

ENVIRONMENTAL QUANTATIVE METHODS

ENVST-UA 310



Image credit: Daniel Forsyth

Instructor: Professor Matthew Hayek

Office Hours: Tues & Thurs 1-3 PM

By Appt on [Google Calendar \(link\)](#)

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New York University, Spring 2021

Tues/Thurs 9:30 – 10:45

4 Credits

Course Assistant: Mukund Palat Rao

Office Hours: Fridays 9:30-10:30 AM & 1-2 PM

Zoom Link: <https://nyu.zoom.us/j/99297468348>

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Course Objectives:

Welcome to quantitative data analysis! Using **R**, the freely available and acclaimed computing language, this course will cover the necessary basics for introductory statistical modeling, from data collection and visualization to model specification and write-up. Throughout the semester, students will conduct analyses on real data and organize their findings into a final presentation and paper.

Textbooks and Materials:

Kaplan (2011, 2nd Ed). *Statistical Modeling: Computational Technique*. Project Mosaic.

- Chapters will be posted on NYUClasses

Grolemund & Wickham (2017, 1st Ed). *R for Data Science*. O'Reilly Media.

- Free electronic version available: <http://r4ds.had.co.nz/index.html>
- Hard copies also available online for purchase (though not necessary)

Computer with **R** installed

- The course requires a computer that can support **R**. All well-functioning modern computers will have this capacity.
- We will cover **R** installation in the first week of class.

Overview:

Each week will roughly be centered around a new statistical topic with a *lecture* followed by a *laboratory*. Lecture will provide the first exposure to the topic. Before the corresponding Lab, students will read the relevant materials and complete a weekly homework. During Lab, students will engage in active and/or group learning related to the topic, with everyone working on the same question sets and data. A lab write-up will be due before the next Lecture. Each week, students will also apply what they are learning to an independent project related to their “own” data, building towards their final project. A brief project report on their project progress will be due before Lab. The last few days of class will consist of student presentations of their independent projects.

Grade breakdown:

Homeworks	25%
Labs	25%
Project Reports	10%
Final Presentation	10%
Final Paper	20%
Academic Professionalism	10%

Schedule:

<i>Session</i>	<i>Day</i>	<i>Topic</i>	<i>Assignment Due</i>
Intros	R: 28/Jan	Introductions	Download R & RStudio
1a lect	T: 02/Feb	Introduction to R	Read Kap. Preface & 1
1b lab	R: 04/Feb	Intro to R Lab	Homework 1
2a lect	T: 09/Feb	Types of Data	Lab 1 & Project 1
2b lab	R: 11/Feb	Data Lab	Homework 2
3a lect	T: 16/Feb	Visualization	Lab 2 & Project 2
	R: 18/Feb	No Class	
3b lab	T: 23/Feb	Visualization Lab	Homework 3 & Project 3
4a lect	R: 25/Feb	Transformations	Lab 3
4b lab	T: 02/Mar	Transformations Lab	Homework 4 & Project 4
4a lect	R: 04/Mar	Exploratory Data Analysis	Lab 4
5b lab	T: 09/Mar	EDA Lab	Homework 5 & Project 5
6a lect	R: 11/Mar	Describing Variation	Lab 5
6b lab	T: 16/Mar	Describing Variation Lab	Homework 6 & Project 6
7a lect	R: 18/Mar	Language of Models	Lab 6
7b lab	T: 23/Mar	Language of Models Lab	Homework 7 & Project 7
Review	R: 25/Mar	Review Session	Lab 7 & Project Slide
Project Intros	T: 30/Mar	Mini Project Presentations	Project Presentations
8a lect	R: 01/Apr	Fitting Models	None
8b lab	T: 06/Apr	Fitting Models Lab	Homework 8 & Project 8
9a lect	R: 08/Apr	Confidence in Models	Lab 8
9b lab	T: 13/Apr	Confidence in Models Lab	Homework 9 & Project 9
10a lect	R: 15/Apr	Hypothesis Testing	Lab 9
10b lab	T: 20/Apr	Hypothesis Testing Lab	Homework 10 & Project 10
11a lect	R: 22/Apr	Fixing Model Assumptions	Lab 10
Wrap-up	T: 27/Apr	Wrap-up	Final Questions
SP	R: 29/Apr	Presentations	Final Presentations
SP	T: 04/Apr	Presentations	Final Presentations
SP	R: 06/May	Presentations	Final Presentations

Prerequisites:

ENVST-UA100 Environmental Systems Science or Permission of Instructor

Assessment:

- 5.00 – 4.80 (A): Outstanding work (4 is perfect and beyond expectations)
- 4.79 – 4.50 (A-): Great work (nearly perfect, one or two very minor errors)
- 4.49 – 4.20 (B+): Good work (clearly understand concepts, several minor errors)
- 4.19 – 3.90 (B): Solid work (general understanding, but some concepts need work)
- 3.89 – 3.60 (B-): Good effort (understanding lacking, but signs of thorough engagement)
- 3.59 – 3.30 (C+): Satisfactory effort (understanding lacking, but complete)
- 3.29 – 3.00 (C): Decent effort (understanding lacking and partially complete)
- 2.99 and lower: More info is needed to evaluate quality. (incomplete)

Basic Expectations:

Attendance and politeness—including punctuality, attention, and engagement—are vital!

Absences & Late Assignments: If something comes up and you are unable to attend class and/or need to turn in assignments late—that is, you hand in an assignment after the class in which it was due—first, let me know as soon as possible! I strongly encourage you to do whatever you can to make sure that you keep on-top of your work and are present during class. If there are extenuating circumstances, please bring in documentation otherwise your grade will be docked 0.3 points for late work. At my discretion, in exceptional cases, you may be allowed to complete a bonus assignment to make-up lost points.

Academic Integrity, Plagiarism, and Cheating: Academic integrity means that the work you submit is original. Obviously, bringing answers into an examination or copying all or part of a paper straight from a book, the Internet, or a fellow student is a violation of this principle. But there are other forms of cheating or plagiarizing which are just as serious — for example, presenting an oral report drawn without attribution from other sources (oral or written); writing a sentence or paragraph which, despite being in different words, expresses someone else's idea(s) without a reference to the source of the idea(s); or submitting essentially the same paper in two different courses (unless both instructors have given their permission in advance). Receiving or giving help on a take-home paper, examination, or quiz is also cheating, unless expressly permitted by the instructor (as in collaborative projects).

Disability disclosure statement: Academic accommodations are available for students with disabilities. The Moses Center website is www.nyu.edu/csd. Please contact the Moses Center for Student Accessibility (212-998-4980 or mosescsd@nyu.edu) for further information. Students who are requesting academic accommodations are advised to reach out to the Moses Center as early as possible in the semester for assistance.

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