

# DSC3022: FINANCIAL DATA ANALYTICS FOR INVESTMENTS

---

## Effective Term

Semester A 2026/27

## Part I Course Overview

### Course Title

Financial Data Analytics for Investments

### Subject Code

DSC - Data Science

### Course Number

3022

### Academic Unit

Data Science (DS)

### College/School

College of Computing (CC)

### Course Duration

One Semester

### Credit Units

3

### Level

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

### Medium of Instruction

English

### Medium of Assessment

English

### Prerequisites

MA1503 Linear Algebra with Applications  
and  
(MA2506 Probability and Statistics or MA2510 Probability and Statistics)

### Precursors

Nil

### Equivalent Courses

SDSC3022 Financial Data Analytics for Investments

### Exclusive Courses

Nil

## Part II Course Details

### Abstract

The goal of this course is to build a foundation for analyzing financial investments. We will cover cross-sectional and time-series facts central to modern financial economics such as the size effect, value effect, momentum, and return predictability. We will introduce these facts through the lens of both traditional tools available in financial economics such as predictive regressions and panel regressions, as well as more modern predictive analytics such as dimensionality reduction and other machine learning techniques. We will also equip students with an introductory understanding of the investment management industry, hedge funds, and high-frequency trading. At the end of this course, students should have a solid background in the issues in modern finance as well as the tools in data science used to address them.

### Course Intended Learning Outcomes (CILOs)

| CILOs |                                                                                                             | Weighting (if app.) | DEC-A1 | DEC-A2 | DEC-A3 |
|-------|-------------------------------------------------------------------------------------------------------------|---------------------|--------|--------|--------|
| 1     | Articulate the difference between cross-sectional and time-series predictability and their uses in finance. | 20                  | x      |        |        |
| 2     | Model stock returns using cross-sectional, time-series, and machine learning techniques.                    | 25                  | x      | x      |        |
| 3     | Discuss modern predictive techniques to capture variation in stock-level returns.                           | 30                  | x      | x      |        |
| 4     | Evaluate the attractiveness of investment strategies using various data science approaches.                 | 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 to gain knowledge on issues in finance as well as the various approaches used to address them. We will incorporate both traditional tools and modern predictive analytics in the methodology. | 1, 2, 3, 4 | 3 hours/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 | 3, 4     | 30            | -                          | Yes                 |

**Continuous Assessment (%)**

60

**Examination (%)**

40

**Examination Duration (Hours)**

2

**Minimum Continuous Assessment Passing Requirement (%)**

30

**Minimum Examination Passing Requirement (%)**

30

**Additional Information for ATs**

Note: To pass the course, apart from obtaining a minimum of 40% in the overall mark, a student must also obtain a minimum mark of 30% in both continuous assessment and examination components.

**Assessment Rubrics (AR)****Assessment Task**

Midterm Test

**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 assignments

**Criterion**

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

**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

**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

**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**

- Cross-sectional and time-series predictability
- Cross-sectional stock market anomalies
- Multifactor models

- Return predictability
- Forecast combinations
- Penalized regressions
- Cross sectional and panel regressions
- Dimensionality reduction techniques
- Investment strategies
- Machine learning applications to stock returns
- Hedge funds
- High-frequency trading

## Reading List

### Compulsory Readings

| Title |                                                                                                       |
|-------|-------------------------------------------------------------------------------------------------------|
| 1     | Asset Pricing: Revised Edition, John H. Cochrane, Princeton University Press                          |
| 2     | The Elements of Statistical Learning, Trevor Hastie, Robert Tibshirani, and Jerome Friedman, Springer |

### Additional Readings

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