SDSC4018: AI IN SYSTEMATIC TRADING

Effective Term
Semester A 2022/23

Part I Course Overview

Course Title
AI in Systematic Trading

Subject Code
SDSC - School of Data Science
Course Number
4018

Academic Unit
School of Data Science (DS)

College/School
School of Data Science (DS)

Course Duration
One Semester

Credit Units
3

Level
B1, B2, B3, B4 - Bachelor's 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 offers students the review of financial systems as well as machine learning, artificial intelligence, and optimization techniques utilized in nowadays financial fields. Students will obtain technical knowledge in collecting a

variety of financial data, developing trading algorithms, and optimizing overall portfolio performance. The goal of this course is to help student establish a clear map of frameworks for developing the artificial intelligence serving financial systems.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Review important concepts in financial systems.	10	x		
2	Introduce methods, algorithms, and techniques in machine learning, artificial intelligence, and optimization utilized in modern financial systems.	30	x		
3	Familiarize the framework of integrating knowledge in machine learning, artificial intelligence, and optimization to construct intelligence for financial systems.	30	x	x	
4	Develop artificial intelligence tools to generate trading strategies, manage financial risk, optimize investment portfolios, and design and value financial products	30	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.

Teaching and Learning Activities (TLAs)

	TLAs	Brief Description	CILO No.	Hours/week (if applicable)
1	Lectures and in-class discussions	Lectures, in-class exercises, in-class Q&A and discussions will be used to implement CILOs 1-4.	1, 2, 3, 4	26 hours/semester
2	Tutorials	A term project will be given to students. In the term project, students will apply the financial tools discussed in the course to practical problems in financial engineering.	2, 3, 4	13 hours/semester

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Assignments	1, 2, 3	10	
2	Project	2, 3, 4	30	

Continuous Assessment (%)

40

Examination (%)

60

Examination Duration (Hours)

2

Assessment Rubrics (AR)

Assessment Task

Assignments

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

Project

Criterion

Project presentation

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

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Assessment Task

Examination

Criterion

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Part III Other Information

Keyword Syllabus

Review of financial systems;
Trading systems
Financial data collection and processing
Machine learning in developing trading algorithms
Artificial intelligence in supervising financial systems
Portfolio theory
Optimization methods in trading and investment

Robo-Advisors.

Reading List

Compulsory Readings

	Title
1	Lecture notes and slides provided by the instructor

Additional Readings

	Title
1	Essentials of Investments, Z. Bodie, A. Kane and A. Marcus, 9th Edition, McGraw-Hill 2013
2	Artificial Intelligence; A Modern Approach, S. J. Russel and P. Norvig, 3rd Edition, Prentice Hall, 2009
3	Investment Science, D. G. Luenberger, Oxford University Press.
4	Financial Markets and Institutions, Frederic S. Mishkin and Stanley G. Eakins, 8th Edition, Pearson International, Prentice Hall, 2015