

SDSC6016: PREDICTIVE ANALYTICS AND FINANCIAL APPLICATIONS

Effective Term

Semester B 2025/26

Part I Course Overview

Course Title

Predictive Analytics and Financial Applications

Subject Code

SDSC - Data Science

Course Number

6016

Academic Unit

Data Science (DS)

College/School

College of Computing (CC)

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 focuses on the application of predictive analytics to financial data. We will review some central tools used in economic and financial forecasting, including predictive regressions, time series models, variable and model selection, forecast combinations, shrinkage methods, and vector autoregression. We will explore how these tools can be applied to predict the returns to financial assets, including global equities and commodities, paying special attention to the different types of forecasts - point forecast, interval forecast, or density forecast. We will also introduce modern predictive methods, such as penalized regressions and neural networks, and their applications to making predictions in financial markets. Students are expected to gain working knowledge of how to apply predictive analytics to economics and financial problems.

Course Intended Learning Outcomes (CILOs)

CILOs		Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Explain the workhorse predictive analytics used for financial data.	25	x		
2	Apply models of financial asset returns using predictive regressions, time series models, and machine learning algorithms.	20	x	x	
3	Apply predictive analytics to forecast financial asset returns.	30	x	x	
4	Evaluate different predictive models and their usage.	25	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	Lectures	Students will engage in formal lectures covering different predictive analytics and their applications to issues in economics and finance. Students are expected to actively participate in class discussions.	1, 2, 3, 4	2 hours/week
2	Tutorials	Students will participate in tutorials in which discussions revolve around implementation of various predictive techniques discussed in class.	2, 3, 4	1 hour/week

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks ("- for nil entry)	Allow Use of GenAI?
1	Midterm Test	1, 2, 3	30	-	No
2	Homework assignments	2, 3, 4	40	-	Yes

Continuous Assessment (%)

70

Examination (%)

30

Examination Duration (Hours)

2

Minimum Examination Passing Requirement (%)

30

Assessment Rubrics (AR)**Assessment Task**

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

Criterion

The midterm test provides students with an opportunity to reflect what they have learned and covers the topics taught before the midterm.

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

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

Criterion

The midterm test provides students with an opportunity to reflect what they have learned and covers the topics taught before the midterm.

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

The final examination covers all the topics taught in the course.

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

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

Criterion

The midterm test provides students with an opportunity to reflect what they have learned and covers the topics taught before the midterm.

Excellent

(A+, A, A-) High

Good

(B+, B) Moderate

Marginal

(B-, C+, C) Basic

Failure

(F) Not even reaching marginal levels

Assessment Task

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

Criterion

The homework assignments allow students to practice what is learned from the lectures and assess the degree of their understanding.

Excellent

(A+, A, A-) High

Good

(B+, B) Moderate

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

The final examination covers all the topics taught in the course.

Excellent

(A+, A, A-) High

Good

(B+, B) Moderate

Marginal

(B-, C+, C) Basic

Failure

(F) Not even reaching marginal levels

Additional Information for AR

The examination, midterm test, and homework assignments will be marked according to the respective marking schemes. The marking schemes will be designed at the time they are set. The grades will then be awarded according to the marks attained.

Part III Other Information

Keyword Syllabus

- Predictive regressions
- Time series models
- Trends and seasonality
- Variable selection

- Model selection
- Model and forecast combination
- Shrinkage
- Point forecast
- Interval and density forecasts
- Forecasting the stock market using machine learning techniques
- Vector autoregression

Reading List

Compulsory Readings

Title	
1	Forecasting in Economics, Business, Finance, and Beyond, Francis X. Diebold

Additional Readings

Title	
1	Online learning material is provided via University computer network.