MATH 587 – Theory and practice of modeling risk and credit derivatives

Course Description from Bulletin: This is an advanced course in the theory and practice of credit risk and credit derivatives. Students will get acquainted with structural and reduced form approaches to mathematical modeling of credit risk. Various aspects of valuation and hedging of defaultable claims will be presented. In addition, valuation and hedging of vanilla credit derivatives, such as credit default swaps, as well as vanilla credit basket derivatives, such as collateralized credit obligations, will be discussed.

Enrollment: Elective for MMF and other majors

Textbook(s): None
Other required material: lecture notes

Prerequisites: MATH 582 or equivalent

Objectives:
1. Students will understand the basic principles of theory and practice of credit risk and credit derivatives.

Lecture schedule: Two 75 minute lectures per week

Course Outline: Hours

1. Mathematical modeling of credit and valuation of defaultable claims   6 weeks

    a. structural approach
    b. hazard function approach
    c. hazard process approach
    d. Single name credit derivatives: CDS, LCDS

2. Hedging of defaultable claims   3 weeks

3. Portfolio credit risk   6 weeks

    a. Dependent defaults and credit migration
    a. Basket credit derivatives : credit indices, n-th to default swaps, CDO, LCDO,
    b. Credit index options

Assessment: Homework   0-10%
                        Quizzes/Tests   45-50%
                        Final Exam   45-50%

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