

Syllabus (FIN 332) Fundamentals of Investments

SUNY POLYTECHNIC INSTITUTE

SCHOOL OF BUSINESS ADMINISTRATION

Instructor: Matt Brigida, Ph.D.

Office: Donovan 1277

Online Office Hours: On request.

Email: matthew.brigida@sunypoly.edu

Class Location: Online.

Class Day/Time: Asynchronous

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

Strictly speaking, the *Investments* text is optional. That said, I highly recommend you pick up some edition of the text. You can often find a used copy online for less than \$10, and in this case it is well worth the money.

Supplementary/Optional Materials:

- YouTube Lectures
- Financial Education
- 39 Arbitrages

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 exchange-listed 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 Black-Scholes (1973) option pricing model to valuing options on nondividend-paying stock. The assumptions of Black-Scholes (1973) will be discussed 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.

Course Objectives and Learning Outcomes:

Upon successful completion of the course each student will be able to:

1. Understand and express factual knowledge, principles and theories in the area of investments,
2. Exhibit creative problem-solving skills and refined reasoning capabilities in the area of investment selection and management,
3. Recognize the need for a broad-based, general education as a useful tool to understand the financial markets,
4. Understand the growing importance of globalization on both the investment process and on security markets,
5. Show an awareness of the various issues and developments that constantly reshape financial markets and investment choices.

Learning Goals and Objectives

Goal or Objective	Assessed by
Goal 1.0: Demonstrate Business Disciplinary Competence	The exams and homeworks will evaluate both equity and fixed income security valuation.
Goal 3.0 (Objectives 3.1 and 3.2): Communicate Effectively Orally and in Written Form	The presentation of a student created Excel spreadsheet to calculate stock option prices using the Black-Scholes(1973) model
Goal 4.0 Objectives 4.1 and 4.3): Demonstrate Analytical Thinking Skills	Students will learn to value securities by the principle of noarbitrage. Further, students will discern which derivative securities may be valued by noarbitrage and which may not
Goal 5.0: Understand Global Issues in the Functional Areas of Business	New exchanges spanning of multiple continents (e.g. NYSE Euronext) will be discussed with particular attention being paid to their effect on the investment landscape.
Goal 6.0 (Objectives 6.1 and 6.3): Demonstrate Effective Use of Technology and Data Analysis Objectives 1.1 (knowledge of a key business discipline), 4.1 (interpretation of evidence), 4.3 (formulation of conclusions), and 6.3 (understanding data analysis)	In both homeworks and these project, students will value complex securities using Excel. Students will measure both individual asset and portfolio risk and return. Through analyzing the effect of portfolio construction on risk and return, students will derive the CAPM. After a discussion of the assumptions of the CAPM, students will weigh the model against the APT.

Exams

There will be three exams (two during the semester and a final exam). Normally no make-up exams will be given. Failure to take an exam will result in a grade of zero for the missed exam. Make-up exams will only be allowed for *extraordinary* and *verifiable* reasons.

Trading/Other Assignments

Trading assignments are here: <https://github.com/Matt-Brigida/fin-332-trading-assignments> Students will complete each of these during the semester. **If you do not make the trades you will receive a 0 for**

the assignment even if you attempt to answer some of the questions.

Market Trading Hours: The stock and option markets are open from 9:30 am to 4pm each non-holiday weekday. Therefore, you must make your trades within these times.

I may assign other 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.

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.

See [here](#) example of the data we can pull using our IB accounts. You may want to think if interesting projects/analyses you can do with access to such data.

Also check out the IB Quant Blog. It is a very good resource.

Required Black-Scholes Project

First, choose a stock whose ticker starts with the same letter that your last name starts with. For example, since my last name is Brigida I may choose Boeing (ticker BA). Once you have chosen your stock create a spreadsheet which will:

1. Value an option on the stock using the Black-Scholes (1973) option pricing model.
2. Calculate the stock's historical annualized volatility, and get an estimate of the implied volatility. To do so the you must show it is able to download a recent time series of the underlying stock price, convert these prices into a time series of returns, calculate the standard deviation of the returns, and then annualize the standard deviation (this is the stock annualized volatility which is a parameter in the option pricing model).
3. Calculate the value of the option by Monte Carlo.
4. Calculate the Greeks.

You should be ready to explain any part of the spreadsheet.

Optional Web App Project

Optional Projects are only for students doing well in the course. They should not be used to attempt to increase your grade.

Students will create a Shiny interactive web application. To do so you'll first need to sign up for a free shinyapps account.

You are free to create the account under a pseudonym, so no one can publicly identify you as the owner of the account. However, the web application is a useful tool to show off your work, and is something that can go on your resume (with a link to the application). So you may prefer to use your real name. My user name is `mattbrigida`.

Your application should have something to do with financial markets, and should be at least somewhat original. See this gallery of applications. Possible applications may be:

- Plot a time series of stock prices, returns, or volatility.

- **Financial Advisers:** Create an app which will return target asset allocation given a person's age and investing goals/risk tolerance.
- Create and plot a stock index.
- A Black-Scholes calculator.
- A margin calculator.
- Create a histogram or probability density plot for bond or stock returns.

To get started you will want to use the RStudio development environment for R. This is available in the Still hall computer lab, or you can install it for free on your own computer from here. If you install it on your own computer you'll need to install R first. You can get R here

Optional Pairs Trade

Implement the pairs trade methodology outlined in Gatev et. al (2006).

@Article{Gatev_2006, author = {Gatev, Evan and Goetzmann, William N. and Rouwenhorst, K. Geert}, title = {Pairs Trading: Performance of a Relative-Value Arbitrage Rule}, year = 2006, volume = 19, number = 3, pages = {797-827}, issn = {1465-7368}, doi = {10.1093/rfs/hhj020}, url = {http://dx.doi.org/10.1093/rfs/hhj020}, journal = {Review of Financial Studies}, publisher = {Oxford University Press (OUP)} }

Optional Optimal Portfolio

Construct a Markowitz Mean-Variance Optimal portfolio.

Course Communication

All important/official announcements will either be posted on D2L or emailed to each student's SUNY Poly email account. All student questions (other than those that contain personal information) should be asked in class or posted to a discussion board. Do not email me questions such as "When is the exam?". These types of questions should be asked in class.

Missed Classes

If you are not in class you are responsible for figuring out what you missed. I will not email you a summary of what we covered in the class.

Re-Grading Assignments

I normally do not regrade assignments, however if I do so your grade may increase **or decrease** when regraded.

Grading

Item	Points
Exam 1	20
Exam 2	20
Final Exam	20
Trading Assignments/Other	20
Black Scholes (or Web App)	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.

An Important Note on Grading

There is no special consideration if you need a certain grade in this course to graduate. **If you require a certain grade in this class to graduate it is your responsibility to earn that grade.** Specifically if you receive a D in this course I will not allow you to do extra assignments after the course is complete in exchange for a higher grade.

An Important Note on Late Work

In this course you have plenty of time to take exams and submit assignments. Therefore, late work is not accepted and will receive a 0 grade. Say, for example, you email me on the due date of an assignment or exam and say “I can’t complete the assignment because the power went off at my house/dorm”. You will receive a 0. The takeaway from this is don’t wait until the last day to submit work.

Again, I’ll note the stock market closes at 4pm. So let’s say you wait until 5 pm on the due date of the trading assignments to start working—you will receive a 0 grade because you can’t complete the trades.

General Notes (most relate only to in class sections)

1. The instructor is not involved in any way with your adding and dropping the course. It is the student’s responsibility to abide by all proper procedures and dates.
2. Attending class, and reading the text is required.
3. All exams will be closed book.
4. If you are late for an exam, no extra time will be allotted to you.
5. There will be no make up exams or extra points assignments.
6. You will be responsible for any material covered in class that is not in your text.
7. You should bring your text to class.
8. You are expected to be on time for class. This is especially important for exam dates.
9. Disruptive behavior in the classroom will not be tolerated.
10. You may not use tobacco products in class.

Tentative Outline

All due dates are in the outline below. There are no due dates listed in D2L.

- Week 1: Chapter 1
- Week 2: Chapter 2 & 3
- Week 3: Chapter 3 & 4
- Week 4: Review and Market Microstructure (*The Only Game in Town* and Payment for Order Flow)
- Week 5: **Exam 1 Due, September 27 | Trading Assignments 1, 2 and 3 are also due September 27**
- Week 6: Chapter 20: Options and Option Markets, 20.1–20.3
- Week 7: Chapter 20: Options and Option Markets, 20.4–20.7
- Week 8: Chapter 21: Options and Option Markets, 21.1–21.3
- Week 9: Chapter 21: Options and Option Markets, 21.4–21.6
- Week 10: **Exam 2 Due, November 8 | Trading Assignments 4 and 5 are also due November 8**
- Week 11: Chapter 22: Futures, 22.1–22.2
- Week 12: Chapter 22: Futures, 22.3–22.4

- Week 13: Chapter 22: Futures, 22.5 and possibly a topic from Chapter 23
- Week 14: Trading, exam review, **Black-Scholes project Due December 3.** | **Trading Assignments 6 and 7 are also due December 3**
- **Final Exam Due: Date TBA**

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 discover 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.

Course Syllabus Disclosure Statement Spring 2022

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>

Answers to Online Questions

On momentum trading strategies such as the post-earnings announcement drift anomaly.

The CAPM does not assume all investors have the same degree of risk aversion