**Course Title:** Interest Rate Derivatives

**Courses #:** FRE-GY 7851

**Course Meeting Days/Times:** Mondays 6pm-8:30pm

## Description:

We would go through in this course the concepts for interest rates and their derivative products, common industry practice, and standard mathematical approaches for modeling interest rates and pricing methods for the derivatives.

## Course Syllabus:

Week 1:

Basic concepts and terminology for interest rates. We would go through the basic concepts inlucding interest rates for continuous versus discrete tie, compound convention and instantaneous forward rates. We would also introduce the concept of zero-coupon bonds, coupon baring bond, yield and duration.

Week 2:

We would introduce the standard Interest rate instruments: MMA, ZCB, forward rate, and vanilla interest rate derivatives such as swaps and swaptions, and the basis for their valuation.

Week 3 and Week 4:

We would briefly review in this week the basic concepts for stochastic process and stochastic differential equations, their application to pricing options, Black-shole model, as well as the concepts of measures and Martingales.

Week 5 and Week 6:

We would the methods of stochastic calculus and go deeper into modeling for interest rates, introducing some commonly known models for interest rates and interest rate swaptions in industry, ranging from single factor model to more complicated models such as HJM.

Week 7:

We would discuss additional topics including risks involving interest rate derivatives, practical method for implementing interest rate derivatives models, computer simulation methods, and etc..

## Evaluation:

Assignments will be posted each week after the lecture. A single research topic is assigned by week 4 in place of final exam. Grading will be based on 75% from assignments and 25% from the research topic.

## Reference:

1. Fundamentals of futures and options markets (9th ed.), John Hull
2. Interest rate swaps and derivatives, Howard Corb
3. The concepts and practices of mathematical finance, Mark S. Joshi
4. On Quantitative Finance, Paul Wilmott
5. Stochastic Calculus and Financial Applications, J. Michael Steele