FACULTY OF APPLIED SCIENCES

BACHELOR OF SCIENCE IN ARTIFICIAL INTELLIGENCE

LEARNING MODULE OUTLINE

Academic Year	2025/2026	Semester	1
Module Code	COMP3111		
Learning Module	Advanced Web Development		
Pre-requisite(s)	COMP1122 Introduction to Programming COMP2115 Web Design and Development		
Medium of Instruction	English		
Credits	3	Contact Hours	45 hrs
Instructor	Hong Lin	Email	linhong@mpu.edu.mo
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MODULE DESCRIPTION

Recent advances in Web standards and their wide support by mainstream browsers have enabled development of sophisticated Web applications that are accessible on desktop and mobile devices. This module examines important concepts and technologies required to develop state-of-the-art Web applications. Topics include the architecture and protocol of the Web, the JavaScript language, development of interactive user interfaces and scalable backend of Web applications, and the design and implementation of Web APIs.

MODULE INTENDED LEARNING OUTCOMES (ILOS)

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

M1.	Identify the architecture and operation of the Web. (C2, C6)
M2.	Differentiate the major architectural components of modern Web applications and devise how they work together securely. (C2, C6, C10, C13)
M3.	Design Web APIs using established styles. (C5, C6)
M4.	Develop Web application clients that have interactive user interfaces with suitable tools and software libraries. (C5, C6, C13)
M5.	Construct scalable, secured, and database-backed Web application servers. (C5, C6, C10, C13)

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	✓		✓	✓	✓

		1	2	3	4	5	6
	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. Web architecture	3
	1.1 HTTP message format and status code	
	1.2 Redirection, GET vs. POST	
2-4	2. The JavaScript programming language	7.5
	2.1 Data structure and control statements	
	2.2 Defining class	
	2.3 Callback and arrow functions	
4-7	3. Web application client development	9
	3.1 Template: interpolations, conditions, loops	

		3.2 Data model and two-way binding	
		3.3 Event handling	
		3.4 Composition API	
7-10	4.	Web application server development	9
		4.1 JavaScript modules and asynchronous programming	
		4.2 Handling HTTP requests and generating responses	
		4.3 Database access	
10-13	5.	Web APIs	9
		5.1 Classic vs. Ajax Web applications	
		5.2 RPC-style vs. REST-style Web APIs	
		5.3 Design, implementation and consumption	
13-15	6.	Advanced topics in HTTP	7.5
		6.1 Connection, session and same-origin policy	
		6.2 Web proxy: forward proxy, reverse proxy	
		6.3 Web caching	
		6.4 Content delivery networks	

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			✓	✓	✓

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. Assignments/Classwork	20	C2, C6, C10, C13	M1, M2
A2. Group Project	20	C5, C6, C10, C13	M3, M4, M5
A3. Test	20	C2, C5, C6, C10, C13	M1, M2, M4
A4. Examination	40	C2, C5, C6, C10, C13	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

There is no official text for this module. Module notes are distributed in the class.

REFERENCES

1.   Crockford, D. (2008). *JavaScript: the good parts*. O'Reilly

2.   Nelson, B. (2018). *Getting to Know Vue.js*. Apress

3.   Patni, S., Clara, S. (2017). Pro *RESTful APIs: Design, Build and Integrate with REST, JSON, XML and JAX-RS*. Apress

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/.