

Course Syllabus
15:291:532
Statistical Methods II
Fall 2013

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Time: Monday, 4:50–7:30 PM

Place: GSE, Room 208

Office hours: Mon 7:30-8:30 in GSE 208 or by appointment

Text: Moore, D. S., McCabe, G. P., & Craig, B. A. (2009). *Introduction to the practice of statistics* (7th ed). New York: W. H. Freeman. Note: earlier editions may be used successfully.

Software: *PASW Statistics (formerly SPSS)* 18.0. Chicago: SPSS Inc.

- Version 18 is not the current version of the software; it is the version packaged with the book which is sold in the bookstore. SPSS was bought by IBM, which no longer supports version 18.
- If you purchase a used version of the text, you can purchase the software (version 21, now owned and maintained by IBM) at: <http://www.onthehub.com/spss/>. The Statistics Base Grad Pack is sufficient for the course.
- Contact the instructor if you would like to use other statistical software for the course.

Course Description

This course is the second part of a two-semester sequence in statistical methods designed to introduce students to the most commonly used methods in educational and social science research. This course focuses on the concept of statistical inference and assumes that students have taken the first part of the sequence or have equivalent knowledge of exploratory data analysis, study design, probability, and sampling distributions.

Topics covered in this course include one- and two-sample t-test, chi-square test, regression analysis, and one- and two-way analysis of variance (ANOVA).

The best way to become proficient at the use of these analysis methods is to combine study of the statistics concepts with the design, creation, and interpretation of actual statistical analyses. Students will regularly analyze and interpret datasets provided for that purpose, as well as design and carry-out a study to address a research question of their choosing.

Learning Goals

During the course, students are encouraged to:

- Think statistically.
- Using statistical tools, accurately apply the statistical methods to realistic data samples.
- Effectively interpret the results of analyses.
- Communicate accurately and comprehensively about data results, conclusions and interpretations.
- Use a critical framework to evaluate study designs and results.

Course Requirements

Class participation

Class participation is crucial to your understanding and application of course content. You are expected to come to class prepared to discuss assigned readings and to participate in class activities.

Homework

All homework assignments are listed on the Sakai course website, under "Resources", on the "Homework Assignments" webpage.

Reading/study: Students are *expected* to read the assigned pages in *Introduction to the Practice of Statistics* (IPS7e) prior to attending class. Students are *encouraged* to further study the topic with the optional "further study" materials listed on the homework page.

Check assessments: These assessments, available on Sakai, are designed to help a student assess how well he/she understands the statistical concepts presented in the reading and should be completed as part of the student's pre-class study. These are formative assessments, for which the feedback option is available during the "test". Be sure to use it, click on the button in the top left, to help you better understand the concepts. If you have trouble with a question, be sure to ask in class for a review.

Data analysis and interpretation: These exercises follow the discussion of a topic in class, encouraging students to practice the implementation and interpretation of the newly learned statistics method or concept. Most exercises will require the use of statistical software. Students should bring their work on these exercises to the next class session.

- Students who will be taking additional statistics courses at the Graduate School of Education should learn to use SPSS for these analyses.
- Students interested to investigate other software tools--Excel, Calc, R, Minitab, SAS, PPSP--are encouraged to do so and to share their experience with the class.)

Chapter quizzes

Students will take chapter quizzes following discussion and practice of the methods presented in the chapter.

Research project

Students will design and implement a study to investigate a research question of their choosing. About halfway through the course, students will create a study proposal including discussion of the research

question and specification of the study design, the sampling plan, data collection, and the data analysis (both exploratory analyses and statistical tests). Using the proposal, students will implement the study plan (collect the data and create the specified analyses) and write a report to describe the study, report results and present conclusions. Students will present their research study during one of the final class sessions.

Final grade

At the end of the course, each student will submit a self-assessment, including a suggested final grade along with evidence to support that decision. Evidence should include specific examples and data (e.g., summary stats, counts, graphs) to support the student's claims. Listed below are some criteria which are useful as evidence of learning:

- participated in class, in particular homework discussions.
- read about/studied new statistics concepts in preparation for discussion in class.
- used online check assessments to evaluate learning.
- created appropriate data analyses and thoughtfully interpreted results; if inadequate at first, persisted until successful.
- answered most of the quiz questions correctly; for instances when learning is not demonstrated on quiz--after further study of concepts missed on a quiz, demonstrated improved understanding.
- designed and implemented a research study, created a research report, and prepared a short presentation of study (including reflections on research process).
- demonstrated improved understanding of fundamental concepts in inferential statistics.

This list is not exhaustive of possible evidence. Students may include other relevant evidence of learning, as desired.

Rutgers Academic Integrity Policy

Principles of academic integrity require that every Rutgers University student:

- properly acknowledge and cite all use of the ideas, results, or words of others
- properly acknowledge all contributors to a given piece of work
- make sure that all work submitted as his or her own in a course or other academic activity is produced without the aid of unsanctioned materials or unsanctioned collaboration
- obtain all data or results by ethical means and report them accurately without suppressing any results inconsistent with his or her interpretation or conclusions
- treat all other students in an ethical manner, respecting their integrity and right to pursue their educational goals without interference. This requires that a student neither facilitate academic dishonesty by others nor obstruct their academic progress
- uphold the canons of the ethical or professional code of the profession for which he or she is preparing.

From: <http://academicintegrity.rutgers.edu/academic-integrity-at-rutgers>

Class Schedule

The following class schedule is *subject to change*. Ideally, reading assignments should be completed prior to each lecture. Additional study materials for each topic are specified on Sakai on the "Homework Assignments" page.

		chapt.sec	Pages
Sep 9	Intro; Review of Statistical Inference	6.1-6.4	341-397
Sep 16	Inference for the Mean of a Population	7.1	403-413; 417-418
Sep 23	Comparing Two Means (independent samples)	7.2; 7.3	432-445; 462-465
Sep 30	Matched Pairs (dependent samples)	7.1	414-417
Oct 7	Chapt 7 quiz; Inference for Proportions	8.1, 8.2	473-500
Oct 14	Analysis of Two-Way Tables	9.1, 9.2	511-530
Oct 21	Chapt 8 quiz; Simple Linear Regression I	10.1	545-563
Oct 28	Chapt 9 quiz; Simple Linear Regression II	10.2	564-579
Nov 4	Research study proposal presentations		
Nov 11	Chapt 10 quiz; Multiple Regression	11.1, 11.2	591-610
Nov 18	Chapt 11 quiz; One-Way ANOVA	12.1	623-641
Nov 25	Contrasts and Multiple Comparisons	12.2	642-653
Dec 2	Two-Way ANOVA	13.1, 13.2	669-685
Dec 9	Chapt 12 & 13 quiz; Self-assessment due; Research report due		
Dec 16	Research study presentations		