

Prof B. Rudloff
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Office hours: TH 2:30-4:30pm

Syllabus FIN 503 / ORF 515

Asset Pricing II: Stochastic Calculus and Advanced Derivatives

Spring 2008

Objectives: This course covers the pricing and hedging of advanced derivatives including topics as exotic options, Greeks, interest rate derivatives and credit derivatives. The course will cover the basics of stochastic calculus necessary for finance. It is designed for Masters students but is also open to PhD students and seniors (with prior permission). Undergraduates, Masters and PhDs will be graded to the same standards.

Lecture: Tue and Thu 9:30 am - 10:50 am, Room: E-225

TA: Zhou (Joe) Yang (zhouyang@Princeton.edu)

Course Outline: The course will cover the topics below. Topics are not necessarily of equal length. This outline is subject to change.

Topic 1: The Binomial option pricing model, Arbitrage pricing in discrete, multi-period models ([H] 11, [M] 10-11)

Topic 2: Normal and lognormal distributions, Black Scholes option pricing model: an introduction, option greeks ([H] 13, 15, [M] 18, 12)

Topic 3: Introduction to Brownian motion, Levy's representation, Ito formula, Girsanov theorem, Martingale representation theorem, SDE's, Feynman-Kac representation ([H] 12, 25, [M] 20, [E], [S])

Topic 4: Black Scholes option pricing revisited, self-financing portfolios, replication,

martingale measure, Black Scholes call price ([H] 13, [E])

Topic 5: Exotic Options: Choosers, barriers, lookback, exchange options,... ([H] 22, [M] 14, 22)

Topic 6: Implied Volatility, Stochastic Volatility models ([H] 16, 24, [M] 12.5, 23)

Topic 7: Interest Rate Derivatives ([H], [M])

Topic 8: Risk Management, VAR, Credit risk and Credit Derivatives ([H] 18, 20, 21, [M] 25, 26)

Textbooks:

- John Hull [H] (2006): Options, Futures and other Derivatives, 6th Edition, Prentice Hall.
- Robert McDonald [M] (2006): Derivatives Markets, Addison Wesley, 2nd Edition.

Other books that might be helpful:

- Etheridge [E] (2004): A Course in Financial Calculus, CUP
- Shreve [S] (2004): Stochastic Calculus for Finance I, II, Springer.

References listed next to each topic indicate where you can look for further information in these books.

Assessment: The final grade will be comprised of:

- 25% Homework assignments
- 25% Midterm Exam
- 50% Final Exam

Both exams will be closed book but you may bring one double-sided, letter sized "cheat sheet" with you. You should also bring a (basic) calculator.