

Quantitative Risk Management

Title of the Course: Quantitative Risk Management

Instructors: Zhiyuan Huang

Course Code:

Teaching Language: Chinese & English

Targeted Students:

Contact Hours: 36

Self-learning Hours: 36

Prerequisites: Applied Statistics, Advanced Operations Research

Number of learners:

Academic Year:

Credits: 2

1. Teacher Staffs

Dr. Zhiyuan Huang is currently an assistant professor in the School of Economics and Management at the Tongji University. His research focuses on robust optimization, rare-event simulation and their applications on artificial intelligent systems and machine learning.

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2. General Introduction

This course introduces methodologies that apply to quantitative analysis of risks with focus on probability, modeling, simulation and optimization methods. The course will encompass data analytics, stochastic modeling, stochastic simulation and optimization for decision under risks. The course is methodology oriented and may interests students pursuing knowledge in data analytics and quantitative decision making.

3. The Teaching Goal and Requirements of the Course

The objective of this course is to introduce the core methodologies and tools in the quantitative risk management, which aims to provide theoretical preparation for students who are interested in working or doing research in the related domain. The course

By the end of the course, students are expected to understand and master the concept of quantitative risk analysis and management, which involves knowledge in probability, statistics, simulation and optimization.

4. Main Course Content and Schedule

Unit	Class Hours	Content
1	2	Probability Basics
2	2	Risk Measures
3	4	Time Series Data and Models
4	4	Extreme Value Theory
5	4	Multivariate Model
6	4	Credit Risks
7	4	Rare-event Simulation
8	4	Decision-making Under Risks and Stochastic Optimization
9	8	Discussion and Exam

5. Teaching Methods and Measures

Lectures, discussions, case analysis.

6. Performance Evaluation: Means & weights

Evaluation Means	Weight (%)	How these means evaluate ILO
Attendance and Engagement	10	Attendance is required in this course. Students are required to present their works in class and to communicate with others.
Course Project	10	The students develop their practical ability by projects; they will cooperate to write reports after analysis of risk models and literature review.
Assignments	20	To review the student ability gained in this course to analyze and solve practical problems.
Exams	60%	Test the concepts, principles, characteristics, and methods of quantitative risk management.

7. Course Book, References and Assigned Reading Materials

- [1] McNeil, A. J., Frey, R., & Embrechts, P. (2015). Quantitative risk management: concepts, techniques and tools-revised edition. Princeton university press.
- [2] Asmussen, S., & Glynn, P. W. (2007). Stochastic simulation: algorithms and analysis. Springer Science & Business Media.
- [3] Shapiro, A., Dentcheva, D., & Ruszczyński, A. (2014). Lectures on stochastic programming: modeling and theory. Society for Industrial and Applied Mathematics.

8. Requirements of Assignment

Biweekly Homework