

FINC-UB.0043 Futures and Options  
Spring 2019

Professor Stephen Figlewski  
Phone: 212-998-0712  
E-mail: [sfiglews@stern.nyu.edu](mailto:sfiglews@stern.nyu.edu)  
Office: MEC 9-64

**Video:** Professor Figlewski on  
[Why You Should Want to Take this Course](#)

## SYLLABUS

**Course description:** This course is designed to introduce Finance students to the theoretical and practical aspects of financial futures, options, and other derivatives. Since the 1970s, the markets for these versatile instruments have grown enormously and have generated a profusion of innovative products and ideas, not to mention periodic crises. Derivatives have become one of the most important tools of modern finance, from both the academic and the practical standpoint. The subject matter requires relatively greater use of quantitative methods and theoretical reasoning than many other business courses, and some students may find it challenging. However, the emphasis in the course is not on the math and theory, but always on developing your intuition. The goal is for you to understand the principles of how these important instruments and markets work, not to derive models and prove theorems.

**FINC-UB.0002 Foundations of Financial Markets is a prerequisite for this course.**

### **Reading:**

The material in this course can be challenging and advanced concepts build quickly upon each other. Students should make sure they master the basics as they are presented, by reading a textbook, doing exercises, working with the TA, etc.--i.e., whatever it takes. It is very helpful to do the reading before the class in which it will be discussed.

**Textbook:** There are several possible textbook choices for the course. You should get one of them. Take a look at them in the bookstore and pick the one that appeals to you most. It's your choice--this is a course on options, after all.

(H) Hull. Options, Futures, and Derivative Securities, 10th ed. Prentice-Hall, 2017.

This textbook has been used for the course through many editions. It is the industry standard reference, that contains "everything you might ever want to know about derivatives." It can be pretty hard reading, especially for non-mathematicians, but worth the effort. Learn everything in Hull, and you will have an outstanding grasp of this subject. If you are short on cash, it is not necessary to get the most recent edition. An earlier one would be OK, but in that case you must make sure you have the correct correspondence to the 9<sup>th</sup> edition chapter numbers in the reading list. (A quick look on Amazon shows lots of earlier versions available cheap.)

**ALTERNATIVE TEXTBOOK:** Sundaram and Das have a recent textbook on derivatives. Its coverage is broad, almost as broad as Hull though not as deep, and it does a very good job of presenting the concepts, with both math and intuition, and connecting them to events in the real world. It is an excellent alternative to Hull.

(SD) Sundaram and Das. Derivatives Principles and Practice. 2nd edition. McGraw-Hill Irwin, 2015. (Note that the chapter numbers are the same for the first and second editions.)

**ONE MORE POSSIBILITY:** Hull has an easier version of his book, which still covers the important material well. It would be a perfectly fine alternative, especially for someone who isn't that into theory.

(H2) Hull. Fundamentals of Futures and Options Markets, 9<sup>th</sup> edition, 2016.

**General Principle for the Readings:** There is a tremendous amount of material in the textbooks. Here is the general principle for how deeply you should read: Hard stuff in the books that is important for you to know will be covered in class. For easy stuff in the readings, such as descriptions of contract types, I will assume you can solidify your understanding from the books on your own. Hard stuff in the readings that is not covered in class is optional.

**Other required materials:**

All class materials, including class notes, homework assignments, spreadsheets, sample problems and exams, and class videos will be available from the course website. Lecture notes and HW assignments will also be distributed in class.

**Computer:**

A working knowledge of Excel is a requirement for the course. Much of the homework will require use of a spreadsheet program. However, following Stern School standard policy, **use of laptops, iPads, smartphones, etc., is NOT permitted during class**. They are too distracting, both for the user and for others, especially the professor.

**Calculator:**

You will need a calculator for quizzes. It should be a "scientific" calculator, with  $x^y$  and  $\log$  functions, but nothing fancier than that is required. A calculator with more functionality than is needed can be purchased for as little as \$3.

**Grading:**

- Instead of a midterm, there will be regular short quizzes throughout the course, probably 6 to 8 in total. Combined, these will be 30% of the grade. There will be no "make-ups" for missed quizzes. However, your two ~~worst~~ least excellent quiz scores will not be counted.
- Homework (40% in aggregate). There will be regular homework assignments whose purpose will be to give you hands-on experience with relevant problems and calculations (along with strong encouragement to think carefully about what you are seeing.) In previous years, about half of the homeworks involved building a term-long risk management Excel spreadsheet. This year, we will still do these kinds of calculations using real-world data, but without the infrastructure of a single elaborate project.
- There will be a written final exam given on the final exam date (30%).

At NYU Stern, we strive to create courses that challenge students intellectually and that meet the Stern standards of academic excellence. To ensure fairness and clarity of grading, the Stern faculty have agreed that for elective courses the individual instructor or department is responsible for determining reasonable grading guidelines. The Finance Department has elected to use the following grading guidelines for elective courses with more than 25 students: "A" or

“A-” to approximately 35%. Experience has shown that students in this class have appeared slightly more deserving than average, and the grading has been consistent with that experience.

**TA / Tutor / Grader:** Phillip You will be the TA for the course. He will hold regular office hours. Times and place will be announced.

## **Stern Undergraduate College Required Sections and Language for Syllabi for All Undergraduate Courses**

### ACADEMIC INTEGRITY

Integrity is critical to the learning process and to all that we do here at NYU Stern. As members of our community, all students agree to abide by the NYU Stern Student Code of Conduct, which includes a commitment to: Exercise integrity in all aspects of one's academic work including, but not limited to, the preparation and completion of exams, papers and all other course requirements by not engaging in any method or means that provides an unfair advantage. Clearly acknowledge the work and efforts of others when submitting written work as one's own. Ideas, data, direct quotations (which should be designated with quotation marks), paraphrasing, creative expression, or any other incorporation of the work of others should be fully referenced. Refrain from behaving in ways that knowingly support, assist, or in any way attempt to enable another person to engage in any violation of the Code of Conduct. Our support also includes reporting any observed violations of this Code of Conduct or other School and University policies that are deemed to adversely affect the NYU Stern community.

The entire Stern Student Code of Conduct applies to all students enrolled in Stern courses and can be found here: [www.stern.nyu.edu/uc/codeofconduct](http://www.stern.nyu.edu/uc/codeofconduct)

To help ensure the integrity of our learning community, prose assignments you submit to Blackboard will be submitted to Turnitin. Turnitin will compare your submission to a database of prior submissions to Turnitin, current and archived Web pages, periodicals, journals, and publications. Additionally, your document will become part of the Turnitin database.

### GENERAL CONDUCT & BEHAVIOR

Students are also expected to maintain and abide by the highest standards of professional conduct and behavior. Please familiarize yourself with Stern's Policy in Regard to In-Class Behavior & Expectations (<http://www.stern.nyu.edu/portal-partners/current-students/undergraduate/resources-policies/academic-policies/index.htm>) and the NYU Disruptive Behavior Policy (<http://www.nyu.edu/about/policies-guidelines-compliance/policies-and-guidelines/bullying--threatening--and-other-disruptive-behavior-guidelines.html>).

### STUDENTS WITH DISABILITIES

If you have a qualified disability and will require academic accommodation of any kind during this course, you must notify me at the beginning of the course and provide a letter from the Moses Center for Students with Disabilities (CSD, 998-4980, [www.nyu.edu/csd](http://www.nyu.edu/csd)) verifying your registration and outlining the accommodations they recommend. If you will need to take an exam at the CSD, you must submit a completed Exam Accommodations Form to them at least one week prior to the scheduled exam time to be guaranteed accommodation.

## COURSE OUTLINE

**H** denotes chapters in the Hull textbook.

**SD** denotes chapters in Sundaram and Das.

Sessions / Dates	Topics	Reading
1-2: Jan 29, Feb 1	Course overview; Introduction to derivatives Fundamental derivatives concepts <ul style="list-style-type: none"> <li>• calculating risk and return</li> <li>• arbitrage</li> <li>• Value at Risk (VaR)</li> </ul>	H1, H4, H22 SD1, SD3 Appendices SD20.1-20.2  Math Review for Derivatives
3-5: Feb 5, 7, 12	Managing risk with forwards and futures <ul style="list-style-type: none"> <li>• Hedging</li> <li>• Mechanics of Futures Trading</li> <li>• Dollar equivalence and basis risk</li> <li>• Eurodollars, T-bonds, Stock index</li> <li>• Computing the minimum risk hedge</li> </ul>	H2, 3, 6 SD2, 5-6 SD26
6-8: Feb 14, 19, 21	Futures pricing and arbitrage <ul style="list-style-type: none"> <li>• expectations versus the cost of carry</li> <li>• fair values, and arbitrage as a trade (gold, FX, stock indexes)</li> <li>• FX trading game</li> </ul>	H5 SD3-4
9-10: Feb 26, 28	Applications of futures and forwards <ul style="list-style-type: none"> <li>• cash-futures arbitrage in practice</li> <li>• using stock index futures to manage beta</li> <li>• the cheapest to deliver T-bond</li> </ul>	review H3-4, 6

Session / Date	Topics	Reading / Homework
11-13: Mar 5, 7, 12	Options Basics <ul style="list-style-type: none"> <li>• terms, payoff diagrams,</li> <li>• option positions and trading strategies</li> <li>• put-call parity, arbitrage, and portfolio dominance properties</li> </ul>	H10, H12 H11  SD7-8, incl. appendix SD9-10
14-17: Mar 14, 26, 28 Apr 2	Option Models <ul style="list-style-type: none"> <li>• Binomial model; risk neutral valuation</li> <li>• Black-Scholes model</li> <li>• delta, the Greeks, and general hedging</li> </ul>	H13 H14-15 H19 SD11-13 SD14.1-14.5, SD15 SD17
18-20: Apr 4, 9, 11	Types of Options <ul style="list-style-type: none"> <li>• dividends</li> <li>• early exercise</li> <li>• modifying the model</li> </ul> Option replication <ul style="list-style-type: none"> <li>• portfolio insurance</li> <li>• equity-linked CD</li> <li>• the collar trade</li> </ul>	H17-18 SD 14.6-14.9, 14A
21-22: Apr 16, 18	Volatility and volatility-based products <ul style="list-style-type: none"> <li>• behavior and modeling of volatility</li> <li>• implied versus implied volatility</li> <li>• VIX index and VIX-based ETFs</li> </ul>	H20, 23, SD 13appendix  SD16 for quants

<p>23-24: Apr 23, 25</p>	<p>Interest rate derivatives</p> <ul style="list-style-type: none"> <li>• types of rate derivatives</li> <li>• pricing FRAs, swaps, caps and floors, swaptions</li> <li>• hedging interest rates</li> <li>• interest rate processes, the Black model</li> <li>• equilibrium models, arbitrage-free models: Vasicek, Ho-Lee, LIBOR Market Model</li> </ul>	<p>H6, H29, H31 through 31.4 SD23 SD28-29, 30.6 (medium depth) (H34, SD24-25, for swap fans)</p>
------------------------------	---	--

<p>25: Apr 30</p>	<p>Mortgages</p> <ul style="list-style-type: none"> <li>• mortgage loans</li> <li>• securitization (GNMAs, CMOs)</li> <li>• Monte Carlo simulation</li> </ul>	<p>H8  H9 skim (boring but important practical details of funding costs)</p>
-------------------	---	--

<p>26: May 2</p>	<p>Credit risk</p> <ul style="list-style-type: none"> <li>• default as an option (structural model)</li> <li>• reduced form model</li> <li>• CDS</li> <li>• CDOs</li> </ul>	<p>H24-25 SD31-32 SD33</p>
------------------	---	------------------------------------

<p>27, 28: May 7, 9</p>	<p>ETFs Commodities as an asset class Blockchain and Bitcoins Structured products Real options Exotic options</p>	<p>H34 H36 H26  SD22 SD18-19  excerpt from F.I.A.S.C.O.</p>
-----------------------------	---	---

<p>TBA</p>	<p>FINAL EXAM</p>	
------------	-------------------	--