Course description

This course provides an introduction to methods for analyzing quantitative criminal justice data. Emphasis is placed on understanding data in relation to key methodological concepts, including units of analysis, variables, measurement, and associations. It will teach strategies for presenting data patterns graphically, describing distributions and relationships through summary statistics, and drawing conclusions about sampled populations using inferential statistical methods, including statistical models. In doing so, it will teach methods for assessing univariate, bivariate and multivariate patterns and relationships.
Instruction will combine the formal teaching of key principles with the development of analytical skills through in-class practical activity. The latter will involve the use of analytic software, notably SPSS. To ensure the practical relevance of the course, instruction and activities will make use of real-world criminal justice data, including records extracted from administrative databases, published data tables, and information collected through surveys or structured observations.

The class will also support the work of students taking the parallel MA course in Research and Evaluation, by assisting them in the development of strategies for analyzing and interpreting data collected in the latter class’ research project. This course feature helps emphasize the strong synergy between research methods and statistics, and will reinforce students’ understandings of the links between theory, data collection, hypothesis testing, statistical analysis, and conclusions.

**Learning objectives**

Upon completion of this course, students will be able to:

- Recognize and describe common forms of criminal justice data
- Describe and define basic statistical principles (e.g. data, units of analysis, variables, measurement, association) and explain their relevance to criminal justice inquiry
- Create and interpret tables, graphs and charts that describe statistical data
- Describe variable distributions using appropriate measures and tests
- Explain the concept of statistical inference
- Test hypotheses using common bivariate and multivariate analytic techniques

**Readings**

The following texts are **required** for this course:


Other readings and resources will be distributed via blackboard on a week to week basis.

**Course management**

The course will make routine use of Blackboard for the submission and grading of assignments and for student notification. Additionally, key resources for study will be provided through a Dropbox folder: [https://www.dropbox.com/sh/bww08ly2kajzhwc/AACE994gXVQGa0Q2Fvcn6hTza?dl=0](https://www.dropbox.com/sh/bww08ly2kajzhwc/AACE994gXVQGa0Q2Fvcn6hTza?dl=0)

**Assessment**

All assessments should be submitted on time through Blackboard. Any assignments submitted late, without authorization from Prof Miller, will be penalized by 3% points for each elapsed day, up to a maximum of 30%. Grades will be based on the following:
A) Attendance and general participation (10%)  
Students are required to attend class, complete readings, participate in and lead discussion. They are expected to carry out practical work in class, including some collaborative group-based work. Authorized absences will only be granted when requested in advance, and when supported by medical or other official documentation. Unauthorized absences will negatively impact the student's course grade.

B) Data analysis exercises (57% overall)  
Students are required to complete six data analysis exercises that will track key methods being taught in class. These exercises are as follows (more detailed protocols will be handed out in class):

- **Exercise 1. Compiling data for analysis (8%; due Oct 8)** – Students will be expected to compile an SPSS dataset from scratch, based on administrative, observational or simple survey data. The data will have at least 15 cases and at least four variables (at least one of which should be categorical). Variable labels and (where required) value labels will be added to the dataset.

- **Exercise 2. Univariate analysis (9%; due Oct 22)** - In this assignment, students will be asked to analyze variable distributions using summary statistics and graphics, and to draw conclusions about variables.

- **Exercise 3. Comparing means (9%; due Nov 5)** – Students will be asked to compare variable means across groups, and to draw conclusions about differences between groups. This will make use of t-test and ANOVA techniques.

- **Exercise 4. Analyzing crosstabulations (9%; due Nov 19)** – Students will describe patterns of association between two categorical/ordinal variables (including tables and graphics) in a dataset of their choice. Analysis will involve use of chi-square statistical tests and relevant measures of association.

- **Exercise 5. Bivariate regression (10%; due Dec 3)** - In this assignment, students will examine the statistical relationship between two interval level variables, using OLS regression. This will require you to define a dependent variable and an independent variable, and to interpret the model coefficients and tests of statistical significance.

- **Exercise 6. Multivariate logistic regression (12%; due Dec 17).** This will require a multivariate analysis using logistic regression for a binary dependent variable, again using SPSS, based on a reasoned scientific hypothesis and plausible controls.

C) Exam (33%) – A final exam will assess students' analytical skills and statistical understanding.

Class schedule

**Week 1 (11 Sep) - Introduction**
This class provides an overview of the course, including assessment criteria and week-to-week structure. Students will be introduced to key software (SPSS and Excel), and will conduct some introductory data exercises.
Week 3 (25 Sep) - Core concepts, data sources and data management
This class reviews foundational principles relating to data sources, variables and statistical methods. These include theory testing; surveys and administrative data; levels of measurement; measurement validity, reliability and error; dependent vs. independent variables; sampling; and experimental and non-experimental (correlational) methods. The class will also focus on the compilation of data into spreadsheets for use with analytic software, and the SPSS environment.

Textbook:
Field, 2013, p1-19 (variables, measurement, error, validity, reliability etc.)
Field, 2013, P. 42-44 (section Part 2.3) (samples and populations)
Field 2013, Chapter 3

Additional reading:

Videos:
https://www.youtube.com/watch?v=jY0kfCkEs (levels of measurement)
https://www.youtube.com/watch?v=DS8Hw00r4w (validity and reliability)
https://www.youtube.com/watch?v=C1zM1c2HbZc (population and sample)

Weblinks:
http://marymount.libguides.com/c.php?g=272189&p=1815387 (criminal justice data sources)

**ASSIGNED: DATA EXERCISE 1 (COMPILING DATA FOR ANALYSIS) – DUE: OCT 8**

Week 4 (2 Oct) - Methods for representing statistical data
This class will explore graphical methods for exploring and displaying data using SPSS and Excel. This will allow students to understand how the properties of data can be presented and interpreted visually.

Textbook:
Field, 2013, Chapter 4

Additional reading:
Cung, 2013 http://escholarship.org/uc/item/2v76v571 (just look at the pictures!)

Videos (Excel related):
Bar charts: https://www.youtube.com/watch?v=JpLW1A7j7r3Y
Histograms: https://www.youtube.com/watch?v=RyxPp22x9Pj
Scatterplots: https://www.youtube.com/watch?v=bYf6qO-iBW0
Line graphs: https://www.youtube.com/watch?v=I-PaQymHkhg
Weblink:

****DUE OCT 8: DATA EXERCISE 1 (COMPILING DATA FOR ANALYSIS)****

Week 5 (9 Oct) - Univariate statistics, introduction to the normal distribution, and confidence intervals
This class will examine statistics used to describe the distribution of variables. It will also introduce the normal distribution, a key concept in parametric inferential statistics, and introduce confidence intervals

Textbook:
Field 2013, 19-34 – central tendency and spread, normal distribution
Field 2013, 52-60 – standard error and confidence intervals
Field 2013, 164-187 – bias, assumptions, Central Limit Theorem

Additional reading:

Videos:
https://www.youtube.com/watch?v=IV_m_uZOUgI (measures of central tendency)
https://www.youtube.com/watch?v=QsQIpF_t1LI (measures of spread)
https://www.youtube.com/watch?v=vxbYw9R84w (Excel for univariate statistics)

ASSIGNED: DATA EXERCISE 2 (UNIVARIATE ANALYSIS) – DUE: OCT 22

Week 6 (16 Oct) - Hypothesis-testing and the comparison of means 1: T-tests
This class introduces the concept of hypothesis testing, and illustrates its application through the example of T-tests.

Textbook:
Field 2013, 60-83 – Hypothesis testing
Field 2013, Section 9.3 – p-364-389 – T-tests

Additional reading:
Wheller et al, 2013 http://library.college.police.uk/docs/college-of-policing/Practitioner-Paper.pdf (focus in particular on Tables 7, 8, 9, 10 and 11)

Videos:
https://www.youtube.com/watch?v=pTmLQvMM-1M (t-test overview)
https://www.youtube.com/watch?v=llfLnx8sh-o (t-test using Excel)
https://www.youtube.com/watch?v=VUufBWlziIU (t-test using SPSS)

****DUE OCT 22: DATA EXERCISE 2 (UNIVARIATE ANALYSIS)****
Week 7 (23 Oct) - Hypothesis-testing and the comparison of means 2: ANOVA
This applies hypothesis testing to multiple means, using the Analysis of Variance (ANOVA).

Textbook:
Field 2013, 429-445
Field 2013, 460-461
Field 2013, 466-468

Additional reading:
Myrstol, 2004
http://justice.uaa.alaska.edu/forum/21/2summer2004/c_gundeterrence.html

Videos:
https://www.youtube.com/watch?v=QUQ6YppWCEg (ANOVA intro)
https://www.youtube.com/watch?v=fFnOD7KBbw (ANOVA algebra)
https://www.youtube.com/watch?v=iOpPHunv8nm (ANOVA in Excel)
https://www.youtube.com/watch?v=qRJRp5363P4 (ANOVA in SPSS)

ASSIGNED: DATA EXERCISE 3 (COMPARING MEANS) – DUE: NOV 5 NOV

Week 8 (30 Oct) - Hypothesis-testing on categorical data: Crosstabs and Chi-Square
In this class will study hypothesis testing on categorical data, using the chi-square test on cross tabulations of data.

Textbook
Field 2013, 721-725,
Field 2013, 735-746

Application

Video
https://www.youtube.com/watch?v=THrZIOnl4qQ (crosstabs and Chi square in SPSS)

****DUE NOV 5: DATA EXERCISE 3 (COMPARING MEANS)****

Week 9 (6 Nov) – Correlation
This week’s class examines how correlation can be measured, for both continuous and ordinal variable types.

Textbook:
Field 2013, 263-279

Additional reading:
Howe and Crilley 2001
https://www.researchgate.net/publication/11957391_Deprivation_and_violence_in_the_community_a_perspective_from_a_UK_Accident_and_Emergency_Department
Week 10 (13 Nov) – Regression OLS 1: Bivariate regression
This week’s class will introduce ordinary least squares regression, using a single independent variable.

Text book:
Field 2013, 293-320

Videos:
https://www.youtube.com/watch?v=JvS2triCgOY (mathematics of OLS regression)
https://www.youtube.com/watch?v=ElkCTFkAGXY (basic SPSS for OLS)

****DUE 19 NOV DATA EXERCISE 4 (ANALYZING CROSSTABULATIONS) ****

Week 11 (20 Nov) – Regression OLS 2: Multiple independent variables and dummy coding
This week’s class continues to examine OLS regression, this time examining models with multiple independent variables and with dummy variables.

Text book:
Field 2013, 321-354
Field 2013, 419-427

Further reading:
Dowler 2003 http://www.albany.edu/scj/jcjc/vol10is2/dowler.html

Videos:
https://www.youtube.com/watch?v=ScV2F0x41A (dummy coding multivariate regression in SPSS)
https://www.youtube.com/watch?v=lDi3qa_ngNQ (examining assumptions with SPSS)

ASSIGNED: DATA EXERCISE 5 (LINEAR REGRESSION FOR TWO VARIABLES) – DUE: DEC 3
**Week 12 (27 Nov) - Logistic regression**
This class focuses on modeling a binary dependent variables using logistic regression.

*Text book:*
Field 2013, 762-768
Field 2013, 773-789

*Further reading:*
Engel and Calnon 2004 [https://www.semanticscholar.org/paper/F-Examining-the-Influence-of-Driver-Engel-Calnon/bb8525efea3ce89a6d585ab0261d50db5283cb/pdf](https://www.semanticscholar.org/paper/F-Examining-the-Influence-of-Driver-Engel-Calnon/bb8525efea3ce89a6d585ab0261d50db5283cb/pdf)

*Videos:*
https://www.youtube.com/watch?v=Po-xZJfIPM (principles of logistic regression)
https://www.youtube.com/watch?v=zj15KUXtC7M (logistic regression with SPSS)

****DUE DEC 3: DATA EXERCISE 5 (LINEAR REGRESSION FOR TWO VARIABLES)****

**Week 13 (4 Dec) - Advanced topics and review**
In the final class, we discuss some more advanced regression topics, and review key principles and lessons from the course.

**ASSIGNED: DATA EXERCISE 6 (LOGISTIC REGRESSION FOR MULTIPLE VARIABLES) – DUE: DEC**

**Week 14 (11 Dec) - Exam**

****DUE DEC 17: DATA EXERCISE 6 (LOGISTIC REGRESSION FOR MULTIPLE VARIABLES)****

**Some data sources for analysis**
National Archive of Criminal Justice Data: [http://www.icpsr.umich.edu/icpsrweb/NACJD/das.jsp](http://www.icpsr.umich.edu/icpsrweb/NACJD/das.jsp)
Sourcebook of Criminal Justice Statistics: [http://www.albany.edu/sourcebook/](http://www.albany.edu/sourcebook/)
General information (School and University)

Academic Integrity

As a member of the Rutgers University community you are not to engage in any academic dishonesty. You are responsible for adhering to basic academic standards of honesty and integrity as outlined in the Rutgers University Policy on Academic Integrity for Undergraduate and Graduate Students (http://cat.rutgers.edu/integrity/policy.html). Your academic work should be the result of your own individual effort, you should not allow other students to use your work, and you are required to recognize and reference any material that is not your own. Violations of the university's policy will result in appropriate action.

Students with Disabilities

As stated in the Manual for Students and Coordinators of Services for Students with Disabilities (http://disabilityservices.rutgers.edu/docs/studentmanual.pdf), Rutgers University "is committed to providing equal educational opportunity for persons with disabilities in accordance with the Nondiscrimination Policy of the University and in compliance with § 504 of the Rehabilitation Act of 1973 and with Title II of the Americans with Disabilities Act of 1990." For students with disabilities, review the manual and then contact the Student Disability Coordinator, Nelitha Wilson-Michael (nmichael@andromeda.rutgers.edu; 973-353-5300), who is located in room 352 in the Robeson Campus Center.

Psychological and Counseling Services

If you experience psychological or other difficulties as a result of this course, or because of other issues that may interfere with your performance in the course, please contact the university's psychological and counseling service center (http://www.counseling.newark.rutgers.edu; 973-353-5805), which is located in Blumenthal Hall, room 101. The center offers a variety of free, confidential services to part-time and full-time students who are enrolled at Rutgers.