ENVIRONMENTAL QUANTATIVE METHODS
ENVST-UA 310

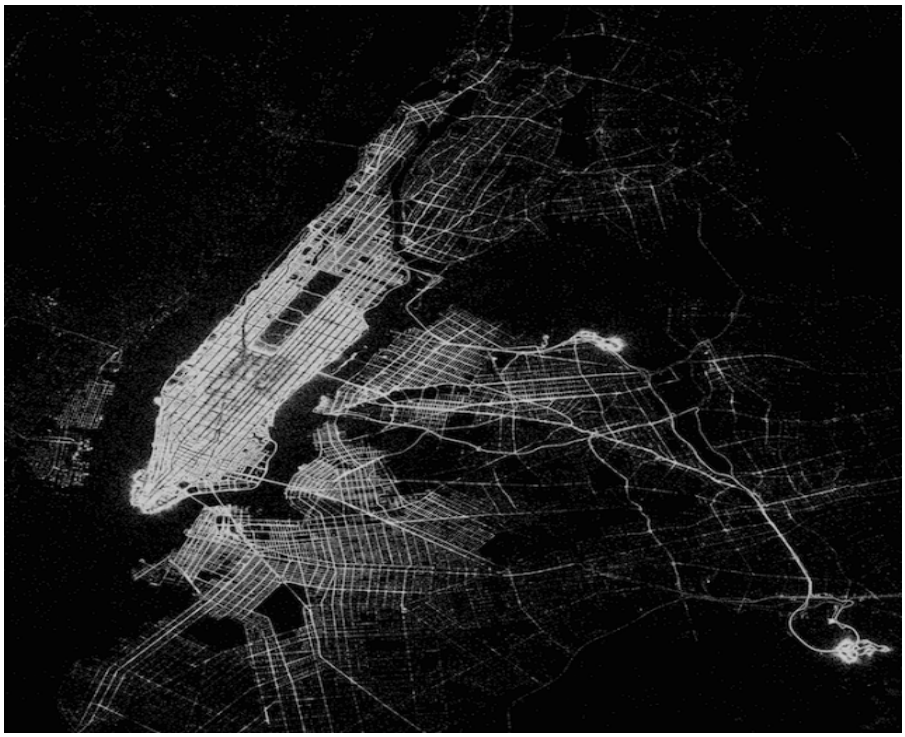

Image credit: Daniel Forsyth

Instructor: Professor Matthew Hayek
Office Hours: Tues & Wed 1-3 PM
By Appt on Google Calendar (link)
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New York University,
Spring 2022
Tues/Thurs 9:30 – 10:45
4 Credits

Course Objectives:

Welcome to quantitative data analysis. Using **R**, the freely available and robust 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.

- Free electronic version available: https://dtkaplan.github.io/SM2-bookdown/
- Critical content in the first chapter is missing. Check Brightspace for Ch. 1 pdf.

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)

Laptop 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 consists of a *lecture* centered around a new concept, followed by a *laboratory* where we apply that concept in R with active group learning exercises. A **lab assignment** that consists of a write-up of your in-class lab exercises, along with additional concept questions, will be due before the next Lecture.

Throughout the semester, students will search for an interesting environmental dataset to explore, visualize, and analyze using techniques we learn in class. Students will apply the concept they are learning each week to some additional assignment questions related to their "own" data, building towards a **final independent research project**. In last few days of class, students will **present** their projects' findings.

Grade breakdown:

Lab Assignments	60%
Final Presentation	10%
Final Paper	25%
Academic Professionalism	5%

Session	*Day*	*Topic*	*Assignment Due*
1a lect	T: 23/Jan	Introduction to R	Install R & RStudio
1b lab	R: 25/Jan	Intro to R Lab	Read Kaplan Ch. 1
2a lect	T: 01/Feb	Types of Data	Lab 1
2b lab	R: 03/Feb	Data Lab	
3a lect	T: 08/Feb	Visualization	Lab 2
3b lab	R: 10/Feb	Visualization Lab	
4a lect	T: 15/Feb	Transformations	Lab 3
4b lab	R: 17/Feb	Transformations Lab	
5a lect	T: 22/Feb	Exploratory Data Analysis	Lab 4
5b lab	R: 24/Feb	EDA Lab	
6a lect	T: 01/Mar	Describing Variation	Lab 5
6b lab	R: 03/Mar	Describing Variation Lab	
7a lect	T: 08/Mar	Choosing & fitting Models	
7b lab	R: 10/Mar	Fitting Models Lab	Lab 6
	T: 15/Mar	Spring Break	
	R: 17/Mar	Spring Break	
	T: 29/Mar	Concepts refresher #1 +Lab	
	R: 31/Mar	Mini Project Presentations	Mini Presentation Slides
8a lect	T: 05/Apr	Confidence in Models	Lab 7
8b lab	R: 07/Apr	Confidence in Models Lab	
9a lect	T: 12/Apr	Hypothesis testing	Lab 8
9b lab	R: 14/Apr	Hypothesis testing Lab	-
10a lect	T: 19/Apr	Model assumptions & Multivariable analysis	Lab 9
10b lab	R: 21/Apr	Multivariable analysis Lab	-
	T: 26/Apr	Concepts refresher #2 +Lab	Lab 10
	R: 28/Apr	Presentations	Final Presentations
	T: 03/May	Presentations	Final Presentations
	R: 05/May	Presentations	Final Presentations
	R: 12/May	Final papers due	Final project

	Assignments and Projects Rubric				
	Unacceptable	**Unsatisfactory**	**Satisfactory**	**Good**	**Great**
	60% and below	**61 to 70%**	**71-80%**	**81-90%**	**91 -100%***
Code & Output	Code has major omissions and mistakes; use of inappropriate methods with incorrect results	Incomplete code and some major mistakes; use of at least partially appropriate methods but with incorrect results	Complete code with some major mistakes; use of appropriate methods but some incorrect results	Complete code but with a few smaller mistakes; use of appropriate methods but a few incorrect results	Complete and correct code; appropriate methods used with correct results
Annotations, Comments, & Exposition	No understanding of concepts; incomplete, disorganized & difficult to follow	No clear understanding of all concepts; incomplete with some omissions and mistakes	Comprehension of some but not all concepts; all questions answered but some include major mistakes	Comprehension of most concepts but some need work; all questions answered but with a few minor mistakes	Concepts are clearly understood; all questions are answered completely and correct
Visualizations	Incorrect and messy formatting of visualizations making it impossible to comprehend the results	Messy formatting of visualizations making it difficult to comprehend the results	Some messy formatting making visualization unclear but results are still comprehendible	Almost publishable visualizations but with a few minor formatting issues.	Publishable visualizations with clear formatting and easy readability

*100% is perfect and beyond expectations

Basic Expectations:

Absences & Late Assignments: Attendance and politeness—including punctuality, attention, and engagement—are vital! Because of COVID, you do not need to ask my permission to attend remotely. We will have a Zoom link on Brightspace every week. But you *must* be in class *or* on Zoom. However, if a problem arises that impacts your attendance (remote or in person) or if you need to turn an assignment in late—first, let me know as soon as possible! If there are extenuating circumstances, please bring in documentation otherwise your grade will be docked 10% for late work. I strongly encourage you stay proactive, checking in with myself and your lab mates frequently.

Academic Integrity, Plagiarism, and Cheating: Academic integrity means that the work you submit is original. Obviously, 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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