

APPLICATIONS OF STATISTICAL METHODS IN PSYCHOLOGY

PSY 117, Section 001, Fall 2010

Tue/Thu 1:15-2:30, 130 Soc/Psych

Once-a-week lab meetings in The Link, Classroom 6

Course Instructor:

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Office hours: Monday & Tuesday 11-12 and by appt. or drop-in

Lab Instructors/Teaching Assistants:

Dawn Epstein (sections 02L and 03L)

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and by appointment

Sean Griffith (sections 01L and 04L)

05A Sociology/Psychology Building

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Office hours: Tue 2:30-4:30, Fri 4:15-6:15

and by appointment

Course website: <http://www.duke.edu/~rhoyle/teaching/psy117/>

Books and Supplies

Required:

Aron, A., Aron, E. N., & Coups, E. J. (2009). *Statistics for psychology* (5th ed.). Upper Saddle River, NJ: Pearson Prentice Hall.

Basic calculator (no need for graphing capabilities or statistical functions).

Access to a copy of the 6th Edition of the *Publication Manual of the American Psychological Association*.

Optional:

Whitley, T. W. (2009). *Study guide and computer workbook for Statistics for Psychology* (5th ed.). Upper Saddle River, NJ: Pearson Prentice Hall.

Brace, N., Kemp, R., & Snelgar, R. (2006). *SPSS for psychologists* (4th ed). New York: Routledge. (Not available in the Duke bookstore. Order online from Amazon.com or similar vendor for about \$43.)

Notice. All information in this syllabus, including the course schedule, reading assignments, grading policies, etc., is subject to change. Any changes will be announced in class, updated in the syllabus, and posted on the course website.

Description and Goals of the Course

This course, required for the psychology major, provides an introduction to statistical methods commonly used in psychological research. Topics in applied statistical methods that will be covered include,

- measures of central tendency and variability
- probability and distributions
- confidence intervals and hypothesis testing
- t -test and analysis of variance
- correlation and regression
- χ^2 tests

Students will learn to calculate and interpret statistics with reference to data and research questions typical in psychological research. The course includes a weekly lab meeting that provides instruction in the management and analysis of psychological data using statistical software designed for use in behavioral science research.

The course is designed to fulfill these goals:

- develop an appreciation for the vital role of statistical methods in psychological science
- master fundamental concepts in statistical reasoning
- learn how statistical methods are used to test hypotheses
- understand the computation of statistical tests, confidence intervals, and effect sizes for statistical methods commonly used in psychological research
- gain experience using widely available statistical software for analyzing data
- learn to translate and interpret statistical results for reports and presentations

Elements of the Course

Textbook

We will cover material from 13 chapters in the textbook. You are strongly encouraged to read the section assigned for each class meeting (see course outline below) at least twice—before the class meeting and again after we have covered the material in class. Accompanying each chapter are practice problems and exercises. A few of these will be assigned in homework problem sets. The others are available to do on your own or with study partners and, if you find yourself struggling with any of the material, you should use the relevant problems and exercises to build understanding and develop mastery.

Attendance at Class Meetings

Attendance at all class meetings is expected but will not be monitored. Although this course makes good use of an excellent textbook, it does not rely exclusively on material in the book; thus, missing class will mean missing material you will be expected to know. Moreover, we will

do occasional exercises in class meetings that could not be duplicated by copying another student's note. *You are strongly encouraged to attend every class meeting.* Class meetings will begin promptly at 1:15. Because the entrance to the classroom is at the front through a noisy door, late arrivals are disruptive. It is better to be late than to not come at all, but make every effort to be in your seat and ready to begin by 1:15.

Meetings with Instructor/TAs

You are encouraged to meet with the instructor or one of the teaching assistants any time you feel you could benefit from such a meeting. Although the number of posted office hours per week is small, the instructor and TAs are available and willing to meet with you at other times. If you would like to discuss the course in general or material presented during class meetings, then you can meet with the instructor or either of the TAs. If you need help with a problem set or an SPSS assignment, then you will find it most beneficial to meet with the TA that is your lab instructor. Such meetings can be arranged by email or immediately following class or lab meeting. Although we are available and reasonably flexible, please do not expect immediate replies to email messages, especially those sent just prior to class or your lab meeting.

Lab Meetings

Every student is enrolled in one of four lab sections. All sections meet once a week in The Link (Classroom 6), located on the lower level of Perkins Library (info here: <http://link.duke.edu>). Lab meeting times and instructors are as follows:

01L—Thu 2:50-4:05, Griffith	03L—Fri 8:30-9:45, Epstein
02L—Thu 4:25-5:40, Epstein	04L—Fri 2:50-4:05, Griffith

The lab meetings are a critical component of the course, and therefore attendance is required. During these meetings, the instructor will review material from class meetings, teach you how to use the statistical software SPSS, and occasionally present new material. Attendance will be taken at all lab meetings and contribute a small amount to your grade for the course (attendance policy on page 5). Your lab attendance grade will begin at 100, then be reduced to 90 following one absence, 80 following a second absence, and zero following a third absence.

Problem Sets

Statistical methods, particularly as they are applied in research, are best learned through practice. As such, the textbook and lectures will be supplemented by a series of problem sets, which are to be completed outside of class and will be reviewed during meetings of lab sections. The activity of completing these homework assignments serves a diagnostic purpose while preparing you for exams and other assignments. Problems sets are due at the beginning of the class meeting before the lab meeting at which they are covered and will only be accepted at this time unless you have an excuse that meets standard university criteria. Problem sets will be graded as follows:

- 0—not completed, or handed in late
- 1—handed in on time but not complete

2—handed in on time, complete, but includes some mistakes

3—handed in on time, complete, and no mistakes

Your performance on the problem sets, coupled with your attendance at lab meetings, will account for 15% of your grade for the course.

Exams

The course is divided into four units that cover equivalent amounts of material (three chapters each except for the fourth unit, which will cover parts of four chapters). For each unit of study there will be a paper-and-pencil exam comprising multiple choice and short answer items. The latter will include brief computational problems and questions that require a written response. The fourth exam will be administered at the scheduled time for the final exam (see course outline below), but it will not be cumulative (although it will be a bit longer and count more toward your course grade because it will cover more material than the first three exams). Collectively, exam grades will account for 65% of your grade for the course.

Paper

You will prepare to hand in at the last class meeting of the semester a short paper in which you report the results of a simple set of statistical analyses. In order to complete the paper successfully, you will have to run the analyses using data provided for you. You will then report the findings in a results section typical of those in professional journal articles published by psychological scientists. Your paper will need to be formatted in APA style. You will be expected to include at least one table and one figure, and include the output of your SPSS runs in an appendix. Your grade on the paper will contribute 20% to your grade for the course.

Course Grades

Your grade for the course will be based on the total percentage of points you earn on six graded activities, weighted as follows:

Exam 1: 15%
Exam 2: 15%
Exam 3: 15%
Lab/problem sets: 15%
Paper: 20%
Final exam: 20%

Grades will be distributed as follows:

Grade	% Range	Grade	% Range	Grade	% Range
A	93.0-100.0	B-	80.0 - 82.9	D+	67.0 - 69.9
A-	90.0 - 92.9	C+	77.0 - 79.9	D	63.0 - 66.9
B+	87.0 - 89.9	C	73.0 - 76.9	D-	60.0 - 62.9
B	83.0 - 86.9	C-	70.0 - 72.9	F	00.0 - 59.9

Policies and Procedures

Academic Integrity

Please be sure you understand and act in accordance with Duke's Community Standard (<http://www.integrity.duke.edu/new.html>). Paraphrasing the published standard, this means you will (1) not lie, cheat, or steal on graded work, (2) conduct yourself honorably in all aspects of the course, and (3) act if the Standard is compromised.

Missing Graded Work

If, for brief and temporary health reasons, you are unable to take an exam (except the final exam) or complete a graded assignment you are to complete the web-based Short-Term Illness Notification Form. (The form is not to be used for simply missing class for health reasons.) You should submit the form prior to the class in which the graded assignment is due or will occur. Submitting the form requires stating that you are adhering to the Duke Community Standard. Upon submission, copies of the form are sent by email to the course instructor and the Trinity academic deans. Information about the policy and access to the form can be found online at <http://www.aas.duke.edu/cgi-bin/trinity/t-reqs/illness/form.pl> If illness leaves you unable to complete the final exam at the scheduled time, you must make arrangements with your academic dean.

Lab Attendance Policy

Unless you have prior approval from you lab instructor, you must attend the lab section in which you are enrolled in order not to be counted absent.

Prior approval will be granted for reasons that ordinarily would qualify as university recognized excused absences. These include athletic participation and professional interviews for which you do not control scheduling.

Prior approval will come with either permission to attend another lab section in the same week during which you will miss the meeting of your lab sections or, if this is not possible, a makeup assignment to be done on your own time but before the next lab meeting. Note that all lab sections are full; thus, it might not be possible for you to attend an alternative lab meeting even if your schedule would permit it. *You must get prior approval to do so.*

If you miss a lab meeting due to illness, you have two options:

1. If you are in a Thursday section, contact the lab instructor for the Friday sections and ask for approval to attend one of those lab meetings.

2. If you are in a Friday section or in a Thursday section but unable to make it up by attending a Friday section, you will need to make it up by doing a makeup assignment on your own time but before the next lab meeting.

Appealing Grades

Although we are not willing to negotiate grades, we are willing to correct any grading errors. Errors that we will correct promptly when they are brought to our attention (but no later than 7 days after the grade is made known to you) include the following:

- points earned on individual components of the graded work were not added correctly
- you indicated or wrote the correct answer but the grader did not see it
- your written answer is correct but was not interpreted as such by the grader

We are *not* willing to consider the following appeals:

- dissatisfaction with the number of points lost
- dissatisfaction with how questions were worded

Religious Holidays

If you will miss class in observance of a religious holiday, please notify the course instructor and/or relevant lab instructor prior to the date in question by submitting a Religious Observance Notification Form, which you can obtain online at <http://www.aas.duke.edu/cgi-bin/trinity/t-reqs/rholiday/form.pl>

Student-Athlete Travel

Student athletes who will need to miss class or lab meetings during the semester due to travel should work with the course instructor or relevant lab instructor as soon as possible to arrange for making up work that will be missed and rescheduling assignments due on days they will be absent. You can find the Notification of Varsity Athletic Participation form online at <http://www.aas.duke.edu/cgi-bin/trinity/t-reqs/novap/form.pl>

Course Outline

1. Tue, Aug 31	introduction to the course and instructors data collection role of statistics in psychological science	syllabus
2. Thu, Sept 2	visual displays of data	Chapter 1
3. Tue, Sept 7	characterizing distributions: central tendency	Chapter 2, pp. 33-42
4. Thu, Sept 9	characterizing distributions: variability	Chapter 2, pp. 43-57
5. Tue, Sept 14	Z scores and the normal distribution	Chapter 3, pp. 67-83
6. Thu, Sept 16	sampling and probability	Chapter 3, pp. 83-96
7. Tue, Sept 21	Exam 1	
8. Thu, Sept 23	logic of hypothesis testing	Chapter 4, pp. 107-118
9. Tue, Sept 28	significance testing statistical tests using the Z distribution	Chapter 4, pp. 119-129 Chapter 5, pp. 137-154
10. Thu, Sept 30	confidence intervals; std error of measurement	Chapter 5, pp. 154-164
11. Tue, Oct 5	inference; effect sizes; meta-analysis	Chapter 6, pp. 175-186
12. Thu, Oct 7	introduction to statistical power	Chapter 6, pp. 187-207
13. Thu, Oct 14	influences on statistical power	Chapter 6, pp. 208-215
14. Tue, Oct 19	Exam 2	
15. Thu, Oct 21	<i>t</i> -test for a single sample	Chapter 7, pp. 222-236
16. Tue, Oct 26	<i>t</i> -test for dependent means	Chapter 7, pp. 236-254
17. Thu, Oct 28	standard error of the <i>t</i> -test for independent means	Chapter 8, pp. 270-278
18. Tue, Nov 2	independent means comparisons using <i>t</i>	Chapter 8, pp. 278-295
19. Thu, Nov 4	χ^2 test for goodness of fit	Chapter 13, pp. 536-546
20. Tue, Nov 9	χ^2 test for independence	Chapter 13, pp. 546-561
21. Thu, Nov 11	logic of analysis of variance (ANOVA)	Chapter 9, pp. 310-325
22. Tue, Nov 16	Exam 3	
23. Thu, Nov 18	hypothesis tests and comparisons in ANOVA	Chapter 9, pp. 327-338
24. Tue, Nov 23	power and effect size in ANOVA raw score approach to ANOVA	Chapter 9, pp. 339-342 Chapter 9, pp. 345-350
25. Tue, Nov 30	interaction effects in factorial ANOVA	Chapter 10, pp. 370-404
26. Thu, Dec 2	correlation	Chapter 11, pp. 432-463
27. Tue, Dec 7	simple regression	Chapter 12, pp. 487-505
28. Thu, Dec 9	logic of multiple regression papers due by the beginning of class	Chapter 12, pp. 506-517
Sat, Dec 18 (7-10pm)	Final exam	
