MS6601: STATISTICAL MODELLING IN ECONOMICS AND FINANCE

Effective Term
Semester A 2025/26

Part I Course Overview

Course Title
Statistical Modelling in Economics and Finance

Subject Code
MS - Decision Analytics and Operations
Course Number
6601

Academic Unit
Decision Analytics and Operations (DAOS)

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
MS5218 Applied Linear Statistical Models

Precursors
Nil

Equivalent Courses
MS6217 Statistical Modelling in Economics and Finance

Exclusive Courses
Nil

Part II Course Details

Abstract

This graduate-level course in financial econometrics explores advanced techniques for analyzing financial time series data. The course covers the following key topics: (1) Linear Time Series Models: Students will learn to model and forecast financial time series using methods such as autoregressive (AR), moving average (MA), and autoregressive integrated moving average (ARIMA) models. (2) Volatility Modeling: The course delves into ARCH and GARCH models, which are widely used for modeling and forecasting the volatility of financial assets, with applications in risk management and portfolio optimization. (3) Cointegration and Pairs Trading: Cointegration analysis will be introduced as a tool for identifying long-run relationships between financial variables, which can then be leveraged for pairs trading strategies. (4) Factor Models: The course covers factor models, which are used to explain the cross-sectional variation in asset returns, with implications for portfolio management and asset pricing. Throughout the course, students will gain hands-on experience in implementing these techniques using appropriate software, developing a strong foundation in financial econometrics that can be applied in various finance-related domains.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Apply appropriate statistical and econometric techniques to analyze and solve business problems.	50	x	x	x
2	Evaluate the validity and limitations of statistical results and communicate them effectively to both specialists and non-specialists.	10		x	x
3	Select the most suitable statistical methods for given business contexts and justify the choices made.	10	x	x	x
4	Implement relevant computer software to execute statistical and econometric analyses proficiently.	20		x	
5	Collaborate effectively both in teams and individually to conduct financial econometric research and present findings coherently.	10	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	Classroom Lectures	Engage in interactive classroom lectures where real-world examples are discussed, allowing you to apply statistical and econometrics techniques to business problems. Participate in class discussions and debates to analyze and evaluate the validity of statistical results, as well as the limitations of the techniques used	1, 3, 4	
2	Computer Lab Tutorials	Attend computer lab tutorials where you will practice implementing statistical and econometrics techniques using relevant software. Engage in hands-on exercises and practical assignments during computer lab tutorials, where you will work individually and in groups to solve business problems using statistical and econometrics techniques.	1, 2, 4, 5	
3	Group Assignment	Collaborate with your peers in a group assignment that involves conducting financial econometric research. Through this assignment, you will apply various statistical methods, evaluate the validity of the results, and present your findings coherently.	1, 2, 3, 4, 5	

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Assignments	1, 2, 3, 4, 5	15	
2	In-Class Midterm Test	2, 3	15	
3	Project	1, 2, 3, 4, 5	20	

Continuous Assessment (%)

50

Examination (%)
50

Examination Duration (Hours)
3

Assessment Rubrics (AR)

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

Criterion
Core concepts and ideas; use of appropriate statistical methods

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

Criterion
Core concepts and ideas; use of appropriate statistical methods

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

Criterion
Ability in using the appropriate statistical methods to solve the business problem

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
Assessing students' understanding of the knowledge in the technical aspects of the subjects.

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

Criterion
Assessing students' understanding of core concepts and use of appropriate statistical methods.

Excellent
(A+, A, A-) High

Good
(B+, B) Significant

Marginal

(B-, C+, C) Moderate

Failure
(F) Inadequate

Assessment Task
In-Class Midterm Test (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion
Assessing students' ability in core concepts and problem solving using statistical models

Excellent
(A+, A, A-) High

Good
(B+, B) Significant

Marginal
(B-, C+, C) Moderate

Failure
(F) Inadequate

Assessment Task
Project (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion
Assessing students' ability to code and solve problems with appropriate statistical models

Excellent
(A+, A, A-) High

Good
(B+, B) Significant

Marginal
(B-, C+, C) Moderate

Failure
(F) Inadequate

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

Criterion
Assessing students' understanding of the knowledge in the technical aspects of the subjects.

Excellent
(A+, A, A-) High

Good

(B+, B,) Significant

Marginal

(B-, C+, C) Moderate

Failure

(F) Inadequate

Part III Other Information

Keyword Syllabus

1. Introduction
- Linear Time Series
- Nonlinear Time Series
- Introduction to R
2. Volatility Modeling
- ARCH and GARCH
- More Volatility Models
- Joint Estimation for Expected Return and Volatility
3. Multivariate Time Series
- Vector Autoregression
- Random Walk and Unit Root Test
- Cointegration and Paris Trading
4. Factor Models
- Risk Anomalies
- Time Series Regression
- Cross-Sectional Regression
- Capital Asset Pricing Model
- Fama-French Factor Models
5. Factor-based Investing
- Evaluation of Factor Models
- Factor-based Portfolio Optimization

Reading List

Compulsory Readings

	Title
1	An Introduction to Analysis of Financial Data with R by Ruey S. Tsay, John Wiley 2012.

Additional Readings

	Title
1	Analysis of Financial Time Series by Tsay, RS , John Wiley 2010.
2	Ang, A. Asset management: A systematic approach to factor investing. Oxford University Press, 2014.
3	Carmona, R. Statistical analysis of financial data in R. Vol. 2. New York: Springer, 2014.