FACULTY OF APPLIED SCIENCES
BACHELOR OF SCIENCE IN COMPUTING
LEARNING MODULE OUTLINE

Academic Year	2023/2024	Semester	2
Module Code	COMP224		
Learning Module	Database Management Systems		
Pre-requisite(s)	COMP211 Database Design		
Medium of Instruction	English		
Credits	3	Contact Hours	45 hrs
Instructor	Wilson Ho	Email	kcho@mpu.edu.mo
Office	A216, Chi-Un building	Office Phone	85996586

MODULE DESCRIPTION

This module introduces the advanced topics in the design and management of database systems. Topics include query processing, relational algebra, transaction management, concurrency control, database recovery, distributed database management systems, privacy and security. Data definition language and the features of Oracle databases will also be introduced in the module.

MODULE INTENDED LEARNING OUTCOMES (ILOS)

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

M1.	Outline the components and functions of database management systems; (EA1p)
M2.	Understand the issues related to query processing and evaluate the cost of processing a query; (EA2p)
M3.	Understand the issues related to transaction management including transaction support, concurrency control and database recovery; (EA1p)
M4.	Design a distributed database; (EA4p)
M5.	State the trends in the Big Data, and the related technologies such as Hadoop, NoSQL, and data analytics; (EA1p)
M6.	Use database management systems such as Oracle Application Express to create databases, and execute queries. (EP2p)

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

PILOs	M1	M2	M3	M4	M5	M6
P1. Select and apply proven methods, tools and techniques to the effective and efficient implementation of information systems;		✓	✓	✓		
P2. Evaluate computer systems in a local area network, and understand the additional requirements for connection to other networks through wide area networks;						
P3. Be competent in system development in the Internet and the web platform;						
P4. Work independently to design and implement a relational database, with an emphasis on how to organise, maintain and retrieve information from a DBMS;						✓
P5. Acquire essential knowledge in specific fields of computing disciplines including multimedia, security and artificial intelligence;						
P6. Acquire the perceptive skills needed to understand information presented in the form of UML diagram, flow chart or other industry standard formats;						
P7. Understand the need for and use of the necessary mathematical techniques;						
P8. Work independently to develop an understanding of, and the knowledge and skills associated with the general support of computer systems and networks;	✓				✓	
P9. Work as an effective member of a team in the analysis, design and development of software systems;						
P10. Use project planning and management techniques in systems development;						
P11. Understand the fundamental and operational issues of computer systems in business environments;						
P12. Equip with adequate written, oral communication and interpersonal skills;						
P13. Build the capacity and desire for lifelong learning and to learn advanced and emerging technologies on one's own;						
P14. (For Enterprise Information Systems specialization) Gain an in-depth understanding of the information technology related to enterprise information systems, with an emphasis on development of such systems to support business processes;						
P15. (For Gaming Technology specialization) Acquire the general and advanced knowledge of current technologies and operating environment in the gaming industry;						
P16. (For Computer Education specialization) Acquire the general and practical knowledge of computer education and its practicing environment in secondary education.						

MODULE SCHEDULE, COVERAGE AND STUDY LOAD

Week	Content Coverage	Contact Hours
1-2	1. Relational algebra	6
	1.1 Selection, Projection, union, Set Difference, Intersection.	
	1.2 Cartesian Product, Theta join, Equijoin, Natural join, Outer join, Semi join, Division	
3	2. Query processing and optimization	3
	2.1 Query processing	
	2.2 Query Optimization and Decomposition	
4-6	3. Transaction management	9
	3.1 Transaction support	
	3.2 Concurrency control	
	3.3 Database recovery	
7-8	4. Oracle SQL	12
	4.1 Data definition language	
	4.2 Introduction of Oracle 11g	
9-12	5. Distributed database systems	9
	5.1 Introduction	
	5.2 Overview of networking	
	5.3 Functions and architecture of a DDBMS	
	5.4 Distributed relational database design	
13	6. Big Data Analytics and NoSQL	3
	6.1 Big data	
	6.2 Hadoop	
	6.3 NoSQL	
	6.4 Data Analytics	
14-15	7. Integrity and Security	3
	7.1 Database security	
	7.2 Countermeasures	
	7.3 DBMSs and Web security	

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	M5	M6
T1. Lectures	✓	✓	✓	✓	✓	✓
T2. In-class exercises		✓	✓	✓		✓

ATTENDANCE

Attendance requirements are governed by the Academic Regulations Governing Bachelor'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 (%)	AHEP3 LOs	ILOs to be Assessed
A1. Assignment / Classwork	25%	EP2p, EA1p, EA2p, EA4p,	M1, M2, M3, M4, M5, M6
A2. Tests	25%	EA1p, EA2p, EA4p, EP2p	M1, M2, M3, M4, M5, M6
A3. Examination	50%	EA1p, EA2p, EA4p	M1, M2, M3, M4, M5, M6

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 must take the re-sit examination even if the overall score for the module is 50 or above.

Students with a score of less than 35 in the final examination must take the re-sit examination even if the overall score for the module is 50 or above.

Students with an overall final grade of less than 35 are NOT allowed to take the re-sit examination.

REQUIRED READINGS

1. Thomas Connolly, Carolyn Begg, 2015, Database Systems: A Practical Approach to Design, Implementation and Management (6th ed.). Addison Wesley.

REFERENCES

1. Carlos Corone, Steven Morris, 2017, Database Systems: Design, Implementation, & Management (12th Edition), Cengage Technology Edition.

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/.