

**HONORS INTRODUCTION TO DATA ANALYSIS  
POLITICAL SCIENCE 585H  
SPRING QUARTER, 2006  
DERBY HALL, 0125  
Tuesday & Thursday 2:30-4:18**

**SYLLABUS**

**Lecturer:** Dr. Omar M.G. Keshk  
**Office:** Derby Hall Room 3085  
**Office Hours:** Monday and Wednesday 1.30-4.00  
or anytime by appointment  
**Office phone:** 688-3209  
**Class Website:** [www.omarkeshk.com](http://www.omarkeshk.com)  
**Email:** [keshk.1@osu.edu](mailto:keshk.1@osu.edu)

**Course Description and Objectives**

The purpose of this course is to introduce students to the analysis of data. The ability to summarize, interpret, analyze and manipulate data is a critical skill in 21<sup>st</sup> century. Whether a layman or a professional, the ability to understand how others are using data and/or the ability to use and manipulate data is critical. This course will lay the foundation for developing such a skill. To this end, this class will first introduce the students to the most common methods of summarizing and presenting data (*descriptive statistics*). An understanding of how data is summarized is not only important for those wishing to analyze data but is also necessary for understanding the data we are constantly presented with in school, television, newspapers, work, etc... Understanding the different ways that data is summarized will allow the student to judge whether they are being presented with accurate information or having the wool pulled over their eyes. Second, the students will be introduced to how the analysis of data is used to substantiate opinions and/or judgments of phenomena of interest (*inferential statistics*). This is perhaps the most powerful and most dangerous use of data. The ability to distinguish appropriate from inappropriate conclusions from a given data becomes critical. This class will hopefully lay the foundation for students to become capable consumers and users of data in the future.

Students should note that this is a demanding course. The essence of the material is abstract and requires intense contemplation of the material for a proper understanding. Furthermore, statistics is a cumulative subjective. That is, to understand what is discussed in week 2 you have to understand what is discussed in week 1, thus, missing lectures is devastating. It is a statistical fact that the more classes a student misses the lower his/her grade will be. So consider yourself warned. Finally, the abstractness of the topic means that a single book will not be sufficient to fully understand the subject; therefore, it is strongly recommended that the student obtain, from the library or wherever, one of the suggested readings and use it as a supplement to the required course readings.

## Course Readings

### Required Readings

Clarke, G. M. & D. Cooke. (1998). *A Basic Course in Statistics*. New York: Arnold.

### Suggested Readings

Adam, William J., Irwin Kabus, & Mitchell P. Preiss. (Any Year) *Statistics: Basic Principles and Applications*. Dubuque: Kendall/Hunt Publishing Company.

Agresti, Alan & Barbara Finlay. (Any Year). *Statistical Methods for the Social Sciences*. New Jersey: Prentice Hall.

Freedman, David , Robert Pisani, & Roger Purves. (Any Year). *Statistics*. New York: W.W. Norton & Company.

Gravetter, Frederick J. & Larry B. Wallnau. (Any Year) *Statistics for the Behavioral Sciences*. United States: Wadsworth Thomson Learning.

Johnson, Richard A. & Dean W. Wichern. (Any Year). *Business Statistics: Decision Making with Data*. New York: John Wiley & Sons, Inc.

Sprinthall, Richard C. (Any Year). *Basic Statistical Analysis..* New York: Ally & Bacon.

Wonnacott, T.H & R. J. Wonnacott (Any Year). *Introductory Statistics For Business and Economics*. New York: John Wiley & Sons.

**Any other books with similar titles should do. The student is strongly recommend to get one of the above or a similar book from the library and read the chapters with the same theme as the given topic on the syllabus.**

## Course Requirements and Students Responsibilities

<b>Exams:</b>	Final (30%)
<b>Papers:</b>	Data Analysis Paper (30%)
<b>Home work:</b>	Four (10% each)

**No make-ups for missed exams or papers will be allowed under any circumstances except for valid medical reasons. Students experiencing any medical problems necessitating that they miss an exam must contact me as soon as possible or else they will not be allowed to makeup the exams. Finally, all makeup exams structure are left to the instructor's discretion and will be nothing like the exams taken during regular scheduled times. No make ups for papers will be allowed. Late home works will be deducted 20 points.**

## Legal Requirements

### **Academic Honesty**

**NO CHEATING WILL BE TOLERATED.** All instances of cheating will be reported to the university committee on academic misconduct.

### **Disability**

Students with disabilities and requiring special assistance are responsible for making their needs known to instructor as soon as possible. Arrangements for students needing such aid can be arranged. An alternative point of contact is the Office for Disability Services in 150 Pomerene Hall. Their phone number is 292-3307.

### **Recording Lectures:**

No student can record lectures without the consent of the professor. Furthermore, the recorded lectures cannot be distributed, sold, or exchanged without the written consent of the instructor. The student wishing to tape the lectures will be required to sign a form affirming that they understand these restrictions, abide by them and accept liability if they violate them.

### **Dates**

Professor reserves the right to move up or move back exams dates, homework due dates and other changes as warranted by class progress.

### **Miscellaneous**

If students want their exams and their papers after the quarter has ended they must notify the Instructor before the end of the current quarter. Otherwise, their exams, papers, etc.. will be disposed off after the 2<sup>nd</sup> week of the following quarter.

## Class Schedule

### *Introduction to Class*

#### **March 28,**

Topics: *Introduction to Class: Why Data Analysis and why we study it*

**Readings**

**None**

### *Descriptive Statistics*

**Objective:** In this section, we will look at the different ways to summarize, condense, and represent data (graphically and numerically) so that it is comprehensible and more importantly, usable, by the human mind. The student will learn that this is an essential first step in any data analysis process. The student will also learn that this is, more often than not, an art rather than a science.

March 30-April 11

**Why descriptive statistics, Types of Data, the Forms of Data, Graphical and numerical representation of data**

Topics:

- 1) Variables: Independent and Dependent
- 2) Quantitative versus Qualitative Variables
- 3) Nominal, Ordinal, and Interval Levels of Measurement
- 4) Univariate Graphical Methods for Summarizing Data
- 5) Univariate Tabular Methods for Summarizing Data
- 6) Univariate Numerical Methods for summarizing Data
- 7) Bivariate Graphical Methods for Summarizing Data
- 8) Bivariate Tabular Methods for Summarizing Data

***Readings***

**Clarke & Cooke:** Chapter 1, 5, 2, & 3  
(Read Ahead As Much As Possible)

April 13-May 2

**Random Variables, Probability, Great Expectations and all types of Distributions**

**Objective:** In this section, will learn about random variables and why they are important in statistics. We will study probability which allows us to study random phenomena, i.e., random variables. We will learn mathematical expectation and its central role in statistics. Finally, we will look at distributions and how they are used to make inferences.

Topics:

- 1) Random Variables
- 2) Probability Theory
- 3) Probability Distributions
- 4) Joint Probability Distributions
- 5) Conditional Probability Distributions
- 6) Expectations of Random Variables
- 7) Normal Distribution
- 8) Sampling Distributions

***Readings***

**Clarke & Cooke:** 8, 6, 7, 10, 9, 15, 3, & 16  
(Read Ahead As Much As Possible)

## May 4- June 1

### *Inferential Statistics, Single Hypothesis Testing, Difference of Means Hypothesis testing, Correlation and Regression*

**Objective:** In this section, we will begin learning and using the most power aspect of statistics. We will learn how we can you samples to make statements about populations. We will learn a variety of techniques by which we can test hypotheses we are interested in. We will also learn that our tests are never definitive and that we must always live with some uncertainty about our test results. We learn how to quantify this uncertainty and use it to our advantage.

Topics:

- 1) Hypothesis tests
  - a) Null hypothesis
- 2) Single Hypothesis test
- 3) Difference of Means tests
- 4) Correlation
  - a) Null correlation hypothesis and their tests
- 5) Linear Regression
- 6)
  - a) Estimation
  - b) Inference
  - c) Model adequacy

#### ***Readings***

**Clarke & Cooke:** Chapter 13 (skip pp. 255-256 & 259-283), 17, 18, 21, 23, & 24.  
(Read Ahead As Much As Possible)

**Final Exam JUNE 1, 2006**

**NOTE JUNE 6, 2006 PAPER ASSIGNMENTS DUE**

## **GEC STATEMENT**

### Diversity: International Issues

#### Goals/ Rationale:

Diversity: International Issues courses help students become educated, productive, and principled citizens of their nation and the world.

#### Learning Objectives:

1. Students exhibit an understanding of political, economic, cultural, physical, and social differences among the nations of the world, including a specific examination of non-Western culture.

### Social Science

#### Goals/Rationale:

Courses in social science help students understand human behavior and cognition, and the structures of human societies, cultures and institutions.

#### Learning Objectives:

1. Students understand the theories and methods of scientific inquiry as they are applied to the studies of individuals, groups, organizations, and societies.
2. Students comprehend human differences and similarities in various psychological, social, cultural, economic, geographic, and political contexts.
3. Students develop abilities to comprehend and assess individual and social values, and recognize their importance in social problem solving and policy making.