

The Hong Kong Polytechnic University

Subject Description Form

Subject Code	BME5150
Subject Title	Medical Artificial Intelligence and Data Analytics
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	(1) Introduce the concept of artificial intelligence and data analytics (2) Equip the students with the fundamental knowledge of artificial intelligence techniques and data analytic algorithms in clinical applications (3) Master the clinical problem formulation and typical data analytic skills (4) Understand the trend of technical development in medical artificial intelligence (5) Be aware of the opportunities and risks in the field
Intended Learning Outcomes <i>(Note 1)</i>	Upon completion of the subject, students will be able to: 1. Understand ideological and theoretical underpinning, the potentials and fundamentals of artificial intelligence and data analytic techniques in medicine; 2. Describe the emerging and increasing healthcare demands for artificial intelligence and data analytics 3. Articulate the major technological approaches of artificial intelligence and machine learning to transform current healthcare service model 4. Apply basic artificial intelligence techniques and machine learning algorithm to tackle the given medical problem 5. Understand the quality, regulatory, and ethical issues related to the use of artificial intelligence and data analytic technologies in medical domain.
Contribution to Programme Outcomes (Refer to Part I Section 2)	Program Learning Outcome (a) Acquire and apply advanced levels of knowledge and skills in BME discipline. (Teaching and Measure)

	- ILO-1:Understand ideological and theoretical underpinning, the potentials and fundamentals of artificial intelligence and data analytic techniques in medicine; - ILO-2:Describe the emerging and increasing healthcare demands for artificial intelligence and data analytics Programme Learning Outcome (c) Demonstrate a higher level of professional competence to cope with the rapid changes in practice in BME discipline. (Teaching, Practice, and Measure) - ILO-3:Articulate the major technological approaches of artificial intelligence and machine learning to transform current healthcare service model - ILO-4:Apply basic artificial intelligence techniques and machine learning algorithm to tackle the given medical problem - ILO-5:Understand the quality, regulatory, and ethical issues related to the use of artificial intelligence and data analytic technologies in medical domain. Programme Learning Outcome (e) Demonstrate your abilities to continuously develop yourself in your professional practice. (Teaching, Practice, and Measure) - ILO-3:Articulate the major technological approaches of artificial intelligence and machine learning to transform current healthcare service model - ILO-4:Apply basic artificial intelligence techniques and machine learning algorithm to tackle the given medical problem - ILO-5:Understand the quality, regulatory, and ethical issues related to the use of artificial intelligence and data analytic technologies in medical domain.
Subject Synopsis/ Indicative Syllabus <i>(Note 2)</i>	▪ Landscape changes and opportunities- introduction of artificial intelligence and data analytic techniques for medical needs ▪ The trend of artificial intelligence and data technology to transform current healthcare system ▪ Characterization of medical signals: feature engineering and extraction ▪ Basic understanding of supervised and unsupervised learning, neural networks, machine learning, and deep learning ▪ Artificial intelligence and data analytic technologies to transform the healthcare service in the future of hospital.

Teaching/Learning Methodology <i>(Note 3)</i>	Students will learn the fundamentals and principles in lectures; Sufficient practice hours will be provided in labs and tutorials hours; Practice projects/assignments/quiz will be adopted to assess the students’ learning outcome.						
Assessment Methods in Alignment with Intended Learning Outcomes <i>(Note 4)</i>	Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed				
			a	b	c	d	e
	1. In-class quizzes (x3)	30%	√	√	√		√
	2. Lab practice (Programming code & project report)	50%	√	√	√	√	√
	3. Classroom activities	10%	√	√	√		√
	4. Attendance	10%					
	Total	100 %					
Student Study Effort Expected	Class contact:						
	▪ Lectures/Tutorial					36 Hrs.	
	▪ Laboratories					3 Hrs.	
	Other student study effort:						
	▪ Self-study					30 Hrs.	
	▪ Assignment					24 Hrs.	
	▪ Final project					24 Hrs.	
	Total student study effort					117 Hrs.	
Reading List and References	Textbooks: - Artificial intelligence in medical imaging: opportunities, applications and risks; Erik R Ranschaert (editor), Sergey Morozov (editor), P. R. Algra (editor); Cham, Switzerland: Springer; 2019 - Medical imaging: artificial intelligence, image recognition, and machine learning techniques; K. C. Santosh (editor); Boca Raton, FL: CRC Press; 2020 - Biomedical Signal Processing and Artificial Intelligence in Healthcare; Walid Zgallai, Academic Press; 2020						
Date of Last Major Revision	20 July 2023						
Date of Last Minor Revision	9 August 2025						