SDSC6013: TOPICS IN FINANCIAL ENGINEERING AND TECHNOLOGY

Effective Term
Semester A 2025/26

Part I Course Overview

Course Title
Topics in Financial Engineering and Technology

Subject Code
SDSC - Data Science
Course Number
6013

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

Innovation of technologies are transforming the financial services industry disruptively in realms of consumer financial services, including mobile payments, foreign exchange, marketplace lending, saving and investing, financial advice (robo-advisers), and personalized insurance. This course aims to understand the economic and technological forces driving this change in areas such aspayments, financing, investments, and insurance. We will first review fundamental concepts and models of financial engineering, and then centre around selected cases with industrial applications and study selected academic papers in order to understand the underlying economics, the technology, and the research matters. The course intends to be interactive, including classroom discussion, lectured cases, group projects, and possibly guest speakers.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Explain clearly the fundamentals of the financial engineering and financial technologies in the context of specific applications.	15	x		
2	Elaborate in details the key ideas behind each area that enable it to be successful for its purpose.	25	x	x	
3	Assess prevailing practices in financial engineering and fintech and identify approaches that enhance the existing financial services.	30	x	x	x
4	Utilize ideas and methods learned to solve given practical problems in potential areas.	30	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	In-class Activities	Students will engage in formal lectures and interactive discussions on identified latest academic research papers and/or industrial practices of identified topics.	1, 2, 3, 4	26 hours/semester

2	Project	Students will participate in a term project so that students to learn problem-solving using selected projects pertaining to the subjects discussed.	1, 2, 3, 4	13 hours/semester

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks ("-" for nil entry)	Allow Use of GenAI?
1	Class Participation: - Attendance and in-class discussion are strongly emphasized for this course. - In particular, the in-class discussion component will focus on discussing selected research papers and identified industrial practice through student groups. - Scoring favour those demonstrate well in these activities.	1, 2, 3, 4	10	-	No
2	Project Presentation: - Presenting the independent work of the course project, either single-person or a group, on selected topics provided by the lecture. - Assessments will be based on individual's presentation performance, in terms of clarity, structure, depth, innovation, and quality of answers to questions.	1, 2, 3, 4	30	-	No

3	Course Paper: - A report paper written in accordance with the course project on selected topics provided by the teacher. - Assessments will be based on the quality of the report paper, in terms of the academic difficulties and the depth of the paper, quality of the empirical/ numerical implementation, availability of the codes. Special points will be given to whether there are new discoveries throughout the process of the conducting the project.	1, 2, 3, 4	30	-	No

Continuous Assessment (%)

70

Examination (%)

30

Examination Duration (Hours)

2

Minimum Examination Passing Requirement (%)

30

Assessment Rubrics (AR)

Assessment Task

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

Criterion

Percentage of classroom attendance.
The quality and intensity of participating in-class discussion, answering questions, etc.

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

Criterion
Quality of the presentation.
Clarity, structure, depth, innovation, and quality of answering questions in terms of demonstration of mastering the basic concepts and the ability to apply methods learned to fintech 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

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

Criterion
Quality of report paper.
Academic depth, implementation quality, and the quality of writing. Particular emphasis will be given to whether there are new discoveries throughout the process of the conducting the project, and whether the report paper show ability to solve conceptual and real-world problems using methods learned in class.

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

Submitted written work

Excellent

(A+, A, A-):
For all 4 CILOs, strong evidence of original thinking; good organization, capacity to analyse and synthesize; superior grasp of subject matter; evidence of extensive knowledge base.

Good

(B+, B, B-):
For at least 3 out of 4 CILOs, evidence of grasp of subject, some evidence of critical capacity and analytic ability; reasonable understanding of issues; evidence of familiarity with literature.

Fair

(C+, C, C-):
For at least 3 out of the 4 CILOs, evidence that student is profiting from the university experience; understanding of the subject; ability to develop solutions to simple problems in the material.

Marginal

(D):
For at least 3 out of the 4 CILOs, sufficient familiarity with the subject matter to enable the student to progress without repeating the course.

Failure

(F):
Little evidence of familiarity with the subject matter; weakness in critical and analytic skills; limited, or irrelevant use of literature.

Assessment Task

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

Criterion

Percentage of classroom attendance.
The quality and intensity of participating in-class discussion, answering questions, etc.

Excellent

(A+, A, A-) High

Good

(B+, B) Significant

Marginal

(B-, C+, C) Moderate

Failure

(F) Not even reaching marginal levels

Assessment Task

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

Criterion

Quality of the presentation.
Clarity, structure, depth, innovation, and quality of answering questions in terms of demonstration of mastering the basic concepts and the ability to apply methods learned to fintech problems.

Excellent

(A+, A, A-) High

Good

(B+, B) Significant

Marginal

(B-, C+, C) Moderate

Failure

(F) Not even reaching marginal levels

Assessment Task

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

Criterion

Quality of report paper.
Academic depth, implementation quality, and the quality of writing. Particular emphasis will be given to whether there are new discoveries throughout the process of the conducting the project, and whether the report paper show ability to solve conceptual and real-world problems using methods learned in class.

Excellent

(A+, A, A-) High

Good

(B+, B) Significant

Marginal

(B-, C+, C) Moderate

Failure

(F) Not even reaching marginal levels

Assessment Task

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

Criterion

Submitted written work

Excellent

(A+, A, A-):
For all 4 CILOs, strong evidence of original thinking; good organization, capacity to analyse and synthesize; superior grasp of subject matter; evidence of extensive knowledge base.

Good

(B+, B):
For at least 3 out of 4 CILOs, evidence of grasp of subject, some evidence of critical capacity and analytic ability; reasonable understanding of issues; evidence of familiarity with literature.

Marginal

(B-, C+, C):
For at least 3 out of the 4 CILOs, evidence that student is profiting from the university experience; understanding of the subject; ability to develop solutions to simple problems in the material.

Failure

(F):
For at least 3 out of the 4 CILOs, sufficient familiarity with the subject matter to enable the student to progress without repeating the course.

Part III Other Information

Keyword Syllabus

- Financial Institutions
- Money, Cash Market and Interest Rates
- Yield Curves and their Constructions
- Single Name and Portfolio Credit Risk
- Market Risk and Value-at-Risk
- Options and Implied Volatilities
- Other selected topics, e.g.
-- Data-driven Investments and Risk Management
--The Fintech Approach to Business Analytics

Reading List

Compulsory Readings

	Title
1	Lecture Notes; Selected Academic Papers.

Additional Readings

	Title
1	NIL