MATH 588   Advanced Quantitative Risk Management

Course Description from Bulletin: (3-0-3)

> This is an advanced course on quantitative risk management. The major concepts and ideas from the modern risk management will be explained and illustrated. The course builds upon general theory of risk measures and performance measures and addresses the current regulatory requirements for market participants. (3-0-3)

Enrollment: Elective for AM and other majors

Textbook(s): Alexander J. McNeil, Rüdiger Frey & Paul Embrechts, *Quantitative Risk Management Concepts, Techniques and Tools,* Princeton University Press, First Revised Edition, 2015, ISBN9781400873210

Other required material: None

Prerequisites: MATH 474 or 475 or equivalent.

Objectives:
1. Students will understand the basic principles of quantitative risk management such as measuring the risk and measuring the performance of financial positions.
2. Students will understand the role of choosing a particular risk measure or performance measure to monitor the overall risk profile of a financial position/institution.
3. Students will learn various mathematical techniques for modeling portfolio value.
4. Students will understand the abstract mathematical concepts in defining a risk measure or a performance measure.
5. Students will understand how to apply the quantitative risk management methodologies to market data.
6. Students will work on projects by developing Python scripts to compute the risk-performance profile of financial positions by using market data.

Lecture schedule: 3 50 minute (or 2 75 minute) lectures per week

Course Outline: Hours

        c.   Aggregation and capital allocation
4. Applications   12
        a.   Market risk
        b.   Credit risk

Assessment: Homework/Projects   20-40%
                       Quizzes/Tests   25-35%
                       Final Exam   40-50%

Syllabus prepared by: Igor Cialenco and Tomasz R. Bielecki
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