22S:273 (ACTS:7730) Advanced Topics in Actuarial Science/Financial Mathematics - Stochastic Interest Rate Models

Instructor: Dr. Qihe Tang

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- Course Schedule: 9:30 A – 10:20 A, Monday, Wednesday and Friday, 75 SH
- Office Hours: 10:30 A – 11:30 A, Monday, Wednesday and Friday, or by appointment
- ICON web site: http://icon.uiowa.edu
- DEO: Professor Luke Tierney; 241 SH; E-mail: luke-tierney@uiowa.edu; Phone: (319) 335-0712

Course Description

Modeling interest rate markets and bond markets, which is at the core of financial mathematics, is fascinating and complex. In this course, we shall follow the first nine chapters of the monograph Cairns (2004) to learn tools required for the arbitrage-free modeling of the dynamics of interest rate markets and bond markets. It will cover various key models and topics in the field and seek applications to actuarial science.

Intended topics include:
1. Introduction to Bond Markets
2. Arbitrage-Free Pricing
3. Discrete-Time Binomial Models
4. Continuous-Time Interest Rate Models
5. No-Arbitrage Models
6. Multifactor Models
7. The Forward-Measure Approach
8. Positive Interest
9. Market Models

This course is designed for graduate students or high-level undergraduate students with a good background of mathematics, probability and statistics. It will stress the fundamentals and explore topics at a somewhat technical level. Nevertheless, the course will be made self-contained so that students who are strong in mathematics but have not taken a stochastic analysis course before can still follow.

An important feature of this course is that, while studying the intended materials and a few selected papers, we shall initiate and focus on interesting research problems, either
theoretical or applied, in the interdisciplinary area of statistics, insurance and finance. The course is particularly suitable for those who desire to pursue a research topic in actuarial science and financial mathematics.

Main References

- A list of papers and book chapters selected from the recent literature of insurance, finance and risk management.

Evaluation System

- There will be two homework assignments, counting for 50%.
- At the end of October, a list of papers selected from the recent literature of insurance and finance will be released. Each student will be asked to pick up one from the list, to study it and make a thirty-minute presentation. This final project counts for 40%.
- Class attendance and engagement in discussions are required and they count for the other 10%.
- Each student has the option to choose an A/B/C/D grade or an S/U grade.

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For the CLAS (College of Liberal Arts and Sciences) policies and procedures, please click the link: [http://www.clas.uiowa.edu/faculty/teaching/policies.shtml](http://www.clas.uiowa.edu/faculty/teaching/policies.shtml)