

# FINN 6210 / BPHD 8240: Financial Elements of Derivatives / Derivatives

## Spring Semester, 2020

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**Class:** Tuesday 5:30-8:15 pm, Center City 604  
**Office hours:** Center City before/after class in Room 713 faculty cubicles and by appointment  
**Course web pages:** Canvas

### Course Description

This course examines derivatives, which are securities whose values derive from (or are contingent on) the price of an underlying asset. The specific types of derivative securities we examine include forward and futures contracts, swaps, and options. We will learn how to value these securities and how to use them for risk management purposes. A central theme in our discussion on valuation is that there should be no opportunities for riskless arbitrage in well-functioning markets. We will learn the mechanics of futures and options trading and implement trading strategies to mitigate various types of risk.

### Learning Outcomes

Key concepts that students will learn in this course include:

- What are forward and futures contracts, and how are they used by market participants to hedge various types of price and/or quantity risks?
- How are futures prices determined, and what is the relation between futures prices and spot prices?
- How can firms use swaps to transform assets and liabilities from floating to fixed or from fixed to floating?
- How can individuals and firms use options to create alternative payoffs or to profit from any type of market environment?
- What are the important models to price options and how can we use these models to compute the Greeks?
- How can we use options and futures to hedge and alter the systematic risk of investment portfolios?

### Course Materials

1. **Textbook:** John C. Hull, *Options, Futures, and Other Derivatives*, 2018 10<sup>th</sup> Edition. You may also want to pick up the solutions manual *Options, Futures, and Other Derivatives 10e: Solutions Manual*.

Note: The 2015 9<sup>th</sup> Edition of *Options, Futures, and Other Derivatives* is virtually identical to the 10<sup>th</sup> Edition and can be used instead of the 10<sup>th</sup> Edition.

2. **Lecture Notes:** Class lecture notes will be posted on Canvas.

- 3. Handouts:** Problem sets and solutions will be distributed in class and/or posted on Canvas.
- 4. Calculator:** You will need a calculator with the following functions:  $y^x$ ,  $1/x$ ,  $e^x$ , and  $\ln$ . A good business calculator (or a cheap scientific calculator) will have these functions.

### Options Software

The 10<sup>th</sup> edition of the Hull book includes DerivaGem 4.00, which consists of two excel applications: the *Options Calculator* and the *Applications Builder*. We will use the *Options Calculator*. For our purposes, earlier editions of the software (e.g., DerivaGem 3.00) can also be used.

### Communication

The easiest way to contact me is via email. I frequently check my email and will always respond to your email. If I haven't responded, that means, for whatever reason, I did not receive it. Please continue to email me until you get a response. If you can't email me, leave me a voice message.

I will contact you on your UNC Charlotte email address (@uncc.edu). If you respond to me with another email address, I will assume it is fine to respond back to you at that same email address. When I email the entire class, however, I will only use your UNC Charlotte email address.

### Problem Sets

There will be four problem sets this semester. The purpose of these problem sets is to provide you with applications of the material covered in the course. The first problem set involves the design of futures contracts. The second problem set covers futures, futures pricing, risk management strategies using futures contracts, and interest rate futures. The third problem set covers swaps and price restrictions on options. The fourth problem set covers option trading strategies, option pricing, and risk management strategies using options. These problem sets will count for 30 percent of your total course grade. The problem sets are due at the beginning of class on the date that they are due (see course outline). Any problem set handed in after that time will be considered late. You will lose 25% of the grade for a problem set for each day that it is late. ***You may work on problem sets in a group with no more than two (2) students. Each group will turn in only one problem set. You do not have to work with the same group for each problem set and you are not required to work in a group.***

### Practice Questions

**Lecture Note Questions:** Each course lecture note has a set of questions with answers. These questions and answers are posted on Canvas.

**Practice Questions (optional):** Each chapter in Hull concludes with Practice Questions. Answers to the Practice Questions are in the *Solutions Manual*.

### Exams

There will be a midterm and final exam that cover class lectures, problem sets, practice questions, and class readings. The final exam covers class material after the midterm (i.e., it is not cumulative). You will be allowed to bring one 8.5" x 11" sheet of paper with notes and formulas -- both sides are fine. The paper must be handwritten, not photocopied, and must be handed in along with the exam. Exams are scheduled well in advance so that you can plan around these dates. Please do not ask to be excused from exams for matters of personal convenience. An unexpected absence without supporting documentation will result in a grade of zero. The midterm and final exam will each be worth 35% of your total course grade.

### Summary of Overall Grading

Item	% of Grade	Due Date
<b>Problem Sets</b>	30	
Problem Set 1		January 28
Problem Set 2		February 18
Problem Set 3		March 31
Problem Set 4		April 28
<b>Exams</b>		
Midterm	35	February 25
Final	35	May 5 (5:00-7:30 pm)

### Grading Scale

The grading scale for the course is as follows:

<u>Letter Grade</u>	<u>Wtd. Avg. %</u> *
A	≥ 90
B	[78, 89]
C	[68, 77]
U	≤ 67

\* **Example:** A student receiving 85%, 75%, 95%, and 100% on Problem Sets 1-4, and 75% and 85% on the midterm and final exams will have an overall weighted-average percentage of  $(0.075)(85) + (0.075)(75) + (0.075)(95) + (0.075)(100) + (0.35)(75) + (0.35)(85) = 82.63\%$  and receive a letter grade of B.

### Lectures

Lectures will stress the most important topics covered in the textbook. You are responsible for all material covered in class, assigned readings, problem sets, and practice questions. Lectures will go beyond the scope of the textbook for certain topics. Therefore, it is important that you attend class. **You are responsible for all announcements made in class.**

### College and University Policies

### Statement on Disability Accommodations

UNC Charlotte is committed to access to education. If you have a disability and need academic accommodations, please provide a letter of accommodation from Disability Services early in the semester. For more information on accommodations, contact the Office of Disability Services at 704-687-0040 or visit their office in Fretwell 230.

### Codes of Conduct

All students are required to read and abide by the UNC Charlotte Code of Student Academic Integrity and the UNC Charlotte Code of Student Responsibility (<http://legal.uncc.edu/policies/up-407>). Violations of the Codes will result in disciplinary action as provided in the Codes.

It is the student's responsibility to be fully and accurately informed of University policies, including, but not limited to, rules regarding dropping and adding classes, graduation requirements, and student conduct. The Dean of Students Office is the authoritative source for these policies.

### Statement on Diversity

The Belk College of Business strives to create an inclusive academic climate in which the dignity of all individuals is respected and maintained. Therefore, we celebrate diversity that includes, but is not limited to ability/disability, age, culture, ethnicity, gender, language, race, religion, sexual orientation, and socio-economic status.

## Course Outline

Each class period includes readings from Hull and my lecture notes. Except for the exam dates, all dates in the course schedule are approximate and may change depending on our pace through the material.

<b>Dates</b>	<b>Topic</b>
Jan 14	Introduction to Derivative Securities <ul style="list-style-type: none"><li>• Hull, Chapters 1 and 2</li><li>• Lecture Note 1</li></ul>
Jan 21 and Jan 28	Pricing Forwards and Futures <ul style="list-style-type: none"><li>• Hull, Chapter 5</li><li>• Lecture Note 2</li></ul>
<b>Jan 28</b>	<b>Problem Set 1 Due (beginning of class)</b>
Feb 4 and Feb 11	Futures Hedging Strategies <ul style="list-style-type: none"><li>• Hull, Chapter 3</li><li>• Lecture Note 3</li></ul>
Feb 18	Interest Rate Futures <ul style="list-style-type: none"><li>• Hull, Chapter 6</li><li>• Lecture Note 4</li></ul>
<b>Feb 18</b>	<b>Problem Set 2 Due (beginning of class)</b>
<b>Feb 25</b>	<b>Midterm Exam</b>
<b>Mar 2 – Mar 7</b>	<b>Spring Break</b>
Mar 10	Swaps <ul style="list-style-type: none"><li>• Hull, Chapter 7</li><li>• Lecture Note 5</li></ul>
Mar 17 and Mar 24	Option Specifications, Price Restrictions, and Early Exercise of American Options <ul style="list-style-type: none"><li>• Hull, Chapters 10 and 11</li><li>• Lecture Note 6</li></ul>
Mar 31	Option Trading Strategies <ul style="list-style-type: none"><li>• Hull, Chapter 12</li><li>• Lecture Note 7</li></ul>

<b>Mar 31</b>	<b>Problem Set 3 Due (beginning of class)</b>
April 7	Binomial Trees and Risk Neutral Valuation <ul style="list-style-type: none"> <li>• Hull, Chapter 13</li> <li>• Lecture Note 8</li> </ul>
April 14	Primer on Stochastic Calculus <ul style="list-style-type: none"> <li>• Hull, Chapters 14</li> <li>• Lecture Note 9</li> </ul>
April 21 and April 28	Black-Scholes-Merton Model and Greeks <ul style="list-style-type: none"> <li>• Hull Chapters 15 and 19</li> <li>• Lecture Note 10</li> </ul>
<b>April 28</b>	<b>Problem Set 4 Due (beginning of class)</b>
<b>May 5</b>	<b>Final Exam (5:00-7:30 pm)</b>