Fall 2013

Instructor: Dr. Qihe Tang

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- Course Schedule: 9:30 A – 10:20 A, Monday, Wednesday and Friday, 150 SH
- Office Hours: 10:30 A – 11:30 A, Monday, Wednesday and Friday, or by appointment
- ICON web site: http://icon.uiowa.edu
- DEO: Dr. Luke Tierney; 241 SH; Email: luke-tierney@uiowa.edu; Phone: 319-3350712

Course Description

The prevalence of rare events accompanied by disastrous economic and social consequences, the so-called Black–Swan events, makes today’s world far different from just decades ago. Examples of such events during the recent past include the September 11, 2001 attacks, the 2004 Indian Ocean earthquake and tsunami, the 2008 Sichuan earthquake, the 2010 Haiti earthquake, the 2011 Japan earthquake, tsunami and nuclear crisis, and the 2012 Hurricane Sandy. The recent global recession, which was triggered by the collapse of the sub-prime mortgage market in the United States in 2008, is arguably one of the worst global recessions in the past century. All of these intensify the need for risk management among the insurance and financial industries. Extreme value theory plays an important methodological role within risk management for insurance, reinsurance, and finance.

In this course, we shall mainly follow the monograph Embrechts, Klüppelberg and Mikosch (1997) to learn the mathematical and statistical theory underlying extreme value theory, and seek applications of extreme value theory to insurance and finance. Intended topics include:

- Regularly Varying Functions
- Fluctuations of Sums
- Fluctuations of Maxima
- Fluctuations of Upper Order Statistics
- Statistical Methods for Extremal Events
- Time Series Analysis for Heavy-Tailed Processes
- Applications to Insurance and Finance

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 advanced statistics courses 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 three homework assignments, counting for 60%.
- 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 30%.
- 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)