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BASIC STATISTICAL METHODS

10:762:205:90:21859
 Spring 2017
 Course Credits: 4
 Course type: Online
 Office Hours: By appointment

PURPOSE AND DESCRIPTION

The purpose of this course is to develop skills in statistical analysis. It is an introductory statistics course, concerning basic methods applicable to any survey of statistics, particularly to urban studies and public health. The material is organized so that it provides the greatest possible flexibility of use. Focus of the course is on general descriptive and inferential statistics, and students will be introduced to basic methods of data collection, data organization and management, data presentation, and data analysis and description. It includes sampling methods, graphical methods of summarizing data, frequency distribution, numerical summaries, correlation and regression analysis, probability and probability distribution, sampling distribution, estimation, hypothesis testing, and chi-square.

The course has 2 goals, and upon the successful completion of this course students will be able to 1) formulate, evaluate, and communicate conclusions and inferences from quantitative information; and 2) apply effective and efficient mathematical or other formal processes to reason and to solve problems. These goals are reflected in the following 4 objectives of the course: 1) to demonstrate the use of applied statistics for social studies; 2) to give students practical experience with data collection, organization, analysis and presentation; 3) to equip students with skills to analyze and present data using Excel and SPSS; and 4) to help students read professional literature with an appreciation for both its substantive contribution and use of statistical tools.

REQUIREMENTS

- Studying course materials (Textbook and Chapter Slides)
- Taking four Inter-session Exams and a Cumulative Final Exam

PROCEDURE AND GRADING

- Chapter homework will be given for your practice.
- There are 4 Inter-session Exams.
- There is a Cumulative Final Exam.

Course grade is based on the following ratios:

• Inter-session Exam I	15 %
• Inter-session Exam II	15 %
• Inter-session Exam III	15 %
• Inter-session Exam IV	15 %
• Final Exam	40 %

* Your final grade will be assigned using the following letters and total score chart:

A : 90-100			
B+ : 85-89	B : 80-84	C+ : 75-79	C : 70-74
D+ : 65-69	D : 60-64	F : 0-59	

* **Academic integrity** is essential to the success of Rutgers community members. For details you may check: <http://academicintegrity.rutgers.edu/>

* **There will be no makeup exam / quiz.** In rare unfortunate situation such as illness, death in the family, etc. you should inform me of your inability to take the exam / quiz before its deadline. In all cases, you must present proper proof for missing exam / quiz. If I accept your excuse, your score for the final exam will be counted towards the Exam(s) you missed, and your grade for the next quiz will be counted for the missing quiz.

REQUIRED TEXT BOOK

Brase, Charles and Brase, Corrinne, 6th ed., 2012, *Understanding Basic Statistics*. Brooks/Cole: United States.

* Course textbook is available at the university bookstore.

RECOMMENDED BOOKS

Triola, Mario, *Elementary Statistics Using Excel*. Addison Wesley: Longman.

Levin, Jack, and Fox, James, *Elementary Statistics in Social Research*. Pearson: Boston.

Salkind, Neil, *Statistics for People Who (Think They) Hate Statistics*. SAGE: California.

Caldwell, Sally, *Statistics Unplugged*. Thomson Learning: United States.

Kirkpatrick, Lee, and Feeney, Brooke, *A Simple Guide to SPSS for Windows*. Thomson Learning: United States.

Keller, Gerald, *Applied Statistics with Microsoft Excel*. Thomson Learning: United States.

ONLINE SOURCES

There are many online educational sources for Basic Statistical Methods, including videos on YouTube. Some of these sources are listed in the slide presentation of chapters, which are available to you on Sakai.

SCHEDULE OF ASSIGNMENTS

All the assignments you need to do for the course, including homework practice and exam, will be posted on Sakai, and the Course Schedule will specify their schedule and deadlines.

COURSE SCHEDULE

Weeks 1-3 (January 17 – February 5)

Chapters One, Two and Three

Introduction – Concept and applications of statistics in social research, the process of social research, examples of current research

Types of data and statistics - Types of data, different levels of measurement, types of statistics and their applications

Fundamentals of research design – Population, sample, unit of analysis, sampling frame, parameter and statistic, variable, independent and dependent variables, control variable, hypothesis

Methods of data collection – Experiment vs. survey, population vs. sample, advantages and limitations of sampling, sampling techniques, data collection techniques, questionnaire design, data collection errors

Methods of data organization - Stem-and-leaf display, frequency distribution, absolute frequency, relative frequency and cumulative frequency distribution

Graphical methods of data presentation – Application of charts (line, bar, pie, pictogram), histogram, polygon

Measures of central tendency and concentration (Averages) - Mean, mode, and median (for single and grouped data), quartiles, outliers

Measures of variation – Range, interquartile range, interquartile deviation, mean deviation, variance, standard deviation (for single and grouped data) Shape of data distribution and data concentration– boxplot, skewness, Chebyshev's theorem, general rules

Review of materials for upcoming exam

* **Inter-session Exam I – Due at 11:00 PM on Sunday February 5.**

Weeks 4-6 (February 6 – 26)

Chapters Three and Four

Measures of variation - Relative standing - Percentile rank, standard unit for relative position

Measures of association, Linear Correlation Analysis – Summarizing relationship between two variables (dependent and independent variables), association vs. causation, Bivariate vs. Multivariate analysis, conditions of linear correlation analysis, scatter plot, coefficient of correlation, coefficient of determination, coefficient of non-determination

Linear Regression Analysis - Introduction to regression analysis, linear regression, least-squares principle, least-squares equation, estimation

Review of materials for upcoming exam

* **Inter-session Exam II – Due at 11:00 PM on Sunday February 26.**

Weeks 7-9 (February 27 – March 19)

Chapters Seven and Eight (exclude chapters 5 and 6)

Normal probability distribution - Properties of normal curve, standard normal curve and standard score (Z), finding proportions between scores, Empirical rules, and normal approximation to the binomial distribution.

Sampling Distribution - Random sampling, distribution of sample means

Central Limit Theorem – Relation between sample and population, sampling error, standard error

Confidence Interval – Estimation using inferential statistics, assumptions and conditions for estimation (Z vs. t), confidence interval for one population mean, one population proportion, comparison of two populations means and proportions

Choosing sample size – Sample size for estimating the mean and proportion

Review of materials for upcoming exam

* **Inter-session Exam III – Due at 11:00 PM on Monday March 20.**

Weeks 10-12 (March 20 – April 9)

Chapters Nine and 10

Hypothesis Testing – Introduction to hypothesis testing, steps of hypothesis testing, Z test and t test, hypothesis testing for one population mean, and hypothesis testing for one population proportion, dependent and independent samples, and paired data, **Hypothesis Testing** – Hypothesis testing for two population means and two population proportions.

Review of materials for upcoming exam

* **Inter-session Exam IV – Due at 11:00 PM on Sunday April 9.**

Week 13-16 (April 10 – May 7)

Chapter Eleven

Chi-square Test – Chi-square distribution, logic of the tests of independence and goodness-of-fit, steps of Chi-square test

Inferences for correlation and regression - Testing the significance of correlation coefficient, confidence Interval for prediction of dependent variable

ANOVA – Concept and applications

Review of materials for upcoming exam

The final exam is cumulative and will cover all of the materials studied during the semester. However, its concentration will be on the final chapters of the textbook

* **Final Exam – Due at 11:00 PM on Sunday May 7.**