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

**FACULTY OF APPLIED SCIENCES**

**BACHELOR OF SCIENCE IN COMPUTING**

**LEARNING MODULE OUTLINE**

| Academic Year | 2023/2024 | Semester | 1 |
|---|---|---|---|
| Module Code | COMP312 | | |
| Learning Module | Internet Programming II | | |
| Pre-requisite(s) | COMP113 Web Technologies | | |
| Medium of Instruction | English | | |
| Credits | 3 | Contact Hours | 45 hrs |
| Instructor | Dr Patrick Pang | Email | patrickpang@mpu.edu.mo |
| Office | N46B, Wui Chi Building, Main Campus | Office Phone | 85996886 |

**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; (EA1p, EA4p) |
|---|---|
| M2. | Differentiate the major architectural components of modern Web applications and devise how they work together; (EA1p, EA4p) |
| M3. | Design Web APIs using established styles; (EA1p, D2p) |
| M4. | Develop Web application clients that have interactive user interfaces; (D2p, EP2p) |
| M5. | Construct scalable, database-backed Web application servers. (D2p, EP2p) |

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. 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 | |
| 4-6 | 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 Components | |
| 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 and session | |
| | 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. Lab practice | | | ✓ | ✓ | ✓ |

**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 | 20% | D2p, EP2p | M1, M2 |
| A2. Group Project | 20% | D2p, EA1p, EP2p | M3, M4, M5 |
| A3. Test | 20% | EA1p, EA4p | M1, M2, M4 |
| A4. Examination | 40% | EA1p, EA4p, D2p | 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/.