Macao Polytechnic University

Faculty of Applied Sciences

PhD of Computer Applied Technology

Module Outline

Academic Year 2022/2023   Semester 1

Learning Module	Selected Topics in Big Data and Smart Society		Class Code	COMP8122
Pre-requisite(s)	B.S. in CS or equivalent			
Medium of Instruction	English only		Credit	3
Lecture Hours	45 hrs	Lab/Practice Hours 0 hrs	Total Hours	45 hrs
Instructor	Dr. Wuman Luo		E-mail	luowuman@mpu.edu.mo
Office	A323, Chi Un Building		Telephone	8599-6321

Description

In this module, students will undertake in-depth explorations of selected topics about the interrelation between Big Data, information science, economy, cyber-culture, media, policies and other information-related phenomena in a society driven by smart applications. Upon completing the module, students will be able to identify and access the interdisciplinary issues in various socio-technical environments with respect to smart applications, and to situate studies of technological innovation in a broad social and Region-specific context.

Learning Outcomes

After completing the course, students will be able to:

1. Determine the problems typically encountered in each aspect of Big Data Sciences and Business Analytics in various perspectives for both technical and social perspectives (D1m, D2m, D5m, ET1m, ET5m, ET6m)
2. Evaluate the various types of work activities that occur and the types of work products that are generated in each phase of the business analytics. (EA4m, D5m, ET6fl, EP9m–11m)
3. Adapt data sciences (or business analytics) methods and processes including those for requirements, design, construction, testing, project management and data quality assurance. (EA4m, D1m, D1fl, D5m, ET5m, EP7m–8m)

4. Criticize Big Data related problems in the various perspectives including business, social, cultural and ethical matters. (D5m, EP4fl)

5. Recommend the practical solutions for various data related matters and the importance to the profession of applying and improving data sciences and business analytics competencies and practices. (D5m, SM1m)

6. Choose the mathematical cores for data sciences and apply the related mathematical models for data science techniques. (SM2m, SM3fl)

Content

1. Big Data Overview   (5 hours)

    1.1   Course Introduction

    1.2   Characteristics of Big Data

    1.3   Data Science and Data Analytics

2. Scalable Computing Systems   (6 hours)

    2.1   Distributed File Systems and Hadoop Architecture

    2.2   Large-Scale Data Processing with Spark

3. Data and Data Pre-processing   (4 hours)

    3.1   Data Objects and Data Attributes

    3.2   Statistical Descriptions of Data

    3.3   Measuring Data Similarity and Dissimilarity

4. Techniques for Data Scientific Thinking   (15 hours)

    4.1   Association Rules

    4.2   Similarity, Neighbours and Clusters

    4.3   Multi-Criteria Decision Making

5. Data Science and Business Strategy   (15 hours)

    5.1   Business & Social Impact of Big Data

    5.2   Big Data Strategic Management

    5.3   Case Studies

Teaching Method

Lectures, seminars and projects

Attendance

Attendance requirements are governed by the "Academic Regulations Governing Doctoral Degree Programmes of Macao Polytechnic University".

Assessment

This learning module is graded on a 100 point scale, with 100 being the highest possible score and 50 being the passing score.

Item	Description	Percentage
1. Test	Knowledge assessment	25%
2. Assignment	Home-based exercise	10%
2. Seminar	Classroom presentation	15%
3. Group Project	Group project with report	50%
	Total Percentage:	100%

Teaching Material(s)

There is no required textbook in this module.

Reference

Reference book(s)

1. Jeffrey D. Camm James J. Cochran Michael J. Fry author Gale Group. (2017), *Essentials of Business Analytics,* Cengage Learning.

2. Han Jiawei, Kamber Micheline, Pei Jian (2011). *Data Mining: Concepts and Techniques,* Elsevier Science.

3. Dimitris Bertsimas, Allison K. O'Hair, and William R. Pulleyblank (2016), *The Analytics Edge,* Dynamic Ideas.T

4. T. Erl, W Khattak (2016). Big Data Fundamentals: Concepts, Drivers & Techniques, Service-Tech

5. T. White (2015). Hadoop: The Definitive Guide: Storage and Analysis at Internet Scale, O'Reilly

6. M. Guller (2015). Big Data Analytics with Spark, Apress

7. Yu Zheng (2019). Urban Computing, MIT Press

8. Yu Zheng, Xiaofang Zhou (2011). Computing with Spatial Trajectories, Springer