

EF5370: MATHEMATICS AND STATISTICS FOR FINANCIAL SERVICES

Effective Term

Semester B 2024/25

Part I Course Overview

Course Title

Mathematics and Statistics for Financial Services

Subject Code

EF - Economics and Finance

Course Number

5370

Academic Unit

Economics and Finance (EF)

College/School

College of Business (CB)

Course Duration

One Semester

Credit Units

3

Level

P5, P6 - Postgraduate 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 course aims to equip students with the quantitative skills to carry out analysis in the insurance profession and to develop students' creativity and originality through teaching, learning, and assessment tasks. The lectures encourage students to raise questions, apply innovative approaches, and discover optimal ways to deal with problems through in-class participation and discussion, which will also enhance students' understanding of mathematical concepts.

Students are required to apply fundamental mathematical concepts to solve real world cases and designed scenarios. A final interpretation of the numerical solution with economic concepts shows the accomplishment of students' ability to discover and innovate.

Course Intended Learning Outcomes (CILOs)

CILOs		Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Understand the fundamental concepts of interest theory, probability and risk measures. Students are encouraged to discover the underlying probability theories in real-world cases and/or designed scenarios.	30	x	x	
2	Understand the basic concepts in life and non-life insurance mathematics. The attitude and ability of discovery and innovation are developed in deriving the mathematical solution to some insurance exercises.	35	x	x	
3	Apply various mathematical methods in life and non-life insurance in an innovative way. The mathematical solutions need to be supported by sound economic interpretations.	35	x	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	Lecture	To provide basic concepts and structure of interest, probability, life and non-life insurance theories.	1, 2, 3
			-

2	In-class exercise, homework	To give students hands-on experience with applications of concepts. Students are encouraged to apply mathematical concepts to solve real world problems. It helps cultivate students' attitudes to innovate and apply.	1, 2, 3	-
3	Examination	To assess the students' understanding of mathematical methods in finance and insurance, and the ability to apply them and make innovations.	1, 2, 3	-

Assessment Tasks / Activities (ATs)

ATs		CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	In-class exercise, homework	1, 2, 3	50	

Continuous Assessment (%)

50

Examination (%)

50

Examination Duration (Hours)

2

Additional Information for ATs

Students are required to pass both coursework and examination components in order to pass the course.

Assessment Rubrics (AR)**Assessment Task**

In-class exercise, homework (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion

Demonstrate the capability of applying the mathematical concepts and methods to tackle some problem-solving questions or exercises as assigned by the lecturer.

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

Examination (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion

Demonstrate having good understanding of the mathematical concepts and methods in relation to finance and insurance business as well as the capability of applying them and making innovation.

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

In-class exercise, homework (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion

Demonstrate the capability of applying the mathematical concepts and methods to tackle some problem-solving questions or exercises as assigned by the lecturer.

Excellent

(A+, A, A-) High

Good

(B+, B) Significant

Marginal

(B-, C+, C) Basic

Failure

(F) Not even reaching marginal levels

Assessment Task

Examination (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion

Demonstrate having good understanding of the mathematical concepts and methods in relation to finance and insurance business as well as the capability of applying them and making innovation.

Excellent

(A+, A, A-) High

Good

(B+, B) Significant

Marginal

(B-, C+, C) Basic

Failure

(F) Not even reaching marginal levels

Part III Other Information

Keyword Syllabus

- (1) Review of Interest Theory
 - a) Simple interest, Compound interest
 - b) Future value, Present value, Net present value, Discount rate
 - c) Annuities
- (2) Overview of Probability
 - a) Random variables
 - b) Probability densities
 - c) Univariate and multivariate probability distributions
 - d) Covariance and correlation coefficients
- (3) Life Insurance Mathematics
 - a) The life table
 - b) Life annuities
 - c) Life insurance
- (4) Non-life Insurance Mathematics
 - a) The collective risk models
 - b) Introduction to stochastic processes

Reading List

Compulsory Readings

Title	
1	Fundamentals of Actuarial Mathematics, 2nd ed. (2011), by S. David Promislow, John Wiley & Sons

Additional Readings

Title	
1	Risk Management and Insurance, current edition, by A. E. Harrington and G. R. Niehaus, McGraw-Hill
2	Section 1 (Interest Theory) - The Theory of Interest, 3rd ed. (2009), by S. G. Kellison, Irwin/McGraw-Hill
3	Section 2 (Probability) - A First Course in Probability, 8th ed. (2009), by S. M. Ross
4	Section 3 (Life Insurance and Risk) - Life Insurance Mathematics, 3rd ed. (1997), by H. Gerber, Springer-Verlag
5	Section 4 (Non-life Insurance) - Non-life Insurance Mathematics: An Introduction with Stochastic Processes (2004), by Thomas Mikosch, Springer