Shanghai Jiao Tong University

BU463 Risk Management and Derivatives (Postgraduate) (Online)

Instructor Information	Ying Wang Home Institution: East China Normal University Email: ywang@fem.ecnu.edu.cn Office Hours: Determined by Instructor

Term	December 17, 2020 - January 8, 2021	**Credits**	4 units

Course Delivery	The class will be delivered in the format of online. Other than recorded lecture videos, the instructor will arrange 5 hours' real-time interactions with students per week (via discussion forum, zoom meeting, and WeChat). The workload students are expected to complete to properly pass this course is about 10-15 hours per week.
Required Texts (with ISBN)	Financial Enterprise Risk Management, Sweeting, Paul, 2nd Edition, 2017.ISBN 978-0-521-11164-5 Value at Risk: The New Benchmark for Managing Financial Risk, Jorion, Philippe, 3rd Edition, 2007. ISBN: 0-07-135502-2 Options, Futures and Other Derivatives, John C. Hull, 6th Edition, Pearson Education, 2005. ISBN: 9787111484370
Prerequisite	Foundations of Finance Statistics

Course Overview

This course will introduce the main steps and corresponding techniques in risk management as well as the basic knowledge of advanced theories about derivatives. Firstly, we will learn the risk definitions which will help you identify the different categories of risks faced by an entity. Secondly, the risk quantification for risk modeling and aggregation will be interpreted to you, and you will learn how to construct approaches to modeling various risks and evaluate how an entity makes decisions about techniques to model, measure and aggregate risks including but not limited to stochastic processes. Moreover, the risk measures such as VaR and their properties or advantages and disadvantages will be illustrated. Additionally, the theories about economic capital will be developed, and so students will understand the concept of economic capital and techniques to allocate the cost of risks within business units. Finally, we will analyze the applicability of derivatives, synthetic securities and financial contracting may be used to reduce risk and other risk mitigation strategies or tools for a given situation, and you will further learn how to choose the most appropriate derivatives in risk management practices.

Learning Outcomes

Upon completion of this course, students will be able to:

1. Understand the types of risks faced by an entity and be able to identify and analyze the risks
2. Identify how each of the financial and non-financial risks faced by an entity can be amenable to quantitative analysis
3. Adopt economic capital for risk aggregation and capital allocation
4. Explain the advantages and disadvantages of VaR as a risk measure and identify whether the risk measure is coherent or satisfies other properties
5. Describe and apply the basic statistic models and Monte Carlo method
6. Understand the economic capital model
7. Apply appropriate risk management strategies for various risk types

Course Structure

This full online module consists of 15 pre-recorded lectures, each around 45-70 mins (max. 18 hrs). The remaining about 19 hrs are dedicated to online interaction through.

- There will be three student teamwork assignments in-class preparing for the next day's teamwork presentation. (3-4 hrs each, Incl. 1-2 hrs for each assignment and 2-3 hrs for each teamwork presentation)

- Online quiz (1 hr)

- Final project (6-8 hrs, mainly own research)

- Other remaining course time should be used to individually and autonomously prepared for the quiz and final course assessment.

Assessment Type

The assessment for this course is based on three in-class presentations, one online quiz and one final project and presentation. For the team work presentation, it is essential that students work well together as a team (about 3-5 students/team), and there will be only one team score, which means everyone within the team will receive the same score. The final project can either be worked either in groups or individually, and will be provided with guidance during the lecture time. The deadline for

submission is **Jan. 9, 10pm China time**.

Grading Policy

Online quiz	20%
In-class group presentation	30%
Final project	50%

Grading Scale is as follows

Number grade	Letter grade	GPA
90-100	A	4.0
85-89	A-	3.7
80-84	B+	3.3
75-79	B	3.0
70-74	B-	2.7
67-69	C+	2.3
65-66	C	2.0
62-64	C-	1.7
60-61	D	1.0
≤59	F (Failure)	0

Class Schedule

Date	Lecture	Readings
Day 1	**COURSE OVERVIEW & INTRO** **Part 1** **Risk Identification** - Risk concepts and risk definitions - Risk taxonomy and its application to different framework Risk definitions for the market risk, currency risk, credit risk, counterparty risk, spread risk, liquidity risk, interest rate risk, equity risk, hazard/insurance risk, inflation risk, environmental risk, pricing risk, product risk, legal risk, operational risk, project risk and strategic risk	FERM Chapter 7
Day 2	- Risk identification process - Four broad areas in risk identification - Risk identification tools - Risk identification techniques	FERM Chapter 8
Day 3	- Liquidity risk - Funding liquidity risk & asset liquidity risk and their assessment	VaR Chapter 13
Day 4	- ERM framework - Risk culture, organization, polices and procedures, building blocks **Assignment**: Reflection about risk identification and ERM framework (team work)	
Day 5	**Online Interaction** Reflection about risk identification and ERM framework (team work presentations online)	
Day 6	**Part 2** **Risk Quantification** - Two approaches to model extreme events - GEV distribution - Generalized Pareto distribution	FERM Chapter 12

Day 7	- Market and economic risk and modelling - Benchmarks - Black-Scholes Model - Interest rate models: duration and convexity - Foreign exchange risk	FERM Chapter 14
Day 8	- Credit risk - Qualitative credit models Probit and logit, discriminant analysis, k-nearest neighbor approach, support vector machines, Merton model, KMV model and credit migration model	FERM Chapter 14
Day 9	- Liquidity risk - Systemic risk - Demographic risk - Mortality risk - Volatility risk - Catastrophe risk - Trend risk - Operational risk	FERM Chapter 14
Day 10	Unquantifiable risks **Online Quiz (60 mins)**	FERM Chapter 15.5
Day 11	- VaR: Computing VaR; Nonparametric and parametric VaR - Risk measures: Why VaR as a risk measure; Four properties for coherent risk measures; Application of VaR; maxVaR - Estimaition errors - Extreme-value theory	VaR Chapter 5
Day 12	**Part 3** **Risk Management Tools and Techniques** - Portfolio Risk: Analytical Methods - Delta-Normal method, portfolio VaR, diversification benefit, marginal VaR, incremental VaR, best hedge, component VaR, efficient frontier, sharp ratio, global minimum risk portfolio	VaR Chapter 7
Day 13	- Forecasting Risk Correlations - Moving average, GARCH, EWMA - Implied volatilities and implied standard deviation	VaR Chapter 9

Day 14	- Some useful Statistics - Monte Carlo Methods - Economic capital modelling **Assignment**: Reflection about risk quantification and management tools (team work)	FERM Chapter 9 VaR Chapter 12
Day 15	**Online Interaction**：Reflection about risk quantification and management tools (team work presentation)	
Day 16	**Part 4** **Risk Mitigation Strategies** - Responses to Risk Reduce, remove, transfer, and accept Methods for management of different risks: Marker risk transfer; basis risk; hedging with futures; hedging against loss; ways to manage credit risk; credit default swaps (CDS); collateralized debt obligations (CDO).	FERM Chapter 16
Day 17	Managing credit risk, liquidity risk, systemic risk, demographic risk, operational risk, regulatory risk, technology risk, moral hazard, bias, legal, process, model, data, reputational and strategic risks **Assignment**: Reflection about comparison of risk mitigation strategies for various risks (team work)	FERM Chapter 16
Day 18	**Online Interaction** Reflection about comparison of risk mitigation strategies for various risks (team work presentations online) **COURSE CLOSURE & WRAP-UP**	