FIN 418: Quantitative Finance with Python

Course Syllabus – Fall B 2022

Instructor:

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Associate Professor of Finance

Course Logistics:

- Live Lectures: Monday and Wednesdays 8:30 - 10:00 (MSF 11B), 10:20- 11:50 (MSF 12B)
- Asynchronous Lectures (7 hours in total, each week has about 1 hour)
- Labs: Wednesdays 13:30-15:40

Live Lectures, Asynchronous Lectures and Labs are mandatory

Office hours: See Blackboard

Classroom and zoom link: See Blackboard

Communication: EXCLUSIVELY on our discussion board (Edstem) (see blackboard for login instructions)

Teaching Assistants: See Blackboard

Important dates, Assignments, and Exams: See Blackboard.

Course Information

1. Course Description and Learning Objectives

This is a data driven course where we will apply the key finance concepts studied in Fin 402 and Fin 411 to real financial market data. While analyzing data, we will learn Python, one of the most popular programming languages. Among many things, we will use Python to: characterize movements in security prices, evaluate investments in mutual funds, test asset pricing models, construct and evaluate portfolios, understand high-frequency data, and relate asset price movements with firm fundamentals. The core goal is to teach you to be a skilled empirical analyst with ability to analyze large data sets.

You do not need to know Python to take this class, but knowledge of programming in some language will make your life a lot easier. It will be very hard for you to succeed in this class without learning Python as most problem sets will be submitted in Jupyter Notebook format.

Previous exposure to Finance is a must. You should have taken or be simultaneously enrolled in Fin 411. If you haven't studied finance before or is studying currently, you will find this class very challenging. The focus of this class is on the "investment" side of finance rather than the corporate side.

2. Communication and Office Hours

Neither me or the TAs will answer questions by email.

We're using Edstem for class discussion. Rather than emailing your questions, post on Edstem publicly. Personal/delicate questions can be posted privately to me or the TA's in the Edstem platform.

Please answer your classmate's questions; it's a huge help to us, and even if you're wrong everyone learns (we check the answers and clear up confusion).

Also, we encourage you to take credit for your questions and answers (rather than posting anonymously)! You will earn participation points for questions that you ask and, specially, questions from your colleagues that you answer.

First thing that you have to do is go to course blackboard site https://learn.rochester.edu/.   and sign up for Edstem from there. You be asked to set a password of your choosing and after that you will be able to go to Edstem directly though the class page. You must use your Simon email for sign up. If you don't have one, please reach out to me ASAP.

3. Required Material

You should bring a computer to every class with

- Software installed as described in class website

These books are very useful but are not mandatory

- "Asset Management: A systematic approach to factor investing", Andrew Ang
- "Investments", Bodie-Kane-Marcus
- "Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython", Wes McKinney (Pandas book)

  Problem sets will be due every week and are to be done individually (first 4) of in groups of 5 people (last 4). The problem sets will consist mostly of data analysis and replication of studies with some extensions of the data analysis in those studies and some conceptual questions concerning the interpretation of the analysis. The goal is to generate a set of quantitative tools and programs throughout the course that are applied in practice. The problem sets cumulatively develop these tools by adding on to previous analysis so that extensive models are developed by the end of the course and similar routines are applied to multiple contexts. Problem set to be submitted in blackboard.

1. Evaluation and grading

The course grade is based on the following (MIDTERM??)

8 Problem sets (4 individual and 4 in group)	30
Async Lecture Quizzes	10
In class weekly Quizzes	10
Final Exam (individual)	40
Professionalism* and Participation	10
Total	100

Letter Grade:
I typically spread the grades between B- and A to get to something slightly below the 3.5 average.

NOTE: Everyone is curved so don't freak out if you don't think you are doing great. This is a hard class and I define success as learning 60% of the content we present in class. Learning means being confuse first. DO NOT FREAK OUT. PUT THE TIME AND YOU WILL BE FINE.

What do I expect from you in terms of participation?

- Engagement asking and answering questions on Edstem
- Engagement in class
- You can do both, but you don't need to. It is fine to be more engaged in one of them.

What should you expect in terms of feedback?
- The best way to get feedback is by asking specific questions on Edstem
- The Problem sets will be graded by the TA's. The grading will be very coarse and the feed back there will also be limited. However we will make the solutions available and the TA will make a video discussing the solution.
- For the final project I will focus on positive feedback. That is, for the top groups of the class I will discuss what I thought it as great about what they did.

2. Class Specifics

Re-grade Requests for Exam: Verbal appeals of grades will not be accepted. A request for a re-grade must be made in writing and should be submitted directly to me. It should clearly and succinctly state the unambiguous error in grading, which you believe has occurred. Request for a re-grade must be made within a week of the work being returned. The entire exam should be resubmitted and will be reviewed; there is no guarantee that grades will rise as, statistically, positive and negative errors in grading are equally likely.

Makeup Policy for Exams: Exams are administered during the pre-determined exam date known to students at registration. Students should not make travel plans during these periods. Students must provide a written notice of a health emergency or illness in order to request a makeup exam. There will be no accommodations with respect to other matters.

3. Accommodations

If you would like to request an academic accommodation based on having a qualifying disability, please contact both your instructor and Anna Rogers, the access coordinator for Simon, during the first two weeks of the course. Brad Rosenbaum can be reached in the Office of Student Engagement at Brad.rosenbaum@simon.rochester.edu or

4. Academic Integrity

Simon's Code of Academic Integrity (see Section 2 of the Student Handbook) states: "*Every Simon student is expected to be completely honest in all academic matters. Simon students will not in any way misrepresent their academic work or attempt to advance their academic position through fraudulent or unauthorized means. No Simon student will be involved knowingly with another student's violation of this standard of honest behavior.*"

In addition to refraining from obvious forms of cheating and plagiarism:
- On assignments, do not copy or paraphrase work from each other, from students who have taken the class previously, from materials of mine distributed in a previous class, or from outside sources. Any written work should be entirely your own (or your team's, as applicable).
- Do not obtain advice, notes, solutions, or other material from students who took the class previously in ways that would give you an unfair advantage or would undermine the learning experience for you and the class (such as, notes from past case discussions). Similarly, do not use others' case analyses posted on-line.
- Use quotation marks when quoting any text directly. Changing a few words of a sentence or longer section does not make the work your own. Independently written texts rarely have even five consecutive words in common.

Most forms of disallowed shortcuts are easy to detect and will be referred to the school's Academic Integrity Committee. If something is going on in your professional or personal life that prevents you from finishing assigned work in a timely manner, get in touch with me before the deadline (and get in touch with Student Services as appropriate). Finally, to help prevent other students from violating academic integrity, do not pass on notes or give advice on assignments to any students who are taking the course in a later quarter or are taking it at the same time in a different section. Please refer to the Student Handbook for any questions regarding the Code of Academic Integrity

5. My expectation of students

Treat class sessions like business meetings. Unprofessional behavior has a negative impact on your participation grade. Specifically,
- Please zoom in if you are feeling under the weather:

<p style="text-align:center">"Sore throat? Go remote!
Dry cough? Take the day off!
Went to a rave? Stay in your cave!"</p>

- Make every effort to attend each class
- It would be great if you could display your name in a class card so I can get to know you better.
- You are expected to be in your "seat" and ready for class at the beginning of each class. Should extenuating circumstances require you to leave early, please let the professor know before the start of class and sit in back so you can leave with as little disruption as possible. This hold even for zoom!
- You are allowed to use laptops and tablets during lecture, but they should only be used for coursework related activities and not for email, social media, or other activities not directly related to the course. Cell phones must be turned off or silenced during class. No photography of any kind is allowed.
- Students should budget a minimum of 9 to 12 hours per week to spend on this course between reading and class participation.
- All students are expected to do well in the course and the instructor will strive to help them achieve. The instructor also expects the students to be autonomous and "active" learners.
- Students should also help each other as best they can in a collegial manner. The instructor expects everyone to be kind and courteous to each other and to ask questions, not only to the instructor, but also to fellow classmates. This class will lend itself to student collaboration and "co-construction" of knowledge. The instructor expects that students will take advantage of that. In addition, the instructor expects the work students submit in this course to be their own. This is consistent with the University of Rochester policy on Academic Honesty.
- For online discussions, you will need to post comments that are scholarly and substantive. Substantive comments, for our purposes, are those that add insight, probe more deeply, challenge (intellectually), and generally help us learn. It is also helpful to post comments that are "social" in nature. So, while, "I agree" is not a substantive comment, it is a useful response in that it helps us know that we are being "heard". But you will need to post substantive comments to "get credit" for discussions. I also encourage you to edit before you post. This course is a graduate course, it is expected that you will carefully read and edit your work prior to sending it. It can be helpful to compose using a word processor to prevent cosmetic errors;this way you can concentrate on demonstrating your highest quality writing.

4. Zoom Behavior (You almost never is allowed to zoom! Only for exemptions)

    a. Keep the camera on at all times
    b. Keep mic off unless talking
    c. To ask a question: use the raise your hand function. Wait for me to tell you to go ahead and ask your question. We will experiment with this.
    d. Do not use the chat to communicate with me during live classes.
    e. Dress professionally
    f. Be ready to be called to answer questions (if you have particular circumstances in that day that makes unmuting and talking complicated simply send me a private chat telling me that this was a not good time, but this should be rare. I expect most of you most of the time be ready to engage)

5. What can you expect from me and the TAs

- TAs will try to grade the problem sets within a week
- I will never answer an email from you, but you should expect prompt answers in Edstem. I will try to check at least three times per day.
- The best opportunity to have a chat with me is during the office hours. If you want to schedule some private one-on-one time during the office hours, we can do that.
- I welcome "confused" questions, i.e., when you are not even sure what you don't get it. But try to formulate a question. It will help us both
- If you have software questions, "Like my python doesn't work", please reach out to the TA's first

6. Relation with other Courses at Simon Business School

- Finance 462 (or 462) and 411 are a prerequisite. (should be taking 411 at the same time)
- Finance 433 (cases in finance).

7. Groups

- For group work students will work with their core team assignments as discussed during orientation.
- If you do NOT have an assigned group on blackboard please let me know in Edstem

TO DO BEFORE THE FIRST CLASS

See class blackboard website for to do list before class (including reading material, help with software installation, and videos)

Readings, Problem sets, and Final Project

See the class website for a schedule of assignments and reading material.

Assignments will be done individually unless otherwise stated.

Final project (and group assignments) to be done with group assigned at orientation.

 See blackboard/Edstem for instructions.

Class Material

All Class material is available through blackboard

It includes 4 types of material

- Jupyter notebooks (https://amoreira2.github.io/quantitativeinvesting/chapters/intro.html)
- Assignments
- Data (in Github : https://github.com/amoreira2/Lectures/tree/main/assets/data)
- Reading/Video/listening content shared in Edstem

I will post material in these folders as needed

Note: The files in Notebooks and Homeworks folders are Jupyter notebook files (*.ipynb). You must make sure this extension is preserved when you save. Easy way to make this happen is by (i) (left) clicking on the file you want, (left) clicking in download, and then (left) clicking direct download.

Course Outline

Week 1: Python Essentials

Week 2: Python Scientific Computing and Working with Data

Week 3: Asset Returns

Week 4: Portfolio Math and Capital Allocation

Week 5: Mean Variance Efficiency and Estimation Uncertainty

Week 6: Constructing a trading strategy

Week 7: Strategy Evaluation