Statistical Principals in Psychological Research (PSYC 215)

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Office Hours:
Thursdays 2:00-3:00 PM or by appointment (EAY),
Mondays 1:00-2:00 (TF)

E-mail: eay@unc.edu (this is the best way to reach me)

Please Note: During the semester I am prepared to meet individually (by appointment) with any and all students enrolled in this course. That is especially true during the first week we meet and especially true for students with disabilities who are registered with the Coordinator of Disability Services and who may need individual arrangements for completing course requirements.

Meeting Time:
Tuesday & Thursday 11:00-12:15 in Davie 101 (lecture/recitation)
Friday 1:00-1:50 in Howell 203 (lab)

Teaching Fellow: Nisha Gottfredson (nisha.gottfredson@gmail.com)

Prerequisites: Calculus

Why Take the Course?

A statistics course should develop critical thinking skills that will be used even if a student never takes another psychology course. Similarly, understanding statistics should enable a person to become a more informed consumer of research regardless of their chosen field. For students considering a psychology-related career, there are other practical reasons for taking the course: Statistics courses generally are required for admission into most graduate level training programs in psychology. Finally, PSYC 215 is designed as important preparation for conducting one's own independent research.

Course Objectives:

PSYC 215 is intended to prepare you to become a critical consumer of psychological research, and to provide a foundation for you to conduct research of your own. Specific goals include:

- Honing critical thinking skills (developing the "fine art of baloney detection") and understanding how statistics help with this
- Understanding the strengths and weaknesses of major research designs
- Selecting appropriate analytical procedures for questions of interest
- Conducting exploratory data analysis, relying heavily on sorting and graphing
- Communicating results in papers and posters adhering to American Psychological Association (APA) format
- Developing the capacity to evaluate information presented in the professional and popular press.

Each of you has unique interests and motives for taking this course. Please view me as a resource to help find material and gather information about research and careers related to psychology. The more you communicate your goals for the class to me, the more effectively I can help you to reach them. This also is an opportunity to learn about graduate school and professional opportunities in the field of scientific psychology, and I am happy to discuss these with you in class when pertinent and individually outside of class.

Grading:

Two projects will each count for 25% of the grade; homework assignments will count for 25%, quizzes on the readings for 15%, and class participation (including attendance) for 10%. Midterm grades on class participation will be posted for reference. The lowest quiz grade (including a zero for a missed class containing a quiz) will be excluded from calculation of the final quiz average. **There will not be any make-up quizzes.**

Radish Project and Poster (25%): One project will involve conducting a "between subjects" design experiment, using radishes as participants. Why use radish plants in a psychology class? They grow quickly enough to produce measurable results within a few weeks, and radishes also do not present the ethical concerns that are inherent in research with animal and human participants. Interestingly, the statistical techniques you will probably use to analyze the results initially were developed for agricultural research. Students will develop the experiment, conduct the research, enter data, perform statistical analyses, and present the findings in a poster format. Student projects may also be combined for a demonstration of "meta-analysis," a way of integrating results from multiple studies, at the end of the semester.

Survey Project and Paper (25%): The other project will focus on correlational research using survey data. Students will develop a questionnaire in class, apply for approval to use the questionnaire with human subjects, and gather data from students enrolled in another psychology course. Students will develop research questions, enter the data, analyze them, and write up their findings following APA 5th edition style guidelines. Both the manuscript and the poster will be completed in modules over the course of the semester. The instructor and teaching assistant will provide written feedback about each module of the project, but will not assign grades until the project is completed. Students will also peer review the manuscript and posters.

If students are dissatisfied with the evaluation of their performance on the survey project, then they have an opportunity to "revise and resubmit" the project. Such revision will involve making the suggested changes, and including a detailed cover letter specifying where and how the changes were made in the manuscript or presentation.

Class participation (10%) includes asking questions during meetings as well as answering them, and unsolicited contributions to the Blackboard listserv also count. For many students, listservs provide a forum for participation that is less threatening than public speaking. Please be courteous, respectful, and supportive in your discussions in class and on the listserv. Regular attendance is expected. At the same time, attendance without active participation will not earn better than a grade of "C-" (70 points) for participation.

Feedback about Grades: Scores on assignments, homework, and quizzes will be entered in the gradebook in Blackboard. You will be able to check your scores using your Blackboard account at any time that you have access to CWRU Net. *Please note that Blackboard cannot weight the different components of your grade, and it will not drop your lowest quiz grade.* If you would like to know your current grade at any point during the semester, please send me e-mail or ask after class. I will be happy to provide you feedback within two business days of any such request (provided that I have Internet access, which may not be the case on days that I am traveling).

Important: Students wishing for re-evaluation of their grades on an assignment must request this within two weeks of receiving the initial grade. Last day to drop a class is Wednesday January 24th, 2007.

Experiential Learning:

This class is being taught using experiential learning, with great emphasis on applying the concepts to your own projects instead of memorizing for exams. The class is more work as a result, but hopefully the concepts will be more meaningful and memorable. You also will learn a set of skills that will be helpful in deciding if you want to pursue graduate education or a career in the social sciences.

Writing Intensive:

This course fulfills the "writing intensive" criteria. Over the course of the semester, each student will produce a paper that typically is more than 10 pages in length, following the APA 5th Edition style guidelines.

Attendance and Late Assignments:

Failure to attend regularly will affect one's grade for class participation. Also, many of the class projects will be collaborative or require that everyone share data. It is expected that assignments and data will be submitted on time even when scheduling conflicts preclude attendance. Please use e-mail or arrange for delivery of the needed material as a courtesy to the rest of the class. Because of the critical nature of timeliness, late assignments will be lowered by one full grade (10%) for each day late until they are received by the instructor (and the students who need to peer review the project, if peer review is involved). The penalty continues to accrue over weekends. For example, sliding

something under the office door on Friday night that was due in class Thursday would probably get marked down 40%: 10% for Friday, Saturday, Sunday, and Monday (when it would be received by the instructor). Do not attempt to deliver things to me at home – use e-mail instead. I will check email daily. In the event of an email service failure or delay, it remains your responsibility to get materials to the instructor and reviewers on time.

Academic Honesty:

The content and goals of the course will expose you to many sources of information, including reference books, journal articles, computer databases, WWW sites, and handouts. Many of these are intended to become resources on which you can rely in other courses and after graduation. By the same token, your fellow students are colleagues with whom you are expected to share materials and discuss ideas. My intention is to foster a collegial atmosphere that promotes critical thinking and reflection about course topics. Given this goal, I will be more impressed by cooperation and discussion than competition.

At the same time, work on assignments should be entirely your own. Information derived from other sources must be appropriately documented; failure to cite the source constitutes plagiarism. Plagiarism is a serious offense in the UNC honor code, and it is an offense that can end research careers when committed by scientists. Please contact me if you have any questions about how to appropriately credit other sources of information.

Assigned Readings:

Students are responsible for obtaining the text, available at the university bookstore. Copies of some of the required readings also will be available for download and printing from the class web site.

Required Texts:

Pagano, R. R. (2007). *Understanding Statistics in the Behavioral Sciences* (8th Edition). New York: Wadsworth.

Suggested Texts:

American Psychological Association. (2001). *Publication manual of the American Psychological Association* (5th ed.). Washington, DC: American Psychological Association.

Follette, W.C., & Pagano, R.R. (2007). *Study Guide for Understanding Statistics, 8th Ed.* New York: Wadsworth.

Jager, R.M. *Statistics as a Spectator Sport.* Newbury Park, CA: Sage.

Other Readings (on Blackboard):

Joswick, K. E. (1999). Getting the most from PsycLIT: Recommendations for searching. In M. E. Ware & C. L. Brewer (Eds.), *Handbook for teaching statistics and research methods* (pp. 162-166). Mahwah, NJ: Lawrence Erlbaum & Associates.

Kazdin, A. E. (1995). Preparing and evaluating research reports. *Psychological Assessment, 7*, 228-237.

Sagan, C. (1995). The fine art of baloney detection, *The demon-haunted world: Science as a candle in the dark* (pp. 201-218). New York: Random House.

Tversky, A., & Kahneman, D. (1993). Belief in the law of small numbers. In G. Keren & C. Lewis (Eds.), *A handbook for data analysis in the behavioral sciences: Methodological issues* (pp. 341-349). Hillsdale, NJ: Lawrence Erlbaum and Associates.

Welch, A. A., & Waehler, C. A. (1999). Preferences about APA poster presentations. In M. E. Ware & C. L. Brewer (Eds.), *Handbook for teaching statistics and research methods* (pp. 282-284). Mahwah, NJ: Lawrence Erlbaum & Associates.

Readings should be completed before the class on the date for which they are listed. There will be unscheduled quizzes on the readings, and discussions will assume that people have read the material.

Materials:

1. SPSS 14.0 (Statistical software)
   $36 on ONECARD, available at Software Acquisition Office, Undergraduate Library Rm 033,
   Order online from www.unc.edu/atn/software (link on right "Student Ordering") before pickup.

2. You will need a scientific calculator for this course. Please bring it to both recitation and lab.

3. Everyone will purchase radish seeds, dirt, and materials to make a poster. These typically cost less than $15 per student, but costs can vary.

Electronic Resources:

The course utilizes three major sources of multimedia materials. The first is a web page developed by the instructor using the Blackboard resources at UNC. The URL to access the course page is: http://blackboard.unc.edu. You will be asked for your login ID (same as your ONYEN) and password. Then select PSYC 215 from the list of courses in which you are enrolled.

The second resource is the SPSS statistical software. Students MUST have access to a copy of SPSS in order to complete the assignments. There are several options here:

- You can locate and use a licensed copy of SPSS at a computer lab.
- You can purchase a license to use.
- You can purchase the "graduate student version" at the University Bookstore for approximately $200. This software would not have an expiration date, and you could continue to use it after the course ended. I do not recommend this option unless you are sure that you will use the software again after you leave UNC, and possibly not even then.
- You can attempt to locate and purchase another version of SPSS on your own (via e-bay, etc.). The course will be taught using version 14.0 or later of SPSS. If you elect to purchase or use an older version of SPSS, there may be minor differences in the format of menus (but version 9 or later will generally have a similar "look and feel" to what will be used in class)

The third resource is the web page developed by the textbook authors and publisher to provide additional supporting materials. The URL for this page is: http://www.thomsonedu.com/psychology/pagano . Then click on the links for Student, and then Companion Site.

Please note that the course includes much content not covered in the textbook, and therefore not reflected on the textbook website. Such material may only be available through the assigned readings and class lecture and discussion.

Class Listserv: http://blackboard.unc.edu/index.html. Log in, select PSYC 215, and send email to "All Users." The listserv is intended to promote discussion about readings, lectures, and general topics related to psychological research methodology. The list also is a forum for asking questions and getting clarification about course assignments, as well as helping coordinate the use of course materials. Any mail sent to this list is automatically forwarded to all list members. Subscribing to the list is a course requirement; posting to the list is voluntary. I recommend checking your e-mail at least once in between classes, so that you can benefit from other people's questions about assignments, exams, etc. The list is also a venue for participation by students who feel uncomfortable asking questions or making comments during class.

Course Schedule:

Tr 1/11	Class Exercises: Introductions, review course requirements & goals Assignments: Install SPSS on your computer, or arrange for regular access to computer with SPSS version 14 or later Telepathy Assignment: Develop hypothesis and tests
F 1/12	Lab
Tu 1/16	**Critical Thinking & Descriptive Statistics** Reading: Skim Chapters 1 & 2 of Pagano The Fine Art of Baloney Detection (Sagan, 1995; 18 pages). ❑ First Homework Due (always in class, unless otherwise noted): Telepathy hypothesis and tests Discuss survey and question development
Tr 1/18	**Frequency Distributions** Reading: Pagano Chapter 3
F 1/19	**Lab – Data Entry** ❑ Due: Finish taking survey, bring to lab for data entry
Tu 1/23	**Central Tendency and Variability** Pagano Ch. 4 Handout: APA Style Checklist (discuss APA format) Class Exercises: Pretest on height, alertness; manipulation; post-test; also review & finalize survey
Tr 1/25	**Normal Distribution, Z-Scores** Reading: Pagano Ch. 5 Class Exercises: Lecture on reliability (examples: Height, alertness) Start writing Title Page & Methods Section – Follow APA format!
F 1/26	**Lab**
Tu 1/30	**Exploratory Data Analysis (EDA); Probability** Reading: Kazdin, 1995; Pagano Ch. 8 Assignment: Graphical interpretation exercise ❑ Due: Methods Section (including sample descriptives), Title Page
Tr 2/1	**More EDA - Graphical Interpretations; Correlation** Reading: Pagano Chapter 6 ❑ Due: Graphical interpretation exercise Hand out radish assignment Assignment: Develop radish manipulation and hypotheses, start thinking about seeds & dirt Assignment #2 (longer term): Survey hypotheses and analyses
F 2/2	**Lab**
Tu 2/6	**Chi-squared, Nonparametric tests** Reading: Pagano Ch. 18 Hand out: SPSS data file containing survey results will be available on Blackboard web site ❑ Due: Radish experiment design (Method, including materials and procedure) and hypotheses
Tr 2/8	**Hypothesis Testing** Reading: Pagano Ch. 10 ❑ Due: Radish materials must be obtained (will allow time at end of class for exchange)
F 2/9	**Lab**
Tu 2/13*	No lab this week; class meets Tr & Fri
Tr 2/15	**Sampling Distribution & Z-test** ❑ **Due: RADISHES MUST BE PLANTED TODAY! (if not sooner)** Reading: Pagano Ch. 12
F 2/16	**T-test, Single Sample** Reading: Pagano Ch. 13

Tu 2/20	**T-test, 2 group** Reading: Pagano Ch. 14 ❑ Due: Reference list for Survey Project
Tr 2/22	**T-test, paired** Reading: Joswick, 1999 (5 pages) Reading: Kazdin, 1995 (10 pages) ❑ Due: Lit review & abstract
F 2/23	**Lab**
Tu 2/27	**ANOVA** Reading: Pagano Ch. 15
Tr 3/1	**Post Hoc Tests** Reading: Pagano Ch. 16 ❑ Due: Survey analyses (SPSS output and statement of hypotheses)
F 3/2	**Lab**
Tu 3/6	**Factorial ANOVA** Reading: Pagano Ch. 17
Tr 3/8	**Review** ❑ Due: Radish update ❑ **Due: Results section and tables for Survey Project**
F 3/9	**No lab**
Tu 3/13	*Spring Break! No Class*
Tr 3/15	*Spring Break! No Class*
F 3/16	*Spring Break! No lab!*
Tu 3/20*	**LAB Meets at Davie 101 at 11:00 – Final Q & A for Survey Papers**
Tr 3/22*	❑ Due: Final Paper for Survey Project at 11:00 in Davie 101 Peer review assignments given
F 3/23	**Lab**
Tu 3/27	**Power** Reading: Pagano, Ch. 11; Welch & Waehler, 1999 (3 pages) Hand out criteria for poster presentation Assignment: Download G*Power Software from http://www.psycho.uni-duesseldorf.de/aap/projects/gpower/ ❑ Due: Radish Data Entry (send data file via email or floppy)
Tr 3/29	**Effect Sizes, Confidence Intervals** Reading: Tversky & Kahneman ❑ Due: Reviews of student papers on Survey Project ❑ Due: Power assignment
F 3/30	**Lab**
Tu 4/3	**Regression** Reading: Pagano Ch. 7 ❑ Due: Rough draft of poster (handouts format, 3 slides per page)
Tr 4/5	**Multiple Regression** Reading: (Pagano Ch. 7, again) ❑ Due: Radish Analyses output
F 4/6	**Lab**
Tu 4/10	Review of Decision-Making about Test Selection

Tr 4/12	**Review of Checking Assumptions & Consequences** ❑ Due: Radish Results & Tables
F 4/13	**Lab**
Tu 4/17	**Ways to Improve Power in Your Projects**
Tr 4/19	**Poster Session** ❑ Due: Posters! ;-) Bring actual poster to hang at beginning of class (if not earlier), along with photocopies of the poster handout to distribute during session. Email final version of Powerpoint file to instructor for inclusion in the online gallery.
F 4/20	**Lab**
Tu 4/24	**Meta-analysis** of radish data – classroom demonstration ❑ Due: Written feedback on two posters (bring two copies – one for instructor, one for presenter)
Tr 4/26	❑ Due: Last chance for first resubmission of survey paper
Friday 4/27	*Last meeting of lab; last day of classes!*
Tu 5/8	*Last day for electronic submission of revised final papers*

The fine print: PSYC 215 is intended for students who are seriously interested in research. The course will require several hours of work each week outside of class, in addition to time spent on the readings.

The above schedules and procedures in PSYC 215 are subject to change in the event of extenuating circumstances.