EAS 4525/6525: Introduction to Weather Risk and Catastrophe Modeling

Instructor: Prof. Yi Deng
Office: ES&T 3248
Phone: 404-385-1821
Email: yi.deng@eas.gatech.edu

Prerequisites: introductory meteorology, basic knowledge of probability and statistics

Course Goals: This course is intended for junior/senior undergraduate and junior graduate students who are interested in learning about weather risk and its management in real life. The goal of the first part of the class is to provide students detailed knowledge of physical processes that lead to hazardous weather at various temporal and spatial scales. The second part of the class will introduce to the students the philosophy, concept and methodology of catastrophe modeling of natural hazards and discuss the application of catastrophe models in the insurance/reinsurance industry and in the general financial market.

Text Books:
1. *Severe and Hazardous Weather: An Introduction to High Impact Meteorology*, 4th edition, Bob Rauber, John Walsh and Donna Charlevoix, Kendall Hunt Pub Co, 2005.
(Required)

2. *Catastrophe Modeling: A New Approach to Managing Risk*, edited by Patricia Grossi and Howard Kunreuther, Springer, 2005. (Recommended)

Course Outline:
1. Overview of natural hazards
2. Review of introductory meteorology
3. Thunderstorms
4. Tornadoes
5. Hailstorms and lightning
6. Downburst
7. Tropical cyclones
8. Extratropical cyclones
9. Freezing precipitation and ice storms
10. Lake-effect snow storms
11. Great plains blizzards
12. Mountain snow storms
13. Storm track dynamics
14. Cold and heat waves
15. Mountain wind storms
16. Floods and drought
17. Basics of risk management, catastrophe model and insurance
18. Building a hurricane loss estimation model
19. Model uncertainty and application

Coursework:
1. There will be 3 homework assignments corresponding to the materials covered in lectures 1-16.
2. Each student needs to complete a course project that involves the design of a hazard module of a catastrophe model.
3. One closed book exam will be given before the start of lecture 17.
4. Each student is expected to give 1 weekly-natural-hazards review throughout the semester.

Grading: 30% Homework, 30% Exam, 30% Project, 10% hazards review.