IS4861: MACHINE LEARNING FOR BUSINESS

Effective Term
Semester A 2023/24

Part I Course Overview

Course Title
Machine Learning for Business

Subject Code
IS - Information Systems
Course Number
4861

Academic Unit
Information Systems (IS)

College/School
College of Business (CB)

Course Duration
One Semester

Credit Units
3

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

Medium of Instruction
English

Medium of Assessment
English

Prerequisites
(CB2200 Business Statistics or MA2506 Probability and Statistics) and one programming course (IS3230 Java Programming for Business or IS2240 Python Programming for Business or CB2240 Introduction to Business Programming in Python)

Precursors
IS4834 Business Intelligence and Analytics

Equivalent Courses
Nil

Exclusive Courses
Nil

Part II Course Details

Abstract

Machine learning plays a central role in the emergence of technology trends such as big data, artificial intelligence, and FinTech. This course introduces students to the real world challenges of implementing machine learning based business solutions. The main topics covered in this course include advanced machine learning techniques (clustering, classification, and regression), Ensemble Method, Neural Network, Deep Learning, sequence models, and so on. This course is an introduction to advanced machine learning and algorithms relevant for business students. Through this course, students will develop a basic understanding of the concepts in machine learning and apply these knowledge to derive business solutions in a wide range of domains. Students will get hands-on experience with machine learning and artificial intelligence from a series of business case studies.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Describe the main concepts in machine learning such as classification, ensemble method, and deep learning.	30	x		
2	Apply the concepts and techniques of machine learning in a wide range of business applications.	20		x	x
3	Develop solutions based on machine learning algorithms using R and Python programming language.	30		x	x
4	Identify appropriate tools and techniques in machine learning to create innovative business solutions.	20	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 self-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	TLA1:Lecture	Explain the fundamental and emerging supervised and unsupervised machine learning techniques that are applied in contemporary business applications.	1, 2	Seminar:3 Hours/Week

2	TLA2:Laboratory	Demonstrations by instructor and hands-on exercises by students to reinforce various machine learning techniques learnt in lectures.	2, 3, 4	Seminar:3 Hours/Week
3	TLA3:Group Project	Students will have to complete a group project requiring them to adopt machine learning to solve a specific business problem.	2, 3, 4	Seminar:3 Hours/Week

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks
1	AT1:Continuous Assessment Students are expected to participate in laboratory exercises using R or Python programming languages. Students are expected to discuss and reflect on the materials covered in the lecture. The specific assessments include: After-class individual programming assignement	1, 2, 3, 4	30	
2	AT2:Group Project A group project, which includes a written report and oral presentation, will be assigned to students to apply the concepts and techniques of machine learning to solve business problems.	2, 3, 4	30	

Continuous Assessment (%)

60

Examination (%)

40

Examination Duration (Hours)

2

Assessment Rubrics (AR)

Assessment Task

AT1:Continuous Assessment

Criterion

Ability to accurately describe the key concepts of machine learning and deep understanding of their importance to business.

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
AT1:Continuous Assessment

Criterion
Ability to evaluate accurately the requirements of various machine learning algorithms in order to solve different business 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
AT1:Continuous Assessment

Criterion
Capability to compare and evaluate accurately the advantages and disadvantages of different machine learning techniques for the same purpose.

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
AT1:Continuous Assessment

Criterion
Capability to innovatively analyze and apply machine learning techniques to solve business 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
AT2:Group Project

Criterion
Ability to evaluate accurately the requirements of various machine learning algorithms in order to solve different business 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

AT2:Group Project

Criterion

Capability to compare and evaluate accurately the advantages and disadvantages of different machine learning techniques for the same purpose.

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

AT2:Group Project

Criterion

Capability to innovatively analyze and apply machine learning techniques to solve business 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

AT3:Final Examination

Criterion

Ability to accurately describe the key concepts of machine learning and deep understanding of their importance to business.

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

AT3:Final Examination

Criterion

Ability to evaluate accurately the requirements of various machine learning algorithms in order to solve different business 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

AT3:Final Examination

Criterion

Capability to compare and evaluate accurately the advantages and disadvantages of different machine learning techniques for the same purpose.

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

AT3:Final Examination

Criterion

Capability to innovatively analyze and apply machine learning techniques to solve business 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

Part III Other Information

Keyword Syllabus

Unsupervised learning; Supervised learning; Sampling; Ensemble Methods; Feed Forward Neural Network; Recurrent Neural Networks; Deep Learning; Sequence models; Tensorflow; Machine learning applications in Sentiment Analysis; Machine learning applications in tick-level stock trading, and so on.

Reading List

Compulsory Readings

	Title
1	Aurélien Géron, Hands-On Machine Learning with Scikit-Learn and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems, O'Reilly Media, 2017.
2	Ian Goodfellow, Yoshua Bengio, and Aaron Courville. Deep Learning. The MIT Press, 2016.
3	John D. Kelleher, Brian Mac Namee and Aoife D'Arcy, Fundamentals of Machine Learning for Predictive Data Analytics Algorithms, Worked Examples, and Case Studies, The MIT Press, 2015.
4	Bradley Boehmke & Brandon Greenwell, Hands-on Machine Learning with R, eBook, 2020.

Additional Readings

	Title
1	Josh Starmer. The StatQuest illustrated guide to machine learning. StatQuest Publications, 2022.
2	Brett Lantz, Machine Learning with R – Second Edition, Packt Publishing, 2015.
3	Bing Liu, Sentiment Analysis: Mining Opinions, Sentiments, and Emotions, Cambridge University Press, 2015.