

PSYC532H: Honors Quantitative Psychology

Course Description and Objectives

This course offers an in-depth exploration of the science of quantitative psychology. The American Psychological Association defines quantitative psychology as "...the study of methods and techniques for the measurement of human attributes, the statistical and mathematical modeling of psychological processes, the design of research studies, and the analysis of psychological data." Quantitative psychology as an independent discipline was first developed over a century ago and directly or indirectly impacts nearly every area of empirical study both within psychology and across the social sciences as a whole. Although the field of statistics is most commonly associated with quantitative psychology (e.g., statistical methods used to analyze psychological data), this represents only one part of a much broader area of scientific inquiry. Additional components of quantitative psychology include psychometrics (e.g., the measurement of psychological constructs such as depression or motivation), assessment (e.g., personality, intelligence), testing (e.g., academic, military), personnel selection (e.g., industrial/organizational psychology), evaluation (e.g., treatment outcome, program evaluation), and research design (e.g., experimental and quasi-experimental design), among many others.

The primary objective of this course is to closely study the core components that make up the science of quantitative psychology through the design and execution of hands-on empirical research. Given the variety of research conducted in quantitative psychology, the research-component of the course will be equally varied. Empirical research will be conducted using computer simulations, the analysis of existing data, and the design and collection of new empirical data. Class lectures will focus on the presentation and discussion of specific topical modules (e.g., applied statistics, psychometrics, assessment, scale construction). Research projects will then be conducted within each module to parallel the topic of study (e.g., data will be simulated to test assumptions; existing empirical data will be analyzed; new data will be collected to support the development of a new scale). The organizing goal is to conduct a series of specific research projects throughout the semester that will culminate in a larger final project that will be presented to the class at the end of the semester. Upon completion of the course, students should have acquired not only a broad introduction to the field of quantitative psychology, but should also have acquired an appreciation for the science of quantitative methods as a mechanism for generating new knowledge.

Prerequisites

The prerequisites for this course are one of PSYC210, PSYC215, SOCI252, or STOR155. Further, because this is a college honors course, a minimum GPA of 3.0 is required. Although there is a significant computer component to this course, no prior knowledge of any statistical software is required. There will naturally be a mathematical component to this course, although any necessary mathematical operations will be reviewed along with the corresponding statistical concepts.

Course Materials

There are one required book for this course titled *The Lady Tasting Tea: How Statistics Revolutionized Science in the Twentieth Century* by David Salsburg (published 2001). Electronic and paperback copies of this text are available via Amazon for less than \$10. A number of additional class readings will be made available via Sakai. There is also a computer component to this course although students will not be required to purchase any software. All software is either freely available via UNC or is accessible in the computer labs at the Odum Institute.

Grading & Requirements

As an honors course, I will structure the class in a way that is more rigorous than a non-honors course. This will primarily take the form of more advanced readings, greater depth of topic coverage, and more hands-on research. Grades will be based on the student's performance within four equally weighted areas.

First, each week students are required to submit either a problem set related to the topic under study or written responses to questions related to the readings and lectures for that week. (Thus each week either a problem set or written responses will be assigned, but not both). The problem sets will typically relate to applied data analysis via computer software; the written responses are called *focus questions* (FQs) and are expected to be approximately one to three double-spaced page responses to specific questions. Both problem sets and FQs are scored on a 4-point scale that translate into the following:

4=excellent: shows clear grasp of all of the main concepts and work is fully or nearly free of errors. Any errors that exist are both small in number and in importance. Nearly nothing could be done to improve performance with additional work.

3=good: shows a general understanding of the main concepts, but not all work is error free. Errors may be small in number and larger in importance, or vice versa, but not both. Some observable improvement could be shown with additional work.

2=fair: shows a modest understanding of main concepts, where more understanding is demonstrated than not. Errors are larger in both number and importance. Significant improvement could be shown with additional work.

1=poor: shows a general lack of understanding of the main concepts, where less understanding is demonstrated than not. Many errors are present, particularly involving core concepts. The problem set would need to be completely revised with additional work.

Late problem sets turned in within one week of the due date will automatically receive one point; problem sets will not be accepted beyond that point. There will be approximately 10 problem sets and FQs throughout the semester, and the portion of the final grade is the percent of total possible points earned.

Second & third, students are required to take two in-class examinations. The two exams will primarily be composed of essay and short answer written responses to conceptual questions about the course content, although other types of material may also be presented. Note that the second exam is scheduled on the final day of class; I have received specific permission to do this so that we may use the final examination period for group research presentations. The contribution to the final grade is the percent of total possible points earned.

Fourth, students will be organized into small groups of approximately four to six students who will work together throughout the semester on a group research project. The project will consist of a single written report co-authored by all group members, and this will be orally presented to the class during the scheduled final examination period. The written paper and oral presentation will be jointly rated on a scale of 0 to 100 in terms of thoroughness, organization, and overall quality, and all members of the group will be assigned the group-level score.

The **final grade** is comprised of equally weighted contributions of the problem sets and FQs, the two in-class exams, and the final group research project. For example, if a student earned 82% of the possible points on problem sets, scored a 79% on the first exam, scored an 85% on the second exam, and whose group received an 88% on the final project, the student's final grade would be

$$(.25)(.82)+(.25)(.79)+(.25)(.85)+(.25)(.88)=.835$$

translating into a grade "B". Final grades are assigned in the standard fashion as "A": 92–100; "A–": 90–91; "B+": 88–89; "B": 82–87; "B–": 80–81; "C+": 78–79; "C": 72–77; "C–": 70–71; "D+": 68–69; "D": 62–67; "D–": 60–61; "F": 0–59.

Finally, it is expected that the FQs and final research report will total approximately 20 to 30 double-spaced pages of writing for the course.

Acceptable excuses for missed exams and problem sets

Of course unplanned issues can arise during the semester that might interfere with your ability to meet deadlines for problem sets or to take the scheduled exams. If you miss a problem set deadline or fail to take the scheduled exams, it is required that you inform me *prior to* the missed deadline. Further, problem set extensions or a makeup exam will only be granted given formal documentation from the Dean's office that justifies your absence. Any make up exam must be completed prior to the exam being returned to the class. Absolutely no exceptions to this policy will be made. If you have any questions about this policy, please contact me or your Academic Dean.

Graduate Research Consultant

We are extremely fortunate to have received funding from the Office of Undergraduate Research to support a Graduate Research Consultant (GRC) for this class. The GRC's primary function is to assist you in your class-related research projects. We are indebted to the Office of Undergraduate Research for this support, and I encourage you to visit the OUR website to see ways that might you and your undergraduate students might engage in research, scholarship and creative performance at Carolina (www.unc.edu/depts/our).

Honor Code

I do not tolerate cheating in any form. The principles of academic honesty, integrity, and responsible citizenship govern the performance of all academic work and student conduct at the University as they have during the long life of this institution. Your acceptance of enrollment in the University presupposes a commitment to the principles embodied in the Code of Student conduct and a respect for this most significant Carolina tradition. The Honor Code is defined in The Instrument of Student Judicial Governance, II.A.:

It shall be the responsibility of every student at the University of North Carolina at Chapel Hill to obey and support the enforcement of the Honor Code, which prohibits lying, cheating, or stealing when these actions involve academic processes or University, student or academic personnel acting in an official capacity.

Your participation in this course comes with the expectation that your work will be completed in full observance of the Honor Code. Academic dishonesty in any form is unacceptable, because any breach in academic integrity, however small, strikes destructively at the University's life and work. If I have any reason to suspect that an honor code violation has occurred, I will pursue this to the full extent of University law; I have done this before and I will do it again. If you have any questions about your responsibility or the responsibility of the faculty under the Honor Code, please consult with the Office of the Student Attorney General (966-4084) or the Office of the Dean of Students (966-4041).

Expected Schedule of Topics

Below is a summary of days on which our class will meet as well as the University holidays and the scheduled exams; I will provide detailed weekly topical coverage on Sakai as the semester progresses. The scheduling of the two non-cumulative exams are fixed and will not be changed. Note that the second non-cumulative exam falls on the final day of class; I have received specific permission for this so that we may use the final exam period for the group presentations.

Class Meeting

Tuesday August 20	First day of class
Thursday August 22	Lecture
Tuesday August 27	Lecture
Thursday August 29	Lecture
Tuesday September 3	Lecture
Thursday September 5	Lecture
Tuesday September 10	Lecture
Thursday September 12	Lecture
Tuesday September 17	Lecture
Thursday September 19	Lecture
Tuesday September 24	Lecture
Thursday September 26	Lecture
Tuesday October 1	Lecture
Thursday October 3	Lecture
Tuesday October 8	Lecture
Thursday October 10	Exam #1
Tuesday October 15	Lecture
Thursday October 17	Fall Break: No Class
Tuesday October 22	Lecture
Thursday October 24	Lecture
Tuesday October 29	Lecture
Thursday October 31	Lecture
Tuesday November 5	Lecture
Thursday November 7	Lecture
Tuesday November 12	Lecture
Thursday November 14	Lecture
Tuesday November 19	Lecture
Thursday November 21	Lecture
Tuesday November 26	Lecture
Thursday November 28	Thanksgiving Break: No Class
Tuesday December 3	last day of class: Exam #2

Final Exam: Tuesday December 10, 12:00-3:00 -- No exceptions without written approval of Dean