MS4226: FINANCIAL RISK ANALYTICS

Effective Term
Semester B 2024/25

Part I Course Overview

Course Title
Financial Risk Analytics

Subject Code
MS - Department of Decision Analytics and Operations
Course Number
4226

Academic Unit
Department of Decision Analytics and Operations (DAOS)

College/School
College of Business (CB)

Course Duration
One Semester

Credit Units
3

Level
B1, B2, B3, B4 - Bachelor's Degree

Medium of Instruction
English

Medium of Assessment
English

Prerequisites
Nil

Precursors
Nil

Equivalent Courses
Nil

Exclusive Courses
Nil

Part II Course Details

Abstract
This undergraduate course in financial risk analytics equips students with essential skills for data-driven decision-making in the financial services industry. The curriculum focuses on the application of analytical tools and statistical methods

to measure and manage credit and market risks. Students will gain a solid understanding of risk terminology in complex business environments, preparing them for real-world challenges. The course emphasizes practical techniques drawn from operations research and statistics, enabling students to effectively assess and mitigate various financial risks. Through hands-on exercises and case studies, participants will develop crucial modeling and computing skills, learning to leverage data analytics in solving financial risk management problems. By the end of the course, students will be well-prepared to apply quantitative methods in risk assessment, contributing to informed business decisions. This foundation in financial risk analytics will prove invaluable for those pursuing careers in finance, banking, or risk management.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Demonstrate a comprehensive understanding of various risk categories, including operational risk, market risk, credit risk, liquidity risk, etc.	20		x	
2	Apply and analyze appropriate models for measuring risks in complex business problems.	20		x	x
3	Assess the risks of a business organization based on statistical tools and make recommendations on managing these risks.	40		x	x
4	Demonstrate the construction of risk mitigation strategies, and align them with the needs of particular organizations.	20		x	x

A1: Attitude
Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability
Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.

A3: Accomplishments
Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

Learning and Teaching Activities (LTAs)

	LTAs	Brief Description	CILO No.	Hours/week (if applicable)
1	Interactive Lectures	Students will actively participate in interactive lectures and discussion to develop a comprehensive understanding of the fundamental concepts, analytical techniques, and practical applications of risk management.	1, 2, 3, 4	
2	Group Work	Students will complete case studies and group projects to reinforce the knowledge on risk management.	2, 3, 4	

3	Group Discussions	Students will discuss with course instructors and/ or Teaching Assistants on risk management cases in teams after class, and reflect. Students reflect their findings and difficulties in analyzing the cases, while the instructor and/ or Teaching Assistants provides directional supervision.	3, 4	

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Group Project Complete and present selected group projects to analyse a risk management cases based on analysis of the data they collect.	1, 2, 3, 4	30	
2	Individual Assignments Answer written questions in a set of assignments, by applying risk management knowledge they learn in the course.	1, 2, 3	10	

Continuous Assessment (%)

40

Examination (%)

60

Examination Duration (Hours)

2

Additional Information for ATs

Examination Students will be assessed via the examination on their understanding of the concepts and skills of risk management.

Assessment Rubrics (AR)

Assessment Task

Group Project and Presentation

Criterion

ABILITY to PRODUCE a collaboratively written report of a risk management case.

Excellent (A+, A, A-)

High

Good (B+, B, B-)
Significant

Fair (C+, C, C-)
Moderate

Marginal (D)
Basic

Failure (F)
Not even reaching marginal levels

Assessment Task
Individual Assignments

Criterion
ABILITY to PRACTISE the problem-solving skills.

Excellent (A+, A, A-)
High

Good (B+, B, B-)
Significant

Fair (C+, C, C-)
Moderate

Marginal (D)
Basic

Failure (F)
Not even reaching marginal levels

Assessment Task
Written Examination

Criterion
ABILITY to APPLY the risk management concepts to solve business problems.

Excellent (A+, A, A-)
High

Good (B+, B, B-)
Significant

Fair (C+, C, C-)
Moderate

Marginal (D)
Basic

Failure (F)

Not even reaching marginal levels

Part III Other Information

Keyword Syllabus

An Introduction to Financial Risk Terminology
Nature, scope and terminology of risk management. Trade-off between returns and risks. Simple models: Markowitz model. Data format and sources for risk analytics.

Value-at-Risk and Expected Shortfall
Risk measures. Value-at-Risk (VaR) and expected shortfalls (ES). Measurement of risks of financial portfolios. Statistical tests for VaR models.

Market Risk Analytics
Sources of market risk. Data-driven modeling and computation of market risk VaR and ES. Interest rate risk.

Credit Risk Analytics
Specifics of default risk. Default risk measurement. Credit rating. Data-driven credit scoring models. Risk measurement of credit portfolios. Credit derivatives and hedging of credit risk.

Management of Market and Credit Risk
Possible actions of risk transferring. Hedging using financial instruments.

Regulations and Compliance
Introduction to Basel Capital Accords. Regulatory capital and economic capital. Risk capital charge.

Reading List

Compulsory Readings

	Title
1	John C. Hull. 2015. Risk Management and Financial Institutions, Fourth Edition, Wiley.

Additional Readings

	Title
1	Kevin Dowd. 2002. An Introduction to Market Risk Measurement. Wiley.
2	Bart Barsens, Deniel Rosch, and Harald Scheule. 2017. Credit Risk Analytics: Measurement Techniques, Applications and Examples in SAS. Wiley.