FNCE 449 L01/668.02 S01
Trading and Market Data Management

Course Outline Part A – Fall 2024

Instructor	Marius Zoican
Telephone	TBC
Office	MTH 139 (Trading Lab)
Email	TBC
Office hours	By appointment only
Website	http://d2l.ucalgary.ca
Lecture location	MTH139
Lecture times	Mo-Tu-We-Th-Fr 8am-5pm, with an hour set aside for lunch

Course Description

The Haskayne School has a Finance and Trading Lab with 40 student seats and one instructor seat. The purpose of the lab is to immerse students in practical experience with market data terminals such as Bloomberg (12 terminals available), FactSet, and S&P (Standard & Poor's) Capital IQ. Students can use the Lab's resources to complete work for other finance classes as well.

These data terminals are staples among finance professionals, and the purpose of this course is to give students an opportunity to find and use market data while mastering the finance principles that relate to the same data. This approach is designed to fast-track students' careers by minimizing the need for extensive on-the-job training.

Additionally, the Lab holds a license for the Rotman Interactive Trader (RIT) software, enabling simulations across various markets—commodities, equities, and physical goods. This platform challenges students to react to market changes and engage in competitive trading, using both market and limit orders.

Finally, the Lab benefits from a data sponsorship from Databento, a low-latency data vendor which provides professional-grade trade and quote data with nanosecond

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granularity, directly from co-location sites for Nasdaq and CME. Databento was built to serve companies at the forefront of finance, such as Virtu Financial, Flow Traders, or Two Sigma.

The curriculum will primarily focus on leveraging Bloomberg, FactSet, S&P Capital IQ, Databento, and the RIT software. While Bloomberg and FactSet offer comprehensive market, news, and derivatives data, Capital IQ excels in delivering superior accounting insights, catering to equity management and investment banking at a lower cost, whereas Databento provides high-granularity order book data. However, Bloomberg and FactSet are versatile tools utilized across these sectors. The RIT software, on the other hand, offers an unparalleled simulation of real-time trading environments.

Pedagogically, the course adopts two contemporary learning methodologies: experiential learning and the flipped classroom model.

Experiential learning, fitting for the lab environment, encourages students to learn through practical engagement with the terminals, fostering independence in seeking out documentation and resources.

The flipped classroom model shifts the focus from traditional lectures to active, hands-on learning, where students apply theoretical finance concepts through practical data analysis and modelling directly from the terminals to spreadsheets. This blend of approaches ensures a dynamic, immersive learning experience, equipping students with the skills and knowledge for a competitive edge in the finance industry.

Course Objectives

The course will show students how to find and extract financial data from, Bloomberg, FactSet, Capital IQ, and Databento data feeds, and how to use the data in the context of the finance material taught at the Haskayne School. It also gives students experience in a real time trading environment, managing a simulated trading book as information arrives. The course emulates many aspects of a trading floor, as used for investment management risk management and speculative activities.

By the end of this course, successful students will be able to:

1. Export information from market data terminals to a spreadsheet for subsequent financial analysis and computation. Each of Bloomberg, FactSet and Capital IQ products has its own syntax for acquiring information, and tools for creating appropriate syntax. The Daily Assignments and Term Project will be used to assess student performance in this area.
2. Identify breaking news specific to a market sector or region through Bloomberg, FactSet and Capital IQ terminal usage and present an action-oriented news summary for the whole class. The actions should identify hedging or speculative strategies that may arise from, or need to be modified, because of the news.
3. Use Application Programming Interface (API) to fetch and manipulate high-frequency trade and quote feeds from Databento.
4. Demonstrate navigation aptitude for Bloomberg terminal information with Bloomberg Certification Test
5. Demonstrate navigation aptitude for FactSet terminal information with FactSet Certification Test

6. Generate strategies to trade for low risk or high profit. Students work in a simulated but real-time trading environment to perform specific tasks such as arbitrage, market-making, speculation, and hedging.
7. Illustrate a holistic picture of the kind of information that can be acquired from Bloomberg, FactSet or Capital IQ and conduct an inquiry with these tools that assesses a trading strategy, corporate governance or other topics that arise in finance. This will be assessed by their work on a term project of their design.

Textbook and/or Other Materials

The course will use handouts from the instructor, and documentation for the Bloomberg, FactSet, Databento, and Capital IQ data feeds as well as the Rotman Interactive Trader software. These will be made available on D2L, and/or through the help systems for the data products. Sample spreadsheets and documentation will be made available on the Finance and Trading Lab network drives.

Grade Scale

The Haskayne School of Business endeavours to ensure consistency of final grades across courses and sections. Variations in distribution will always be considered by the instructor when called for by the performance in each individual class. The student does not have any 'right' to a certain grade but is responsible for earning grades. The instructor has unfettered discretion to evaluate student performance and assign all grades.

Grade		Percentage	Grade Point Value	BComm Description	MBA Description	
A+	≥	95.0	4.0	Outstanding	Outstanding/Exceptional Performance	
A	≥	90.0	4.0	Excellent		
A-	≥	85.0	3.7	Approaching excellent	Consistent, very high quality work	
B+	≥	80.0	3.3	Exceeding good performance	Good performance	
B	≥	75.0	3.0	Good performance	Basic competence	
B-	≥	70.0	2.7	Approaching good performance	Marginal performance, defined as having gaps in basic competence	
C+	≥	65.0	2.3	Exceeding satisfactory performance		
C	≥	60.0	2.0	Satisfactory performance	All grades below B- are indicative of failure at the graduate level and cannot be counted toward the course requirements.	
C-	≥	55.0	1.7	Approaching satisfactory performance		
D+	≥	52.0	1.3	Marginal pass. Insufficient preparation for subsequent courses in the same subject		

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			Minimal pass. Insufficient preparation for subsequent courses in the same subject		
D	≥	45	1.0		
F	≥	0%	0	Failure. Did not meet course requirements.	

Grade Distribution

Due Date	Assessment	Weighting	Course Outcomes Assessed
2 Business Days after being assigned	Assignments (5 in total, best 4 are scored)	40%	1, 3, 6, 7
Daily	Daily News Summary for all 5 class days	10%	2, 4, 5, 6
October 7, 2024, 11:59 pm	Bloomberg Market Concepts Certification	10%	4
October 7, 2024, 11:59 pm	FactSet Certification Test	5%	5
During daily class RIT simulations	Rotman Interactive Trader Simulation Performance	15%	6
November 4, 2024, 11:59 pm	Term Project	20%	1, 3, 4, 5, 7
	Total	**100%**	

A higher grade has been assigned to the Bloomberg Market Concepts component than to the FactSet component. This decision should not be interpreted as a reflection of Bloomberg's greater importance. Instead, it is due to the more substantial time commitment required to complete the Bloomberg component. The intention is to reduce the likelihood of busy students opting to skip this critical part of the course.

Students will develop data management and analytic techniques that are used in the finance industry to capture, analyse, and act upon historic and real-time market data. The components of the Grade Distribution above are all designed to help the students meet the course objectives and measure their performance in meeting those objectives. Below, we provide greater detail on the grading components and how they relate to course outcomes.

The final grade in the course and the final pass/fail status is determined

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ıny component of the distribution be completed or passed to achieve a passing grade in the course.

Missed Assessment Policy	Undergraduate students must follow the guidelines outlined in Part B of the outline to request a deferral for missed work during the term, including quizzes, assignments, and exams. MBA students must coordinate with the instructor to seek a deferral for missed work during the term, including assignments, and exams. Typically, deferrals are only granted in cases of illness, domestic affliction, or religious conviction, and are entirely at the discretion of the instructor. If a deferral is granted, an instructor may require a make-up assessment to be completed or transfer the weight of the missed assessment to another assessment in the course.
Late Policy	The tight deadlines on the assignments are intended to constrain the scope of the projects and assignments. If there is no sense of urgency in completing these materials, they tend to be handed in at the end of the term and it is hard for a student to remember what they were doing with the project or assignment. Accordingly, grades will be reduced for each assignment, project, and certificate (Bloomberg or FactSet) test score that is late at the rate of 5% of the maximum grade for each business day late, after the deadline. In addition, no submissions later than 2 weeks after the deadline will be graded, so they will receive a grade of zero.
Class Participation	The Daily News Summary is a graded component of class participation. Generally, students are encouraged to ask questions and propose answers to issues and questions as the class progresses.
Assignments	Assignments are worth 10% each. They must be submitted, through D2L Dropbox, in the form of a well-documented spreadsheet or Jupyter Notebook that can collect the appropriate data from the Lab data feeds and perform the analysis. Students will learn how to find the codes and use the syntax developed by Bloomberg, FactSet and Capital IQ for downloading data to a spreadsheet. Further, they will learn how to use the Databento Python API to fetch and process trade and quote data. They will also learn how to analyse the data to perform the financial calculations required for the assignment. Grades will be assigned according to whether the correct data has been acquired and manipulated to deliver the information requested in the assignment. Deductions will be made for "Bad Spreadsheets/Notebooks" that are hard to understand, and the course documents include a description of bad spreadsheet/notebook techniques and ways to avoid the creation of bad spreadsheets or notebook. The data collection should be performed on worksheets or Jupyter Notebooks with live links to Bloomberg, FactSet or Capital IQ feeds, as well as individual Databento API keys

whenever needed. However, all the data collected should also be "frozen" (copied as values with the same format) and the analysis should be performed on this frozen data, so that it can be understood even without an available data feed.

Assignments are **due 2 business days** after being assigned.

Daily News Summary

Each student will be assigned a business sector or situation to follow during Block Week. At the start of class, each student will have approximately 3 minutes to summarize the breaking news and make oral recommendations on how to use the news in a trading strategy.

For this assignment, students will learn how to use the news feeds in Bloomberg, FactSet and Capital IQ. The news feeds have a variety of filters that can be applied so that a student can focus on one business sector. Most of the other graded elements of the course use the spreadsheet links that Bloomberg, FactSet and Capital IQ provide for data, so students don't get much of a chance to use the terminal interface. This element of the course will give the students expertise in using the terminal interfaces.

Students will receive a grade that reflects their ability to keep abreast of important topics and ignore stale or unimportant topics. If the business sector only has stale news on a certain day, the student can either pass the baton or bring up an older news story for that sector. Each summary should end with a recommended action, such as "Sell Enron" or "Buy manure futures" or "Be alert for an interest rate increase from today's Fed meeting". In addition, the instructor often will ask a question about a news report and the student will be expected to research that question to be answered the next day. Students are graded each day on their news summary.

Bloomberg and FactSet Certification

Bloomberg and FactSet certifications are based on online multiple-choice tests managed by Bloomberg and FactSet for their product. Links to the tests and the test material are in the D2L material for the course.

By preparing for the certification tests, students will become more familiar with the powerful data information interfaces provided by these products, so that they can use them for their assignments and in other courses, as well as their future career.

The certification results provide a numeric score that will be entered directly into the gradebook for this part of the course.

Bloomberg will provide information about their actual scores for their certification directly to the instructor, so students are not required to submit their Bloomberg scores if they sign up for the Bloomberg test using the link provided in D2L.

Students must submit the record of the FactSet certification. This requires making a screen shot of the message provided by FactSet

Trading Simulation

The Rotman Interactive Trader (RIT) software allows for the simulation of several trading environments ("cases"), with varying degrees of complexity involving the ability of traders to interactive with each other in their trades as well as with a passive "liquidity trader". Students will learn how to use bids, asks, market orders and limit orders. They will be given tools to manage their book of trades that simulate tools used

in industry. They will develop trading strategies that respond to exogenous information provided by the terminal, as well as the endogenous game information of their fellow students' trading activities. We will have trading exercises each day, with increasing complexity. Marks are assigned each day for the student's performance.

There will be practice runs of each trading case that aren't scored. For scored runs, the Profit & Loss (P&L) of each student trader is saved. Scores will be normalized by the cross-sectional (class) standard deviation and mean of class scores for each run. Some of the trading cases require a hedging strategy, so marks will be deducted (adjusted) for risky and unreliable P&L scores. These adjusted normalized scores will be averaged for each case. The four case averages will be added to give an overall trading score for the day. The mark for each student's trading performance will be based on the rank order of the overall trading score within the class for that day. An effort will be made to give the same letter grade to students with a similar average score.

Term Project
The term project is **due within two months** of the end of Block Week. This will be an investigation chosen by the student, following on material in their FNCE courses or the material covered in this course, using the Lab data feeds. The students should submit a well-written but brief report of approximately 10-20 pages through D2L Dropbox, and provide associated spreadsheets showing their analysis, with the same structure as their Assignments above.

The content of this course cuts across that of several other Finance courses, and I'd like the project to cut across several courses. But your report should not be one that could be a report for another Haskayne class. In other words, I would like this report to be distinct from any term paper that you could submit for any other class, unless you have discussed this relationship with me by explaining how this term paper goes beyond what would normally be submitted for the other class.

The objective of this term project is for the students to think how they can use these data feeds or trading techniques to create value for an organization that might hire them.

Screen Shots for written materials.
The four Assignments and the Term Project will often require screen shots of a Bloomberg, FactSet or Capital IQ terminal screen. Students should try to make these readable. In particular:
- Whenever possible, the screen shot should have a white background, rather than the terminal default of a black background. In particular, red text and lines set against a black background are very hard to read.
- The default for pasting screen shots into MS Word often involves a size reduction of the graphic. The graphics should be enlarged to have the same size as the original terminal view.

Collaborative versus Independent Work
One thing that helps students learn in this course is a collaborative spirit where students talk with each other and learn from each other. I believe this is an effective learning strategy and I encourage it.

But the Instructor needs to base grades on the extent to which each student demonstrates that they can do the work themselves. Thus, students can work together

to solve problems associated with the assignments, but the material that is handed in must be prepared from a blank spreadsheet or a blank word processing document for each student.

If the spreadsheet structure appears to be the same across students, grades of the similar students will be reduced accordingly. For example, if students use the same named variables in a spreadsheet, or the same formulas that result in errors, this is a strong indication that they did not complete the final spreadsheet on their own. Note that naming your variables is one of the first things you should do when building a spreadsheet, so similarity of named variables is very suggestive of work that was not completed independently.

Class Preparation & Desire2Learn (D2L)	Lectures focus on the material presented in the readings and general discussion relating to the topic(s) outlined in the lecture schedule. Students are expected to read the assigned readings before class and be prepared for class discussion. Important information and additional readings for FNCE 449 are posted on Desire2Learn (D2L). Students should regularly check the Announcements section of D2L for ongoing notices.
Email Communication	Email is commonly used by students to communicate with their instructor. It is the generally preferred method of communication outside of Block Week. However, it does limit the effectiveness of the communications and may not be the best way for instructors to answer student questions, especially those requiring an explanation of concepts covered in this course or some personal concerns. Therefore, the instructor may request a telephone call or personal meeting. Your instructor will inform you as to his expectations about emails. In particular, the subject line of all emails should include the phrase "FNCE 449" to help the instructor find it when stormed by spam.
Internet & Electronic Communication Devices	Any surfing of the Internet during lectures that is not directly related to the class discussion is distracting and strictly forbidden. Additionally, the use of any electronic devices (e.g., cellular phones/smartphones) for e-mailing, text-messaging, etc. is strictly prohibited. Please turn OFF your phone before the beginning of each lecture.
Academic Integrity and Rigor	Academic integrity and rigor are critical components of a University degree. Academic integrity is the foundation of the development and acquisition of knowledge and is based on values of honesty, trust, responsibility, and respect. The Haskayne School of Business values ethical leadership and personal integrity, and expects its faculty, staff, and students to live these values. In the online environment, certain additional measures will be put in place to help safeguard the integrity of online assessments and the intellectual property of the instructors.
Course Outline Part B	The Course Outline Part B (here for undergrad and here for grad students) contains more generalized information for Haskayne and the University. You are responsible for reading and understanding all content in both parts of the outline.

Class Schedule & Topics

Please note that lecture topics and readings are tentative and subject to change. The dates of assessments will not be changed.

Important dates (e.g. Block Week, Lecture start dates, Reading Week, etc.) can be found at the following web site: http://ucalgary.ca/pubs/calendar/current/academic-schedule.html

Date	Details	Class Preparation (readings, reviews, etc.)
Monday, August 26, 2024	<mark>**11:59 am – last date to drop Block Week course**</mark>	
	News Summaries by students	Use your data terminal to find breaking news on your assigned topic.
	Factor Models for Securities Returns • Fetching historical stock return data. • The single-index (market) model. • Fama-French and Carhart models. • Estimating beta for thinly traded stocks.	**Required reading:** Course lecture notes **Suggested reading**: M. Scholes and J. Williams. Estimating betas from nonsynchronous data. *Journal of Financial Economics*, 5:309–327, 1977. E. Dimson. Risk measurement when shares are subject to infrequent trading. *Journal of Financial Economics*, 7:197–226, 1979. E. Fama and K. French, Size and book-to-market factors in earnings and returns, Journal of Finance 50, 131–15, 1995. M. Carhart, On Persistence in Mutual Fund Performance. *The Journal of Finance*, 52: 57-82, 1997. C. Asness, R. Krail, and J. Liew. Do Hedge Funds Hedge? *The Journal of Portfolio Management*, 28(1):6-19, 2001.
	Assignment 1: **Asynchronous betas** Collect market data on 2 stocks or commodity futures with low trading volume. Calculate the betas of the stocks for various return intervals that are affected by thin trading: hourly, daily, weekly, or monthly. Use the Dimson trade-to-trade and Scholes-Williams adjustments for asynchronous trading. Compare the results with those calculated by Bloomberg and FactSet.	For the Dimson trade-to-trade beta, you may find it best to use minute by minute data rather than tick data, so that each trade is in a subsequent period. **Due at 11:59 pm on August 28, 2024.**
	Rotman Interactive Trader (RIT) Introduction to the Rotman Interactive Trader simulation with the Price Discovery PD0 case. This case will be scored for grading purposes.	

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Date	Details	Class Preparation (readings, reviews, etc.)
Tuesday, August 27, 2024	**News Summaries by students**	Use your data terminal to find breaking news on your assigned topic. Address any open questions that arose from your previous day of news.
	Quantitative Trading and Statistical Arbitrage • Three forms of market efficiency. • Efficiently inefficient markets. • Fundamental quant strategies. • Statistical arbitrage. • A primer on commodities futures.	**Required reading:** Course lecture notes **Suggested readings:** E. F. Fama. Efficient capital markets: A review of theory and empirical work. *The Journal of Finance*,25(2):383–417, 05 1970. E. F. Fama. Efficient capital markets: Ii. *The Journal of Finance*, 46(5):1575–1617, 12 1991. N. Garleanu and L.H. Pedersen. Efficiently Inefficient Markets for Assets and Asset Management. *The Journal of Finance*, 73: 1663-1712, 2018
	Assignment 2: Pairs Trading Form a pairs trading rule (long-short 2 or more stocks selected to match on certain characteristics that you choose). Set the trading thresholds with one year of daily data. Follow it for a subsequent year of potential day-trading or microstructure profits. Summarize the results in terms of profit/loss and number of trades.	Recommended reading for pairs trading: R. J. Elliott, J. V. D. Hoek, and W. P. Malcolm. Pairs trading. *Quantitative Finance*, 5(3):271—276, 2005. E. Gatev, W. Goetzmann, K. Rouwenhorst. Pairs Trading: Performance of a Relative-Value Arbitrage Rule, *The Review of Financial Studies,* 19(3): 797–827, 2006. **Due at 11:59 pm on August 29, 2024.**
	RIT A more sophisticated trading simulation involving (statistical) arbitrage between Futures and Spot markets and storage. The F2 Futures trading simulation will be used. Introduction to spreadsheet links with the Rotman Interactive Trader. This case will be scored for grading purposes.	

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Date	Details	Class Preparation (readings, reviews, etc.)
Wednesday, August 28, 2024	**News Summaries by students**	Use your data terminal to find breaking news on your assigned topic. Address any open questions that arose from your previous day of news.

	Market Microstructure and Trading Costs
	
	• Limit order book structure.
	• Liquidity measures:
	  ▪ Bid-ask spread.
	  ▪ Market depth.
	  ▪ Implementation shortfall.
	• Optimal execution and order splitting.
	• High-frequency trading.
	  • Fetching and processing high-frequency data from Databento.
		Required reading:
		Course lecture notes
		
		Suggested readings:
		
		A. Kyle. Continuous Auctions and Insider Trading. *Econometrica,* 53(6): 1315–35, 1985.
		
		A. Perold. The Implementation Shortfall: Paper vs. Reality. *Journal of Portfolio Management* 14(3): 4–9, 1988.
		
		M. O'Hara. *High frequency market microstructure.* Journal of Financial Economics 116(2): 257—270, 2015.
		
		V. van Kervel and A. Menkveld. High-Frequency Trading around Large Institutional Orders. *Journal of Finance,* 74: 1091-1137, 2019.

	Assignment 3: Algorithmic Trading You are tasked with developing, implementing, and back testing a basic algorithmic trading rule, using granular trading data from Databento. The assignment focuses on the frequency of trades and importance of transaction costs for the strategy profit.	Recommended reading: M. Goldstein, A. Kwan, R. Philipp. High-Frequency Trading Strategies. *Management Science* 69(8):4363-4971, 2023. Databento documentation, "A high-frequency liquidity-taking strategy", url: https://databento.com/docs/examples/algo-trading/high-frequency **Due at 11:59 pm on August 30, 2024**
	RIT Rotman Interactive Trader Liability Trading 2 (LT2): Orders in Illiquid Markets. The case involves choosing between limit and marketable limit orders to manage inventory stemming from executing a large institutional trade.	

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Date	Details	Class Preparation (readings, reviews, etc.)
Thursday, August 29, 2024	**News Summaries by students**	Use your data terminal to find breaking news on your assigned topic. Address any open questions that arose from your previous day of news.
	Discretionary Trading and Qualitative Data • Share ownership (amounts and names) of firms: individual and institutional, and concentration of ownership have impacts upon corporate governance and agency issues. • Governance: Board composition also has an impact upon performance. • Understanding industry dynamics. • Activist investing. • Catalysts. Stock price response to news events: event studies and cumulative abnormal residuals.	**Required reading:** Course lecture notes **Suggested Reading:** M. C. Jensen and W. H. Meckling. Theory of the firm: Managerial behaviour, agency costs and ownership structure. Journal of Financial Economics, 3(4):305–360, 1976. A. Shleifer and R. W. Vishny. A survey of corporate governance. The Journal of Finance, 52(2):737–783, June 1997. E. M. Fich and A. Shivdasani. Are busy boards effective monitors? Journal of Finance, 61(2):689 – 724, 2006. V. Gregoire and C. Martineau. How is Earnings News Transmitted to Stock Prices? Journal of Accounting Research 60(1): 261—297, 2022.
	Assignment 4: Corporate Governance For 2 firms, examine their ownership and board structure as reported on Bloomberg, FactSet or Capital IQ. Comment on their governance situations. Look for independence of directors and hidden links between directors and management that may compromise their independence.	**Due at 11:59pm on Tuesday, September 3, 2024**
	RIT Crude Oil RIT case COM1 as an application of directional trading based on a news feed. This case will be scored for grading purposes	

Date	Details	Class Preparation (readings, reviews, etc.)
Friday, August 30, 2024	**News Summaries by students**	Use your data terminal to find breaking news on your assigned topic. Address any open questions that arose from your previous day of news.
	Derivatives and Hedging - Futures and options price quotes - Futures Options - Common Pricing formulae: Lattice (binomial), Black-Scholes (stock) and Black (futures) - Portfolio insurance and delta hedging. - Implied volatility of stock options and futures options - Understanding volatility smiles and surfaces for commodity options and their relationship to mean reversion in commodity prices.	**Required reading:** Course lecture notes **Suggested reading for basic option pricing**: F. Black and M. Scholes. The pricing of options and corporate liabilities. Journal of Political Economy, 81(3):637–654, May-June 1973. F. Black. The pricing of commodity contracts. Journal of Financial Economics, 3(12):167–179, 1976. **Suggested readings on implied volatility, measured as VIX.** R. Whaley, Understanding the VIX. The Journal of Portfolio Management 35(3): 98—105, 2009. **Suggested reading on the term structure of implied volatility (IV) :** E. S. Schwartz and J. E. Smith. Short-term variations and long-term dynamics in commodity prices. Management Science, 46(7):893–911, July 2000.
	Assignment 5: Implied Volatility Choose one stock and one commodity futures contract. Get the implied volatility table and volatility surface plot (both) for each of these securities, using both Bloomberg and FactSet and spot check their IV calculations. Do this for puts and calls. Compare the results and discuss.	**Due at 11:59pm on Wednesday, September 4, 2024**
	RIT H3 – Delta-Neutral Hedging. Traders are buying/selling blocks of options for individual equities from their clients. When trades are made, students are then responsible for hedging their position and remaining delta-neutral.	

==THERE IS NO FINAL EXAM IN THIS COURSE.==

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