

Imperial College Business School

Asset Pricing and Derivatives
Spring

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Syllabus

I. Administrative:

Homework:

Web-based homeworks will be assigned every week. These assignments are immediately graded, so that both you and me will have a precise sense of your learning during the course. Late homeworks will not be accepted.

Grading:

The course grade is based on your performance on the Final (80 percent) and Homeworks/Case Studies (20 percent). The case studies material will be distributed in class. The Homeworks will be done on-line (weekly) and solved in class by tutor.

Required Text:

1. *Options, Futures, and Other Derivatives* by John C. Hull, Prentice-Hall Latest Edition. This is the key and main text of the course.

Optional Texts and Reference Texts:¹

1. *Derivative Securities*, by R. A. Jarrow and S. M. Turnbull, South-Western College Publishing, 1996, ISBN #0-538-84255-5. Or later edition.
2. *Options Markets*, John C. Cox and Mark Rubinstein, Prentice Hall, 1985, ISBN #0-13-638205-3.
3. *Merton Miller on Derivatives*, by Merton H. Miller, John Wiley and Sons, Inc., 1997, ISBN #0-471-18340-7.
4. *Investment Science*, by David G. Luenberger, Oxford University Press, 1997, ISBN # 0195108094. Useful reference for some topics.

II. Course Outline and Reading List:

Note: all readings, except for starred readings (*), are *required* and should be read prior to the class for which they are assigned. Starred readings (*) are *recommended*.

- **Week 0** - (*Please review this material - it will not be covered in class*)

¹You do not need to purchase any of them; they are for reference only!

1. Continuous Compounding and Term Structure Mathematics
 - Hull, Ch. 4*

- **Week 1**

1. Introduction and Institutional Aspects of Forwards and Futures
 - Lecture Note 1 Part A
 - Hull Ch. 1, 2
 - J&T Ch. 1.1-1.5*, 1.7*
2. Pricing Forwards and Futures
 - Lecture Note 1 Part B
 - Hull Ch. 5 (including appendix)
 - J&T Ch. 2*

- **Week 2**

1. Case Study: Strategic Risk Management at Titan Shipping Company: Lessons from Metallgesellschaft

The following readings are background material on the Metallgesellschaft debacle, useful for the solution of the case study:

- Culp, C. L., Miller M. H., 1994. Hedging a Flow of Commodity Deliveries with Futures: Lessons from Metallgesellschaft. *Derivatives Quarterly*, Fall 1994, 7 - 15.
- Mello, A. S., Parsons, J. E., 1999. Strategic Hedging. *Journal of Applied Corporate Finance*, 12, 43 - 54.
- Culp, C. L., Miller M. H., 1995. Metallgesellschaft and the Economics of Synthetic Storage. *Journal of Applied Corporate Finance*, 4, 62 - 76.

The following are additional readings (not necessary, but interesting):

- Culp, C. L., Miller M. H., 1995. Hedging in the Theory of Corporate Finance: a Reply to our Critics. *Journal of Applied Corporate Finance*, 1, 121 - 127.*
- Mello, A. S., Parsons, J. E., 1995. Maturity Structure of a Hedge Matters: Lessons from the Metallgesellschaft Debacle. *Journal of Applied Corporate Finance*, 8, 106 - 120.*
- Mello, A. S., Parsons, J. E., 2000. Hedging and Liquidity. *Review of Financial Studies*, 13, 127 - 153.*
- Krapels, E., 26/03/2001. Re-examining the Metallgesellschaft Affair and its Implication for Oil Traders. *Oil and Gas Journal*.*

2. Introduction to Options
 - Lecture Note 2 Part A
 - Hull Ch. 8

3. Basic No-Arbitrage Bounds on Options Prices
 - Lecture Note 2 Part B
 - Hull Ch. 9.1-9.4, 9.7 to the end
 - J&T Ch. 3*
 - Ofek, E., Richardson, M., Whitelaw, R. F., 2004. Limited Arbitrage and Short Sales Restrictions: Evidence from the Options Markets. *Journal of Financial Economics*, 74, 305 - 342 *.
4. Optimal early Exercise of American Options
 - Lecture Note 2 Part C
 - Hull Ch. 9.5-9.7
 - J&T Ch. 7.0-7.3*
5. Elementary Trading Strategies and Additional No Arbitrage Restrictions

Note: *examinable* material that will *not* be covered in class

 - Lecture Note 2 Appendix
 - Hull Ch. 10

- **Week 3**

1. Binomial Option Pricing
 - Lecture Note 3
 - Hull Ch. 11
 - J&T Ch. 4*, 5.1-5.5*, 7.4*

- **Week 4**

1. Black and Scholes Pricing Formula
 - Lecture Note 4
 - Hull Ch. 13 (everything except 13.10), 12*
 - J&T Ch. 8*
 - Black F., Scholes, M., 1973. The Pricing of Option and Corporate Liabilities. *Journal of Political Economy* 81, 637 - 659.*

- **Week 5**

1. Extensions to Black and Scholes and Risk Management with Options
 - Lecture Note 5
 - Hull Ch. 15, 16.1-16.8, 17
 - J&T Ch. 9.1-9.5*, 10*, 11.1-11.8*, 12*

- **Week 6**

1. Empirical Evidence

- Lecture Note 6 Part A
- Hull Ch. 18
- Coval, J.D., Shumway, T., 2001. Expected Option Returns. *Journal of Finance*, 56, 983 - 1009.*
- Derman, E., Kani, I., 1994. The Volatility Smile and Its Implied Tree. *RISK*, 7, 139 - 145.*
- Yan, S., 2011. Jump Risk, Stock Returns, and Slope of Implied Volatility Smile. *Journal of Financial Economics*, 99, 216 - 233.*
- Driessen, J., Maenhout, P., 2007. An Empirical Portfolio Perspective on Option Pricing Anomalies. *Review of Finance*, 11, 561 - 603.*

2. Volatility Markets

- Lecture Note 6 Part B
- Brockhause, O., Long, D., 2000. Volatility swaps made simple. *Risk*, 19, 92 - 95. *
- Demeterfi, K., Derman, E., Kamal, M., Zou, J., 1999. A Guide to Volatility and Variance Swaps. *The Journal of Derivatives*, 6, 9 - 32.*
- Van der Grient, B., 2008. Volatility as Alpha Driver. *MET*, 16, 33 - 36.*

• Week 7

1. Swaps, Swaptions, and Interest Rate Options

- Lecture Note 7
- Hull Ch. 7
- J&T Ch. 14*

• Week 8

1. Case Study

- Handout: "Creative" Balance Sheet Debt Management: Greek Swaps and Swaps "a la" Milanese
- Balzli, Beat, 02/08/2010. Greek Debt Crisis: How Goldman Sachs Helped Greece to Mask its True Debt. *Spiegel*.*
- Dunbar, Nick. 01/07/2003. Revealed: Goldman Sachs' Mega-Deal for Greece. *Risk Magazine*.*
- Boland, V., Dinmore, G., Sanderson, R., Tett, G., 09/03/2010. An Exposed Position. *Financial Times*.*
- Boland, V., 18/03/2010. Milan Swaps Case Puts Banks in Hot Seat. *Financial Times*.*

2. Using Option Theory to Value Corporate Securities

- Lecture Note 8

- Greenhalgh, H., 26/04/2009. Convertibles Get a Brief Boost. Financial Times.*
- Hughes, J., 08/02/2010. Convertibles Look Ahead to Sunny Days. Financial Times.*

- **Week 9**

1. Introduction to Fixed Income Derivatives and Term Structure Models

- Lecture Note 9
- Hull Ch. 28, 30
- J&T Ch. 15*, 16*
- Ho, T. S., Stapleton, R. C., Subrahmanyam, M. G., 1997. The Valuation of American Options on Bonds. Journal of Banking & Finance, 21, 1487 - 1513.*
- Vasicek, O., 1977. An Equilibrium Characterisation of the Term Structure. Journal of Financial Economics, 5, 177 - 188.*