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# Data 205-JUM3 Syllabus

Introductory Analytics (Queens College CUNY)



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# DATA 205: INTRODUCTORY ANALYTICS (ONLINE-SYNCHRONOUS)

**Semester: Fall 2024**
**Instructor: Hongwei Xu, Associate Professor**
**Office Address: PH 233G, Department of Sociology, Queens College**
**Email: hongwei.xu@qc.cuny.edu**
**Office Hours: Monday & Wednesday 12PM - 1PM**

## Course Description

Join me in seeking out on all things data! Didn't know you were a data geek? Well, allow me to introduce you to an exciting new world—even if you think you hate numbers.

This course is an introduction to Data Analytics, a major component of Data Science. During the semester, we'll be learning a lot of different ways to organize and make sense of data. You'll learn the mathematical formulae underlying key statistical procedures, but the emphasis here will be on concepts, application, and interpretation. Unlike traditional statistics classes, you won't be doing pencil-and-paper calculations, and you won't even need a scientific calculator. Instead, you will be using **R**, an open-source (i.e., free!) statistical software and programing language that is in high demand in the data job market. The emphasis in this class will be on using data analytics tools to describe, visualize, and draw insights from data.

## Course Objectives

The course objective is to make you data literate—a good consumer and user of data. You'll sharpen your quantitative reasoning skills and gain an understanding not only of basic statistical concepts but also of how to evaluate data, how to interpret visualizations, and of how to structure data for analysis.

My personal goal is to open your eyes to the powerful flow of data in your daily life and to get you excited about all of the possibilities available to you once you know how to ask and answer questions with it. If at the end of the semester you're not a full-on data geek, you still might find this course to be one of the most useful courses of your undergraduate career.

This course is required for the Sociology major and minor as well as for the Data Analytics minor. A grade of B+ or better in this course is also a prerequisite for our Accelerated Master's Program in Data Analytics and Applied Social Research. Data 205 also counts toward the Quantitative Reasoning (QR) requirement in Pathways.

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# Required Core Math and Quantitative Reasoning Course

This course satisfies the Mathematical and Quantitative Reasoning (MQR) requirement of the Pathways General Education Required Core

***All MQR courses must satisfy the following learning outcomes:***

| |
|---|
| MQR 1: Interpret and draw appropriate inferences from quantitative representations, such as formulas, graphs, or tables. |
| MQR 2: Use algebraic, numerical, graphical, or statistical methods to draw accurate conclusions and solve mathematical problems. |
| MQR 3: Represent quantitative problems expressed in natural language in a suitable mathematical format. |
| MQR 4: Effectively communicate quantitative analysis or solutions to mathematical problems in written or oral form. |
| MQR 5: Evaluate solutions to problems for reasonableness using a variety of means, including informed estimation. |
| MQR 6: Apply mathematical methods to problems in other fields of study. |

# Course Delivery

DATA 205 is a 4 credit, 6 contact hour course. It meets for approximately two hours of lecture, two hours of lab, and two hours of supervised out-of-classroom work each week. Lecture slides and other course materials will be posted on **Brightspace**. You should plan to spend about 8-9 hours per week on this course including class time.

| Class | Days & Times | Location | Instructor |
|---|---|---|---|
| **Jumbo Lecture**<br>DATA 205- JUM3<br>(Class No. 43486) | Tue 5:00PM - 6:50PM | Online-synchronous | Hongwei XU<br>(hongwei.xu@qc.cuny.edu) |
| **Lab A**<br>DATA 205-JM3A<br>(Class No. 43485) | Thu 5:00PM - 6:50PM | Online-synchronous | Deepakie Sodhi<br>(d.sodhi15@gmail.com) |
| **Lab B**<br>DATA 205-JM3A<br>(Class No. 43484) | Thu 5:00PM - 6:50PM | Online-synchronous | Joseph Pascarella<br>(Joseph.Pascarella@qc.cuny.edu) |
| **Lab C**<br>DATA 205-JM3A<br>(Class No. 43483) | Thu 5:00PM - 6:50PM | Online-synchronous | John Furnari<br>(JohnFurnariQC@gmail.com) |

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- **Unless noticed otherwise, the instructor will deliver weekly lectures on Zoom at 5:00-6:50 PM on Tuesday.**

- **Labs will be delivered weekly on Zoom by lab instructors.** There are three lab sessions (see the table above) and students must register one of them. Based on your enrollment in CUNYFirst, you have been assigned to one of the following lab instructors who will track and grade your lab assignments and tests. Labs will provide a combination of lecture and hands-on work in Posit Cloud (formerly known as R Studio Cloud): https://posit.cloud/. You will learn how to sign up for a free account in your lab sessions.

- Lecture and lab slides will be available at the beginning of class for you to download and annotate. Both lectures and labs will be interactive and will include polls, surveys, and pop quizzes as well as the opportunity for questions and answers.

- **Assignments.** Expect to have reading and lab assignments *every* week unless otherwise noted. You will submit your lab to your lab section on **Brightspace**.

# Grading

This is one of the most demanding courses in the Sociology undergraduate curriculum. The key to success in this course is staying on top of the material. The grading system is set up to reward students who put appropriate effort into the class. **If you cannot allocate 8-9 hours per week to this course, you should consider choosing another semester to take this course.**

We'll be covering concepts and skills using a variety of different approaches, exercises, and examples, and the knowledge in the course is cumulative. You will be expected to keep applying the things you learn throughout the semester and in increasingly sophisticated ways. For this reason, the grading scheme rewards participation and on-time completion of assignments.

Your final grade consists of the following components:

- Class attendance and participation (10%)
- Reading & Writing assignments (10%)
- Lab assignments (50%)
- Midterm and Final Exams (30)

The weighted average of these component-specific grades will be converted into letter grades as follows:

| Grade | Score | Grade Points |
|---|---|---|
| **A** | 93-100 | 4.0 |
| **A-** | 90-92 | 3.7 |
| **B+** | 87-89 | 3.3 |
| **B** | 83-86 | 3.0 |
| **B-** | 80-82 | 2.7 |
| **C+** | 77-79 | 2.3 |

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| | | |
|---|---|---|
| **C** | 73-76 | 2.0 |
| **C-** | 70-72 | 1.7 (GPA in Academic Probation) |
| **D+** | 67-69 | 1.3 |
| **D** | 60-66 | 1.0 (Grade of D is the lowest passing grade in the undergraduate division) |
| **F** | 0-59 | 0.0 |

The instructor may give an "A+" to students who have mastered all class materials and done exceptional work. Such grades are rare and should not be expected.

Assignments must be handed in on their due date. Extensions may be petitioned under extenuating circumstances (e.g., religious holidays, court dates, medical procedures, serious illness, death in the family). **Late assignments will not be accepted without prior written approval for an extension from the professor.** Petitions are at the instructor's discretion and more likely to be granted the earlier they are received. If you encounter difficulties with submitting your work on time, you must notify the professor before the submission deadline.

# Readings

There are no required textbooks for this course. However, here are two books used in my previous teaching of DATA 205 if you want to check out at the library:

***Discovering Statistics Using R***, by Andy Field, Jeremy Miles, and Zoe Field, is a chatty textbook designed to make analytic and statistical concepts easy to understand.

***Naked Statistics***, by Charles Wheelan, is a book of thoughtful essays containing discussions and real-world application of data and statistical concepts.

# Additional Class Policies

## Academic Integrity

Students must do all their work within the boundaries of acceptable academic norms. Academic dishonesty is prohibited in The City University of New York and is punishable by penalties, including failing grades, suspension, and expulsion. The university defines the administrative processes and sanctions for violating its code of academic integrity in The City University Policy on Academic Integrity. The text of this policy is available on the web at: https://www.cuny.edu/about/administration/offices/legal-affairs/policies-procedures/academic-integrity-policy/.

You are advised to read and understand this policy immediately. Should you have any difficulty accessing or interpreting this policy, contact the instructor. Students found guilty of any form of academic dishonesty will be subject to appropriate disciplinary action, which may include reduction of grade, a failure in the course, or expulsion from Queens College.

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## Students with Disabilities

Students who require accommodation based on special needs are asked to contact the Office of Special Services for Students with Disabilities at 171 Kiely Hall, telephone: (718) 997-5870. We are unable to provide accommodations without documentation from the Special Services office.

## Classroom Conduct

Any student who takes this class agrees to act professionally in class. Any student who disrupts lectures, labs, or tests will be ejected from the online platform and referred to the Dean's Office. If you are dismissed, you will be considered absent from that class. A dismissal due to student conduct on test day will result in a zero for that test.

## Communicating with Instructor

Communicate with the instructor via e-mail or via the Brightspace Discussion. All communication should be properly spelled and professional in tone. Under normal circumstances, you can expect a response within three business days. If a response is urgent and requires immediate attention, write "URGENT" in the subject line of your e-mail.

## Grades

Grades reflect careful consideration of student performance and will not be changed unless a recording or calculation error is revealed. It is your responsibly to monitor your grades and provide immediate feedback in the case of any discrepancy.

Students must notify the instructor via e-mail of any problems with their final grades within two weeks of their grades' posting on CUNYFIRST. After two weeks from the grades posting on CUNYFIRST, all grades are final and not subject to further discussion.

**Note: P/NC grades will not be an option for this course for any students taking it to fulfill a requirement.**

# Schedule and Topics

There are ten units of lectures and associated labs in total, while the last unit (Unit 10) is optional, depending on the course progress. There are three tests in total.

| Unit | Topic | Assignments-- Due the Following Week Unless Otherwise Noted |
|---|---|---|
| **1** | **Course Introduction** | |
| Lecture | Course Introduction | Reading Assignment #1 |
| Lab | Setting Up for Success: Working with R Studio Cloud and Brightspace | Lab Assignment #1 |
| **2** | **The Research Process** | |
| Lecture | Asking questions, Dependent and Independent Variables, Formulating and testing hypotheses, Correlation and Causation, Validity and Reliability | Reading Assignment #2 |

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|---|---|---|
| Lab | Working with data in R, Formulating and testing hypotheses | Lab Assignment #2 |
| **3** | **Levels of Measurement** | |
| Lecture | Levels of Measurement and Measures of Central Tendency. | Reading Assignment #3 |
| Lab | Using measures of central tendency to describe data and test hypotheses | Lab Assignment #3 |
| **4** | **Data Distributions** | |
| Lecture | Measures of Dispersion, Normal Distributions, and Z-scores | Reading Assignment #4 |
| Lab | Visualizing and analyzing dispersion and measures of central tendency | Lab Assignment #4 |
| **5** | **Probability and Central Limit Theorem** | |
| Lecture | Probability, Samples and Populations, Sampling Distributions | Reading Assignment #5 |
| Lab | Drawing conclusions about expected values from sampling distributions | Lab Assignment #5 |
| **6** | **Comparing Means** | |
| Lecture | Confidence Levels and Confidence Intervals, Critical Values, One-Tailed and Two-Tailed Tests, t-tests | Reading Assignment #6 |
| Lab | Using t-tests and confidence intervals to test hypotheses comparing means | Lab Assignment #6 |
| **7** | **Comparison of Proportions** | |
| Lecture | Margin of Error, Contingency Tables and Cross-tabulations, Chi-Square test of significance | Reading Assignment #7 |
| Lab | Using margin of error in polling, making and interpreting cross-tabs | Lab Assignment #7 |
| **8** | **Correlations** | |
| Lecture | Introduction to Linear Relationships | Reading Assignment #8 |
| Lab | Visualizing and Analyzing Correlations and Linear Relationships: scatterplots and fitted lines | Lab Assignment #8 |

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