



Stevens Institute of Technology WebCampus (elearn.stevens.edu) Syllabus

Course FE680: Advanced Derivatives

Overview

. This course will address the practical and theoretical issues for Fixed Income Securities and Structured products.

Learning Goals

After taking this course, the student will be able to:

- Understand the pricing of different fixed income derivatives
- Use Excel and VBA to create pricing models
- Difference between risk neutral and objective measure pricing
- Price credit derivatives using copula

Pedagogy

The course will employ lecture, supplemental reading and additional resources, quizzes, online discussion, two term papers, weekly team assignments and a final team presentation.

Required Text(s)

Bruce Tuckman, Fixed Income Securities, Second Edition

Philipp J. Schönbucher, Credit Derivatives Pricing Models

Optional: C.Bluhm,L.Overbeck,C.Wagner, An introduction to credit Risk Modeling

Required Readings

Required Readings will be assigned for each week and will be found on the course website.

Course Outline

In the first part of the course we will discuss the methodology and principles behind Interest rate models and the valuation and hedging of Mortgage Backed Securities. The second part of the course will be focused on credit models: building discount curves for credit models estimation of default probability and credit spread from equity prices. We will discuss Gaussian copula model and other recent developments recent developments in CDO modeling.

Assignments

Specific details on the assignments are found on the course website. The assignments and their weights are as shown below:

1. Class Participation (discussions, assessments, profile)	10%
2. Midterm	25%
3. Homework	40%
4. Final	25%
TOTAL	100%

Please note that assignments in this class may be submitted to www.turnitin.com, a web-based anti-plagiarism system, for an evaluation of their originality.

Course Schedule

Week #	Topic
1	Construction of discount factors, zero coupon rates, forward rates. Pricing bonds and interest rates swaps.
2	Bond price sensitivity to interest rates moves(duration, DV01, convexity). Arbitrage free movements of the curve.
3	Review: Probability and Stochastic integration
4	Martingales and pricing measures. Futures versus forwards, Black formula for option pricing.
5	Stochastic interest rates models: one factor Hull – White, shifted log normal, Libor market model : HJM
6	Credit models: Default event and survival probabilities. Risk neutral and realized default probabilities. Cashflows conditional on default and survival probabilities. Forward default intensity curve.
7	Clean par credit curve. Pricing credit default swaps. Survival probability and recovery values.
8	CDO's: introduction, Gaussian copula models, Large portfolio approximation,
9	Correlation smiles, Base correlation
10	Merton's Asset Value Model
11	Cashflow CDO's
12	Recent development in CDO modeling (stochastic intensity models)
13	Review and Final Exam