FACULTY OF APPLIED SCIENCES
MASTER OF SCIENCE IN BIG DATA AND INTERNET OF THINGS
LEARNING MODULE OUTLINE

Academic Year	2024/2025	Semester	2
Module Code	COMP6135		
Learning Module	Big Data Analytics		
Pre-requisite(s)	Nil		
Medium of Instruction	English		
Credits	3	Contact Hours	45 hrs
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MODULE DESCRIPTION

Recent advances in information and communication technologies (ICTs) have led to the rapid explosion of data. Business intelligence derived from big data can help firms to better understand market needs, develop new products and services, improve operational efficiency, and acquire competitive advantages. This learning module provides an overview of common big data applications and analytical techniques (e.g., sentiment analysis, decision tree, clustering, classification, etc.) in business and discusses some implementation issues related to big data projects. As part of a group project, students will need to demonstrate the ability to come up with a business plan based on a given case study and a relevant data set.

MODULE INTENDED LEARNING OUTCOMES (ILOS)

On completion of this learning module, students will be able to:

M1.	Apply a comprehensive knowledge of big data preparation for analytics in a typical business setting; (AHEP4-M1, AHEP4-M7)
M2.	Acquire some commonly used data mining techniques for big data analytics; (AHEP4-M1, AHEP4-M7)
M3.	Make use of mining techniques to support business decisions; (AHEP4-M1, AHEP4-M2, AHEP4-M3, AHEP4-M4, AHEP4-M16)
M4.	Evaluate ethical and privacy issues related to data mining. (AHEP4-M2, AHEP4-M7)

These ILOs aims to enable students to attain the following Programme Intended Learning Outcomes (PILOs):

PILOs		M1	M2	M3	M4
P1.	Master the principles of system engineering and relevant enabling technologies for building of IoT solutions				
P2.	Critically evaluate scientific methodologies and mathematical models for Big Data and its applications	✓		✓	
P3.	Master the advanced software and programming tools and techniques for IoT solutions and Big Data	✓	✓		
P4.	Explain the processes involved in IoT solutions and Big Data analytics in a typical business setting			✓	
P5.	Explain different application domains and analyze their requirements for IoT and Big Data	✓			
P6.	Apply knowledge in advanced communication and multimedia technologies for the design and implementation of IoT solutions				
P7.	Apply knowledge in applied statistics, machine learning, leading-edge technologies and programming techniques for Big Data		✓	✓	
P8.	Design and carry out an advanced project following an ethical and professional methodology				✓
P9.	To demonstrate advanced knowledge and R&D techniques in Big Data and IoT				
P10.	To investigate and develop new, emerging ICT technology for Big Data and IoT				
P11.	To develop a global vision on the critical development and new application of Big Data and IoT				
P12.	To communicate technically and effectively in both speaking and writing				
P13.	To have a positive attitude towards society and the environment.				✓
P14.	To adhere to high moral standards and commit to excellence in life-long learning.				

MODULE SCHEDULE, COVERAGE AND STUDY LOAD

Week	Content Coverage	Contact Hours
1-2	1. Overview	5 hours
	1.1 Power of Big Data	
	1.2 Introduction to Data Analytic Thinking	
2-4	2. Classification	6 hours
	2.1 Decision Trees and Bayesian Classifier	
	2.2 Support Vector Machin	
4-8	3. Similarity, Neighbors and Clusters	12 hours
	3.1 K-Means Clustering	
	3.2 Hierarchical Clustering Methods	
	3.3 Model-Based Clustering and Density-Based Clustering	
	3.4 Subspace Clustering	
8-12	4. Pattern Recognition	12 hours
	4.1 Association Rules	
	4.2 FP Tree	
12-15	5. Other Mining Techniques	10 hours
	5.1 Data Stream Mining	
	5.2 Web Database Mining	
	5.3 Multi-criteria Decision Making	

TEACHING AND LEARNING ACTIVITIES

In this learning module, students will work towards attaining the ILOs through the following teaching and learning activities:

Teaching and Learning Activities	M1	M2	M3	M4
T1. Lectures	✓	✓	✓	✓

ATTENDANCE

Attendance requirements are governed by the Academic Regulations Governing Master's Degree Programmes of the Macao Polytechnic University. Students who do not meet the attendance requirements for the learning module shall be awarded an 'F' grade.

ASSESSMENT

In this learning module, students are required to complete the following assessment activities:

Assessment Activities	Weighting (%)	AHEP4 LOs	ILOs to be Assessed
A1. Assignment(s)	10%	AHEP4-M1, AHEP4-M2	M1, M2
A2. Test(s)	25%	AHEP4-M1, AHEP4-M2	M1, M2
A3. Group Project	25%	AHEP4-M1, AHEP4-M2, AHEP4-M3, AHEP4-M4, AHEP4-M7, AHEP4-M16	M1, M2, M3, M4
A4. Examination	40%	AHEP4-M1, AHEP4-M2	M1, M2

The assessment will be conducted following the University's Assessment Strategy (see www.mpu.edu.mo/teaching_learning/en/assessment_strategy.php). Passing this learning module indicates that students will have attained the ILOs of this learning module and thus acquired its credits.

Students with an overall score of less than 35 in the coursework will fail the module even if the overall score for the module is 50 or above.

Students with a score of less than 35 in the final examination will fail the module even if the overall score for the module is 50 or above.

REQUIRED READINGS

1. Foster Provost, Tom Fawcett (2013). *Data Science for Business: What You Need to Know About Data Mining and Data Analytic Thinking*, O'Reilly Media, Inc.

REFERENCES

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.

STUDENT FEEDBACK

At the end of every semester, students are invited to provide feedback on the learning module and the teaching arrangement through questionnaires. Your feedback is valuable for instructors to enhance the module and its delivery for future students. The instructor and programme coordinators will consider all feedback and respond with actions formally in the annual programme review.

ACADEMIC INTEGRITY

The Macao Polytechnic University requires students to have full commitment to academic integrity when engaging in research and academic activities. Violations of academic integrity, which include but are not limited to plagiarism, collusion, fabrication or falsification, repeated use of assignments and cheating in examinations, are considered as serious academic offenses and may lead to disciplinary actions. Students should read the relevant regulations and guidelines in the Student Handbook which is distributed upon the admission into the University, a copy of which can also be found at www.mpu.edu.mo/student_handbook/.