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, probability and probability distribution, sampling distribution, estimation, hypothesis testing, correlation and regression analysis, and chi-square and ANOVA. In addition, the course has formal lab sessions and students learn to use Excel and the statistical package of SPSS for Windows. The course will consist of lectures, readings, problem sets, mini projects, presentation, and examinations.

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 tolls.

Requirements

- Regular class attendance, preparedness and participation in class discussions
- Doing quizzes
- Doing take-home exercises, mini projects / class presentation
- Taking two inter-session exams and a cumulative final exam

Procedure and Grading

Lectures will be given at every class. Short quiz will be given every week. There will be take-home projects given to students in which you have to do appropriate statistical analyses. Course grade is based on the following ratios:

- Quiz, Take-home project/Presentation 20%
- Inter-session exams 35%
- Final exam 35%
- Attendance, and class participation 10%

* Occasionally questions will be asked from the class, and students who give correct answer receive points toward their exams.
* Students should turn off their cell phone before class begins.
* Academic integrity is essential to the success of Rutgers community members. For details you may check: http://academicintegrity.rutgers.edu/
* Students are expected to attend all classes; if you expect to miss any class, please use the absence reporting website, https://sims.rutgers.edu/ssra/, to indicate the date and reason for your absence. An email is automatically sent to me.
* Attendance, Preparedness and Class Participation: Students should show up for class on time and to stay current with the readings, and be prepared to discuss the class materials, and actively participate in asking questions or responding to questions.
* Class attendance will make up 5 percent of your course grade, and the policy on absences and arriving late/leaving early is as follows: Everybody gets one absence and one late arrival or early departure, without any injury to your Attendance, Preparedness and Class Participation score. After that, points are deducted from that score based on my decision.
* Your active participation is classroom discussions and responding to questions is valued. Participation will make up 5 percent of your course grade, and is often the deciding factor when your point totals are close to a grade break point. I will assign participation points at the end of the semester.

Required Text Book

* Available at the university bookstore

Recommended Books

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

**Weeks 1 and 2 (September 5 – 16)**
Chapters 1 and 2
**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, and polygon.

**Weeks 3 and 4 (September 18 – 30)**
Chapter 3
**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
**Measures of variation** - Relative standing - Percentile rank, standard unit for relative position

**Weeks 5 and 6 (October 2 - 14)**
Chapters 4
**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 I – October 9

**Weeks 7 and 8 (October 16 – 28)**
Chapters 5, 6, 7 and 8
**Probability** – Concept of probability, types of probability, characteristics of an event
**Probability Distribution** – Random variable, Normal probability distribution, and Binomial probability distribution
**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

**Weeks 9 and 10 (October 30 – November 11)**
Chapters 8 and 9
**Choosing sample size** – Sample size for estimating the mean and proportion
**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
**Review of materials for upcoming exam**
* Inter-session Exam II – November 13

**Weeks 11 and 12 (November 13 – 25)**
Chapters 10 and 11
**Hypothesis Testing** – Hypothesis testing for two population means and two population proportions, independent samples and paired data
**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
* Tuesday, November 21, Thursday classes
* Wednesday, November 22, Friday classes
* No Class Nov 23 – 26 - Thanksgiving Recess

**Weeks 13 and 14 (November 27 – December 9)**
Chapter 11
**Analysis of Variance** – Concepts of Analysis of Variance and application of one-way ANOVA
**Other Methods** – Concepts of multiple regression, correlation matrix, and two-way ANOVA

**Weeks 15 and 16 (December 11 – 22)**
Research presentation
**Review of materials for the final exam**
* December 14 – Reading Days
* Final 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