

Soc. 352  
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Research Methods

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## CRIMINOLOGICAL STATISTICS AND DATA ANALYSIS

**Text:** *Paternoster, Raymond and Ronet D. Bachman. 2018. Essentials of Statistics for Criminology and Criminal Justice. Thousand Oaks, CA: SAGE Publications.*

**Software:** *Blackboard course software (UMB).  
Virtual Lab (UMB lab access from off campus).  
SPSS (Statistical package in UMB PC labs).*

Statistics: What are they good for? You know they involve numbers and mathematical formulas and that they can seem hard to understand. But you also know that statistics are all around us. We see them in news articles, in advertisements, in crime reports, in drug studies, and of course in many, many social science articles and books. So if we don't understand statistics, we miss out on a lot. And it's important stuff that we're missing, because statistics in the social sciences are used to understand people and how and why they do the things they do. So the effort you put into learning statistics in this course will pay off in improved ability to evaluate information about the social world, in better performance in your other courses, and even in improved job prospects.

In this course, you will study the statistics used in research by criminologists and sociologists and other social scientists and learn how to generate the numbers and what they mean. A variety of class activities will help you to develop your statistical skills: reviewing social science articles that use statistics, analyzing data from real social science research projects, reviewing course material on the text study site, and reading and discussing the core text.

Specific course objectives are to learn how to:

1. Select suitable statistics for specific research questions and types of data;
2. Understand the meaning of general concepts in statistics;
3. Calculate basic statistics;
4. Interpret statistics reported in social science research;
5. Enjoy your newfound ability to discuss statistics in news stories and research articles

The substantive issues that keep us all interested in social science are never far away when we use social statistics. The reason for using social statistics is to learn about something, after all, not just to convert real life issues into dry numbers. So I will also try not to lose sight of the interesting issues that brought all of us to social science. The assignments in the course and many in-class examples will focus on topics that you'll be interested in on their own terms. I think you will leave the course knowing more about crime and justice and other social issues, as well as about statistics.

The next syllabus section describes course requirements and grading policies. This course requires hard work, but it will also help you to make substantial advances in understanding the social world and preparing for careers or graduate school. Keep in mind that the course is designed for you, so that you should do fine if you keep up with the reading, come to class—on time, complete assignments, complete the exercises, and ask questions when you need to have something clarified.

## COURSE ACTIVITIES

Every class involves a mixture of listening, talking, reading, and doing, and you'll need to be prepared to do each in this class. Your success in the class will be determined to a considerable extent by the “doing” part—if you focus attention on assignments and other class projects, you should do fine—but in order to complete these graded activities you'll also have to read the text carefully and attend every class so that you can listen to explanations of the course material and talk about the issues that concern you. You will also need to spend some time analyzing data with the statistics that you are learning about in a computer lab on campus (and you can access the lab programs and data from anywhere, using the university's “virtual lab”). Just be sure to follow the syllabus and complete required work when it is due.

**Readings.** Read each assigned chapter before it is covered in class—and then review it after the class discussion. Also take advantage of the review materials in the text, in Blackboard, and on the text study site (<https://study.sagepub.com/paternoster>). Try to develop the habit of reviewing the **learning objectives** and **key terms** in the text before you read each assigned chapter and then after you finish the chapter. Use the self-guided quizzes and flash cards on the study site to review terms and objectives, and also check yourself by completing practice problems at the end of each chapter (answers are on the web site). The time you spend on end-of-chapter and quiz questions should pay off: *much of the content of exams will be based on these questions.*

**Computer and web resources.** *We will meet each day (after the first week) in the Green Lab in the library* (Green Lab: Healey Library, UL, Room 0028). Please plan your morning commute so that you arrive at the Green Lab by 8:00 am (starting with Tuesday of our second week). We will use computers in each class session, but on most Thursdays we will focus on analyzing data with SPSS (Statistical Package for the Social Sciences).

Outside of class, you can complete statistical analyses for the course in a public lab on campus (Red Lab: Healey Library, Upper Level, Room 015) or at other campus locations [https://www.umb.edu/it/getting\\_services/computer\\_labs/general\\_use\\_computer\\_labs](https://www.umb.edu/it/getting_services/computer_labs/general_use_computer_labs). You can also do the computer work for the class from home or anywhere you have access to the internet, using the Virtual Lab: [https://www.umb.edu/it/getting\\_services/computer\\_labs/virtual\\_computer\\_labs](https://www.umb.edu/it/getting_services/computer_labs/virtual_computer_labs). You also have 24x7 access to the text study site, with its flash cards, quizzes, web resources, and other tools to help you learn the course material.

**Blackboard.** The course Blackboard site provides all the materials you need for the course, including the syllabus and assignments (2 weeks prior to their due date) and review materials. A discussion thread on Blackboard allows you to ask questions about any course material at any time (with response guaranteed in 24 hours). You **MUST** post questions about assignments, etc. on Blackboard (not by email to me or our TA), so that clarifications will be available for the whole class. I will also expect you to contribute to a “tips and techniques” forum on Blackboard for each of the three assignments. All assignments and other materials must be submitted through the Blackboard site and all course grades will be posted there. Handouts, graded assignments and exams, etc. will **NOT** be distributed on paper!

Assistance. Candace Evans, my course teaching assistant and I will be available to help you throughout the course. Seek Candace out whenever you need help, by email or in person. You can also post your questions on the course website (and I encourage you to do so, since then other students can benefit from the question and response). You also are always welcome to come to my office during my office hours (see above) or by appointment at another time. We are eager to help you with course material, but you must take the initiative and ask for assistance. Support for students who need extra help is also available at the Office of Academic Support: CC-1-1300, 617-287-6550, or [https://www.umb.edu/academics/vpass/academic\\_support](https://www.umb.edu/academics/vpass/academic_support). Academic Support now has special tutors assigned to work with students on statistics.

### **ASSIGNMENTS, EXAMS, GRADING**

Article Presentations. In the list of resources for each chapter on the text study site, there are PDFs of 2 articles that use some of the statistics discussed in that chapter. The abstract of each article is followed by 3 questions. At the start of class each Tuesday (after Week 1), a student will make a 5-10 minute presentation that will give an overview of one of these articles and answer the questions. At the end of class on Thursday of Week 1, we will have a signup session for article presentations. The article presentations will be on the Tuesday *after* the week in which the corresponding chapter was assigned (so in Week 2, the Tuesday morning article presentation will be about one of the articles for Chapter 1, then in Week 3, it will be about a Chapter 2 article, and so on). (Check out the articles after our first class so that you know which one you'd like to present by Thursday's class. If more than one student wants to present a particular article, we will choose one student randomly.) You must upload your article presentation to the Blackboard site prior to the class in which you present it.

SPSS Exercises. We will spend most of each Thursday's class analyzing data with SPSS in the computer lab. One student will serve as the assistant for each of these sessions. When you assist with the SPSS exercises, you will guide the class through some of the exercises using the projection system in the lab. I expect you to meet with me or our TA prior to that Thursday's class in order to prepare for this. Students will sign up for this role during our second Tuesday class (the first time we meet in the computer lab). At the end of each Thursday's class, you must also upload in Blackboard an answer to one of the SPSS exercises for that chapter. Upload the answer that you feel best illustrates your mastery of the material.

Assignments. There are three assignments, each focusing on a different type of statistic. Each assignment will involve analysis of one of the datasets available for the course (accessible from the computer labs or on the text study site). For each assignment, you will choose a dataset, formulate a research question that can be analyzed with that dataset, list the variables (and their level of measurement) that you will use in your assignment, and conduct analysis using the techniques on which the assignment focuses (descriptive, inferential, or explanatory statistics). **POST YOUR PLAN FOR EACH ASSIGNMENT IN BLACKBOARD IN THE WEEK THAT IT IS DISTRIBUTED.** Candace or I will provide feedback and direction, as needed.

#### *Assignment 1: Descriptive Statistics (Week 4)*

Pose a descriptive question involving variables in the dataset you have chosen. Your question should cover three hypotheses concerning the association between any pairs of these variables (in each pair, one variable must be independent and the other dependent). Present frequency distributions for at least 5 variables, graphs for at least 3, appropriate measures of central tendency for each of them, and describe the variation in each and the shape of each distribution (using a verbal description if none of the statistics we have studied is appropriate). Present and discuss the crosstabulations of the variables for the three hypotheses. Discuss your findings and answer your research question. Note any limitations of your analysis.

*Assignment 2: Inferential Statistics (Week 10)*

Pose research questions requiring inferential tests with variables in the dataset you have chosen. It will often make sense to use some or all of the variables you used in Assignment 1, but be sure that you can present crosstabulations involving 2 pairs of these variables (one dependent and one independent in each pair). Calculate standard 95% confidence intervals for the means of at least 4 variables and present statements describing the confidence you have in each of the point estimates. Now repeat this process using 99% confidence intervals for 2 of these variables. Graph the distribution of one variable and compare it to a normal distribution. Conduct a chi-square test for the two crosstabulations. Discuss your findings and answer your research questions. Note any limitations of your analysis.

*Assignment 3: Explanatory Statistics (both descriptive and inferential) (Week 14)*

Pose two hypotheses involving the difference on a quantitative variable between two groups, two hypotheses involving the difference on a quantitative variable between 3-5 groups, and two hypotheses involving the association between pairs of quantitative variables. Conduct appropriate statistical test, summarize your findings, and evaluate the support for each of your hypotheses.

Exams. There will be a midterm and a final exam. The final exam will not cover much material prior to the midterm—but bear in mind that the course material is cumulative, so if you need to develop your understanding of the material in the first half of the course in order to do well in the second part.

The midterm and final exams will be in class and will contain a mixture of multiple choice and short answer questions and questions involving calculation. I will give you a list of key terms (without definitions) and statistical formulas from the preceding chapters for use during the tests.

Course grades will be computed as follows:

Assignments 1-3	30%
Article review	10
Chapter SPSS exercises	10
Midterm	20
Final	30
	100%
Article critique (optional)	5%

Your three assignments, your article review, and your SPSS exercises must be uploaded in Blackboard on the day they are due. Work that is one day late will suffer a 10% penalty (one grade) and no work that is any later will be accepted. I will not give a grade of "incomplete" in other than the most unusual, extreme circumstances.

**ACADEMIC DISHONESTY**

Plagiarism occurs when someone claims someone else's work or ideas as their own. UMass Boston's policies about such academic dishonesty are spelled out at in the Code of Student Conduct:

[https://www.umb.edu/life\\_on\\_campus/policies/community/code](https://www.umb.edu/life_on_campus/policies/community/code) (see #11-#14).

## ACCOMMODATIONS

Section 504 of the Rehabilitation Act of 1990 offers guidelines and support for curriculum modifications and adaptations for students with documented disabilities. If applicable, students may obtain adaptation recommendations from the Ross Center for Disability Services, CC-UL-0211, 617-287-7430. If this applies to you, be sure to present these recommendations and discuss them with me within a reasonable period, presumably during the Drop/Add period (<https://www.umb.edu/academics/vpass/disability/students>).

## COURSE OUTLINE

<u>Week</u>	<u>Topic/Reading/Activity</u>
<b>1 (1/23, 1/25)</b>	<p><b>SETTING THE STAGE</b> Overview of basic social research concepts; levels of measurement, rates and proportions</p> <p>Paternoster &amp; Bachman: Chapter 1</p> <p>ADD/DROP ENDS 1/29</p>
<b>2 (1/30, 2/1)</b>	<p><b>FREQUENCY DISTRIBUTIONS AND GRAPHS</b> Frequency distributions, relative frequency distributions, bar charts and histograms, grouped values and recoding, distribution shape</p> <p>Paternoster &amp; Bachman: Chapter 2</p> <p>ASSIGNMENT 1: DESCRIPTIVE STATISTICS</p>
<b>3 (2/6, 2/8)</b>	<p><b>MEASURES OF CENTRAL TENDENCY</b> Mode, median, median and their advantages and disadvantages</p> <p>Paternoster &amp; Bachman: Chapter 3</p>
<b>4 (2/13, 2/15)</b>	<p><b>MEASURES OF DISPERSION</b> The variation ratio, the range, the standard deviation and variance</p> <p>Paternoster &amp; Bachman: Chapter 4</p> <p>ASSIGNMENT 1 DUE (2/18, midnight)</p>
<b>5 (2/20, 2/22)</b>	<p><b>CROSSTABULATION</b> Preparing and reading percentage tables</p> <p>Paternoster &amp; Bachman: Chapter 8 (pp. 195-201)</p>
<b>6 (2/27, 3/1)</b>	<p><b>INFERENCEAL STATISTICS</b> Probability, hypothesis testing, sampling distribution, central limit theorem</p> <p>Paternoster &amp; Bachman: Chapter 5</p>

- 7 (3/6, 3/8)**                    **POINT ESTIMATION AND CONFIDENCE INTERVALS**  
Confidence intervals for means and proportions  
  
Paternoster & Bachman: Chapter 6  
  
**MIDTERM EXAM (3/8)**  
  
SPRING VACATION (3/11-18)
- 8 (3/20, 3/22)**                **HYPOTHESIS TESTING WITH ONE POPULATION**  
Large and small sample tests, directional and non-directional  
  
Paternoster & Bachman: Chapter 7  
  
ASSIGNMENT 2: INFERENTIAL STATISTICS
- 9 (3/27, 3/29)**                **HYPOTHESIS TESTING WITH CATEGORICAL DATA**  
Chi-square with crosstabs; measures of association for crosstabs  
  
Paternoster & Bachman: Chapter 8 (pp. 201-220)
- 10 (4/3, 4/5)**                    **HYPOTHESIS TESTING WITH TWO MEANS, PROPORTIONS**  
t-tests and z-tests  
  
Paternoster & Bachman: Chapter 9  
  
ASSIGNMENT 2 DUE (4/8, midnight)
- 11 (4/10, 4/12)**                **HYPOTHESIS TESTING WITH THREE OF MORE MEANS**  
Analysis of variance (ANOVA), F test, eta squared  
  
Paternoster & Bachman: Chapter 10
- 12 (4/17, 4/19)**                **BIVARIATE CORRELATION AND REGRESSION**  
Scatterplots, correlation coefficient, least squares regression, b coefficient  
  
Paternoster & Bachman: Chapter 11  
  
ASSIGNMENT 3: EXPLANATORY STATISTICS  
  
WITHDRAWAL, P/F DEADLINE (4/20)
- 13 (4/24, 4/26)**                **MULTIPLE REGRESSION**  
Multiple regression analysis, beta weights  
  
Paternoster & Bachman: Chapter 12  
  
Interactive Exercises: Reporting Research
- 14 (5/1, 5/3)**                    **RECAP AND REVIEW**  
  
ASSIGNMENT 3 DUE (5/6, midnight)

**15 (5/8)**

**REVIEW**

SEMESTER ENDS (5/9)

FINAL EXAM WEEK (5/12-18)