Statistical Inference in Business
Course Syllabus

Information

Course
Fall, 2013.

•Web Page: `http://www.nd.edu/~bizstat` (This site is also displayed in Sakai.)
•Where: Room L051 Mendoza College of Business.
•When: 11:00 to 12:15 (Section 1) or 12:30 to 1:45 (Section 2) Mondays and Wednesdays.

Professor
Ken Kelley, Ph.D.
•Email Address: `KKelley@ND.Edu`
•Office Hours: Monday & Wednesdays 2:00 – 4:00, by appointment, and anytime my door is open.
•Office Location: 363B Mendoza College of Business.
•Office Phone Number: (574) 631-1459.
•Mobile Phone Number: (574) 607-5478 (text messages are fine).

Teaching Assistants
Katherine Puziol (`kpuziol@nd.edu`) and *Kevin Schneider* `KSchnei4@ND.Edu`
•Office Hours: Sundays, Mondays, and Tuesdays, 7:00–8:30 PM and by appointment.
•Office Location: L051 Mendoza College of Business.

Description

Statistical Inference in Business builds on *Statistics for Business and Economics* (or equivalent) and focuses on making inferences about population quantities from sample data via hypothesis testing and confidence intervals. *Statistical Inference in Business* applies statistical methods in a business context in order to address business related questions and help make evidence based decisions. In *Statistical Inference in Business*, you will learn to apply commonly used statistical methods in business contexts and how to interpret analyses performed by others.

Objectives

The overarching objective of *Statistical Inference in Business* is for students to gain an understanding of how to use data to address business decisions and processes. The specific course objectives are to:

- perform the appropriate statistical analyses based on the business question and the type of data;
- interpret the results of statistical analyses;
- make inferences about the population from sample data;
- apply inferential statistics to make evidence based business decisions.

Required Textbook & Software

Textbook

Anderson, Sweeney, Williams, Camm, & Cochran. (2014). *Statistics for Business and Economics* (12th Edition). South-Western: Mason, OH.

Alternatively, the 10th, 11th, or the 11th Revised edition of *Statistics for Business and Economics* can be used. Neither the CD-ROM or on-line passcode is necessary.

Statistics for Business and Economics presents the numerous processes involved in making evidence based, real-world business decisions in a well-written and comprehensible way. The book is written from a conceptual point of view and focuses on the meaning of the numbers, not derivations or mathematical proofs. This approach to statistical education is endorsed by the American Statistical Association and their Guidelines for Assessment and Instruction in Statistics Education (i.e., the GAISE Report: `http://www.amstat.org/education/gaise/GaiseCollege_Full.pdf`). *Statistics for Business and Economics* is part of the most widely used business statistics series that I know of and is highly regarded in the field.

Software

We will use IBM SPSS Statistics and Microsoft Excel to implement many of the statistical methods. Microsoft Word is required for all of the assignments. Correspondingly, access to SPSS, Excel, and Word is required.

Electronic Devices

The classroom is a computer classroom. Only at designated times may the classroom computers be used. Mobile phones, tablets, MP3 players, laptop computers, et cetera, are not allowed to be used in the classroom.

Course Notes

I will provide a note packet for each of the topics. However, the course is much more than simply a set of note packets. Correspondingly, they should *not* be regarded as all that is necessary to understand the course material and implement the various statistical methods.

Attendance

Attendance is required. If a University approved excuse is provided, the student may make-up any missed work. When a University approved excuse is provided for a day when an assignment is due or an exam or quiz administered, the student must turn in or make-up the quiz or exam prior to the next class meeting (or before the absence).

Participation

Students are required to work on in-class assignments and actively participate during class, which necessarily requires attendance. Your time in class will be more enjoyable and productive if you participate fully in activities, discussions, and ask as well as answer questions. Topics discussed in class will be the basis for many questions on homework, quizzes, and exams. Correspondingly, it is important to attend class and participate in classroom activities.

Assignments

There will be an assignment for most topics. **Assignments are due electronically before class via Sakai one week following the topic completion.** For problems with an incorrect final answer, partial credit may be rewarded only if the preceding work is clearly documented and the error identified. **Homework assignments require Word, with any SPSS or Excel output (e. g., calculations, figures, and/or tables) inserted (via copy and paste) into the Word document.** The assignment component of the course grade will be weighted according to the total number of possible points. Assignments, along with the assignment's due date, will be posted on the course web site (`http://www.nd.edu/~bizstat`). Late assignments will receive a 10% penalty for every 24 hour period they are late, starting immediately after assignments should have been turned in (i.e., before class on the designated day). The assignment component will count 25% toward the course grade. As discussed more below, assignments are potentially collaborative.

Quizzes

Students are required to take a quiz on most Wednesdays of the semester. The quiz component of the course grade will be weighted according to the number of possible quiz points. The quizzes will involve answering conceptual questions, implementing statistical methods (by hand and computer), and interpreting the results of statistical methods. The quiz component will count 15% toward the course grade. The quiz that most negatively affects the quiz component of the course grade will not be counted. Note that the quiz questions are similar to exam questions.

Special Needs

Please let me know if you have any special needs that should be addressed at the beginning of the semester. We can work together so that any special needs you have are met.

Examinations

There is a midterm and a final exam. Examinations are based on the lectures, readings, assignments, in-class exercises, quizzes, Excel, and SPSS. The format of the examinations is varied with multiple choice, fill-in, short answer, and calculation based questions. Students are allowed to use a help sheet that is one standard ($8\frac{1}{2} \times 11$) piece of paper with handwritten notes on each side for the exams. The help sheet for a specific exam may contain handwritten notes, equations, definitional terms, worked examples, et cetera, but no material may be printed or attached to the help sheet. Each help sheet will be handed in with the exams. Standard calculators are required. The final exam is semi-cumulative, in the sense that the course material continues to build on itself and will apply differently in new situations. However, the vast majority of the final is specific to the second part of the course. The midterm and final exam will each count for 30% of the final grade (i.e., 60% of the total course grade).

Getting Help

Help is regularly available! The teaching assistants and I will do whatever we can to help you you master the material. Statistics, more than many other subjects, is cumulative in nature, in which the material continues to build on previous material. The last topic, for example, combines various aspects of almost everything else discussed in the course. That being said, if you are not sure that you understand the material completely, please seek help early and often. We will meet with you whenever possible.

Collaboration

Students may work together on assignments, with up to three students per assignment. Additionally, students are encouraged to discuss classroom topics, course notes, handouts, readings, previous quizzes, and assignments in small groups. Discussing course materials generally leads to better success for all who take part in the discussion, provided that all parties are actively engaged in the conversation. For collaboration on the assignments, it is best if each student does the assignment and then meets with the group. If, for example, students assign different questions to different group members, each group member may only learn about a specific type of problem or application, whereas the full scope of the assignment's topics needs to be understood. Thus, the idea of "divide and conquer" is not a good strategy, as students will not be exposed to the multidimensional types of problems that an entire assignment will contain. Thus, it is best for each student to work on each problem before meeting as a group.

Grading

As noted above, grading for *Statistical Inference in Business* will be based on assignments (20%), quizzes (15%), a midterm exam (30%), and a final exam (20%). The equation that governs the numeric course grade is thus

$$Grade = .25Assignments + .15Quizzes + .30Midterm + .30Final.$$

However, in any given semester the above scale may be adjusted. The target GPA across my sections for the course, as with all BAMG courses, is 3.2–3.4, which is a Department of Management grading policy. Note that because of the way in which the numeric scale maps onto the ordinal grades, there is no rounding of numeric grades when determining the letter grade.

Course Schedule

Date	**Topic(s)**	**Topical Reading(s)**
•8/28	•Introduction to Course •Course Expectations	•Review Foundations •Review Probability •Review Descriptives •Review Normal Distributions
•9/2	•Introduction to SPSS •SPSS Laboratory	•Browse *SPSS:A Brief Guide*
•9/4	•Point Estimation •Sampling Distributions •The Sampling Distribution of the Sample Mean	•Sections 7.1–7.5
•9/9	•Interval Estimation for a Population Mean (σ known) •Interval Estimation for a Population Mean (σ unknown)	•Sections 8.1–8.2

•9/11	•Rationale of Null Hypothesis Significance Testing •Hypothesis Testing for a Population Mean (σ known)	•Sections 9.1–9.3
•9/16	•Hypothesis Testing for a Population Mean (σ unknown)	•Section 9.4
•9/18	•Inference for Paired Means	•Section 10.3
•9/23	•Inference for Independent Means	•Sections 10.1–10.2
•9/25	•Inference for Independent Means (Continued)	•Sections 10.1–10.2
•9/30	•Inference for a Single Variance •Inference for Two Variances	•Sections 11.1–11.2
•10/2	•Correlation •Issues of Causality	•Section 3.5
•10/7	•Correlation (Continued) •Properties of Estimators •Types of Sampling Methods	•Section 7.7–7.8
•10/9	•Topical Wrap-up •Review for Midterm Exam	•Prepare Questions
•10/14	•Exam 1 (Exam will be during class.)	•Bring Calculator •Bring Help Sheet
•10/16	•Review of Exam 1 •Business Analytics •Big Data, Data Mining, Predictive Analytics	•Readings
•10/21 •10/23	•Fall Break!	
•10/28	•Analysis of Variance (ANOVA)	•Sections 13.1–13.2
•10/30	•Multiple Comparisons in ANOVA	•Sections 13.3

•11/4	•Factorial ANOVA	•Section 13.5
•11/6	•Simple Regression	•Sections 14.1–14.9
•11/11	•Multiple Regression	•Sections 15.1–15.8
•11/13	•Multiple Regression (Continued)	•Sections 15.1–15.8
•11/18	•Multiple Regression: Model Building	•Sections 16.1–16.6
•11/20	•Multiple Regression: Model Building	•Sections 16.1–16.6
•11/25	•Inference for Proportions •Inference for the Difference Between Proportions	•Sections 8.4 & 9.5 •Sections 11.1 & 11.3
•11/27	•Thanksgiving Break!	
•12/2	•Chi-Square Tests for k Proportions •Chi-Square Test of Independence	•Sections 12.1–12.2
•12/4	•Chi-Square Goodness of Fit	•Section 12.3
•12/9	•Ethics, Data, and Data Ethics	•Section 1.7 •Ethics Readings
•12/11	•Topical Wrap-up •Review for Final Exam •Homework Q & A	•Prepare Review Questions
•12/17	•Exam 3 •7:30-9:30 PM •Location will be announced.	•Bring Calculator •Bring Help Sheet

Academic Honesty

Students in *Statistical Inference in in Business* are expected to abide by the University of Notre Dame Honor Code for all matters relating to the course. Recall that the University's Honor Code states "as a member of the Notre Dame community, I will not participate in or tolerate academic dishonesty."

Syllabus Disclaimer

The information provided on this syllabus is tentative and may be modified. Modifications to the syllabus will be announced during class.