Finance 513 – Financial Engineering I– Course Outline

This syllabus describes the topics to be covered during the term. Some topics may be altered or expanded as the semester goes along. For general information about the class, see the handout course_info.pdf on the course Compass pages.

The lecture notes are the official text for the course. (They will be distributed each class and posted to the Compass site.) There is a packet of cases at the bookstore, which you should purchase. I also recommend that you get one of the following recent text books to serve as a reference:


The syllabus below shows the sections of the text books which relate to the material covered in that lecture. This reading is not required.

Also indicated are the cases we will discuss, and the deadlines for each assignment. See course_info.pdf for details on these.

1. Tuesday, January 18. What is Financial Engineering?
   Readings: McDonald Ch. 1.

2. Thursday, January 20. Forwards and Futures Contracts
   Readings: Hull Ch. 5; McDonald Chs. 5,6,7.
   Assignment: Problem set 1 handed out.

3. Tuesday, January 25. Futures vs Forwards
   Case: Russian Rouble: June 1998 (Compass)

4. Thursday, January 27. Principles of Swaps: Commodity Swaps, Currency Swaps
   Readings: Hull Chs. 7, 32; McDonald Ch. 8; Whaley Ch. 4.
   Deadline: Problem set 1 due.
   Assignment: Problem set 2 handed out.

5. Tuesday, February 1. Interest Rate Swaps

6. Thursday, February 3. Returns Swaps, Default Swaps
   Case: Smith-Breeden Associates (packet)
7. **Tuesday, February 8.** Options: Robust No-Arbitrage Relations  
   **Readings:** Hull Chs 9; McDonald Chs. 2, 9; Whaley Ch. 6.  
   **Deadline:** Problem set 2 due.  
   **Assignment:** Problem set 3 handed out.

8. **Thursday, February 10.** Static Arbitrage with Options  
   **Case:** Citigroup exchange offer (packet)

9. **Tuesday, February 15.** Curvature Restrictions and State-Price Densities

10. **Thursday, February 17.** Introduction to Dynamic Arbitrage  
    **Readings:** Hull Chs. 11, 19.1-19.3; McDonald Chs. 10, 11  
    **Deadline:** Problem set 3 due.  
    **Assignment:** Problem set 4 handed out.

11. **Tuesday, February 22.** Binomial Model: Implementation and Extensions

12. **Thursday, February 24.** The Black-Scholes-Merton Model  
    **Readings:** Hull Chs. 12, 13, 17; McDonald Chs. 12, 13.5, 18, 20; Whaley Ch. 7.  
    **Deadline:** Problem set 4 due.  
    **Assignment:** Problem set 5 handed out.

13. **Tuesday, March 1.** Options in Compensation Contracts  
    **Readings:** Hull, Ch. 14; McDonals Ch. 16.2; Whaley Ch. 13.  
    **Case:** Sally Jameson (packet)

14. **Thursday, March 3.** Extending the Black-Scholes Formula  
    **Readings:** Hull Ch. 15, 24.11; McDonald Chs. 12.2, 14.6, 22.6

15. **Tuesday, March 8.** Application of Option-to-Exchange  
    **Case:** Arley Merchandise (packet)  
    **Deadline:** Problem set 5 due.

16. **Thursday, March 10.** Structural Models of Credit Risk  
    **Readings:** McDonald Chs. 15.1-15.3, 16.1, 26.1-26.3; Whaley Ch 12.  
    **Assignment:** Problem set 6 handed out.

17. **Tuesday, March 15.** Application of Structural Models  
    **Case:** UBS reverse-convertible bonds (Compass).

18. **Thursday, March 17.** Single Name Credit Derivatives  
    **Readings:** Hull Chs. 23.1, 23.2; McDonald Ch. 26.4, Whaley Ch 19.  
    **Deadline:** Problem set 6 due.
19. **Tuesday, March 29.** The Behavior of Volatility  
**Readings:** Hull Chs. 18, 26.2; McDonald Ch. 23.  
**Assignment:** Problem set 7 handed out.

20. **Thursday, March 31.** Options Valuation with Stochastic Volatility

21. **Tuesday, April 5.** Model Risks  
**Case:** LTCM (packet).

22. **Thursday, April 7.** Derivative Pricing in \( N \) Dimensions  
**Readings:** McDonald Chs. 19, 21; Hull Chs. 27.

23. **Tuesday, April 12.** Financial Engineering with Non-Hedgeable Risks  
**Deadline:** Problem set 7 due.  
**Assignment:** Problem set 8 handed out.

24. **Thursday, April 14.** Valuation of Non-Hedgeable Exposures  
**Case:** BASIX: Weather Risk in India. (packet)

25. **Tuesday, April 19.** Multi-name Credit Derivatives: Introduction  
**Deadline:** Problem set 8 due.  
**Assignment:** Problem set 9 handed out.

26. **Thursday, April 21.** Multi-name Credit Derivatives: CDOs  
**Readings:** Hull Ch. 23; McDonald Ch. 26.4.  
**Case:** Structured Index Products and Default Correlation. (packet)

27. **Tuesday, April 26.** Mortgage-backed Securities  
**Readings:** Hull Ch. 31.3

28. **Thursday, April 28.** Financial Engineering and the Subprime Crisis  
**Case:** Subprime Meltdown. (packet)  
**Deadline:** Problem set 9 due.

29. **Tuesday, May 3.** Course review

30. **Week after May 6 (TBD)** Final exam