

Syllabus for Computing for Economics 21:220:350 & 550

Prof. Jason Barr

Office Hours: Via zoom appointment (email me to set up a time).

Email: jmbarr@rutgers.edu

Meeting Time: Monday and Wednesday, 4:00pm – 5:20pm

Location: Online via Blackboard Collaborate Ultra

Please note: This course is not open to computer science or math majors or minors. It is a course on economic and statistical methods using programming. It is designed for economics and related majors in business and social sciences. Math or computer science students cannot use this course for their major or minor. If you are a data science minor you should be able to use it for that particular minor.

Course Overview: This course will give you the basic foundations of computer programming for economic applications. **The course assumes no programming skills whatsoever** and will start from the very beginning.

This semester we will be learning programming using the Python programming language (<https://www.python.org/>), which is a commonly used high-level, general-use language. It allows for a wide range of applications, including economic, financial, and statistical modeling. Python is open-source and free. Documentation on how to use Python is widespread. Python is used commonly in academic, scientific and business environments. The point of the class is to learn to use Python for economic applications.

Note: If you have some familiarity with Python, you are welcome to take the course, but since I will start at the most basic level, there may be some material with which you are already familiar, and you need to consider if this course is the best use of your (and my) time.

For this course, we will be using the free Python software suite known as Anaconda and which includes Spyder, a user-friendly text editor in which to write your programs. To get the software go to <https://www.anaconda.com/products/individual>, and scroll down to the bottom and choose Windows or Mac (assuming your computer is not too old, choose the 64-bit version).

Course Pre-reqs.: Ideally all students should have at least Intro. to Microeconomics, Intro. to Macroeconomics, and Intro. to Statistics. Having Intro. to Statistics is a must, since a large part of the course will be about using Python to analyze data. I will review the relevant economic concepts as we need them.

Course Readings: The readings will be comprised of book chapters, articles or online pdf documents about computer programming and economics that I will post on Blackboard. The readings will assist you in learning more about the programming concepts and languages. I will also be posting readings on economic topics as we get to them later on in the semester.

Learning Goals: By the end of this course, you will have a strong foundation in the basics of programming using the Python programming language. You will learn standard programming methods such as using loops, conditional statements, and working with lists. You will learn how to install and run the various packages and libraries that are an integral part of Python. You will also learn how to do programming for basic economic analysis, including supply and demand and modeling of economic behavior. Lastly, you will learn how to perform basic statistical analysis and data graphing in Python. The goal is to give you a set of tools so that you may use Python and computer programming in new settings, such as for research or in the workplace, as it relates to economic and data analysis.

Requirements and Grading:

Regular homework programming assignments	30%
Online quizzes	30%
<u>Final Project</u>	<u>40%</u>
Total:	100%

Quizzes: Throughout the semester, I will post several short multiple-choice quizzes to test your understanding of the material. You will give ample time to complete each one.

Assignments: There will be several programming assignments to learn the code and methods discussed in class. You will upload your code and I will run it. You will be graded on two dimensions: (1) Does it run properly and give the correct output, and (2) is the code well-formatted, readable, and neat? If I run your code, and it fails to complete or it gives bad output, you will get a zero for the assignment. You can resubmit it multiple times until it runs, but each time it will cost you 1 point (and I will not tell you what was wrong—that is your job, but I am happy to zoom with you to help, if you need it).

Grading works along the following rubric: If the program is successful the first time, you get 10 points for part (1), otherwise you can keep submitting until it runs (with -1 more point each time); otherwise your get a zero for the assignment. If (1) is successful, I then I grade part two on a 10-point scale. I will then take the average of (1) and (2) for your assignment grade.

Project: The final project is for you to demonstrate your ability write a program in Python with an economic application. The project will include: a brief write-up of the problem you aim to model or study; the motivation and related literature; sources and other necessary information., and all of the output created by your program. Finally, you will also have to submit your code. I will discuss the project guidelines during the second or third week of the semester.

Python: I will be teaching from the Anaconda version of Python, which is the programming language and a suite of related applications. Here is the download website:
<https://www.anaconda.com/products/individual>. During the lectures I will refer to you various useful websites or readings.

Topics. Note that the course will be divided into three sections: (1) Intro. to Programming, (2) Economic Applications, and (3) Working with data. The following is a general roadmap, which is subject to change.

Part I: Introduction to Python and Programming

- Topic 1: What is Programming for Economics?
- Topic 2: Introduction to Python and Spyder, and how to get started
- Topic 3: Working with variables and lists
- Topic 4: Conditionals and loops
- Topic 5: Introduction to functions
- Topic 6: Introduction to Numpy, Scipy, and Matplotlib
- Topic 7: Creating Modules

Part II: Programming Economics Models

- Topic 8: Programming Supply and Demand
- Topic 9: Programming Game Theory Models

Part III: Working with Data

- Topic 10: Introduction to Pandas
- Topic 11: Processing Data and Creating New Variables
- Topic 12: Statistical Analyses
- Topic 13: Intro to Web Scraping
- Topic 14: Graphing Data