

Vanderbilt University
Leadership, Policy and Organizations
Class Number 3904
Maymester 2006

Decision Analysis II: Quantitative Reasoning

William R. Doyle
Office: 207E Payne
Office Hours: This class only: Saturday 7-8 a.m., or by appointment
w.doyle@vanderbilt.edu
phone (615) 322-2904

Course Overview

The overview includes an introduction to the course, guidelines on grading, and required texts.

Introduction

This course will equip the student with basic skills needed to perform data analysis for the purpose of research. Through applied practice, students will gain an understanding of how to use quantitative analysis to answer research questions.

We will cover how to describe data using various summary and graphical techniques, along with measures of central tendency and variance. We will then cover how to analyze data through the use of t-tests, correlational analysis, regression, and analysis of variance (ANOVA).

Two characteristics of this course should be noted from the outset. First, we will emphasize the interpretation of data analysis over a theoretical approach. Second, most of the learning will take place through a hands-on approach to data analysis.

This course will provide students with the ability to use data to effectively inform decision making.

Grading

Evaluation for the course will be based on the following factors:

Final Project 40%

Quizzes: 20%

Problem sets: 40%

Final Project: For your final projects, you will work in groups of two to perform a data analysis on one of several pre-selected datasets (*n.b.* you may use your own dataset if you have already collected information. Please see me if this is the case). The final project will be due two months after our last class, on August 4th, 2006 at 5 p.m. The project will be discussed in extensive detail during class, but major requirements will include the use of techniques described during the course to answer questions about substantive issues.

Tests: I will give three tests that will be completed on-line after each weekend. The tests will cover the concepts in the course up until that point. Each test will be given on a pass/fail basis, and may be re-taken until a passing grade is achieved. Revisions are due one week after the test is graded. No late submissions or revisions will be accepted.

Problem sets: I will assign problem sets from the texts described below, which will be due on the Monday before the class meets. Each problem set will be graded pass/fail, and students may revise their answers until they achieve a passing grade. Revisions are due one week after the problem set is returned. No late assignments or revisions will be accepted.

Texts

The following texts are available in the bookstore, but should be purchased in any way you see fit:

Jaeger, R. M. (1993). *Statistics: A Spectator Sport*. Sage, Newbury Park

Referred to as **Jaeger**. This is a very user-friendly introduction to many of the concepts of the class, and will serve as the backbone of the “mini-lectures” I will give on each topic.

Salkind, N. J. (2004). *Statistics for people who (think they) hate statistics*. Sage, Thousand Oaks, 2nd edition

Referred to as **Salkind**. Again, a user friendly introduction, with specific application of the techniques described in SPSS.

Sweet, S. A. and Grace-Martin, K. (2003). *Data Analysis with SPSS: A First Course in Applied Statistics*. Allyn and Bacon, Boston, 2nd edition

Referred to as **Sweet**. This provides helpful step-by-step instructions on the use of SPSS for the purpose of data analysis. This will also be the source for most of the problem sets for the course.

SPSS Software

You will also need to have access to SPSS software to complete assignments and to perform analyses for the final project. SPSS is available in most of the computer labs on campus. It can also be purchased: Vanderbilt offers the SPSS grad pack for a not-very-reasonable price (the career starter is also adequate for the purposes of this course, but the student version is not).

Schedule for Meetings

The schedule for all class meetings is as follows:

Friday, May 5

Topic: Review of Empirical Research

Research Questions

Variables

Measurement Scales

Required Readings:

Jaeger Chapters 1 & 6

Sweet Chapter 1

Salkind Chapters 1 & 6

Topic: Data Sets

Introduction to data sets to be used in course

Variables and values: labeling

Producing a codebook

Entering data

Coding missing data

Cleaning data sets

Required Readings:

Sweet Chapters 1 & 2

Topic: General Techniques for Describing Data

Histogram

Stem and leaf plot

Density plot

Frequency tables

Box plots

Required Readings:

Handout from Tufte, E. R. (2001). *The Visual Display of Quantitative Information*. Graphics Press, Cheshire, CT, 2nd edition. Available on [oak](#).

Assignments

Pre-test: please complete by 9 p.m. May 4th.

Sweet Chapter 1 problem set due by 9 p.m. May 4th.

Saturday, May 6

Topic: Descriptive Statistics I: Measures of Central Tendency

Mean

Mode

Distribution

Problems with central tendency: skewness, outliers

Required Readings:

Jaeger Chapters 2 & 5

Sweet Chapter 3

Salkind Chapters 2 & 4

Topic: Descriptive Statistics II: Measures of Variability

Range

Deviations

Standard deviation

The Normal distribution

Required Readings:

Jaeger Chapter 3

Sweet Chapter 3

Salkind Chapters 3 & 7

Topic: Recoding variables: scales, indexes, and others

How to create scales

Reliability: coefficient α

Required Readings:

Jaeger pages 91-92

Sweet Chapter 4

Salkind Chapter 16

Topic: Deciding on a statistical analysis

Which do I use?

Answering my research question

Required Readings:

Jaeger Chapter 7

Friday, May 19

Topic: Inference and estimation in statistics

Statistical inference

Estimation

Hypothesis testing

Required Readings:

Jaeger Chapters 7,8 & 9

Sweet Chapter 6

Salkind Chapter 8

Assignments

First quiz to be taken by Friday, May 12th.

Second problem set Due Monday, May 15th by 5 p.m. Problem set includes the following:

Sweet Chapter Three, questions 2-6; Chapter Four, all questions

Research topic proposals due to me by 4 p.m. Friday May 19th.

Saturday, May 20

Topic: Differences between groups I: Student's t test

When do I use the t test?

What does the t-statistic mean?

Required Reading:

Jaeger Chapter 10

Sweet Chapter 6

Salkind Chapters 9 and 10

Topic: Differences between groups II: Analysis of Variance (ANOVA)

When do I use ANOVA?

How do I interpret the results?

Required Reading:

Jaeger Chapter 13

Sweet Chapter 6

Salkind Chapters 11 and 12

Topic: Relationships between variables I: Categorical variables

Crosstabulation

Chi-square test

Required Reading:

Jaeger Chapter 12

Sweet Chapter 5

Salkind Chapters 15

Friday, June 2

Topics: Relationships between variables II: Continuous variables and correlation

Graphical description: scatterplots

Measures of correlation: Pearson correlation coefficient

Measure of correlation: Spearman correlation coefficient

Required Readings

Jaeger Chapters 4 and 11

Sweet Chapter 7

Salkind Chapters 5 and 13

Assignments

Second quiz to be taken by Friday, May 26th.

Second problem set Due Monday, May 29th by 5 p.m. Problem set includes the following:

Sweet, Chapter Four, all questions; Sweet Chapter Five, questions 1,3,4,5; Chapter Six, questions 1,2,5,6

Saturday, June 3

Topics: Relationships between variables III: Regression

Slope

Intercept

Measures of fit

Coefficients

Diagnosing common problems: multicollinearity, heteroscedacity, outliers, and other scary-sounding words

Required Readings

Jaeger Chapter 15, pp. 333-344

Sweet Chapter 7

Salkind Chapter 14

Further Assignments

Last quiz to be taken by Friday, June 9th, 5 p.m.