

The Hong Kong Polytechnic University

Subject Description Form

Please read the notes at the end of the table carefully before completing the form.

Subject Code	COMP6708
Subject Title	Advanced Big Data Computing
Credit Value	3
Level	6
Pre-requisite/ Co-requisite/ Exclusion	NIL
Objectives	<ol style="list-style-type: none"> 1. To introduce students the concept and challenge of big data; 2. To teach students in applying skills and tools to manage and analyze the big data.
Intended Learning Outcomes <i>(Note 1)</i>	<p>Upon completion of the subject, students will be able to:</p> <ol style="list-style-type: none"> a) Demonstrate a comprehensive understanding of principles and algorithms of big data analytics and distributed machine learning. b) Apply state-of-the-art big data computing techniques to various emerging engineering problems. c) Design and implement original solutions to solve big data analytics problems in new circumstances.
Subject Synopsis/ Indicative Syllabus <i>(Note 2)</i>	<ol style="list-style-type: none"> 1. Fundamental Cloud Computing Basics; Big Data Computing: Concepts, Platform, Service, and Tools; Large-Scale Programming Abstraction: MapReduce and its open source implementation of Hadoop; Machine Learning Systems for Big Data: Methods and Tools 2. Advanced Large-Scale Data Processing Framework: Apache Spark and its Built-in Modules; Large-Scale Database Management: NoSQL and other tools (e.g. MongoDB, Google BigTable, etc); Deep Learning; Big Data Analytics at Edge: Federated Learning; Time Series Analytics 3. Applications Big Data Visualization: Visual Encoding and Perception; Edge Learning Systems
Teaching/Learning Methodology <i>(Note 3)</i>	Lectures/ Seminars/ Tutorials / Project

Assessment Methods in Alignment with Intended Learning Outcomes <i>(Note 4)</i>	<table border="1"> <thead> <tr> <th rowspan="2">Specific assessment methods/tasks</th> <th rowspan="2">% weighting</th> <th colspan="6">Intended subject learning outcomes to be assessed (Please tick as appropriate)</th> </tr> <tr> <th>a</th> <th>b</th> <th>c</th> <th>d</th> <th>e</th> <th></th> </tr> </thead> <tbody> <tr> <td>1. Project</td> <td>50 %</td> <td>✓</td> <td>✓</td> <td>✓</td> <td></td> <td></td> <td></td> </tr> <tr> <td>2. Assignment</td> <td>20 %</td> <td>✓</td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>3. Quiz/Exam</td> <td>30 %</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> </tbody> </table>	Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)						a	b	c	d	e		1. Project	50 %	✓	✓	✓				2. Assignment	20 %	✓	✓					3. Quiz/Exam	30 %	✓	✓					Total	100 %						
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<p>Assignment(s): assessment of the theoretic studies with respect to the understanding of the relevant subject matters including new concepts, algorithms and techniques by proving answers to the assignment questions.</p> <p>Project: assessment of the ability for problem solving through real case studies and implementation of a prototype system for demonstration.</p> <p>Test: assessment of the overall performance by exam or quiz.</p>																																															
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Reading List and References	<ol style="list-style-type: none"> 1. EMC Education Services (Editor), Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data, Wiley, 2015. 2. Song Guo and Zhihao Qu, Edge Learning for Distributed Big Data Analytics: Theory, Algorithms, and System Design, Cambridge University. 3. Wei Yang Bryan Lim, Nguyen Cong Luong, Dinh Thai Hoang, Yutao Jiao, Ying-Chang Liang, Qiang Yang, Dusit Niyato, and Chunyan Miao, Federated Learning in Mobile Edge Networks: A Comprehensive Survey, IEEE Communications Surveys & Tutorials, Volume: 22, Issue: 3, thirdquarter 2020, Page(s): 2031 - 2063. 4. Ethem Alpaydin, Introduction to Machine Learning, 3rd Edition, MIT Press, 2015. 5. Jared Dean, Big Data, Data Mining, and Machine Learning: Value Creation for Business Leaders and Practitioners. Wiley, 2014. 																																														

	6. Simon Haykin, Neural Networks and Learning Machines, 3 rd Edition, Pearson, 2009.
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Note 1: Intended Learning Outcomes

Intended learning outcomes should state what students should be able to do or attain upon subject completion. Subject outcomes are expected to contribute to the attainment of the overall programme outcomes.

Note 2: Subject Synopsis/Indicative Syllabus

The syllabus should adequately address the intended learning outcomes. At the same time, overcrowding of the syllabus should be avoided.

Note 3: Teaching/Learning Methodology

This section should include a brief description of the teaching and learning methods to be employed to facilitate learning, and a justification of how the methods are aligned with the intended learning outcomes of the subject.

Note 4: Assessment Method

This section should include the assessment method(s) to be used and its relative weighting, and indicate which of the subject intended learning outcomes that each method is intended to assess. It should also provide a brief explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes.