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**NOTE: This syllabus is subject to minor changes both before and during the semester.**

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## Statistics for Lawyers

The goal of this course is to prepare students to be knowledgeable consumers of statistics as practicing lawyers. To this end, the course will emphasize the foundation of statistics rather than presenting a cookbook-type approach to which statistics should be applied when (that question will also be covered but it is not the central emphasis of the course). The course will start with the basics of data description working on the assumption that we have information from a complete "population". Part II of the course will cover some basic issues in probability theory and introduce the concept of the "random variable. Part III focuses on basic statistical inference (estimation and hypothesis testing) involving one or two variables. Part IV moves beyond inference for two variables. After completing this course students should be able (1) to understand the kinds of issues that arise in the use of statistics, (2) to read and understand expert reports using statistics, and (3) to ask intelligent questions of their own and opposing experts.

There is one required text for the course:

- Moore, McCabe, & Craig (MMC), *Introduction to the Practice of Statistics* [6th edition]

In addition there is an electronic manual for using Excel in conjunction with MMC available at <http://courses.bfwpub.com/ips6e.php>

- Betsy Greenberg (BG), *Excel Manual for Moore and McCabe's Introduction to the Practice of Statistics, Sixth Edition*

In addition, a set of readings will be placed on TWEN. **The online syllabus should provide direct links to these readings (let me know if any of the links fail to work).**

The *requirements* for this course consist of the following:

- 1 midterm examinations (25%).
- 1 final examination (65%).
- 1 short (6-8 page) paper (10%) in which students are to locate two cases using statistics in a significant way, and assess the way the statistics are dealt with by the court. In this paper I am looking for evidence that you understand the issues involved in statistical analysis and the process of drawing inferences from statistical results. The paper is due the last day of exam period.

The course is scheduled to meet for three sessions of 50 minutes per week. In addition, I will schedule a fourth hour on Wednesday evening which will normally be an optional meeting to go over problems and do other things such as using Excel or reviewing algebra. My lectures are interruptable, and I strongly encourage

students to raise questions as we go along (keep in mind that if you are confused by something, there are almost certainly others in the class who are equally or more confused, and you are providing a service to your classmates by asking questions).

I will provide suggested problems for students to do as a learning aid, and while these are not required or graded, I strongly urge devoting time to the problems. The text comes with a CD with text files containing many of the datasets used in the problems. We will be using Excel to assist in doing problems and exercises. While Excel is not designed as a statistical analysis package, it does provide for many types of basic statistics. You should be sure that the optional "data analysis" add-in is installed and ready to use. On the [publisher's website](#) (login required) you will also find an additional Excel add-in designed to be used with the text; you should also download and install that as well. If you contemplate actually doing any statistical analysis in the future, I am happy to consult with you regarding various software options that you might want to consider. For some types of demonstrations and examples, I may choose to use two different statistical software packages, SPSS or Stata.

Suggestions and feedback regarding the course are welcome at any time.

### PLEASE NOTE THE FOLLOWING:

Formulas discussed in class will be posted as PDF files prior to each lecture. They will be formatted for note taking. I strongly suggest printing these off prior to the lecture and bringing them to class so that you can annotate them with your own notes. **Links will be added to the online syllabus with this information.**

[E-mail questions are welcome.](#)

I welcome students to come see me during my office hours (Tuesday and Thursday, 10-11, or by appointment). My office is located in Room 326.

## ASSIGNMENTS

<u>Week</u>	<u>Topic &amp; Reading Assignment</u>
	<p><b>PART I: DATA DESCRIPTION</b></p> <p><b>Types of Data and Data Structures</b></p> <p><b>Description of One Variable:</b></p> <p>Plots, percentages</p> <p>Central tendency, dispersion, transformations</p> <ul style="list-style-type: none"> <li>• Reading: <ul style="list-style-type: none"> <li>◦ MMC, pp. 1-53</li> <li>◦ BG, pp. 1-34</li> <li>◦ <a href="#">Barnes &amp; Conley, <i>Statistical Evidence in Litigation</i>, pp. 1-36</a></li> <li>◦ <a href="#">Gastwirth, "Use of Statistical Tables and Summary Descriptive Statistics" (from <i>Statistical Reasoning in Law and Public Policy</i>)</a></li> <li>◦ <a href="#">Craig v. Boren., 429 U.S. 190 (1976)</a></li> <li>◦ <a href="#">Castaneda v. Partida, 430 U.S. 483 (1976)</a></li> </ul> </li> <li>• Suggested problems: <ul style="list-style-type: none"> <li>◦ TBA</li> </ul> </li> </ul>
Sept. 8 & 10	

**Wednesday evening: [Algebra Review](#)**

Sept. 14-17

**Density Curves and Data Transformation**

Normal distribution  
 Standard normal transformation  
 Generalized data transformation

**Description of Two Variables:**

Crosstabulation, difference of means, Dot plots

- Reading:
  - MMC, pp. 53-78, 83-86, 142-153
  - BG, pp. 34-37, 46-53
  - [Marianne Githens, "Getting Appointed to the State Court: The Gender Dimension," \*Women & Politics\* 15 \(1995\), 1-24.](#)
- Suggested problems:
  - TBA

**Wednesday evening: Excel basics**

Sept. 21-24

**Description of Two Quantitative Variables:**

Scatterplots, Linear regression, Correlation

- Reading:
  - MMC, pp. 86-142, 154-161
  - BG, pp. 38-45
  - [Segal and Cover, "Ideological Values and Votes of U.S. Supreme Court Justices," \*American Political Science Review\* 83 \(1989\), 557-565](#)
  - [Mike Adams, "The Dead Grandmother/Exam Syndrome and the Potential Downfall of American Society," \*The Connecticut Review\* \(1990\)](#)
- Suggested problems:
  - TBA

**PART II: PROBABILITY THEORY**

Sept. 29-30\*, Oct.

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NO CLASS

MONDAY

\* makeup at  
noon Wed.**Introduction to Probability I:**

Sampling & Sampling Distributions  
 Basic Probability Rules & Conditional Probability  
 Random Variables

- Reading:
  - MMC, pp. 197-224, 237-270
  - BG, pp. 54-60

- Suggested problems:
  - TBA

Oct. 5-8

**Introduction to Probability II:**

Random Variables and Expected Values  
General Probability Rules  
Bayes's Rule

- Reading:
  - MMC, pp. 270-306
  - BG, pp. 89-93
- Suggested problems:
  - TBA

Oct. 12-15

**Sampling Distributions**

Binomial distribution, Poisson Distribution, Normal Distribution  
Distribution of the sample mean  
Central limit theorem

- Reading:
  - MMC, pp. 311-350
  - BG, pp. 60-67
  - [Gastwirth, "Use of the Binomial Model in Cases Involving Discrimination in Jury Selection or Employment Opportunity" \(from \*Statistical Reasoning in Law and Public Policy\*\)](#)
- Suggested problems:
  - TBA

Oct. 19-20

**Midterm Exam** (review Monday, exam Tuesday)**PART III: BIVARIATE INFERENCE STATISTICS**

Oct. 22

**Point Estimation**

- Reading:
  - BG, pp. 68-74
  - [Saks & Blanck, "Justice Improved: The Unrecognized Benefits of Aggregation and Sampling in the Trial of Mass Torts," 44 \*Stanford Law Review\* 815-826 \(1992\).](#)

Oct. 26-29

**Interval Estimation, Hypothesis Testing, Power**

- Reading:
  - MMC, pp. 353-411
  - BG, pp. 75-84
  - [Reserve Mining Co. v. EPA, 514 F.2d 492 \(8th Cir. 1975\)](#)
  - [Kaye, "Statistical Significance and the Burden of Persuasion," 46 Law & Contemporary Problems 13-23 \(1983\).](#)
  - [United States v. Fatico, 458 F. Supp. 388 \(E.D.N.Y. 1978\)](#)
- Suggested problems:
  - TBA

Nov. 2-5

**Basic inference for means and proportions**

t-tests

Z-tests

- Reading:
  - MMC, pp. 417-473, 487-519
  - BG, pp. 85-92
  - [Gay v. Waiters' and Dairy Lunchmen's Union, Local 30, 489 F. Supp 282 \(N.D. Cal. 1980\)](#)
- Suggested problems:
  - TBA

Nov. 9-12

**Two Alternate Approaches to Hypothesis Testing:**

Goodness-of-fit: Hypothesis testing for crosstabulations: Chi Square

Reduction in predictive error: Simple analysis of variance: ANOVA

- Reading:
  - MMC, pp. 525-548, 637-655
  - BG, pp. 92-98, 114-117
  - [Chance v. Board of Examiners, 330 F. Supp 230 \(S.D.N.Y. 1971\)](#)
- Suggested problems:
  - TBA

Nov. 16-19

**Inference for Simple (Bivariate) Regression (and Correlation)**

- Reading:
  - M&M, pp, 559-594
  - BG, pp. 98-104
  - [United States v. City of Chicago, 385 F. Supp 543 \(N.D. Ill. 1974\)](#)
  - [South Dakota Public Utilities Commission v. Federal Energy Regulatory Commission, 643 F. 2d 504 \(8th Cir. 1981\)](#)

- Suggested problems:
  - TBA

## **PART IV: MOVING BEYOND TWO VARIABLES**

Nov. 23-24

### **Multiple Regression (including "dummy" variables)**

- Reading:
  - MMC, pp. 607-628
  - BG, pp. 105-113
  - [Theodore Eisenberg and Geoffrey P. Miller \(2004\) "Attorney Fees in Class Action Settlements: An Empirical Study." 1 Journal of Empirical Legal Studies 27-78.](#)
  - [Finkelstein & Levanbach, "Regression Estimates of Damages in Price-Fixing Cases," 46 Law & Contemp. Probs. 145-169 \(1983\)](#)
  - [Presseisen v. Swarthmore College, 442 F. Supp 593 \(E. D. Pa. 1977\)](#)
- Suggested problems:
  - TBA

Nov. 30- Dec. 3

### **Solving Problems in Regression Analysis**

Time series data (autocorrelation)

Heteroscedasticity and correlated observations (robust standard errors)

Dichotomous dependent variables and count variables

Maximum Likelihood Estimation

- Reading:
  - MMC, Chapter 14 (pdf file on CD)
  - BG, pp. 135-136
  - [Gastwirth, "Logistic Regression" \(from \*Statistical Reasoning in Law and Public Policy\*\)](#)

Dec. 7-8

### **Extending Maximum Likelihood Estimation**

Heteroscedastic regression

Selection models

Switching regression

- Reading:
  - none

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*Last modified, August 27, 2009*