NEW YORK UNIVERSITY STERN SCHOOL OF BUSINESS

Derivatives (FINC-UB 43)
Spring 2023, Tuesdays and Thursdays, 9:30-10:45am

PRELIMINARY COURSE SYLLABUS

Instructor: Bruce Tuckman
Class Meetings: KMEC 4-80, Tuesdays and Thursdays, 9:30-10:45am
Office Hours: Tuesday and Thursdays after class and by appointment
Email: btuckman@stern.nyu.edu
Teaching assistant: TBD

Course Description

This course is about how market participants hedge, manage risk, and invest using derivatives. The course’s wide-angle focus on how end users solve business problems with derivatives will include contract specifications, pricing and hedging methodologies, margin, some accounting, the role of intermediaries, and regulatory frameworks.

Lectures will present material through a wide range of real-world applications, described in the detailed course outline below. Each broad topic area will include a breakout session, which will allow students to apply their knowledge and to prepare for the course exams. Breakout sessions will also be used to discuss two formal case studies.

Course Materials

Lecture slides and supplementary materials (e.g., links to articles or papers) will be posted to NYU Brightspace throughout the semester. A packet of two case studies will be available for purchase from the NYU Bookstore. Instructions for purchasing the cases will be distributed before the first class.

The course will not use a textbook. However, for students wishing to know more about the particularly quantitative aspects of the course, the instructor will provide references linking class lectures to pages in John Hulls’ Options, Futures, and Other Derivatives, Tenth Edition, Pearson, 2018.
Exams

There will be three multiple-choice and short-answer exams over the course of the semester, each covering material from approximately 1/3 of the course. The exams will be given on the following dates:

Exam #1: Thursday, February 23
Exam #2: Tuesday, April 4
Final Exam: TBD, during exam period (Wednesday, May 10 – Tuesday, May 16)

STUDENTS MUST ARRANGE THEIR SCHEDULES TO BE PRESENT AT ALL THREE EXAMS. NO MAKE-UPS WILL BE SCHEDULED APART FROM PERSONAL MEDICAL AND FAMILY EMERGENCIES.

Grading

The semester grade will be the average of the scores on the three exams.
Detailed Course Outline

1. Introduction

Tues 24 Jan and Thurs 26 Jan

Derivatives from ancient to modern times; overview of derivatives markets; how derivatives are used to hedge business risks; the implicit leverage of derivatives.

Recommended reading:


II. Commodity Futures, Swaps, and Options

Tues 31 Jan, Thurs 2 Feb, Tues 7 Feb, and Thurs 9 Feb

Commodity forwards, futures, swaps, and options; product descriptions; hedging; cross-product hedging and basis risks.

Applications:
Airline hedging of jet fuel costs
Global oil futures markets
Negative May 2020 WTI crude oil futures prices

III. Interest Rate Swaps (IRS)

Tues 14 Feb, Thurs 16 Feb, and Tues 21 Feb

Review of corporate bonds, pricing, and risk metrics; interest rate swaps; clearing and CCP risk management; size of the IRS market and the transition away from LIBOR; uses of IRS to hedge and transform corporate bond positions.

Applications:

Formal case study: Dominion Gas (2012)
EXAM #1: Thurs 23 Feb
Covers: Overview; Commodity Futures, Swaps, and Options; Interest Rate Swaps

IV. Credit Default Swaps (CDS) and their Tranches

Tues 28 Feb, Thurs 2 Mar, Tues 7 Mar, and Thurs 9 Mar

Definitions and mechanics; market size and composition.

Applications:
- Replication (Synthetic Asset) Transactions (RSAT) for life insurers
- The London Whale (2012)

SPRING BREAK: Tues 14 Mar and Thurs 16 Mar

V. FX Derivatives

Tues 21 Mar, Thurs 23 Mar, and Tues 28 Mar

Exchange rates; FX futures, forwards, NDFs, swaps, cross-currency swaps; hedging with FX derivatives; the violation of covered interest rate parity and non-zero cross-currency basis swap spreads.

Applications:
- Reverse Yankee Issuance
- Reserve Bank of Australia’s investment of reserves

EXAM #2: Tues 4 Apr
Covers: Credit Default Swaps and their Tranches; FX Derivatives

VI. Arbitrage Pricing of Contingent Claims

Thurs 30 March, Thurs 6 April, Tues 11 April; Thurs 13 April, Tues 18 April

Static and dynamic replication; put-call parity; arbitrage pricing with binomial trees; the Black-Scholes-Merton model; volatility smile/skew; Black’s model; interest rate term structure models; Monte Carlo simulations.

Applications:
- Options on SPX
- Options on five-year U.S. Treasury futures
- Valuing a callable bond
- Asian options on Oil
VII. Hedging Options in the Real World

Thurs 20 Apr, Tues 25 Apr, and Thurs 27 Apr

The Gamma-Theta trade-off; hedging with trading costs; some practical recommendations.

Applications:
- The P&L from delta hedging a call option on a stock in discrete time.

VIII. Interest Rate and Equity Volatility Products

Tues 2 May and Thurs 4 May

Swaptions; fixed rate mortgages; mortgage-backed securities (MBS); mortgage servicing rights (MSR); callable bonds.

Applications:
- Hedging MBS and MSR: AGNC Investment Corp, Two Harbors Investment Corp, Cherry Hill Mortgage Investment Corporation
- Formosa bonds
  - Formal case study: Principal-Protected Equity-Linked Notes (2014)
# Summary of Class Calendar

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<td>Tues 31 Jan</td>
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<td>Tues 7 Feb</td>
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<td>Tues 2 May</td>
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**TBD: Final Exam (during final exam period, Wed 10 May – Tues 16 May)**