (the misrepresentation of the ideas or words of another as one’s own). At my discretion, cheating will be punishable by either an “F” for the assignment or an “F” in the course. Further details about cheating are available in the University Catalog.

4. Reasonable accommodations are available for students with a documented disability. Please notify me by the end of the second week of class if you require any accommodations. Late notification may delay the requested accommodations. All accommodations must be approved through Disabled Student Services (869-3333).
5. Class attendance is strongly recommended because exams cover material from class meetings and from the text. Furthermore, you are responsible for all material presented in class, including any changes in the class schedule or exam dates. Absenteeism is detrimental to performance on exams. Arriving late to class or leaving early is fine as long as it is done quietly and without disturbing others.
6. Difficulty with the English language. You should have a good working knowledge of English to take this class. However, if English is not your native language and you want to use a translation dictionary during the exam, or if English is your native language and you need a dictionary, notify me by the end of the second week of class. We will work out a procedure at that time so you may use the dictionary.
7. Exams. There will be 3 exams, each worth 100 points. Exams will cover information both from the assigned readings and from class meetings. Any information from these two sources may appear on exams unless stated otherwise in class: Assume that material from the text that is untouched upon in class will be on the exam. Exams are cumulative, but emphasize the material covered since the last exam. Exams may contain the following types of questions: multiple-choice, short-answer, essay, and data/graph analysis. Performing well on exams will require memorizing terms, but will also require understanding the theories behind each concept, and how to apply the knowledge you have learned to novel situations. Some exam questions will test your knowledge of facts, some will test your comprehension of concepts and theories, some will require that you apply your knowledge to novel situations, and some may require data or graph analysis. Please bring two #2 pencils to exams and a calculator. You will write on your exams, so no blue books are necessary.
8. Make-up exams: Experience has shown that students do not perform well on make-up exams. Specifically, students usually score one or more "letter grades" lower on make-up exams than they score on in-class exams. The types of questions on make-up exams are typically like those on in-class exams, although the number of each type of question may vary greatly from in-class exams. Make-up exams may be all of one type of question (e.g., all multiple-choice or all essay). For the above reasons, I strongly encourage you to take exams in class. However, if you feel you cannot take an exam in class because of an outside conflict, in order to make-up the exam you must receive my approval at least 48 hours before the exam. Approval is not automatic: Your reason for not being able to take the exam in class must be a valid one. If an emergency arises less than 48 hours before the exam that will prevent you from taking the exam in class, please communicate with me immediately to discuss options: In such cases, some form of documentation verifying your inability to take the exam in class may need to be provided to arrange a make-up exam. Extreme penalties are usually incurred for un-excused absences from exams. If you miss an exam, for whatever reason, contact me as soon as possible.
9. Time allowed on exams is somewhat flexible. I try to design exams to be completed within the class period for the average student. However, if you need additional time on exams I can arrange for you to stay past the normal class period to finish the exam. If you have extreme test anxiety or other problems taking tests please be sure to let me know and I will make every effort to help you.
10. Homework assignments. The three homework problem sets are designed to complement class discussions of statistical reasoning and to help you prepare for each exam. Homework sets are usually composed of some of the problems at the end of each chapter in your textbook. Each homework set focuses on the content for an upcoming exam and will be due at the beginning of class before each exam. Use any kind of paper you wish,

but show all your work for each question, make sure your work is readable, and circle your final answer for each question. You may work on the problems with other students currently enrolled in the course, but each student turns in his or her own homework. Because the purpose of homework is to prepare you for each exam, and because you should be doing your homework on an ongoing basis, I accept late homework rarely and I usually impose severe point reductions for late work.

11. Lab assignments will be announced throughout the quarter, each worth 5 points. Lab assignments focus on using SPSS to solve statistical problems like those we discuss in class. In lab, I will demonstrate how to conduct an analysis, then give you data and questions to answer, and you will submit your completed assignments at the end of class - they are not "take-home." All work should be completed during the time period allowed for each lab session. Late lab assignments are accepted, but usually with severe point reductions.

12. Grades of A, A-, B+, B, B-, C+, C, C-, D+, D, D-, and F may be assigned at the end of the quarter based on the total points earned, combined from lecture and lab (you get the same grade for lecture and lab). Since the total number of points you have earned determines your overall grade, there is no curving of the grades in this course. I use percentages of the "total points possible" to determine cut-offs for grades, then compare your point total to the cut-offs to determine your grade. I use the following scale to determine final grades:

A	=	93.34-100.0%	B	=	83.34-86.66%	C	=	73.34-76.66%	D	=	63.34-66.66%
A-	=	90.00-93.33%	B-	=	80.00-83.33%	C-	=	70.00-73.33%	D-	=	60.00-63.33%
B+	=	86.67-89.99%	C+	=	76.67-79.99%	D+	=	66.67-69.99%	F	=	59.99% or below

I will post your scores after each exam on the website using a 4 digit code you give to me before the first exam (only with your permission). Along with your exam scores, I will post a guide to your current course standing based on the number of cumulative points you have earned up to that date and the above scale. I will keep all exams. However, you are strongly encouraged to review them by making an appointment. Reviewing is helpful for at least two reasons: 1) as a learning exercise, and 2) to help prepare for the next exam.

13. Your grade is based on the amount of learning you have achieved as measured by the points you have earned. Note that grades are not based directly on the amount of time and effort you expend in studying, but rather, on how well you perform. Some of my students in past courses felt they deserved a higher grade than the one they received because they had worked hard. However, high grades are not an entitlement due to hard work, but are awarded based on high achievement in the course. In accordance with the university's guidelines for grading as stated in the University Catalog, I use the following meanings of the main letter grades:

- A** Extraordinarily high achievement; shows unusually complete command of the subject matter
- B** Above average comprehension of course material
- C** Satisfactory work indicating a basic understanding of the course material
- D** Passing work, but lacks a basic understanding of some of the course material
- F** Work performed does not meet the minimum specifications of the course

14. Academic Difficulty. If you are not understanding the material or if your exam performance is not up to your expectations, make an appointment with me. I will try to help you, and I may be able to offer suggestions to improve your retention of the material. Some suggestions will be offered in class, but I may be able to offer some advice unique to your situation. Please do not wait until the term is halfway over before you seek assistance.

**TENTATIVE CLASS SCHEDULE\***

wk	Dy	Date	Ch	Lecture Topic	Pages
1	T	6-22	----	Introduction and Syllabus.	-----
	R	6-24	1,2	The study of statistics, Frequency distributions	1-52
2	M	6-28	----	Late registration ends	-----
	T	6-29	3,5	Characteristics of distributions - central tendency, variability, percentiles	53-77, 100-107
	R	7-1	5	Relative standing – scale properties, standardized scores	107-132
3	T	7-6	5	Relative standing, review for exam 1	107-132
	R	7-8	6	<b>Exam 1 - Hand in homework set 1</b>	-----
4	M	7-12	----	Last day to withdraw	-----
	T	7-13	6	Regression and linear relationships	133-161
	R	7-15	7	Correlation and properties of the correlation coefficient	162-188
5	T	7-20	7	Correlation and properties of the correlation coefficient	162-188
	R	7-22	8	Sampling distributions, sampling error, hypothesis testing	189-213
6	M	7-26	----	Fall quarter registration begins	-----
	T	7-27	9	Hypothesis testing - when estimating population parameters	214-239
	R	7-29	9	Hypothesis testing, review for exam 2	214-239
7	T	8-3	10	<b>Exam 2 - Hand in homework set 2</b>	-----
	R	8-5	10	Hypothesis testing - inferences about differences between means	240-253
8	T	8-10	10	Hypothesis testing - inferences about correlation coefficients	253-268
	R	8-12	11	Effect size and interval estimation	269-295
	F	8-13	----	Last day to apply for current quarter graduation	-----
9	T	8-17	14	ANOVA - introduction and logic	351-375
	R	8-19	14	ANOVA - comparisons between specific means	375-388
10	T	8-24	16	Nonparametric techniques	424-436, 450-460
	R	8-26	16	Nonparametric techniques	424-436, 450-460
11	T	8-31	----	<b>Review, Final Exam at 9:10am, hand in homework set 3</b>	-----

\*Note: I reserve the right to deviate from this tentative schedule if I feel such a change is necessary.

**SUGGESTIONS FOR IMPROVING YOUR PERFORMANCE ON EXAMS**

The following advice comes from 9 years of my own undergraduate and graduate school experience, and 15 years of teaching undergraduates and graduate students. Please accept these ideas as suggestions only: If you think they will work for you, use them, and if not, ignore them. I do not promise good or bad results: They are intended only as suggestions from someone who has spent a lot of his life in school.

**How to read the textbook:**

To perform well on exams you must understand what you read at a deep level. Understanding something at a deep level means you have thought about it in a highly meaningful way. Understanding at a deep level requires you to take new information (new stuff) and relate it meaningfully to stuff you already know about (old stuff). For example, let's say you want to remember some new stuff that you have just read: bananas are grown on the Canary Islands. You might "link" the new stuff with old stuff in the following way: bananas are yellow (old stuff), and canaries are yellow (old stuff), which helps to "link" bananas with the Canary Islands (new stuff). In addition, let's say you also know that bananas are a tropical fruit (old stuff) and that the Canary Islands are located in the tropics (old stuff), which again helps you to "link" bananas with the Canary Islands (new stuff). The more ways you can find to link new stuff with old stuff, the deeper you are processing the information, and the better you will understand and remember the information later. If you can somehow relate the new stuff to yourself or someone you know well, this also serves to deeply process the information. For

example, if your best friend (old stuff) just returned from the Canary Islands and brought you some bananas, this will help you to "link" bananas with the Canary Islands (new stuff).

The difficult part about deep processing is that it is time consuming: It requires you to stop reading and think for awhile, before reading any more material. This will obviously slow down the pace of your reading. But, it will also increase your comprehension and your ability to remember the new stuff later on. I usually tell students to read a couple of sentences or a paragraph (depending on the difficulty of the material) and then stop and think about it before reading any further. This is what I must do when I am reading a journal article. In fact, to read some articles, I must read a single sentence and think about it for awhile before moving on.

Understanding at a deep level is different from reading the text and believing that you understand it; rather, it involves one or more of the following (and the more the better):

- Thinking about the meaning of the new facts or ideas
- Thinking about how the new concept relates to what you already know.
- Thinking of examples of the new information.
- Creating new examples to illustrate a new concept.
- Explaining the new information to someone else.
- Writing down an explanation of the new information.

### **How to take notes in class:**

Usually students have devised their own strategies for note taking by the time they get to college. Here are some additional pieces of advice. The first key to taking good notes in class is to read the book before coming to class. By doing this, you will have a better understanding of what I am saying in class, and you will use your note-taking to deepen your understanding of the topic rather than recording stuff you have heard for the first time, perhaps without full comprehension. The second key to taking good notes is not to write down every letter in every word. Instead, devise your own type of "short-hand" that you will understand when you read your notes at a later time. For example, if my college professor had said, "Freud proposed that people who experience anxiety use a variety of defense mechanisms to eliminate or reduce their anxiety," I would have written:

Freud: peop who exper. anx. use def. mech's to reduce anx.

The third key to taking good notes is to find time as soon after class as possible to review your notes and clarify any ambiguous or missing information. Use a different colored pen at this time so you know which notes were class notes, and which notes were added afterwards. This usually takes relatively little time and may have a big payoff later on, when you are trying to de-cipher your notes while studying for the exam.

### **How to study for exams:**

In addition to your own strategies for studying, here are some suggestions. Studying for an exam should take place during the weeks before the exam, that is, on an ongoing basis, rather than "cramming." As mentioned above, read the material to be covered during the upcoming class session before coming to class. Read all of the material to be covered on an exam at least twice, with as much comprehension as possible each time you read it. Every time you read, think deeply about the material. There is a direct relationship between the amount of time you spend processing material deeply and how well you will comprehend and remember it.

Finally, one problem with psychology is that some of it seems "intuitively obvious" and students feel they know the material well until their knowledge is tested more deeply on an exam. You may need to really work with the textbook and classroom notes to get a good grade. The study aids you produce yourself are the most important for learning.

### **How to handle poor exam performance:**

Unfortunately, despite their best efforts, some students still do poorly on the first exam. Don't wait until after the second exam to seek my assistance if you feel you need help - see me as soon as possible. Sometimes poor exam performance is unrelated to studying, but is due to factors beyond control – I call these factors “life intrusions.” Life can interfere with studying in many ways. Some common distractions from studying include such things as personal illness, job-related stresses, stressful home environment, or the death of a close friend or relative. Obviously, exam performance may improve only after resolution of these kinds of difficulties.

However, in terms of controllable factors, such as how one studies, the two most common mistakes that students make are trying to cram for exams, and not reading the book closely enough. Although there are many possible reasons why students do not perform well on tests, students often fall into one of four categories:

1. Students experience life intrusions (as mentioned above)
2. Students are pretty good at taking tests, but fail to study productively.
3. Students study productively, but are not good at taking tests.
4. Students neither study productively, nor are they good at taking tests.

If you fall into category 1, exam performance is best improved by removing the intrusion or finding a strategy for adapting despite the intrusion. If you fall into categories 2 or 4 you need help with study strategies, and this handout is for you. If you need further assistance, see me for additional suggestions. If you fall into categories 3 or 4 you may be experiencing one of various forms of exam anxiety. The "symptoms" may include such things as extreme nervousness, difficulty in thinking clearly, or "blanking out" while trying to answer questions. To reduce exam anxiety and to allow more time for taking the exam, some students find it helpful to take the exam in the Learning Center on the bottom floor of the library, and this option is available to all students. Students who select this option must begin the exam in the Learning Center at the same time as students taking the exam in class. If you wish to take an exam in the Learning Center you must notify me at least a week before each exam.

### **Miscellaneous Study Tips From Former Students:**

1. "Don't miss class - class really helps you to understand the material better."
2. "When I spent more time reading the book, I did better on the exams "
3. "Make a schedule for reading the book and studying and stick to it."
4. "Don't be bashful about asking questions - What you don't understand is sure to be on the test."
5. "Don't wait until the week of the exam to study - go over your notes everyday"
6. "Questions are mostly applied or conceptual - be sure to understand the material - memorization won't work"
7. "Follow up on exams- get the correct answers, look at the questions you missed and why you missed them, look at the types of questions included on the exam. The same styles of questions are used on all tests."