RMBI 3110
Introduction to Risk Management and Business Intelligence
Spring, 2025
Department of Information Systems,
Business Statistics and Operation Management

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Class meets: TuTh 3:00PM - 4:20PM Rm 1007, LSK Bldg

Course Objectives and Outcomes

Objectives: This course presents concepts and techniques for risk management and business intelligence from entry level to intermediate level. We will apply modern analytic approaches to predict and evaluate risks and anomaly in market activities.

Outcomes: After completing this course, you are expected to know, how to use quantitative risk tools and business intelligence technique to help you evaluate and handle financial risks.

Course Materials

A. Reference book ” Risk Management and Financial Institutions ”, John C, Hull.

B. Reference book ”Mastering PyTorch”, Ashish Ranjan Jha

C. Reference book ”Deep Reinforcement Learning Hands-On”, Maxim Lapan.

D. You need to complete two assignments with python. Basic knowledge of Python(i.e. ISOM 2020 and ISOM 2600) is required for this course.

E. A course website (http://canvas.ust.hk) is maintained.

Evaluation

Your overall grade will be based on the following items:

A. 2 Assignments (30%): Both are grouped assignments(group size ≤ 3) The weights of two projects are 15% and 15%.

B. Final(60%):

C. Attendance(10%): you need to attend 90% lectures to get full attendance.

Course Outline

Unit I: Python for Financial Analysis

- Basics of Python programming

- Working with Pandas:

  - Pandas Series
  - Pandas DataFrame

Key Outcomes:

- Gain familiarity with Python syntax and data structures.

- Learn to manipulate and analyze financial data using Pandas.

Unit II: Risk, Return, and Portfolio Management

- Introduction to financial markets
- Definition of risk and return
- Portfolio return and the efficient frontier
- Effect of diversification on unsystematic risk in portfolios
- Systematic risk hedging using long-short portfolios

Key Outcomes:

- Understand the fundamental concepts of risk and return.
- Learn to construct and optimize portfolios.
- Explore diversification benefits and risk hedging techniques.

Unit III: Outlier Detection and Applications in Financial Markets

- Definition of outliers in financial data
- Clustering-based outlier detection techniques

Key Outcomes:

- Detect anomalies in financial markets using clustering techniques.

Unit IV: Advanced Quantitative models

- Time Series Modeling
- Multi-Factor Models
- Quantitative risk measurement
- Extreme Value Distributions
- Position size

Key Outcomes:

- Forecast asset prices using time series models and evaluate stationarity.
- Design multi-factor portfolios and analyze factor exposures.
- Compute risk metrics (VaR, CVaR) for portfolio optimization.
- Model extreme market events using EVT for tail risk hedging.

Unit V: Reinforcement Learning in Risk Management

- Introduction to reinforcement learning (RL)
- RL algorithms for risk management
- Evaluating RL-based strategies

Key Outcomes:

- Learn the fundamentals of RL and its applications in trading.
- Build RL agents to optimize dynamic risk management.
- Evaluate and backtest RL-based strategies for practical insights.

Unit VI: Risk Management with Options (Optional)

- Basics of options: Calls, puts, and payoff diagrams

- Option pricing models and implied volatility

- Reducing portfolio risk using options

- Hedging with options: Protective puts and covered calls

- Selling covered calls and cash-secured puts

Key Outcomes:

- Understand how options can be used to hedge and manage portfolio risk.

- Learn to apply options strategies for income generation and risk minimization.

Grievance Procedure

If you disagree with grades that have been assigned to your work, you have the possibility to meet instructors within one week after the grades have been published on the course website. Be specific about what it is that you don't agree with.

Academic Integrity

Academic dishonesty includes, but is not limited to, cheating, plagiarizing, fabricating of information facilitating acts of academic dishonesty by others, having unauthorized possession of examinations, submitting work of other groups, or tampering with the academic work of other groups. All exam answers must be your own, and you must not provide any assistance to other students during exams.