Subject Code	MM6761
Subject Title	Machine Learning Empowered Business Intelligence
Credit Value	3
Level	6
Pre-requisite/ Co-requisite/ Exclusion	None
Objectives	1. Introduce students to the recent development in machine learning, and the emerging quantitative marketing literature that leverages and further advances the new techniques. 2. Help students to gain in-depth knowledge in important areas of marketing research.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Understand the key techniques and core models in machine learning that are used to solve marketing problems. b. Demonstrate an ability to criticize research methodologies and findings in the quantitative marketing literature. c. Develop and advance their own research interests in the quantitative marketing and/or related areas such as information system, economics, and computer science.
Subject Synopsis/ Indicative Syllabus	**Part I**: Foundations of Machine Learning Session 1: Basic programming skills (R, Python, MATLAB) Session 2: Key machine learning ideas and models • Autoencoders and embeddings • Deep neural networks • Generative adversarial networks Session 3: Key machine learning ideas and models (continue) • Spatio-temporal prediction models • Dynamic programming • Reinforcement learning • Federation learning **Part II**: Linking Features Extracted from Unstructured Data to Business Outcomes Session 4: Features from text data Session 5: Features from image and video data Session 6: Market structure surveillance with unstructured data (text, image, customer trajectories in shopping malls) **Part III**: Modelling the Generation of Unstructured Data Session 7: Text data • Statistical models, LDA variants • Transformer Session 8: Image and video data

	• Statistical models • Transformer
	Part IV: Causal Inference Session 9: Natural, quasi, and field experiments Session 10: Matching methods and synthetic control Session 11: Recent advancements **Part V**: Other Emerging Topics Session 12: Spatio-temporal data mining in marketing Session 13: Generative AI (GenAI) and its impact on business Session 14: New development in dynamic models *Notes*: 1. Part I may be delivered in 2 sessions only, and some sessions may be merged so that the course has 13 sessions in total. 2. New topics may be incorporated due to the fast development in machine learning.
Teaching/Learning Methodology	Student participation and discussion in class will be strongly encouraged and weighted in final grades. Based on their reading of the assigned materials, students need to develop their own research ideas, present the ideas to the class and get feedbacks from their peers and the instructor, and finally write a term paper based on one idea.
Assessment Methods in Alignment with Intended Learning Outcomes	(see table below)

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)			
		a.	b.	c.	
Continuous Assessment*	**100%**				
1. In-class discussion	25%	✓	✓	✓	
2. Take home assignments	25%	✓	✓		
3. Paper and idea presentations	25%	✓		✓	
4. Term paper	25%	✓		✓	
Total	100 %				

Weighting of assessment methods/tasks in continuous assessment may be different, subject to each subject lecturer.

To pass this subject, students are required to obtain Grade D or above in the overall subject grade which is based on the sum of the four Continuous Assessment components.

	Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:
	Students are assigned journal articles to read at home. They are then required to prepare written reviews on these articles. They also need to share and discuss these reviews in the class. This approach enables students to appreciate the latest development in machine learning, their applications in quantitative marketing research, and relevant managerial implications. It also gives students an opportunity to appreciate the strengths and weaknesses of various quantitative marketing studies. They need to generate research ideas and present their research ideas in classes. At the end of the semester, students also need to write a term paper based on the best research idea they generate during the semester.

Student Study Effort Expected	Class contact:	
	▪ Lecturers and seminars	39 Hrs.
	Other student study effort:	
	▪ Preparation for lectures and seminars	39 Hrs.
	▪ Preparation for homework, presentations, and term paper	39 Hrs.
	Total student study effort	117 Hrs.

Reading List and References	The focus will be on reviewing and discussing journal articles and working papers dealing with relevant issues in the topic areas. Since the focus is on recent articles, the required readings will be updated from time to time.