Seminar in Enterprise Risk Management (ERM)
MTH [490 / 491 / 890 or Actuarial Capstone]

Content: A basic overview of ERM from multiple sources:
- Financial Enterprise Risk Management (Paul Sweeting / Cambridge Press)
- Industrial input from local partners, reviewing their daily experience. Topics could include Basel II/III implementation, concentration risk, portfolio management, extreme value theory, among other issues in modern risk management

Audience: Faculty, Undergraduate Students, Graduate Students/Postdoctoral fellows (in Math, Statistics, Finance, or Business Analytics), and Industrial Partners

Department: Mathematics, but with strong support from Statistics and Probability as well as Finance.

Benefits: As a relatively new program in the Midwest, MSU’s BS in Actuarial Science has been successful in providing complete ASA exam and VEE preparation. With the Society of Actuaries’ new Chartered Enterprise Risk Analyst (CERA) designation, there is a need to expand our educational goals to include advanced instruction in risk management from the actuarial viewpoint. This seminar will provide the basis for such a course in the future, while establishing in the present a fertile environment for scholarly interaction with industrial partners in developing new research lines in actuarial science at Michigan State.

Course Overview: We will cover parts of Sweeting:
- Chapters 7 and 8 as an introduction to Risk
- Review basic statistics
- Chapter 10 (Copulas)
- Chapter 11 (Introduction to Credibility)
- Chapter 12 (Extreme Value Theory)
- Chapter 14 (Quantifying Risk)
- Chapter 15 (Risk Measures)
- Chapter 18 (Economic Capital)
- Chapter 19 (Risk Frameworks)

We will also look at Value at Risk (using Jorion as our main source) to
- Define VaR
- Analyze Portfolio Risk
Discuss Liquidity Risk
Discuss Credit and Operational Risk Management

**Recommended Background:** STT 351 or STT 442 and FI 379 or FI 478 and MTH 457 or MTH 458.

**Grading (Undergraduates):** Participation is mandatory from all enrolled members. Undergraduate members will also be required to present material and a group project, depending on their number of credits. The semester project will require presentation of theory in other sections of Sweeting or Jorion as well as computation based on data related to the material. Those students who use this as teamwork experience will be graded on their ability to work with their peers and present to faculty and industry partners who will attend the presentation. The grade given to all members of the team will be on a scale of 0-20 as follows:

1.) Presentation: Ability to communicate technical ideas to possibly non-technical audience (5 pts)
2.) Computation: Ability to learn and use spreadsheets or other numerical computational software. Data must be pulled and credited from an official source. (5 pts)
3.) Written Presentation or Project Website: Final presentation of material, both overview and group contribution (10 pts)

The grade cutoffs (conditioned on regular attendance) are:

- QPA of 4.0: 18 pts
- QPA of 3.5: 16 pts
- QPA of 3.0: 14 pts
- QPA of 2.5: 12 pts
- QPA of 2.0: 10 pts
- QPA of 1.5: 9 pts
- QPA of 1.0: 8 pts

If more than two classes are missed, the student will be required to meet with the instructor to explain their absence and discuss how to make up the material.

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