

**GP 9526B Winter 2017**

## **Insuring Catastrophe Risk: Catastrophe Models, Model Creation, Portfolio Risk Management and Pricing**

**Instructor:** Dr. Gero Michel, adjunct Professor Western University, MD Chaucer Copenhagen, Senior Treaty Underwriter

**Credit:** 1 half-course

**Term and Duration:** Winter term, 1 week (5 days), March 20-24, 2017

**Locations:** Monday, March 20: Earth Sciences Boardroom BGS 1027  
Tuesday, March 21: Earth Sciences Boardroom BGS 1027  
Wednesday, March 22: HSB 16  
Thursday, March 23: SSC 1000  
Friday, March 24: SSC 1032

**Description:** Natural and man-made catastrophes continue to a) drive the fortune or misfortune of people, governments, and companies around the globe; b) demand the largest amounts of insurance and reinsurance capital; and c) attract direct investments from the capital market. Catastrophe risk assessment has evolved significantly over the last two decades, creating catastrophe-specific consulting companies and vendor models, as well as a new breed of employees called modelers. Very few science organizations have been successful in the catastrophe insurance world despite the fact that there is a significant need for science in the area. A few private vendors have however made significant returns with highly expensive tools and models. Catastrophe reinsurance, so far the largest consumer of catastrophe models and consulting is seeing considerable rate softening, and a need to allow for more bespoke and competitive models that allow minimizing costs and maximizing utility.

In this course we will examine the following questions: What do insurance executives mean when they talk about catastrophes? What is needed to understand, price, and assume catastrophe risk? How are insurance and reinsurance deals structured? What supply chain is needed to understand and insure risk? What is covered and what is excluded in policies and how are policies evolving? What is a market cycle? What models and model platforms are currently available? How is a catastrophe model created and what does it entail? How is the hazard and financial side of risk modelled? Which territories and perils are covered? What is not modelled? What is the role of a modeler? How are catastrophe risk portfolios constructed and managed? What needs to be reported to CROs, CEOs, company boards, regulators or rating agencies? Are models and processes efficient and accurate? Will the ultra-hard catastrophe vendor model market change?

This course aims to provide insight into the catastrophe insurance and reinsurance market and the products, tools and models it uses to quantify, assume and manage risk. The first section (1) will concentrate on introducing students to the catastrophe insurance and reinsurance market, its products, and decision making processes. The second section (2) will then focus on models and

model creation from hazard to financial risk and will provide insight into how these tools are created and why they are deemed to be capable of analyzing global risk ranging from assessing single risks to managing global portfolios. The last section (3) will shed a critical light on the current processes in the catastrophe market, will target the offset between supply and demand in risk assessment, discuss whether current models and processes actually do what they are supposed to do and whether current catastrophe insurance risk management is efficient or likely to change. A major theme throughout the course is the clash in communications, behavior and thought between the insurance market and science which continues to hinder their convergence.

**Evaluation Criteria:**

Evaluation tentatively will consist of the following:

- a) Daily questionnaire/quizzes (30%);
- b) Design and creation of a model (30%); and
- c) A report (40%) covering the model creation and challenges as well as its possible application in the insurance and/or any other market