
Syllabus: Machine Learning and Algorithms for CSS

ECON-GA 4005 | Spring 2023

Revised: January 26, 2023

When applied correctly, "machine learning" tools allow individuals to approximate complicated outcomes in the real world. However, when applied carelessly, these tools generate misleading findings. This course covers supervised learning (both regression and classification), reinforcement learning, and model selection via validation procedures. This course prepares students to apply classical and cutting-edge machine learning techniques to problems in the social sciences.

The course presents a principled approach that adheres to best practices and encourages understanding and transparency.

This class will use Python, a popular high-level computer language, that is being used widely across many fields. "High-level" means it's less painful than most (the hard work is done by the language), but it's a serious language with extensive capabilities.

About the instructors

This course is co-taught by three instructors: Chase Coleman (cgc332@nyu.edu), Spencer Lyon (sgl290@nyu.edu), and Thomas Sargent (ts43@nyu.edu).

Office hours: By appointment

Where and When

Meeting times: Thursday 6:00 pm - 8:50 pm (Eastern Standard Time)

Meeting place: [Gather](#) (password: nyu_compsosci – best to copy/paste)

Requirements

The main prerequisites for this course are a solid mastery of the concepts covered in the Mathematical Foundations for Computational Social Science (ECON-GA-4002) and the Data Skills for Computational (ECON-GA-4003) Social Science courses. See the corresponding course syllabi for a list of topics covered in these courses. If you have not taken the courses, we will expect that you either have commensurate experience or are willing to work hard to gain it early in the semester.

A willingness to consult Wikipedia for math and statistics concepts will also be helpful for students.

Getting help

This course is meant to be collaborative and to have a strong support system to help you when you run into problems. Please use the discussion board or other forms of communication to communicate with your classmates and ask questions/help each other.

The bottom line: **If you're stuck, ask for help.**

Really. Don't be a hero, ask for help.

Course materials and assignments

All course materials will be posted on [Github](#).

Assignments, including your exam, will be assigned through Brightspace

Deliverables and grades

Graded work includes:

- **Code Practice (30%)** There will be several homework assignments throughout the semester. We find that people who finish these assignments tend to keep up with the material better and these are easy points to get in terms of grades.
- **Exam (20%)** There will be one exam. The exam will be take home and you may use your notes and the internet. The only exception is that we'd ask that you don't ask the exam questions in online forums and that you don't speak with your classmates about the exam.
- **Project (40%)** The most important deliverable, both in terms of your grade and what you will learn, is a project that applies the tools from class to some question in the social sciences.
- **Participation and Quizzes (10%)** We expect students to participate in class. If you have questions, don't be shy about asking them. The discussion forums are a great place to participate in class as well. We will also have quizzes from time to time. These will not be announced beforehand and will only cover material from previous class sessions. This is a mechanism designed to help you stay up to speed with the topics and content.

Due dates will be posted on the Brightspace.

Dates are not negotiable. Anything handed in late will get a grade of zero.

All your work should be clean and professional. We expect your math to be written in LaTeX for this course and expect your code to conform to good code habits.

Final grades will be computed from

Participation / Quizzes	10%
Code practice	30%
Exam #1	20%
Project	40%

Final grades are not subject to any fixed distribution or curve. The number of A grades, for example, will depend only on your performance in the course.

Recommended work habits

Python is not something you can learn from reading a book and attending lectures. You need to **write programs**... The more the better. Think about how you'd learn to play basketball or soccer; reading and listening to lectures aren't enough, you need to do it. We'll do a lot of programming in class, but it's essential that you follow up outside of class.

Pacing

The course is designed to be cover material at whatever pace the class is capable of. The topics should take roughly one week each, but we can scale that up or down as needed. If you're an expert, don't worry, we'll cover a lot of material either way.

Other questions

We encourage students who have questions to typically post their questions on the Brightspace site so that answers can be referenced by other students. If no answer is provided in a reasonable amount of time (i.e. wait at least 24 hours), you may email us to remind us of the question. If you have a question about a matter that should be kept private, please don't hesitate to reach out directly by email.

Policies

- **General Behavior.** The School expects that students will conduct themselves with respect and professionalism toward faculty, students, and others present in class and will follow the rules laid down by the instructor for classroom behavior. Students who fail to do so may be asked to leave the classroom.
- **Collaboration on Graded Assignments.** You may discuss assignments with anyone (in fact, we encourage it), but anything you submit, including your code, should be your own.

Exams should be entirely your own work. Violation of this policy will result in a failing grade for the course.

- **Academic Integrity.**

- Integrity is critical to the learning process and to all that we do here at NYU. As members of our community, all students agree to abide by the NYU Student Code of Conduct, which includes a commitment to:
- Exercise integrity in all aspects of one's academic work including, but not limited to, the preparation and completion of exams, papers and all other course requirements by not engaging in any method or means that provides an unfair advantage.
- Clearly acknowledge the work and efforts of others when submitting written work as one's own. Ideas, data, direct quotations (which should be designated with quotation marks), paraphrasing, creative expression, or any other incorporation of the work of others should be fully referenced.
- Refrain from behaving in ways that knowingly support, assist, or in any way attempt to enable another person to engage in any violation of the Code of Conduct. Our support also includes reporting any observed violations of this Code of Conduct or other School and University policies that are deemed to adversely affect the NYU community.

The entire Student [Code of Conduct](#) applies to all students enrolled in NYU courses. **Any violation of the a policies pertaining to Academic Integrity will result in a failing grade for the course.**

Students with disabilities

If you have a qualified disability that requires academic accommodation during this course, please contact the Moses Center for Students with Disabilities (CSD, 212-998-4980) and ask them to send me a letter verifying your registration and outlining the accommodation they recommend. If you need to take an exam at the CSD, you must submit a completed Exam Accommodations Form to them at least one week prior to the scheduled exam time to be guaranteed accommodation.