

## Risk Management and Derivatives

**Department:** FISS

**Date:** 2022/4/8

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| <b>Course Code</b>   | ECON170032  |
| <b>Course Title</b>  | Risk Management and Derivatives   |
| <b>Credit</b>  | 3   |
| <b>Credit Hours</b>  | 48  |
| <b>Course Objectives</b>   | <ul style="list-style-type: none"> <li>- Students will gain a basic structure about quantitative finance, learn the definition and application of various derivatives, and how to apply binomial trees to price financial derivatives.</li> <li>- Students will learn trading strategies involving call and put options.</li> <li>- Students will master how to apply risk measures such as Value at Risk and Expected Shortfall in risk management framework.</li> </ul>   |
| <b>Course Description</b>  | <p>This course covers forwards, futures, swaps, and options. In Part I, students will have good knowledge of how forwards, futures and swaps work, how they are used, and how they are priced. In Part II, we will introduce the mechanics of option markets, properties of stock options, options on stock indices and currencies as well as various types of exotic options. In Part III, theories about binomial trees, Wiener processes, Ito's Lemma, Black-Scholes-Merton Model will be further illustrated, and market risk measures will be covered.</p> |
| <b>Course Requirements: (e.g. pre-requisites)</b><br>Prerequisites: Foundations of Finance<br>Statistics   |   |
| <b>Teaching Methods:</b><br>Online live lectures for 12 weeks, approximately 4 hours per week  |   |
| <b>Instructor's Academic Background:</b><br>Dr. Ning ZHANG<br>University of Reading, Reading, UK<br><i>ICMA Centre, Henley Business School</i><br><b>Ph.D. in Finance</b> 2016-2020<br><b>MSc in Financial Engineering</b> 2015-2016<br><br>Sichuan University, Chengdu, China<br><i>School of Economics</i><br><b>BA in Finance</b> 2011-2015 |   |

**Course Schedule** (Please supply the details about each lesson):

| Week    | Lecture   | Readings                 |
|---------|---|--------------------------|
| Week 1  | Introduction<br>Futures Markets and Central Counterparties  | Chapter 1<br>Chapter 2   |
| Week 2  | Hedging Strategies Using Futures<br>Interest Rates          | Chapter 3<br>Chapter 4   |
| Week 3  | Determination of Forward and Futures<br>Prices              | Chapter 5                |
| Week 4  | Interest Rate Futures                                       | Chapter 6                |
| Week 5  | Swaps   | Chapter 7                |
| Week 6  | Securitization, the Credit Crisis and XVAs                  | Chapter 8<br>Chapter 9   |
| Week 7  | Mechanics of Options Markets<br>Properties of Stock Options | Chapter 10<br>Chapter 11 |
| Week 8  | Options on stock indices and currencies<br>Exotic options   | Chapter 17<br>Chapter 26 |
| Week 9  | Trading Strategies Involving Options                        | Chapter 12               |
| Week 10 | Binomial Trees<br>The Black–Scholes–Merton Model            | Chapter 13<br>Chapter 15 |
| Week 11 | The Greek letters<br>Volatility smiles                      | Chapter 19<br>Chapter 20 |
| Week 12 | Value at risk and expected shortfall                        | Chapter 22               |

**The design of class discussion or exercise, practice, experience and so on:**

Discussion: We may use WeChat, Tencent or Zoom online meetings for class discussion every week.

Practice and exams: There will be two individual projects throughout the course as below:

- Mid-term project
- Final project

**Grading & Evaluation** (Provide a final grade that reflects the formative evaluation process):**Assessment:**

|                  |     |
|------------------|-----|
| Attendance       | 10% |
| Mid-term project | 40% |
| 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   |  |

**Usage of Textbook:** ☒ Yes (complete textbook information form below) ☐ No

**Textbook Information** (No more than two textbooks) :

| Title                                  | Author       | ISBN          | Publishing time | Publisher         | Type I   | Type II  |
|--|--------------|---------------|-----------------|-------------------|--|--|
| Options, Futures and Other Derivatives | John C. Hull | 9780136939979 | 2022            | Pearson Education | <input type="checkbox"/> Self-compiled Textbook (Published)<br><input type="checkbox"/> Non-mainland Textbook<br><input type="checkbox"/> Other Textbook (Published) | <input type="checkbox"/> National Planning Textbook<br><input type="checkbox"/> Provincial and Ministerial Planning Textbook<br><input type="checkbox"/> School Level Planning Textbook<br><input type="checkbox"/> Others |
|  |              |               |                 |                   | <input type="checkbox"/> Self-compiled Textbook (Published)<br><input type="checkbox"/> Non-mainland Textbook<br><input type="checkbox"/> Other Textbook (Published) | <input type="checkbox"/> National Planning Textbook<br><input type="checkbox"/> Provincial and Ministerial Planning Textbook<br><input type="checkbox"/> School Level Planning Textbook<br><input type="checkbox"/> Others |

**Teaching References** (Including author, title, publisher, publishing time, ISBN):

Other reference books: 《Fundamentals of Futures and Options Markets》; 《Introduces Quantitative Finance》

Table column size can be adjusted according to the content.