

MF 703: Programming for Mathematical Finance

Instructor Aaron Stevens Email: azs@bu.edu Office: QST 546F Office Hours: Mon 1-2pm; Thu 1pm-2pm; and by appointment: http://aaronstevens.youcanbook.me .	Class Meetings Section D2: TR, 9:30am-11:00am, KCB 107 Section D1: TR, 11:00am-12:30pm, KCB 107 Teaching Fellows Li Chen, lchensmg@bu.edu Office Hours: Wed from 12:30 to 1:30 in QST 519 Dapeng Shang, dpshang@bu.edu Office Hours: Mon & Fri 10:00-11:30 am, location TBD
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Course Description

MF 703 develops computational problem-solving skills for mathematical finance in the Python programming language. The course will cover the fundamentals of programming, including working with data (numbers, strings and lists), arithmetic, functions, recursion, iteration, data files, graphing, and object-orientation. In addition, we will explore using the popular Numpy and Pandas toolkits for working with numeric datasets.

Finance-specific applications will include: the time value of money and bond pricing/analytics, descriptive statistics for quantifying risk/return in stock investments, matrix operations and linear algebra, binomial and Black-Scholes options pricing algorithms, Monte-Carlo simulation for pricing exotic options, minimum variance portfolios and the efficient frontier, developing an event study, and back-testing possible trading strategies.

Teaching/Learning Method

Learning to program is a skill that takes practice, similar to learning a sport or a musical instrument. You cannot learn to play basketball by simply watching the Celtics; rather, you need to go to the gym and practice your shots. This course is designed around a set of weekly assignments, which you must complete in order to master the material. It is not possible to learn how to program by simply “watching.” To become a programmer, you must actively program!

In general, this class will be **teaching by examples**. Students **must come to class with a laptop computer and the required software installed** and be prepared to follow along with and discuss the examples in class. All example code will be posted online after class, but students will obtain the greatest benefit from writing the example in class.

Assignments will often be very time consuming, so you must plan ahead and start early. Each week’s assignment is due on the Sunday following the week of class and is a necessary building block for the following week’s material.

Textbooks

We will use the following online textbooks:

How to Think Like a Computer Scientist with Python 3

by Peter Wentworth, Jeffrey Elkner, Allen B. Downey, and Chris Meyers

<http://openbookproject.net/thinkcs/python/english3e/>

Specific readings will be assigned each week per the schedule page. Read the assigned sections BEFORE coming to class, and bring question to discuss in class.

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Software Tools

The course will cover programming in. An Integrated Development Environment (IDE) allows us to write, edit, and test our code. We will use the Spyder IDE for Python 3.x. Download/install from the Anaconda scientific computing package: <https://www.anaconda.com/>.

Online Course Materials

All materials will be posted or linked to Questrom Tools, <http://questromtools.bu.edu>.

We will have an online course discussion Q&A on Piazza: <http://piazza.com/bu/fall2018/mf703>.

Grading/Requirements

- Weekly assignments (40% of the final grade)
- Exams: one midterm exam (25%) and a final exam (25%)
- Attendance and participation (10%)

To pass the course, you must earn a passing grade for each of the three components.

Collaboration Policy and Individual Work

Collaboration is recommended in understanding programming concepts and system features. You are encouraged to discuss the examples, the homework problem statements, algorithms and expected output, and to seek and receive help with the Python programming language, syntax, and any IDE or other debugging tools.

However, *each student must write his or her own code and other deliverables independently.*

What is plagiarism?

With respect to MF703, **plagiarism** is specifically defined to include (but is not limited to) the following:

- copying any part of someone else's program, even if you have permission and/or have modified the code
- sharing or giving your code or even a subset of your code to another student to review
- reviewing another student's solution (including from past semesters)
- excessive collaboration (i.e., writing your solution together)

It is course policy to use **automatic plagiarism detection software**, and suspicious similarities will be uncovered. It is the student's responsibility to know and understand the provisions of the Questrom School of Business's Academic Conduct Code, copies of which are available here: <http://questromworld.bu.edu/acc/>.

Cases of plagiarism will be dealt with seriously. The minimum penalty for a first time offense will be of a grade of 0 on the assignment or test in question, as well as a reduction in the overall course grade (e.g., from A- to B-).

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Administrative Policies

The official administrative business of this class will be conducted by email. Grade questions or requests for review, notification of absence, etc. will be processed via email so that we both have a written record of what was agreed.

Attendance and discussion/asking questions are expected and will be reflected in your grade. If you must be absent, please email me in advance to let me know why you won't be in class, and to let me know what you will do to keep up with the assignments. *MF703 is not a correspondence course. Inadequate attendance is sufficient grounds for a grade of F.*

There will be no make-up quizzes or exams. If you have to miss a quiz for a medical reason or other extreme circumstances, you must inform me in advance. You will have the opportunity to write the quiz as an ungraded take-home assignment and then count your final exam score in its place.

No special make-up work will be accepted after the end of the semester. Don't even ask. In the event of a documented major medical problem, a grade of Incomplete will be given pending the submission of complete work. However, make up work "to improve one's grade" will not be accepted.

Requests for review or re-grading of quizzes or assignments should be brought to your TF or instructor by email (preferred) or in office hours, no later than *2 weeks after the quiz/homework* has been returned, and *absolutely no later than the last class day of the semester.*