

IERO 4723 Topics in Quantitative Finance: Credit Risk Modeling/Credit Derivatives

Columbia University, Spring 2006. Thursday, 6:10pm to 8:40pm.

Objectives: The course aims at giving the student an introduction to modeling of credit risk for risk management, and computation of credit risk from such models. It will provide students with a general understanding of major credit derivatives and their valuation methods commonly used in practice. The course will be jointly taught by a faculty at the IEOR dept and an industry practitioner.

Instructor 1: Steven Kou, Associate Professor, Department of Industrial Engineering and Operations Research. 312 Mudd Building. 212-854-4334. sk75@columbia.edu

Instructor 2: Anlong Li, Director, Emerging Market Credit Derivatives, Barclay's capital, New York, NY. 646-3310-9071, Anlong.Li@BarCap.com

Prerequisite: Understanding stochastic calculus at the level of E4707: Financial Engineering (II).

Recommended textbooks: (1) *Credit Risk Modeling – Theory and Applications*. (2004) David Lando, Princeton University Press. (2) *Credit Derivatives Pricing Models*. (2003). P. J. Schonbucher, Wiley.

Grading: Hwk: 10%, Project: 15%, Quizzes: 15%, Exam I: 30%, Exam II: 30%

Tentative Outline

1. Introduction to credit risk and review of stochastic processes
2. Credit spread shapes; intro to structural models (I): Black model, Merton model
3. Structural models (II): First passage models
4. Optimal capital structure: Leland model
5. The impact of credit risk on equity and on equity options; jumps in credit risk.
6. Reduced form models.
7. Exam (I)
8. Construction of credit curves from credit default swap spreads
9. Credit default swaptions, constant maturity CDS, credit linked notes
10. Hybrids: credit contingent equity, FX and interest rate derivatives
11. Copula method; n-th to default option and swaps on credit baskets
12. Conditional independence, factor models, CDO and CDO2
13. CDX markets, base correlation, skew and advanced valuation models
14. Exam (II)