

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

I. 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:

Tuckman, B. (2015), "In Defense of Derivatives: From Beer to the Financial Crisis," Policy Analysis, CATO Institute, pp. 1-14.

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:

"Greece slashes rates exposure with €35 billion swap programme," Risk.net, November 28, 2018.

"Corporates sprint to lock in low rates," Risk.net, March 25, 2020.

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

Class	Date	Unit; Other	Class	Date	Unit; Other
1	Tues 24 Jan	History and Overview	15	Tues 21 Mar	FX
2	Thurs 26 Jan	History and Overview	16	Thurs 23 Mar	FX
3	Tues 31 Jan	Commodity Futs & Swaps	17	Tues 28 Mar	FX
4	Thurs 2 Feb	Commodity Futs & Swaps	18	Thurs 30 Mar	Arbitrage Pricing
5	Tues 7 Feb	Commodity Futs & Swaps	19	Tues 4 Apr	EXAM #2
6	Thurs 9 Feb	Commodity Futs & Swaps	20	Thurs 6 Apr	Arbitrage Pricing
7	Tues 14 Feb	Interest Rate Swaps	21	Tues 11 Apr	Arbitrage Pricing
8	Thurs 16 Feb	Interest Rate Swaps	22	Thurs 13 Apr	Arbitrage Pricing
9	Tues 21 Feb	Interest Rate Swaps	23	Tues 18 Apr	Arbitrage Pricing
10	Thurs 23 Feb	EXAM #1	24	Thurs 20 Apr	Options in Real World
11	Tues 28 Feb	CDS	25	Tues 25 Apr	Options in Real World
12	Thurs 2 Mar	CDS	26	Thurs 27 Apr	Options in Real World
13	Tues 7 Mar	CDS	27	Tues 2 May	Vol Markets
14	Thurs 9 Mar	CDS	28	Thurs 4 May	Vol Markets

TBD: Final Exam (during final exam period, Wed 10 May – Tues 16 May)