



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

Academic Year	2025/2026	Semester	1
Module Code	COMP413		
Learning Module	Enterprise System and Application Development		
Pre-requisite(s)	COMP221 Object Oriented Technologies		
Medium of Instruction	English		
Credits	3	Contact Hours	45 hrs
Instructor	Dr. Liam Lei	Email	liamli@mpu.edu.mo
Office	Rm. N46B, Wui Chi Building	Office Phone	8599-6808

MODULE DESCRIPTION

Enterprise systems should always provide high-quality services for automating the key business processes and integrating the legacy systems within an organization. This module provides the knowledge required to build the enterprise systems and accordingly to develop applications in Java. It will focus on the current enterprise system and application development practices such as server-side resource management, high-performance database manipulation, software design pattern, framework implementation, and system security.

MODULE INTENDED LEARNING OUTCOMES (ILOS)

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

M1.	Construct middleware with an MVC design pattern; (AHEP3 LO: EA4p)
M2.	Optimize the server-side resource; (AHEP3 LO: EA2p)
M3.	Choose a different approach for database access; (AHEP3 LO: D5p, EP3p)
M4.	Develop an enterprise application with a modern software framework; (AHEP3 LO: ET2p)
M5.	Determine the security level before launching a system. (AHEP3 LO: D1p)

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

PILOs	M1	M2	M3	M4	M5
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 specialisation) 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 specialisation) 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	1.Introduction to Enterprise System and Application	3
	1.1 Enterprise Application System (EAS)	



	1.2 Middleware Development	
2-3	2. Essential Enterprise Development Technologies	6
	2.1 Fundamental Server Components	
	2.2 Fundamental Enterprise Application Development	
4-6	3. Advanced Enterprise Software Development	9
	3.1 Model-View-Controller Design Pattern Implementation	
	3.2 Introduction to Software Framework	
	3.3 Java Enterprise Edition Development	
	3.4 Microservices and Web Services	
7-9	4. Core Web Technologies and Management	9
	4.1 Server-Side Resource Management	
	4.2 Multi-tiers Systems Architecture	
10-12	5. Enterprise Data Management	9
	5.1 Highly Reliable Connectivity Methods	
	5.2 Native SQL and Stored Procedures	
	5.3 Concurrency Control	
	5.4 Hibernate O/R Mapping	
13-15	6. Enterprise Cybersecurity	9
	6.1 Information Security in Enterprise	
	6.2 Two-Factor Authentication	
	6.3 Data Center	

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
T1. Lectures	✓	✓	✓	✓	✓
T2. In-class tutorials and exercises	✓		✓	✓	✓
T3. laboratory	✓		✓	✓	

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. Assignments/Classwork/Project	25%	EA3p, D5p, D4p, EP6p	M2, M3, M4, M5
A2. Test	25%	SM2p, EA3p, D5p	M1, M2, M3
A3. Examination	50%	SM2p, EA3p, D5p	M1, M2, M3

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. David R. Heffelfinger. (2017). Java EE 8 Application Development, Packt Publishing.

REFERENCES

1. Luciano Manelli. (2020). Beginning Jakarta EE Web Development, Apress.
2. Ying Bai. (2011). Practical Database Programming with Java, Wiley-IEEE Press.

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



澳門理工大學
Universidade Politécnica de Macau
Macao Polytechnic University

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/.