Syllabus (FIN 532) Investment Management

SUNY POLYTECHNIC INSTITUTE

SCHOOL OF BUSINESS ADMINISTRATION

Instructor: Matthew Brigida, Ph.D.

Office: Donovan 1277

Email: matthew.brigida@sunypoly.edu

Class Location: Online (Blackboard)

Text: *Investments* by Bodie, Kane, and Marcus, 8th edition (or later), ISBN: 0077261453

Supplementary/Optional Materials:

- Financial Education
- 39 Arbitrages

Course Structure and Interaction

- Text Readings and Exercises

- Via BlackBoard Collaborate. Since we may not be able to meet at the same time, you'll want to check the `Recordings` section of Collaborate.

Description

An introductory survey of the fundamental principles of investment management. The learning outcomes for this course are summarized below:

1. Understanding the structure of various capital markets, as well as how and why organizations (ranging from individuals to multinational firms) participate in these markets. Particular importance will be assigned to innovations in market structures (dark pools, ECNs) and their implications for market participants. The student will be able to set up buy and sell orders for various securities, as well as understand the use of leverage inherent in margin accounts and some derivative securities.

2. To extend previous study on equity and fixed income security valuation. Further, we will introduce and value hybrid securities which have characteristics of both debt and equity (particularly convertible bonds). Valuing the warrant in a convertible bond will also serve as a prelude to derivative securities.

3. Quantify the interest rate risk in fixed income securities using duration and convexity. Moreover, the student will be able to discuss the allocation of interest rate risk between lender and borrower in fixed rate as compared to adjustable rate securities.

4. Assess reinvestment risk in fixed income securities and the benefits inherent in the option to prepay.

5. This course will also introduce exchangelisted derivative securities (futures and options), along with basic hedging and speculation strategies using these securities. Students will also learn about the markets wherein derivatives are traded, and how laws governing these markets may differ from the laws governing the stock markets. A basic introduction to valuing futures on storable commodities, currencies, and interest rates will be afforded. We will then briefly discuss futures on nonstorable commodities (particularly electricity). Lastly, using Excel students will apply the BlackScholes (1973) option pricing model to valuing options on nondividend paying stock. The assumptions of BlackScholes (1973) will be discusses along with a nonrigorous introduction to risk neutral pricing (intended to motivate further study).

6. Students will be able to measure the risk and return of individual securities as well as of a portfolio of multiple risky securities. The effect of forming a portfolio on risk and expected return will be quantified, as well as the resulting implications for forming an efficient portfolio. We will derive the Capital Asset

Pricing Model (CAPM) and thereby calculate the expected return for individual securities. A short discussion of the assumptions of the CAPM and the alternative 'Arbitrage Pricing Theory' (APT) will conclude.

Academic Honesty Policy

Academic dishonesty will not be tolerated in this class. Cheating on quizzes, examinations, and other forms of dishonesty (e.g., plagiarism, collusion, and falsification of data) will be dealt with in a serious and formal manner. The penalty for academic dishonesty in this class will be course failure. That is, any student who is found to be cheating or engaged in other academically dishonest behavior will be failed for this course for this semester. Course withdrawals to avoid such a failure will not be permitted. As a student, you have a responsibility to become familiar with the Academic Honesty Policy found in the Student Rights, Regulations, and Procedures Handbook.

Online Office Hours

I will be logged on the course throughout the week to answer questions and review the discussions. If a few students have questions on the material, and there is a good time to meet, I'll log into BB Collaborate and record the answers.

Students do not need to access the course simultaneously, and therefore have a measure of flexibility regarding when they access the course. However, students should access the course regularly to keep up with assignments, and to maintain a presence in the Discussion Room. Students should also often check their SUNY Poly email account.

Lectures

In addition to the lectures I posted to YouTube, I will also record lectures via BB Collaborate. I'll try and let you know when I am recording each lecture, so you can log in an interact. However all that is required is that you watch the lecture at some point—meaning you are free to just watch the recording.

Exams

There will be two exams (a midterm and a final). The exams will mainly be comprised of short-answer questions, and/or computations. All questions will be worth equal points. Exam questions may be derived from the assigned end-of-chapter questions, so you can prepare for the exam by completing all of the end-of-chapter questions. Specifically, the discussion (*Concept Questions*) are similar to the short answer questions, and the *Optimal Homework* is similar to the computations.

Normally no make-up exams will be given. Failure to hand in an exam will result in a grade of zero. Make-up exams will only be allowed for *extraordinary* and *verifiable* reasons.

Mid-term Exam

I will post the exam as a pdf file to Blackboard by the Wednesday before the exam due date. You will have until the exam due date/time to submit the mid-term exam. You will submit your exam using the Dropbox in Blackboard.

Final Exam

The final exam is concentrated on the topics learned after the mid-term exam, so the exam is not comprehensive *per se*. However, the concepts learned after the mid-term rely heavily those tested in the mid-term, so a poor understanding of the material on the mid-term will lead to a poor performance on the final exam.

Exactly like the mid-term, I will post the exam as a pdf file to Blackboard by the Wednesday before the exam due date. You should upload your completed exam to the Blackboard Dropbox by the due date/time.

Exam Rules

You are not to discuss the exam with other students. Both receiving help from another student, or helping another student on an exam, are considered serious academic irregularities the result of which can range from receiving an F in the course to dismissal from the university.

You must complete and submit your computation questions in a spreadsheet. If you submit your computation answers in Word, I will reduce your score. You should also not treat your spreadsheet as a Word or text file. That is answers should be written as formulas, and not as text strings.

If your spreadsheet is disorganized you will lose points. The computations and answers should be easily found and understood by anyone opening your spreadsheet. See the 'Note on Spreadsheet Design' at the end of this syllabus.

Brokerage Accounts

We will use paper trading accounts provided by Interactive Brokers. These trading accounts are the exact same as the actual brokerage accounts—except the money isn't real. You will have access to (and real data from) stock, bond, commodity, and foreign exchange markets. While the data alone is worth a fair amount of money, Interactive Brokers is offering the accounts to us for free. Keep this in mind while following the directions to set up your account customer service will be nonexistent. **If you lose your password, or forget your username, etc, you will not have an account for the semester.** In this case you will have to trade in another student's account, or mine. Please pay attention while setting up your account, and write everything down.

Projects

Throughout the semester we'll work on a series of projects that will help us understand both financial theories, and also, *importantly*, practical considerations we are faced with when applying these theories in the real-world. Some notes on the projects:

- I'd like to give you the chance to choose a few projects from a larger set. This will give you and opportunity to choose projects which are most relevant to your work or interests. So there will be **required** and **potential** projects.

- **Everyone must complete all required projects.**

- **Everyone must complete one potential project OR the set of Trading Assignments.**

- Each project will require computations either in a spreadsheet, or programming language. Use whichever you wish, though if you write it in a programming language (such as R or Python) you'll have to share the code so I can reproduce your results.

If you have questions on a project you are encouraged to post your spreadsheet/code to the relevant discussion board so I and other students can help. You learn a great deal by helping others, and by seeing how others approach the problem. Also don't worry too much about others copying you. It is fairly easy to tell when one spreadsheet has been copied from another. Moreover, since you posted yours, it would be clear that you were the one copied off of.

Required Projects

- Market Depth
- Mean-Variance Optimal Portfolios
- Black-Scholes Option Valuation

Potential Projects

- Futures from Options
- Immunization

- Securitization
- Regulatory Capital and Bank Lending
- Trading Assignments
    - Trading Assignment 1
    - Trading Assignment 2
    - Trading Assignment 3 Ignore that it says assignment 4 on the web page.

Participation

For each two-week period I will post a set of *End-of-Chapter Questions* from the text. You must choose 1 of the questions from the set and post your answer to the discussion board. Try and choose a question that has not yet been answered, but if all the questions have been answered then try and add unique information in your answer.

The subject line of your discussion post should be the in the format [chapter].[question number]. For example, if you are answering question 5 from chapter 3, your subject line should be '3.5'. Also, be sure to have one post for each answer. Don't answer multiple questions in one post.

If the questions requires computation, then use Excel (or other spreadsheet) and post your spreadsheet as your answer.

A particular period's discussion will conclude Sunday at 9pm.

Trading/Other Assignments

I'll assign several homeworks throughout the semester that involve either trading in your brokerage accounts, or downloading data in R and performing some calculation/analyses. If I give pop quizzes, these grades will be included here.

Course Communication

All communication will be through Blackboard and email. If you have question you are strongly encouraged to post it to a discussion forum instead of emailing me. This way, other students can get the benefit of the question and answer. It also saves me from answering the same question many times via email, and frees me up to answer more questions and generally provide more effective instruction for you.

Grading

Item	Points
Midterm Exam	15
Final Exam	15
Participation (Blackboard Discussion)	25
Required Projects	25
Trading (or Potential Project)/Other Assignments	20
Total Points	100

Final grades will be assigned according to the following scale:

- 90 - 100 A
- 80 - 89.9 B
- 70 - 79.9 C
- 60 - 69.9 D
- < 60 F

    +/- grades may be assigned at the instructors discretion.

Tentative Outline

- Week 1: Chapter 1
- Week 2: Chapter 2 & 3
- Week 3: Chapter 3 & 4 (Note: chapter 3 is more important than 4.) **Start Market Depth Project**
- Week 4: Chapter 5 Some useful *optional* videos for chapters 5, 6, and 7 are here, here, here, and here.
- Week 5: Chapter 6
- March 5: **Recommended Due Date for the Market Depth Project**
- Week 6: Chapter 7
- **Start MV Optimal Portfolio Project** You can follow the example in the text. Also optionally See This Video and These Spreadsheet Instructions
- Week 7: Securitization
- *Midterm is through Securitization. Final exam will cover from here onward.*
- Week 8: Interlude: The term structure of interest rates and measuring bond price sensitivity to interest rates. **No calculations required**
- Week 9: Chapter 20
- Week 10: Chapter 21
    - April 9: **Recommended Due Date for the MV Optimal Portfolio Project**
    - **Start Option Pricing (Black-Scholes) Project**
- Week 11: Chapter 22
- Week 12: Chapter 23
- Week 13: Projects/Trade
- Week 14: Projects/Trade
- April 29 **All assignments/exams/projects due..**

    Based on student input, we may add topics in portfolio theory such as those found in chapters 5 through 10, and chapter 24.

General Notes

- All times referred to in this course are Eastern Standard—unless otherwise indicated.
- There will be no make up exams or extra points assignments.
- Cheating will result in prosecution to the fullest extent possible under university rules.
- You are responsible for material covered in the online discussion, as well as text material.
- **Internet Access:** This course requires that you have regular access to the internet to submit work. You should not take this course if you plan on being in an area with insufficient internet access. "My internet was down for a week" is not an acceptable reason to hand in late work.
- **Adding or Dropping the Course:** To add or drop the course the student should consult the university guidelines and withdrawal dates. The course instructor is not involved in a student's adding or withdrawing from the course.
- **Software:** You will need word processing and spreadsheet software to take this course. Common examples of such software are Microsoft Word and Excel. However, there is no need to buy this software if you don't already have it. There are many free (open-source) alternatives which are just as good (and which allow you to save/read files as .doc(x), .pdf, and .xls(x)). Some widely used free office suites are LibreOffice (http://www.libreoffice.org) and OpenOffice (http://www.openoffice.org). Feel free to download and use these. *In this course all word processed submissions should be in .pdf, and all spreadsheets should be submitted as .xlsx.*

BRTI Tick Data

Below are millisecond data for the Bitcoin Real-Time Index on Jan 3, 2018. The data are pulled via the IB API. With data of this type, you can dicover interesting features of market data—for example, notice the "last trade" is often outside of the bid/offer. This is particularly important to understand when trading illiquid contracts, such as some options. You can left-click your mouse, and drag, to zoom in on subintervals.

Some Notes on Spreadsheet Design

You should construct your spreadsheet as if you were an analyst at a company, and you were going to submit the spreadsheet to upper management. Therefore, getting the correct answer can be considered the minimal amount of work. The spreadsheet should be easily readable and organized. There are a couple of reasons why this is important: (1) management often will check some numbers (or maybe change a few inputs if they have more up to date information) and it will reflect very poorly on you if they have to search around through a muddled and ill-conceived spreadsheet; and (2) anyone should be able to pick up your spreadsheet and complete it if you are not there (vacation, sick, or hopefully promoted). Following are a couple tips on spreadsheet design, though it is far from exhaustive.

- Hard-code as little as possible. You want a few cells for your inputs, or a place where you put your data, and then every other cell is linked and feeds off of these input cells. This way, to update your spreadsheet you simply change the inputs or drop in new data.
- Take the time to label cells, and put in appropriate comments if necessary - though comments should not be used excessively. Also, it is common to change the cell color depending on whether it is hard-coded (an input) or a formula. This way you (or anyone else) can immediately look at a cell and tell whether it is one in which you can type (an input). Don't forget to include a key.
- It is often better to add tabs to a spreadsheet than continue calculations on one tab. You can easily page through spreadsheet tabs with `Ctrl+Shift` and `Page-up` or `Page-down`.
- Pivot tables. While we probably won't need them in this course, you should nonetheless get to know them. Pivot tables are incredibly useful for summarizing data, and it is very possible you will be asked in an interview whether you are familiar with them. Similarly, get to know VLOOKUP.
- If you are inputting a long formula, then break the calculation into multiple cells. This makes it much easier to tell where a mistake was made - and everyone always spends a fair amount of time looking for errors.
- Excel has many built in formulas which can be useful, however it is important that you understand what the formula is doing to use them. Blindly applying a formula can lead to trouble. For example, if you use the IRR() function on cash flows with multiple roots, the formula will return the first root it finds without signaling to you that there are other roots. Also, there are Excel formulas that are flat out incorrect - in particular the NPV() function. So, use a function if it saves time, but first be sure you know what the function is doing and verify it works. That said, in my experience it is better (and faster) to input your own formula instead of using Excel's. You often have to break the calculation into a couple of steps, but this can be done quickly, and the result is a spreadsheet that you know works and is easily auditable.

Mean Variance Optimal Portfolios

In this project you'll create optimal portfolios as in the Appendix A to chapter 7 (pages 231 to 236) of your text.

Here is a short lecture on the topic (it requires knowledge from some of the earlier "Portfolio Theory" videos): https://www.youtube.com/watch?v=HQrba-gn1Gs&t=533s&index=10&list=PLRK1VeglPb4MeP83AIO ZFj2quPZ1t4dN6

Here is a video on constructing your spreadsheet: https://www.youtube.com/watch?v=jjjQV___bSHk&list= PLRK1VeglPb4MeP83AIOZFj2quPZ1t4dN6&index=12

This contains code to automatically pull stock returns (but it is a work in progress): https://matt-brigida.github.io/fin_532_markowitz/

Also, using the link above requires that you run the code from within R. If you don't not want to install R, I have a web app here (https://mattbrigida.shinyapps.io/chapter3/) which will pull the data for you. Though the app is broken at this point because Yahoo Finance changed their API, so if you want to use it I'll go ahead and fix the app. Do not use the default stocks in the app.

And of course, always feel free to post questions to the projects discussion board.

Black Scholes Valuation

In this project you'll value a stock option by the Black-Scholes model (which is for a European Option). The Black-Scholes model is on page 729 of your text.

Let me know if the link works for you. If it does not, I have also uploaded the video as an attachment (the the 'Black_Scholes_Project' file). Your browser may recognize it and start streaming the file—this works on my system with chromium. However it also may try and download the entire 200+ MB file. So if the link doesn't work, and your browser is attempting to download the whole file, let me know and I'll do a separate recording for this course.

You can follow the directions in this video, with the exception that you will not work in groups—you'll do the assignment individually. Also, be sure to pick a different stock than me. You can choose any stock you wish.

Accommodations for Students with Disabilities:

In compliance with the Americans with Disabilities Act of 1990 and Section 504 of the Rehabilitation Act, SUNY Polytechnic Institute is committed to ensuring comprehensive educational access and accommodations for all registered students seeking access to meet course requirements and fully participate in programs and activities. Students with documented disabilities or medical conditions are encouraged to request these services by registering with the Office of Disability Services. Please request accommodations early in the semester, or as soon as you become registered with Disability Services, so that we have adequate time to arrange your approved academic accommodation/s. Once Disability Services creates your accommodation plan, it is your responsibility to provide me a copy of the accommodation plan.

If you experience any access concerns that may require the need for adaptive or alternate format/presentation of materials, reach out to me or Disability Services right away.

For information related to these services or to schedule an appointment, please contact the Office of Disability Services using the information provided below. The Office of Disability Services can accommodate virtual meeting requests. The website has helpful information, and the link can be found here: https://sunypoly.edu/student-life/diversity-equity-inclusion/disabilities-services/contact-us.html