Subject Description Form

Subject Code	EIE3124 (for 42477 and 42375)
Subject Title	Fundamentals of Machine Intelligence
Credit Value	3
Level	3
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	1. To introduce basic knowledge about various algorithms that forms the foundation of machine intelligence. 2. To develop practical knowledge about machine intelligence.
Intended Subject Learning Outcomes	**Upon completion of the subject, students will be able to:** Category A: Professional/academic knowledge and skills 1. Understand the foundation knowledge about machine intelligence 2. Apply different techniques of machine intelligence to solve problems Category B: Attributes for all-roundedness 3. Presents ideas and findings effectively
Subject Synopsis/ Indicative Syllabus	**Syllabus:** 1. Introduction to machine intelligence Ideas of machine intelligence; Use of statistics in various phases of machine intelligence including data preparation, model selection, model evaluation, model presentation and prediction. 2. Use of statistics in machine intelligence Descriptive statistics; inferential statistics; Important findings in statistics for machine intelligence such as the Law of Large Numbers and Central Limit Theorem; Hypothesis testing and Significance tests. 3. Parametric estimation Introduction to parametric estimation; classical parametric estimation such as Bayes Theorem, maximum likelihood estimation, maximum a posteriori estimation; Application examples of parametric estimation in machine intelligence including data pre-processing, parametric identification, model generation, validation and selection criteria. Applications of parametric estimation and linear regression techniques. 4. Non-parametric estimation Introduction to basic ideas of non-parametric estimation Introduction to techniques such as k-k-nearest neighbors, artificial neural networks and radial basis functions. Application examples of non-parametric estimation. Laboratory experiments: 1. Lab 1: Use of statistics in machine intelligence 2. Lab 2: Parametric estimation 3. Lab 3: Non-parametric estimation

Teaching/ Learning Methodology

Teaching and Learning Method	Intended Subject Learning Outcome	Remarks
Lectures	1, 2	Fundamental principles and key concepts of the subject are delivered to students.
Tutorials	1, 2	Supplementary to lectures: Students will be able to clarify concepts and to have a deeper understanding of the lecture materials; Problems and applications are given and discussed.
Laboratory sessions / Mini-project	2, 3	Students will evaluate different methods of machine intelligence.

Assessment Methods in Alignment with Intended Subject Learning Outcomes

Specific Assessment Methods/ Task	% Weighting	Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)		
		1	2	3
1. Continuous Assessment (total 40%)				
• Tests	15%	√	√	
• Quizzes	5%	√		
• Laboratory sessions	12%		√	√
• Mini-project	18%		√	√
2. Examination	50%	√	√	
Total	100%			

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

Specific Assessment Methods/Tasks	Remark
Quizzes	They can measure the students' understanding of the theories and concepts as well as their comprehension of subject materials.
Tests and examination	End-of-chapter-type problems are used to evaluate the students' ability in applying concepts and skills learned in the classroom; Students need to think critically and to learn independently in order to come up with an alternative solution to an existing problem. They need to present their solutions logically and systematically in the tests and the examination.
Laboratory sessions, mini-project	Oral examination will be conducted to evaluate student's technical knowledge and communication skills.

	Class contact (time-tabled):	

Student Study Effort Expected	• Lecture	24 Hours
	• Tutorial/Laboratory/Practice Classes	15 hours
	Other student study effort:	
	• Lecture: preview/review of notes; homework/assignment; preparation for test/quizzes/examination	36 Hours
	• Tutorial/Laboratory/Practice Classes: preview of materials, revision and/or reports writing	30 Hours
	Total student study effort:	**105 Hours**
Reading List and References	1. Joshi Ameet, “Machine learning and artificial intelligence”, Springer 2020. 2. Jose Unpingco, Python for Probability, Statistics, and Machine Learning, second edition, Springer, 2019. 3. Steven W. Knox and Hoboken NJ, Machine learning: a concise introduction, Wiley 2018. 4. James D. Miller, Statistics for Data Science: leverage the power of statistics for data analysis, classification, regression, machine learning, and neural networks, Packt Publishing, 2017. 5. Pratap Dangeti, Statistics for machine learning: build supervised, unsupervised, and reinforcement learning models using both Python and R, Packt Publishing, 2017. 6. 5. Machine Learning: a Probabilistic Perspective by Kevin Murphy, MIT Press, 2012.	
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