The purpose of this course is to provide a firm foundation for the analysis of quantitative data in criminology and criminal justice. It is required for partial fulfillment of the support sequence for the Ph.D. program in criminal justice. The heaviest emphasis will be devoted to the linear regression model, including its estimation, interpretation, assumptions, and diagnostics. The linear regression model is the workhorse of quantitative analysis, and many of its underlying assumptions and mechanics of estimation apply to the more general models that will be considered in Intermediate Statistics and Advanced Statistics. Time permitting, more specialized topics will be considered, including missing data and matching methods.

Course Objectives

- Understanding of the principles of casual inference in observational studies.
- Expertise with the mathematics and interpretation of the linear regression model.
- Knowledge of the key assumptions of the linear regression model.
- Awareness of the consequences of violating the assumptions for statistical inference.
- Ability to diagnose and remediate violations of regression assumptions.
- Familiarity with the use of statistical software for regression models.
- Application of the linear regression model to an independent research problem.
- Acquiring the skills to write competently about the results from regression analysis.

Course Prerequisite

It is assumed that students have successfully completed a graduate-level course in descriptive statistics and univariate inference, and have a rudimentary level of understanding of computer-based statistical programs (e.g., SPSS, SAS, Stata, R). Comfort with algebra is assumed.

COURSE MATERIALS
The analysis will primarily be performed using R software environment for statistical computing and graphics. We will use R through RStudio, a free and open-source integrated development environment. In preparation for class, make sure to complete the freely available Introduction to R online course at DataCamp: https://www.datacamp.com/courses/free-introduction-to-r.

**Required Textbooks**


**Recommended Readings**


**COURSE GRADING**

The grading scale that will be used for the final semester grades is as follows:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>90.0% or higher (Outstanding)</td>
</tr>
<tr>
<td>B</td>
<td>80.0% to 89.9% (Good)</td>
</tr>
<tr>
<td>C</td>
<td>70.0% or 79.9% (Satisfactory)</td>
</tr>
<tr>
<td>F</td>
<td>69.9% or lower (Unsatisfactory)</td>
</tr>
</tbody>
</table>

Grading will be based on the following four criteria:

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class Preparation</td>
<td>10%</td>
</tr>
<tr>
<td>Homework Assignments</td>
<td>40%</td>
</tr>
<tr>
<td>Empirical Project</td>
<td>50%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>100%</td>
</tr>
</tbody>
</table>

**Class Preparation (10%)**

Students are expected to have read and to be conversant (to the extent possible) with the required reading material for each class meeting. Some of this material will be of a technical nature, so the goal of the class meetings will be to help students understand what they have read (both conceptually and algebraically), and to work through empirical applications of key concepts.

**Homework Assignments (40%)**
There will be no more than five (5) homework assignments given throughout the semester. They are to be handed in to the instructor at the beginning of the class periods during which they are due. The assignments will be problem sets using data made available by the instructor. The objective of each of the homework assignments is to give students hands-on experience using statistical software to manipulate data and to estimate a variety of statistical tests.

Students are encouraged to work in pairs or in small groups on the homework assignments. While joint results may be reported, each student must provide his or her own interpretations of the findings. Late homework assignments will not be accepted, unless the student has given prior notification and the instructor has granted approval.

_Empirical Project (50%)_

In lieu of a final exam, the semester will culminate in an independent research project on a topic of the student’s choosing. A written report will be submitted in the form of a journal manuscript, with sections for an introduction, literature review, hypotheses, data, methods, results, discussion (including limitations) and conclusion, as well as references, tables, and figures.

Because this course is concerned with the linear regression model, students will be expected to demonstrate proficiency with its application to their research problem. This means that they will have to think carefully about the underlying assumptions of their model, evaluate the fit of the model to their data, and identify the limitations of their research design and analysis. The written project must not be longer than 20 pages in length. Sentences should be double-spaced with font size 12.

Students are welcome (and are in fact encouraged) to use this project as an opportunity to consult with their faculty advisor or mentor, and to make substantial progress on analyses that can lead to a publishable manuscript.

**COURSE POLICIES**

_Authenticity Policy_

Students are expected to regularly attend class meetings and come prepared by reading the assigned chapters and doing the exercises. If you expect to miss one or two classes, send an e-mail directly to the instructor to inform them of your future absence.

_Academic Integrity Policy_

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://studentconduct.rutgers.edu/academic-integrity).
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*

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 additional information please visit the website [https://ods.rutgers.edu/](https://ods.rutgers.edu/) or contact the representative for the Newark Campus:

Kate Torres  
Coordinator of ADA Services and Academic Support  
Robeson Campus Center, Suite 352  
350 Martin Luther King Jr. Boulevard  
Newark, NJ 07102  
Phone: 973.353.5300  
Fax: 973.353.5666  
E-mail: kate.torres@rutgers.edu  
Website: [https://ods.rutgers.edu/](https://ods.rutgers.edu/)

*Rutgers-Newark Counseling Center*

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](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.