

THE DEPARTMENT OF MATHEMATICAL SCIENCES

## MATH 432H: Mathematics and Financial Derivatives I - Honors

### *Fall 2023 Course Syllabus*

**NJIT Academic Integrity Code:** All Students should be aware that the Department of Mathematical Sciences takes the University Code on Academic Integrity at NJIT very seriously and enforces it strictly. This means that there must not be any forms of plagiarism, i.e., copying of homework, class projects, or lab assignments, or any form of cheating in quizzes and exams. Under the University Code on Academic Integrity, students are obligated to report any such activities to the Instructor.

### COURSE INFORMATION

**Course Description:** Mathematical analysis of models encountered in the area of financial derivatives. Topics include modeling and analysis of futures markets, determination of future prices, hedging strategies, swaps, option markets, stock options and their trading strategies.

**Number of Credits:** 3

**Prerequisites:** MATH 222 with a grade of C or better and MATH 346 with a grade of C or better.

**Course-Section and Instructors:**

| Course-Section | Instructor        |
|----------------|-------------------|
| Math 432-H01   | Professor A. Pole |

**Office Hours for All Math Instructors:** [Fall 2023 Office Hours and Emails](#)

**Required Textbook:**

|           |                            |
|-----------|----------------------------|
| Title     | <i>Derivatives Markets</i> |
| Author    | McDonald                   |
| Edition   | 3rd                        |
| Publisher | Addison Wesley             |
| ISBN #    | 978-0321543080             |

**University-wide Withdrawal Date:** The last day to withdraw with a W is **Monday, November 13, 2023**. It will be strictly enforced.

### COURSE GOALS

## Course Objectives

This course will teach students the mathematical analysis of financial derivative contracts: What instruments exist, how they are used, and how they are priced.

## Course Outcomes

On successful completion of this course, the student will be able to:

- Explain basic financial derivative contracts: forwards, futures, options and swaps.
- Perform payoff and profit calculations for financial derivatives.
- Demonstrate hedging strategies using financial derivatives.
- Apply the techniques to practical problems.

**Course Assessment:** Assessment of objectives is achieved through homework assignments, projects, and a comprehensive final exam.

## POLICIES

**DMS Course Policies:** All DMS students must familiarize themselves with, and adhere to, the **Department of Mathematical Sciences Course Policies**, in addition to official **university-wide policies**. DMS takes these policies very seriously and enforces them strictly.

**Grading Policy:** The final grade in this course will be determined as follows:

|              |     |
|--------------|-----|
| Homework     | 25% |
| Projects     | 25% |
| Midterm Exam | 25% |
| Final Exam   | 25% |

**Attendance Policy:** Attendance at all classes will be recorded and is **mandatory**. Please make sure you read and fully understand the **Math Department's Attendance Policy**. This policy will be strictly enforced.

**Projects:** There will be 2 research projects for your selected companies.

There will be 3 mini-projects for the selection of companies. You are required to take the four core concepts modules and their tests for the Bloomberg terminals. They must be completed by mid-semester. If you are on campus and can access the Bloomberg terminals you can take the fifth module on the terminal and become Bloomberg certified. This is encouraged if you are able, but it is not required for the class.

This arrangement is tentative.

**Exams:** There will be a cumulative final exam during the final exam week:

|                   |                                 |
|-------------------|---------------------------------|
| Final Exam Period | December 17 - December 23, 2023 |
|-------------------|---------------------------------|

The final exam will test your knowledge of all the course material taught in the entire course. Make sure you read and fully understand the **Math Department's Examination Policy**. This policy will be strictly enforced.

**Makeup Exam Policy:** There will be **NO MAKE-UP QUIZZES OR EXAMS** during the semester. In the event an exam is not taken under rare circumstances where the student has a legitimate reason for missing the exam, the student should contact the Dean of Students office and present written verifiable proof of the reason for missing the exam, e.g., a doctor's note, police report, court notice, etc. clearly stating the date AND time of the mitigating problem. The student must also notify the Math Department Office/Instructor that the exam will be missed.

**Cellular Phones:** All cellular phones and other electronic devices must be switched off during all class times.

## ADDITIONAL RESOURCES

**Math Tutoring Center:** Located in the Central King Building, Lower Level, Rm. G11 (See: **Fall 2023 Hours**)

**Further Assistance:** For further questions, students should contact their instructor. All instructors have regular office hours during the week. These office hours are listed on the Math Department's webpage for **Instructor Office Hours and Emails**.

**Accommodation of Disabilities:** The Office of Accessibility Resources and Services (OARS) offers long term and temporary accommodations for undergraduate, graduate and visiting students at NJIT.

If you need an accommodation due to a disability, please contact the Office of Accessibility Resources and Services at [oars@njit.edu](mailto:oars@njit.edu), or visit Kupfrian Hall 201 to discuss your specific needs. A Letter of Accommodation Eligibility from the office authorizing student accommodations is required.

For further information regarding self identification, the submission of medical documentation and additional support services provided please visit the Office of Accessibility Resources and Services (OARS) website at:

<https://www.njit.edu/accessibility/>

**Important Dates** (See: **Fall 2023 Academic Calendar, Registrar**)

| Date                             | Day                   | Event                        |
|----------------------------------|-----------------------|------------------------------|
| September 4, 2023                | Monday                | Labor Day                    |
| September 5, 2023                | Tuesday               | First Day of Classes         |
| September 11, 2023               | Monday                | Last Day to Add/Drop Classes |
| November 13, 2023                | Monday                | Last Day to Withdraw         |
| November 21, 2023                | Tuesday               | Thursday Classes Meet        |
| November 22, 2023                | Wednesday             | Friday Classes Meet          |
| November 23 to November 26, 2023 | Thursday and Saturday | Thanksgiving Recess - Closed |
| December 13, 2023                | Wednesday             | Last Day of Classes          |
| December 14, 2023                | Thursday              | Reading Day 1                |
| December 15, 2023                | Friday                | Reading Day 2                |

|                                     |                    |                   |
|-------------------------------------|--------------------|-------------------|
| December 17 to<br>December 23, 2023 | Sunday to Saturday | Final Exam Period |
|-------------------------------------|--------------------|-------------------|

## Course Outline

| Week    | Chapter   | Topic                                  |
|---------|-----------|--|
| 1       | Chapter 1 | <i>Introduction to Derivatives</i>     |
| 2 - 4   | Chapter 2 | <i>Forwards and Options</i>            |
| 5       | Chapter 9 | <i>Parity</i>                          |
| 6 - 8   | Chapter 3 | <i>Collars and Other Strategies</i>    |
| 9 - 10  | Chapter 4 | <i>Introduction to Risk Management</i> |
| 11 - 13 | Chapter 5 | <i>Forwards and Futures</i>            |
| 14      | Chapter 8 | <i>Swaps</i>                           |

*Updated by Professor A. Pole - 8/18/2023  
Department of Mathematical Sciences Course Syllabus, Fall 2023*