I am interested in futures and options because
I will spend the rest of my life in the future
and I want to improve my options.

Professor Avraham Kamara

FIN 561 - FINANCIAL FUTURES AND OPTIONS

SPRING 2015

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OFFICE HOURS: Mon. 5:30-6:30 PM, Wed. 5:30-6:30 PM, and by appointment.

This course provides a comprehensive overview of futures markets and options markets. We will analyze the pricing of futures contracts and options as well as various price relationships and review available empirical evidence concerning these markets. We will give particular attention to risk management by hedging. We will compare Futures, forwards, swaps and option contracts, and study alternative investment and risk management strategies.

COURSE RESPONSIBILITIES

Students will be graded on the basis of:

1. **HOMEWORK ASSIGNMENTS AND PROJECTS (EVERY CLASS) (**can be submitted individually or in groups of up to FIVE students, and either typed or handwritten).   **(TOTAL WEIGHT of 20%)**

2. **TWO EXAMS (that must be done individually, of course…).**
    (TOTAL WEIGHT OF 80%)

3. **OPTION: STUDENTS CAN GET A BONUS OF UP TO 10% FOR <u>VALUABLE CONTRIBUTION</u> TO CLASS PARTICIPATION. (A VALUABLE RISK MANAGEMENT STRATEGY!)**

EXAM DATES and WEIGHTS

1. **EXAM #1:**
   A TAKE-HOME EXAM ON THE WEEKEND AFTER THE
   CLASS OF WEDNESDAY, April 29, 2015.
   A WEIGHT OF 40%.

2. **EXAM #2**
   A TAKE-HOME EXAM ON THE WEEKEND AFTER THE
   LAST CLASS OF THE QUARTER.
   A WEIGHT OF 40%.

THE WILL BE NO MAKE-UP EXAMS!

THE HOMEWORK ASSIGNMENTS ARE ONLINE ON CANVAS
LOOK INSIDE "FILES."
I WILL ANNOUNCE THE DUE DATES DURING CLASS.

"Wise people realize how little they understand about life, themselves, and the world around them."

"Improve yourself by learning from others knowledge, so that you shall gain easily what others have labored hard for."

Socrates (469–399 B.C.E)

"Teach your tongue to say 'I don't know' and you shall progress."

Moses Maimonides (1135 or 1138 – 1204)

Moses *Maimonides* (Rabbi Moshe Ben Maimon, RAMBAM) - A Jewish rabbi, physician, and philosopher in the Middle Ages, who also influenced the non-Jewish world. Although his writings on Jewish law and ethics were met with Jewish opposition during his lifetime, he was posthumously acknowledged as one of the foremost philosophers in Jewish history. Today, his works and views are considered a cornerstone of Jewish thought and study.

How do you calculate the grade credit for your homework assignments?

CURRENTLY, ALL THE QUESTIONS AND ASSIGNMENTS ARE REQUIRED. However, some homework assignments CAN have required and optional questions. The change in the designation of a particular question from required to optional will be announced in class depending on the material studied in the class. **Otherwise, the question remains a required question.**

The optional questions give you bonus points. You will NOT lose any homework credit towards your grade because you did not answer any optional question. You will lose homework credit towards your grade ONLY IF you do not get full credit on the required questions of the assignments, and do not have enough bonus points to offset that loss.

The score that you will get for each homework assignment is your total points for that assignment. If you solve an optional question, your total points for that assignment can exceed the total required points. The bonus points for optional questions will help you in case you lose any required homework points on that assignment or any other assignment.

The MAXIMUM grade credit that you can get for your homework assignments, even with bonus points, is 20% (= 20 grade points of 100 total grade points).

Example: Suppose we have two homework assignments only. Each has a required 100 points, and the first assignment also has 20 bonus points. The maximum number of required homework points is 200.

As long as you get a total of **AT LEAST** 200 homework points (required plus bonus), you will get the maximum of **20 grade points, and no more than 20 grade points**.

Suppose you get 120 points (100 required points + 20 bonus points) on the first assignment and 100 points on the second assignment. You will have a total of 220 points. You will get **20 grade points, and no more than 20 grade points**.

Suppose you get 100 (required or required plus bonus) points on the first assignment and 100 points on the second assignment. You will have a total of 200 points. You will get **20 grade points.**

Suppose you get 120 points on the first assignment and 80 points on the second assignment. You will have a total of 200 points. You will get **20 grade points**.

Suppose you get a total of 100 points (required or required plus bonus) on the first assignment and 80 points on the second assignment. You will have a total of 180 points. You will get $20 \times (180/200)$ = **18 grade points.**

It is important to understand that the bonus points on homework assignments count towards the 20% homework part of the grade only. They cannot be used towards any other part of the grade. That is, they will not help you with points lost on an exam.

Solving optional questions and getting bonus points is a good risk management (and learning ☺) strategy. It reduces the risk of not getting the full 20 grade points.

REQUIRED READINGS:

FIN 561 – LECTURE NOTES:

1. VOLUME I - FUTURES, FORWARDS AND SWAPS.

2. VOLUME II - OPTIONS.

The two volumes have my lecture notes for the entire course.

Volume I is available for purchase in the University Bookstore.

Volume II will be available for purchase in the University Bookstore later.

PLEASE READ THE ASSIGNED LECTURE NOTES BEFORE and, AGAIN, AFTER THE LECTURE!

THERE IS NO REQUIRED TEXTBOOK.

You MAY wish to buy the following RECOMMENDED (optional) TEXTBOOK:

John C. Hull, *Options, Futures and other Derivatives*, 9th edition, 2015, Prentice-Hall.

You may wish to use the following book:

John C. Hull, *Fundamentals of Futures and Options Markets*, Either 8th edition (2014) or 7th edition (2011), Prentice-Hall.
(The 7th edition is on reserve at Foster library - for FIN 461.)

Hull's textbook comes with a software CD.

However, Hull also has online software (free, and does not require the textbook) for Excel (called DerivaGem for Excel), which calculates option prices.
You can download it from http://www.rotman.utoronto.ca/~hull/software/

Chicago Mercantile Exchange (CME Group), Chicago Board of Options (CBOE), Futures Industry Association (FIA), Options Clearing Corporation (OCC), and Options Industry Council have interesting material (often free of charge)on pricing and trading strategies using futures and options online at:
www.cmegroup. com,   www.futuresindustry.org,   www.cboe.com, www.optionsclearing.com,   www.optionseducation.org.

In particular, CBOE has interesting online material, including EDUCATION TOOLS (home>>education>> education tools) that you can use online or some you can or download at no cost,
at   http://www.cboe.com/LearnCenter/RCTools.aspx

The EDUCATION TOOLS includes an **OPTIONS PRICING CALCULATOR** for both American and European options.

Emanuel Derman is one of the world's leading experts on financial-derivatives modeling. He had a very distinguished career on Wall Street, at Goldman Sachs and briefly at Salomon Brothers, from 1985 until he retired in 2002.

He is currently a professor at Columbia University and the Director of its program in financial engineering (he received a Ph.D. in theoretical physics from Columbia University in 1973.)

He writes about financial-modeling and risk management related issues on his site:
http://www.emanuelderman.com

The following "Opinion" from January 29, 2014, is a nice, simple, way to describe most of what we will study in this course.
In Fin 460 and 560 – Investments, you study points #1 and #2.
In our course, we will study point #3 (Hedging) and the sentences below it.

Financial Valuation Modeling in a Nutshell: Dilution, Diversification and Hedging

Every couple of years I make some attempt to condense the principles of financial modeling:

All securities bear risk.

The essential problem of financial modeling is to determine the expected return that goes with a given estimated (future) risk.

To determine the expected return of a given risky security, note that there are three ways of lowering its risk:

1. **Dilution**: combining the security with a **riskless** bond;

2. **Diversification**: combining the security with other **uncorrelated** securities;

3. **Hedging**; combining the security with another **anti-correlated** security to cancel one aspect of its risk.

If by these means you can lower the estimated risk of a portfolio that contains the security to zero, it is logical that you should expect to earn the return of a riskless bond, assumed known. The expected return of the given security can then be pinned down from this constraint. [*]

[The paragraph above describes "The No-Arbitrage Pricing Method."]

[*] - *All of this is perfectly reasonable a priori. Where it fails in real life is that one cannot estimate risk correctly.*

[It is crucial to remember this footnote when working with financial models to price securities and manage risk.]

http://www.emanuelderman.com/writing/entry/financial-valuation-modeling-in-a-nutshell-dilution-diversification-and-hed

COURSE OUTLINE

WE WILL DEVIATE FROM THE OUTLINE DEPENDING ON THE PACE THE CLASS FEELS COMFORTABLE WITH.

PLEASE READ THE ASSIGNED MATERIAL BEFORE and, AGAIN, AFTER THE LECTURE!

Articles, which I have written on issues related to class topics, are designated by an asterisk. They are available on Blackboard. They are NOT required for the class.

THE LECTURE NOTES FOR THE TOPICS BELOW ARE IN FIN561 – VOLUME 1.

1. Introduction to Futures, Forwards and Options Contracts.

* Kamara, "Delivery Structure of Futures Contracts." In *The New Palgrave Dictionary of Money and Finance*, edited by P. Newman, M. Milgate and J. Eatwell, Macmillan Press Limited, London, 1992.

2. Arbitrage in Futures and Spot Markets and the Pricing of Futures Contracts

* Kamara, "Market Trading Structures and Asset Pricing: Evidence From Treasury Bill Markets," Review *of Financial Studies*, Winter 1988, pp. 357-375.

* Eldor, Hauser, Kahn and Kamara, "The Nontradability Premium of Derivatives Contracts" *Journal of Business*, Vol. 79, no. 4, July 2006, pp. 2067-2097.

* Kamara, "The Behavior of Futures Prices", *Financial Analysts Journal*, July-August 1984, pp. 68-75.

* Kamara, "Forecasting Accuracy and Development of a Financial Market: The Treasury Bill Futures Market", *Journal of Futures Markets*, August 1990, pp. 397-405.

3. Hedging with futures contracts.

* Kamara, "Issues in Futures Markets: A Survey," *Journal of Futures* Markets, Fall 1982, pp. 261-270.

* Kamara and Siegel, "Optimal Hedging in Futures Contracts with Multiple Delivery Specifications," *Journal of Finance*, September 1987, pp. 1007-1021.

* Kamara, "Production Flexibility, Stochastic Separation, Hedging, and Futures Prices," *Review of Financial Studies*, Vol. 6, No. 4, Winter 1993, pp. 935-957.

MANAGING INTEREST RATE RISK:

4. Short-Term Interest Rate Futures

* Kamara, "The Relation Between Default-Free Interest Rates and Economic Growth is Stronger Than You Think," *Journal of Finance*, Vol. 52, No. 4, September 1997, pp. 1681-1694.

* Hess and Kamara, "Conditional Time-Varying Interest Rate Risk Premium: Evidence from the Treasury Bill Futures Market," *Journal of Money, Credit and Banking*, Vol. 37, no, 4, August 2005, pp. 679-698.
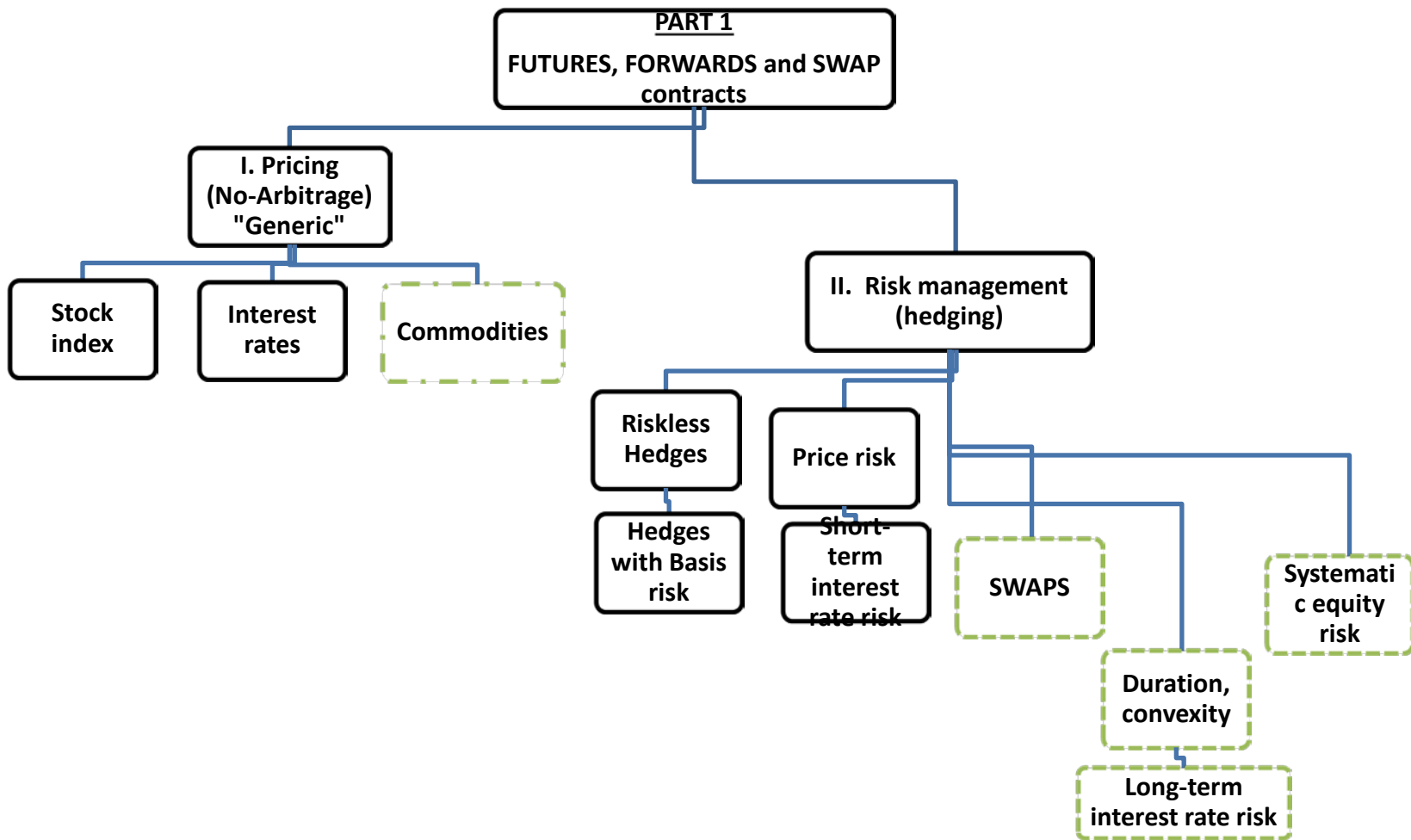
5. Interest Rate Swaps

6. Duration and Convexity.

7. Long-Term Interest Rate Futures.

8. Stock Index Futures.

* Kamara, "New Evidence on the Monday Seasonal in Stock Returns," *Journal of Business*, Vol. 70, No. 1, January 1997, pp. 63-84.

* Kamara, "The Effects of Futures Trading on the Stability of Standard and Poor's 500 Returns," *Journal of Futures Markets*, Vol. 12, No. 6, December 1992, pp. 645-658 (with Thomas W. Miller Jr. and Andrew F. Siegel).

* Kamara, Lou and Sadka, "Has The US Stock Market Become More Vulnerable Over Time?" *Financial Analysts Journal*, Vol. 66, no. 1, January/February 2010, pp. 41-52.

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                          │        PART 1           │
                          │ FUTURES, FORWARDS and   │
                          │     SWAP contracts      │
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PART 1
FUTURES, FORWARDS and SWAP contracts

I. Pricing (No-Arbitrage) "Generic"

- **Stock index**
- **Interest rates**
- **Commodities**

II. Risk management (hedging)

- **Riskless Hedges**
  - **Hedges with Basis risk**
- **Price risk**
  - **Short-term interest rate risk**
- **SWAPS**
- **Duration, convexity**
  - **Long-term interest rate risk**
- **Systematic equity risk**

THE LECTURE NOTES FOR THE TOPICS BELOW ARE IN FIN561 – VOLUME 2.

9. Introduction to Options Markets. Basic Trading Strategies.

10.   Hedging with Options.

11.   Put-Call Parity.

*   Kamara and Miller, "Daily and Intradaily Tests of European Put-Call Parity," *Journal of Financial and Quantitative Analysis*, December 1995, pp. 519-539.

Options calculators, which are available online from the Chicago Board of Options or the Options Industry Council, are useful for both the Binomial and Black Scholes options pricing models that we will study next, and for both European and American Options:

http://www.cboe.com/TradTool/OptionCalculator.asp

http://www.optionseducation.org/resources/options_calc.jsp
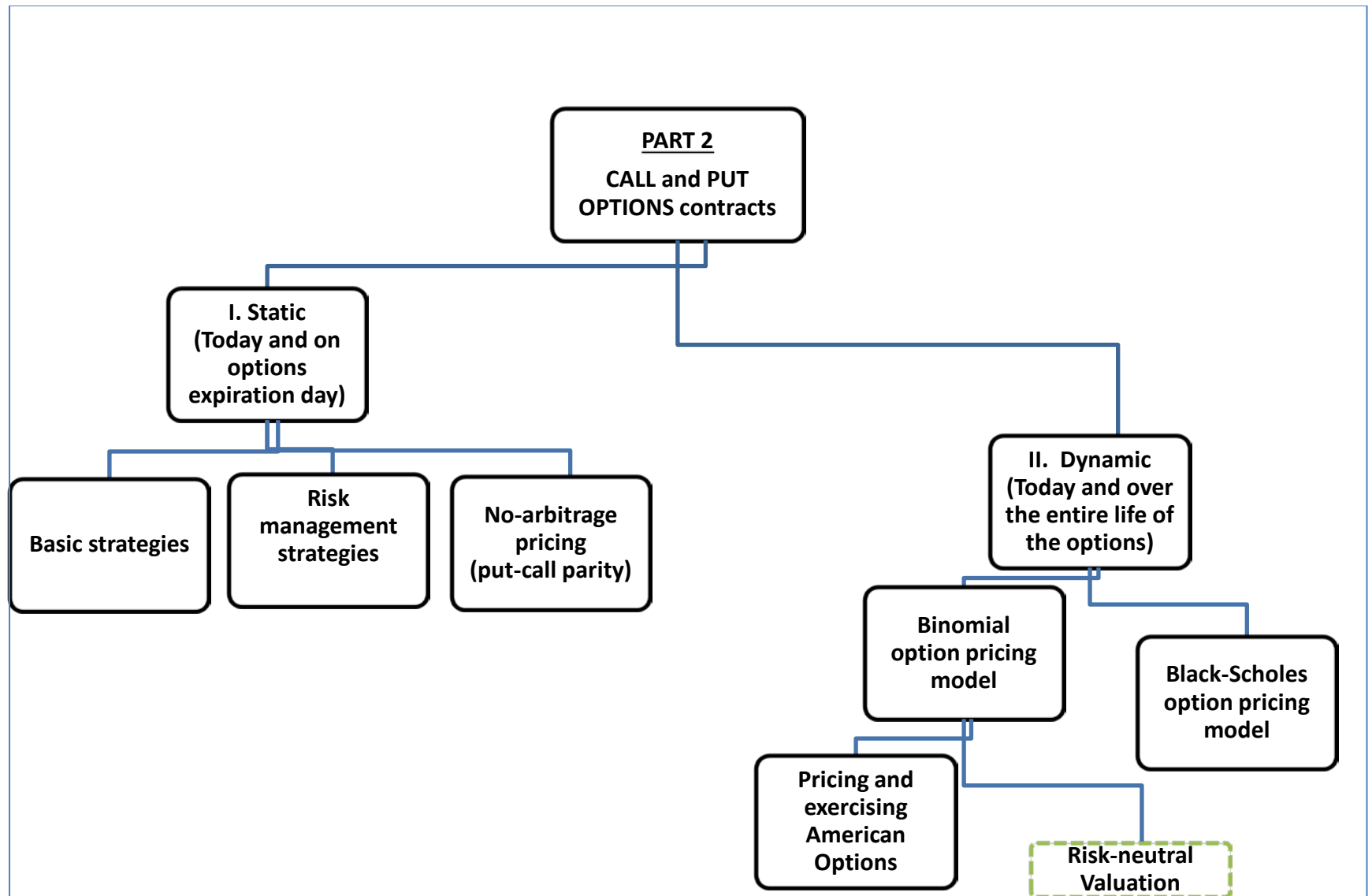
12.   The Binomial Options Pricing Model – European Options.

13.   The Black-Scholes Option Pricing Model. Implied volatility. The "Greeks."

14.   Pricing and Optimal Exercise of American Call and Put Options.

15.   Risk-Neutral Valuation.

A FUTURE WITH OPTIONS - DON'T LEAVE SCHOOL WITHOUT IT!

PART 2

CALL and PUT OPTIONS contracts

I. Static (Today and on options expiration day)

Basic strategies

Risk management strategies

No-arbitrage pricing (put-call parity)

II. Dynamic (Today and over the entire life of the options)

Binomial option pricing model

Black-Scholes option pricing model

Pricing and exercising American Options

Risk-neutral Valuation

OPTIONAL READING LIST

PART 1 – FUTURES and SWAPS

John C. Hull, *Options, Futures and other Derivatives,* 9th Edition, 2015, Prentice Hall.

John C. Hull, *Options, Futures and other Derivatives,* 8th Edition, 2012, Prentice Hall.

The same Sections in either book.

1. **Introduction to Futures, Forwards and Options Contracts.**
   Ch. 1.
   Ch. 2: 2.1; 2.2; 2.4-2.7; 2.11.

2. **Arbitrage in Futures and Spot Markets and the Pricing of Futures Contracts**
   Ch. 4: 4.1; 4.2;
   Ch. 5: 5.1-5.6; 5.8;
   Ch. 3: 3.5;
   Ch. 5: 5.9:
   Ch. 2: 2.3;
   Ch. 6: 6.1-6.3.

3. **Hedging with futures contracts.**
   Ch. 3: 3.1-3.4.

4. **Short-Term Interest Rate Futures**
   Ch. 6: 6.3.

5. **Interest Rate Swaps**
   Ch. 7: 7.1-7.3.

6. **Duration and convexity.**
   Ch. 4: 4.8 and 4.9.
   Ch. 6: 6.4.

7. **Long-Term Interest Rate Futures.**
   Ch. 6: 6.5 and Summary.

8. **Stock Index Futures.**
   Ch. 3: 3.5 and Appendix.

OPTIONAL READING LIST: PART 2 – OPTIONS

*John C. Hull, **Options, Futures and other Derivatives**, **9th Edition**, 2015, Prentice Hall.*

9. Introduction to Options Markets. Basic Trading Strategies.
Ch. 1.
Ch. 10: 10.1-10.8.; Ch. 12: 12.4.

10.   Hedging with Options.
Ch. 1: 1.7;   Ch. 12: 12.2.

11.   Put-Call Parity.
Ch. 11: 11.2; 11.4; 11.5-11.6 (w/o Bounds); 11.7; 11.1.

12.   The Binomial Options Pricing Model – European Options.
Ch. 13: 13.1, 13.3, 13.4, 13.6-13.9.

13.   The Black-Scholes Option Pricing Model. Implied volatility. The "Greeks."
Ch. 15: 15.1-15.4, 15.8-15.9;
Ch. 11: 11.1; Ch. 20: 20.3;   Ch. 19: 19.4.

14.   Pricing and Optimal Exercise of American Call and Put Options.
Ch. 13: 13.5. Ch. 21: 21.1-21.4.

15.   Risk-Neutral Valuation.
Ch. 13: 13.2; Ch. 15: 15.7;   Ch. 21: 21.1.

*John C. Hull, **Options, Futures and other Derivatives**, **8th Edition**, 2012, Prentice Hall.*

9. Introduction to Options Markets. Basic Trading Strategies.
Ch. 1: 1.5-1.7, 1.8-1.10.
Ch. 9: 9.1-9.8.;   Ch. 11: 11.4.

10.   Hedging with Options.
Ch. 1: 1.7;   Ch. 11: 11.2.

11.   Put-Call Parity.
Ch. 10: 10.2; 10.4; 10.5-10.6 (w/o Bounds); 10.7; 10.1.

12.   The Binomial Options Pricing Model – European Options.
Ch. 12: 12.1, 12.3, 12.4, 12.6-12.9.

13.   The Black-Scholes Option Pricing Model. Implied volatility. The "Greeks."
Ch. 14: 14.1-14.4, 14.8-14.9;
Ch. 10: 10.1; Ch. 19: 19.3;   Ch. 18: 18.4.

14.   Pricing and Optimal Exercise of American Call and Put Options.
Ch. 12: 12.5. Ch. 20: 20.1-20.4.

15.   Risk-Neutral Valuation.
Ch. 12: 12.2; Ch. 14: 14.7;   Ch. 20: 20.1.
Ch. 20: 20.1.

A Short Bio

AVRAHAM (Avi) KAMARA
Professor of Finance
William W. Alberts Professor
University of Washington, Michael G. Foster School of Business

Ph.D., Columbia University, New York, 1986.

   Professor Kamara has taught courses on financial risk management, futures and options contracts, real options, capital markets and security valuation in the MBA, executives, and undergraduate programs at the University of Washington. He also taught at Columbia University, UCLA, and overseas.

   During 2002-2006, Professor Kamara served as the Chairman of the Department of Finance and Business Economics at the University of Washington.

   Professor Kamara has served as an expert advisor on financial products and risk management for several companies and law firms (for example, locally, Safeco and Darigold, among others). He has also worked with the Commodity Futures Trading Commission in the USA, and with foreign governments/companies.

   Professor Kamara has published articles in the *Journal of Business*, *Journal of Finance*, *Journal of Financial and Quantitative Analysis, Journal of Financial Economics, Journal of Financial Markets, Review of Financial Studies, Journal of Future Markets,* and *Financial Analysts Journal,* as well as other outlets. Professor Kamara's research focuses on risk management, derivatives contracts (futures, swaps, and options), and commodities, equity and fixed-income markets.
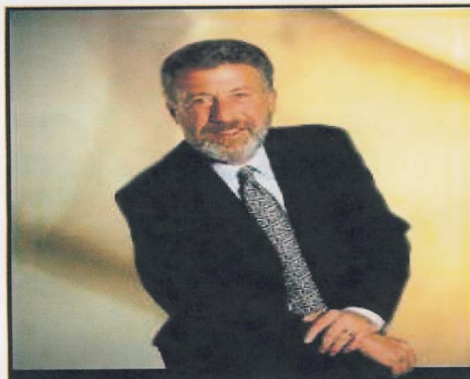
IF YOU STUDY HARD IN
PROFESSOR KAMARA'S
CLASS YOU WILL
LEARN A LOT!

I GUARANTEE IT!

George Zimmer

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