

City University of Hong Kong
Course Syllabus

offered by College/School/Department of Information Systems
with effect from Semester A 2023/24

Part I Course Overview

Course Title:	Machine Learning & Social Media Analytics
Course Code:	IS6941
Course Duration:	One Semester (13 weeks)
Credit Units:	3
Level:	P6
Medium of Instruction:	English
Medium of Assessment:	English
Prerequisites: <i>(Course Code and Title)</i>	Nil
Precursors: <i>(Course Code and Title)</i>	Nil
Equivalent Courses: <i>(Course Code and Title)</i>	Nil
Exclusive Courses: <i>(Course Code and Title)</i>	Nil

Part II Course Details

1. Abstract

This course aims to develop students' knowledge and skills to apply machine learning and social media analytics tools and techniques to enhance various business applications.

2. Course Intended Learning Outcomes (CILOs)

(CILOs state what the student is expected to be able to do at the end of the course according to a given standard of performance.)

No.	CILOs	Weighting (if applicable)	Discovery-enriched curriculum related learning outcomes (please tick where appropriate)		
			A1	A2	A3
1.	Describe the basic concepts and techniques for machine learning and social media analytics.	20%	✓	✓	
2.	Design and apply machine learning and social media analytics tools and techniques to enhance various business applications.	30%	✓	✓	✓
3.	Critically evaluate various machine learning and social media analytics technologies with respect to realistic business contexts.	30%		✓	✓
4.	Work productively as part of a team, and in particular, communicate and present analytics solutions effectively in written and oral forms under a collaborative work environment.	20%	✓	✓	
		100%			

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.

3. Teaching and Learning Activities (TLAs)

(TLAs designed to facilitate students' achievement of the CILOs.)

TLA	Brief Description	CILO No.				Hours/week (if applicable)
		1	2	3	4	
TLA1: Lecture	<p>Concepts and general knowledge of machine learning and social media analytics tools, techniques, and their business applications are illustrated.</p> <ul style="list-style-type: none"> In-class discussion: Students actively participate in discussions in lectures (e.g. face-to-face discussion, using mobile devices) and the lecturer provides feedback based on students' responses. Active Reflection: At the beginning of every lecture, students are expected to actively reflect and summarize the main topics covered in the previous lecture and lecturer will provide feedback based on students' concerns and questions. 	✓	✓	✓		
TLA2: Tutorial, Laboratory and Case Studies	<p>The tutorial and laboratory sessions cover the technical aspects of various machine learning and social media analytics tools and techniques, and their real-world applications.</p> <ul style="list-style-type: none"> <u>Tutorial exercises</u>: e.g. hands-on activities of utilizing lexicon and machine learning based social sentiment analysis; hands-on activities of applying large-scale social network analysis software such as Pajek for social media analytics; hands-on activities of applying various Python-based APIs for online social media data management and analytics, etc. <u>Case/Group project discussion</u>: Students will be given some case studies and a project relating to machine learning-based analytics or social media analytics application under a realistic business context. Discussion on various aspects of a case or project for applying machine learning and social media analytics tools to improve the productivity and efficacy of a business application will be conducted. 	✓	✓	✓	✓	
TLA3: On-Line Active Readings and Discussions	<p>Students are encouraged to conduct self-reflection and sharing of concepts, techniques, and methods related to machine learning and social media analytics methodologies, and their applications to real-world business contexts.</p>	✓	✓		✓	

4. Assessment Tasks/Activities (ATs)

(ATs are designed to assess how well the students achieve the CILOs.)

Assessment Tasks/Activities	CILO No.						Weighting	Remarks
	1	2	3	4				
Continuous Assessment: 100%								
<u>AT1: Individual Tutorial Exercises</u> Students need to complete and submit individual tutorial exercises that cover both conceptual exploration and hands-on skills of machine learning and social media analytics tools and techniques.	✓	✓					10%	
<u>AT2: Team Project</u> There will be a team project associated with the course. The assessment of the team project is based on the understanding of the concepts and techniques related to machine learning and social media analytics discussed in lectures, and the creativities of applying these tools and techniques to solve a real-world business problem. The project requires a project proposal, prototype system demonstration, and presentation, as well as a final report.	✓	✓	✓	✓			40%	
<u>AT3: Individual Online Reflection and Discussion Exercises</u> Students need to complete and submit individual self-reflection and collaborative discussion reports related to case studies of applying machine learning and social media analytics solutions to enhance various business applications.			✓	✓			10%	
<u>AT4: Individual Test</u> The individual test will be used to assess students' achievement on various intended learning outcomes.	✓	✓	✓				40%	
							100%	

5. Assessment Rubrics

(Grading of student achievements is based on student performance in assessment tasks/activities with the following rubrics.)

Applicable to students admitted in Semester A 2022/23 and thereafter

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B)	Marginal (B-, C+, C)	Failure (F)
1. AT1: Individual Tutorial Exercises	Capability to describe the basic concepts and techniques for machine learning and online social media analytics.	High	Significant	Moderate	Not even reaching marginal levels
	Ability to design and apply machine learning and social media analytics tools and techniques to enhance various business applications.	High	Significant	Moderate	Not even reaching marginal levels
2. AT2: Team Project	Ability to describe the basic concepts and techniques for machine learning and social media analytics.	High	Significant	Moderate	Not even reaching marginal levels
	Ability to design and apply machine learning and social media analytics tools and techniques to enhance various business applications.	High	Significant	Moderate	Not even reaching marginal levels
	Ability to critically evaluate various machine learning and social media analytics technologies with respect to realistic business context.	High	Significant	Moderate	Not even reaching marginal levels
	Ability to work productively as part of a team, and in particular, communicate and present machine learning and social media analytics solutions effectively in written and oral forms under a collaborative work environment.	High	Significant	Moderate	Not even reaching marginal levels
3. AT3: Individual Online Reflection and Discussion Exercises	Ability to critically evaluate various machine learning and social media analytics technologies with respect to realistic business context.	High	Significant	Moderate	Not even reaching marginal levels
	Ability to work productively as part of a team, and in particular, communicate and present machine learning and social media analytics solutions effectively in written and oral forms under a collaborative	High	Significant	Moderate	Not even reaching marginal levels

	work environment.				
4. AT4: Individual Test	Ability to describe the basic concepts and techniques for machine learning and online social media analytics.	High	Significant	Moderate	Not even reaching marginal levels
	Ability to design and apply machine learning and social media analytics tools and techniques to enhance various business applications.	High	Significant	Moderate	Not even reaching marginal levels
	Ability to critically evaluate various machine learning and social media analytics technologies with respect to realistic business context.	High	Significant	Moderate	Not even reaching marginal levels
	Ability to work productively as part of a team, and in particular, communicate and present machine learning and social media analytics solutions effectively in written and oral forms under a collaborative work environment.	High	Significant	Moderate	Not even reaching marginal levels

Applicable to students admitted before Semester A 2022/23

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B, B-)	Fair (C+, C, C-)	Marginal (D)	Failure (F)
1. AT1: Individual Tutorial Exercises	Capability to describe the basic concepts and techniques for machine learning and online social media analytics.	High	Significant	Moderate	Basic	Not even reaching marginal levels
	Ability to design and apply machine learning and social media analytics tools and techniques to enhance various business applications.	High	Significant	Moderate	Basic	Not even reaching marginal levels
2. AT2: Team Project	Ability to describe the basic concepts and techniques for machine learning and social media analytics.	High	Significant	Moderate	Basic	Not even reaching marginal levels
	Ability to design and apply machine learning and social media analytics tools and techniques to enhance various business applications.	High	Significant	Moderate	Basic	Not even reaching marginal levels

	Ability to critically evaluate various machine learning and social media analytics technologies with respect to realistic business context.	High	Significant	Moderate	Basic	Not even reaching marginal levels
	Ability to work productively as part of a team, and in particular, communicate and present machine learning and social media analytics solutions effectively in written and oral forms under a collaborative work environment.	High	Significant	Moderate	Basic	Not even reaching marginal levels
3. AT3: Individual Online Reflection and Discussion Exercises	Ability to critically evaluate various machine learning and social media analytics technologies with respect to realistic business context.	High	Significant	Moderate	Basic	Not even reaching marginal levels
	Ability to work productively as part of a team, and in particular, communicate and present machine learning and social media analytics solutions effectively in written and oral forms under a collaborative work environment.	High	Significant	Moderate	Basic	Not even reaching marginal levels
4. AT4: Individual Test	Ability to describe the basic concepts and techniques for machine learning and online social media analytics.	High	Significant	Moderate	Basic	Not even reaching marginal levels
	Ability to design and apply machine learning and social media analytics tools and techniques to enhance various business applications.	High	Significant	Moderate	Basic	Not even reaching marginal levels
	Ability to critically evaluate various machine learning and social media analytics technologies with respect to realistic business context.	High	Significant	Moderate	Basic	Not even reaching marginal levels
	Ability to work productively as part of a team, and in particular, communicate and present machine learning and social media analytics solutions effectively in written and oral forms under a collaborative work environment.	High	Significant	Moderate	Basic	Not even reaching marginal levels

Part III Other Information (more details can be provided separately in the teaching plan)

1. Keyword Syllabus

(An indication of the key topics of the course.)

- Online social media services (e.g. YouTube, Twitter, Facebook, GitHub, Pinterest, etc.) and their APIs.
- Social media analytics tools. Analytics development tools such as Python and social network analytics tools such as Pajek.
- Scraping and extracting conversational topics on Internet forums using Python.
- Analyzing social media contents (e.g. tweets) using sentiment analysis and entity recognition tools.
- Classical machine learning techniques for social media analytics such as Naïve Bayes classification for social link prediction, the K-Nearest Neighbour (KNN) method for social sentiment analysis, Multilayer Perceptron for social sentiment analysis, Decision Trees and Random Forests for social emotion classification, etc.
- Unsupervised machine learning (e.g., fuzzy c-means clustering) for social text clustering, application of conceptual clustering techniques such as Latent Dirichlet Allocation (LDA) to social text analysis.
- Deep learning for multimodal social media content analysis. Convolutional Neural Networks (CNNs) for social image analysis. TextCNNs for social media text analysis. Pre-trained BERT for social media text analysis.

2. Reading List

2.1 Compulsory Readings

(Compulsory readings can include books, book chapters, or journal/magazine articles. There are also collections of e-books, e-journals available from the CityU Library.)

1.	Aurélien Géron, Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems, O'Reilly Media; 2nd Edition (October 15, 2019), ISBN: 978-1492032649.
2.	Chatterjee, Siddhartha and Krystianczuk, Michal, Python Social Media Analytics: Analyze and visualize data from Twitter, YouTube, GitHub, and more (1st edition), Packt Publishing (2017), ISBN: 978-1-78712-148-5.

2.2 Additional Readings

(Additional references for students to learn to expand their knowledge about the subject.)

1.	Stephen Klosterman, Data Science Projects with Python: A case study approach to successful data science projects using Python, pandas, and scikit-learn, Packt Publishing (2019), ISBN: 978-1838551025.
2.	Ganis, M. and Kohirkar, A., Social Media Analytics: Techniques and Insights for Extracting Business Value Out of Social Media, IBM Press, (1 st edition, December, 2015), ISBN-13: 978-0133892567.
3.	Bali, R., Sarkar, D., Sharma, T., Learning Social Media Analytics with R: Transform data from social media platforms into actionable business insights (May 26, 2017), ISBN-13: 978-1787127524.
4.	Christina Prell, Social Network Analysis: History, Theory and Methodology, SAGE Publications Ltd (November 24, 2011), ISBN: 978-1412947152.

2.3 Online Resources

Course reading materials will be augmented by articles from journals and by whitepapers and other materials available on-line. Below are some examples:

Luo, Bei, Lau, Raymond Y.K., Li, C. July 2023, Emotion-regulatory chatbots for enhancing consumer servicing: An interpersonal emotion management approach, *Information and Management* (60:5).

Yuan, Hui, Tang, Yuanyuan, Xu, Wei, Lau, Raymond Y. K. January 2021, Exploring the influence of multimodal social media data on stock performance: An empirical perspective and analysis, *Internet Research* (31:3), pp. 871-891

Lau, Raymond Y. K., Zhang, W. & Xu, W., Oct 2018, Parallel Aspect Oriented Sentiment Analysis for Sales Forecasting with Big Data, *Production and Operations Management* (27:10), pp. 1775-1794.

Lau, Raymond Y. K., Zhao, J. L., Chen, G. & Guo, X., Dec 2016, Big Data Commerce, *Information and Management* (53:8), pp. 929-933.

Lau, Raymond Y. K., Leon Zhao, J., Zhang, W., Cai, Y. & Ngai, E. W., Jun 2015, Learning context-sensitive domain ontologies from folksonomies: A cognitively motivated, method, *INFORMS Journal on Computing* (27:3), pp. 561-578.

Du, X., Ye, Y., Lau, Raymond Y. K. & Li, Y., Apr 2015, OpinionRings: Inferring and visualizing the opinion tendency of socially connected users, *Decision Support Systems* (75), pp. 11-34.