Subject Description Form

Subject Code	BME5150
Subject Title	Medical Artificial Intelligence and Data Analytics
Credit Value	3
Level	5
Responsible staff & Department/School	Dr Edmond LAM (BME)
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	Upon completion of the subject, students will be able to: a. Understand ideological and theoretical underpinning, the potentials and fundamentals of artificial intelligence and data analytic techniques in medicine; b. Describe the emerging and increasing healthcare demands for artificial intelligence and data analytics c. Articulate the major technological approaches of articular intelligence and machine learning to transform current healthcare service model d. Apply basic articular intelligence techniques and machine learning algorithm to tackle the given medical problem e. 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 articular intelligence and

<table>
<tr><td></td><td>machine learning to transform current healthcare service model

- ILO-4: Apply basic articular 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 articular intelligence and machine learning to transform current healthcare service model

- ILO-4: Apply basic articular 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.</td></tr>
<tr><td>Subject Synopsis/ Indicative Syllabus</td><td>▪ 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.</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>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.</td></tr>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td>
<table>
<tr><td rowspan="2">Specific assessment methods/tasks</td><td rowspan="2">% weighting</td><td colspan="6">Intended subject learning outcomes to be assessed</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td></td></tr>
<tr><td>1. In-class quizzes (x3)</td><td>30%</td><td>√</td><td>√</td><td>√</td><td></td><td>√</td><td></td></tr>
<tr><td>2. Lab practice</td><td>70%</td><td>√</td><td></td><td>√</td><td>√</td><td>√</td><td></td></tr>
<tr><td>2a. Programming code</td><td>30%</td><td>√</td><td></td><td>√</td><td>√</td><td>√</td><td></td></tr>
<tr><td>2b. Q&A session</td><td>20%</td><td>√</td><td>√</td><td>√</td><td>√</td><td>√</td><td></td></tr>
<tr><td>2c. Individual report</td><td>20%</td><td>√</td><td>√</td><td>√</td><td>√</td><td>√</td><td></td></tr>
<tr><td>Total</td><td>100 %</td><td colspan="6"></td></tr>
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<tr><td>Student Study</td><td>Class contact:</td><td></td></tr>
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Effort Expected	▪ 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	20 July 2023	