



**FACULTY OF APPLIED SCIENCES**  
**BACHELOR OF SCIENCE IN ARTIFICIAL INTELLIGENCE**  
**LEARNING MODULE OUTLINE**

Academic Year	2024/2025	Semester	1
Module Code	COMP2111		
Learning Module	Database Design		
Pre-requisite(s)	Nil		
Medium of Instruction	English		
Credits	3	Contact Hours	45 hrs
Instructor	Calana Chan	Email	calanachan@mpu.edu.mo
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**MODULE DESCRIPTION**

This module is designed to provide students with an understanding of the principles of relational database design and the ability to apply these principles in the design and development of database projects. Principles of good design and modelling, how to structure queries using SQL will be the focus.

**MODULE INTENDED LEARNING OUTCOMES (ILOS)**

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

M1.	Explain basic database concepts and terminology; (C1)
M2.	Produce data models, schemas and instances; (C1)
M3.	Design, model and implement relational databases; (C2, C6)
M4.	Produce well-structured database using functional dependencies and normalization; (C1)
M5.	Apply the structured query language for database manipulation; (C1)
M6.	Work in different roles within a team. (C16)

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 on common platforms, including the Internet platform;				✓	✓	



P2.	Acquire essential knowledge in specific fields of artificial intelligence, including machine learning, computer vision and natural language processing;						
P3.	Apply necessary mathematical techniques to model, analyse and devise solutions to complex problems;						
P4.	Work independently to develop an understanding of, and the knowledge and skills associated with the general support and mitigation of security risks of computer systems and networks;						
P5.	Design and implement both relational and non-relational data stores, with an emphasis on how to organise, maintain, retrieve and analyse information;	✓	✓	✓	✓	✓	
P6.	Distinguish the fundamental and operational issues of computer systems and artificial intelligence applications, with considerations of user, business, ethical, societal and environmental needs;						
P7.	Evaluate, prepare and communicate effectively on technical information to both technical and non-technical audience;						
P8.	Work as an effective member of a team in the analysis, design and development of software systems, with recognition of requirement to support equality, diversity and inclusion;						✓
P9.	Use project planning, risk management and quality management techniques in solutions to complex problems;						
P10.	Build the capacity and desire for lifelong learning and to learn advanced and emerging technologies on one's own.						

#### MODULE SCHEDULE, COVERAGE AND STUDY LOAD

Week	Content Coverage	Contact Hours
1	1. Introduction to Databases	3
	1.1 Three-Level ANSI-SPARC Architecture	
	1.2 External/conceptual and conceptual/internal mappings	
	1.3 Logical and physical data independence	
2-3	2. Relational Model	4.5
	2.1 Terminology	
	2.2 Entity integrity and referential integrity	
3	3. Database Development Lifecycle	1.5
	3.1 Major stages of the database system development lifecycle	
	3.2 Main phases of database design	



4-6	4. Entity-relationship modeling	7.5
	4.1 Basic concepts associated with ER model in database design	
	4.2 Diagrammatic technique for displaying ER model using Unified Modelling Language (UML)	
	4.3 Enhanced ER modeling	
6-8	5. Normalization	6
	5.1 Purpose of normalization	
	5.2 Data redundancy and update anomalies	
	5.3 Functional dependencies	
	5.4 Process of normalization	
8-10	6. Conceptual, Logical and Physical database design for the relational model	7.5
11	7. Microsoft ACCESS tutorial	3
12-14	8. SQL: Data manipulation	9
	8.1 Purpose of SQL statements	
	8.2 Using SELECT statement	
	8.3 Using INSERT, UPDATE, and DELETE statements	
15	9. Data Modelling Trends [optional]	3

### 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 (%)	AHEP4 LOs	ILOs to be Assessed
A1. Project and Assignment	20%	C1, C2, C6, C16	M2, M3, M4, M5, M6
A2. In-class exercises	10%	C1	M2, M4, M5
A3. Test	25%	C1	M1, M2, M4, M5
A4. Examination	45%	C1	M1, M2, M4, M5

The assessment will be conducted following the University's Assessment Strategy (see [www.mpu.edu.mo/teaching\\_learning/en/assessment\\_strategy.php](http://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. Connolly, T., & Begg, C. (2015). *DATABASE SYSTEMS: A Practical Approach to Design, Implementation and Management* (6th ed.). Pearson.

#### REFERENCES

1. Michael J. Hernandez (2020). *Database Design for Mere Mortals: A Hands-On Guide to Relational Database Design* (4th ed.). Addison-Wesley Professional

#### 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/](http://www.mpu.edu.mo/student_handbook/).