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

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

| | | | |
|---|---|---|---|
| Academic Year | 2025/2026 | Semester | 2 |
| Module Code | COMP1124 | | |
| Learning Module | Advanced Programming | | |
| Pre-requisite(s) | COMP1122 Introduction to Programming | | |
| Medium of Instruction | English | | |
| Credits | 3 | Contact Hours | 45 hrs |
| Instructor | Dr. Chester Wong<br>Dr. Hong Lin | Email | chesterwong@mpu.edu.mo<br>linhong@mpu.edu.mo |
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**MODULE DESCRIPTION**

This module covers the principles of object-oriented programming using the Java language. Fundamental programming skills and methods related to object-oriented approaches are discussed. Topics include: objects and classes, encapsulation, inheritance and polymorphism, abstract classes and interfaces, generics and container classes, exception handling, and functional programming.

**MODULE INTENDED LEARNING OUTCOMES (ILOS)**

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

| | |
|---|---|
| M1. | Encapsulate related data and operations in objects and classes; (C1, C2) |
| M2. | Apply abstraction and implementation to separate programming tasks; (C1) |
| M3. | Model and design OO software using UML; (C1, C5) |
| M4. | Design and organize programs and data using objects, interfaces and classes; (C1, C2) |
| M5. | Apply the exception handling mechanism to handle programming errors and anomalous events; (C1) |
| M6. | Apply functional programming techniques to enhance program understandability and efficiency in problem solving; (C1) |
| M7. | Apply appropriate testing and debugging techniques in modern IDE. (C13) |

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

| PILOs | M1 | M2 | M3 | M4 | M5 | M6 | M7 |
|---|---|---|---|---|---|---|---|

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 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 |
|---|---|---|
| 1-3 | 1. Objects and Classes | 9 |
| | 1.1 Java Basis | |
| | 1.2 Encapsulation | |
| | 1.3 Constructors | |
| | 1.4 Immutable Objects and Classes | |
| | 1.5 Arrays of Objects | |
| 4-6 | 2. Inheritance and Polymorphism | 9 |

| | | | |
|---|---|---|---|
| | 2.1 Superclasses and Subclasses | | |
| | 2.2 Overriding, Polymorphism and Dynamic Binding | | |
| | 2.3 Typecasting | | |
| | 2.4 Static Methods and Factories | | |
| | 2.5 Methods in the Object Class | | |
| 7-8 | 3. Abstract Classes and Interfaces | 6 | |
| | 3.1 Abstract Classes | | |
| | 3.2 Interfaces and Implementations | | |
| 9 | 4 Introduction to UML | 3 | |
| | 4.1 Fundamental Notations | | |
| | 4.2 Structural Modeling Diagrams and Behavioral Modeling Diagrams | | |
| 10 | 5. Generics | 3 | |
| | 5.1 Generic Classes and Methods | | |
| | 5.2 Wildcards | | |
| 11-12 | 6. Java Collections Framework | 6 | |
| | 6.1 The Collection Interface | | |
| | 6.2 Sets, Lists and Maps | | |
| 13-14 | 7. Introduction to Functional Programming | 6 | |
| | 7.1 Lambda Expressions | | |
| | 7.2 Streams and Stream Operations | | |
| 15 | 8. Exception Handling | 3 | |
| | 8.1 Exceptions and Exception Types | | |
| | 8.2 Catching and Throwing | | |

**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 | M7 |
|---|---|---|---|---|---|---|---|
| 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.  Assignments/Classwork | 20% | C1, C2, C13 | M1, M2, M3, M4, M5, M6, M7 |
| A2.  In-class exercises and lab practices | 20% | C1, C2, C13 | M1, M2, M3, M4, M5, M6, M7 |
| A3.  Test | 20% | C1, C2, C5 | M1, M2, M3, M4, M5, M6 |
| A4.  Examination | 40% | C1, C2, C5 | 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.    Liang, Y. Daniel. (2023). Introduction to Java Programming and Data Structures. (13th edition). Pearson.

**REFERENCES**

1.    Marc, L., Patrick, N. and Daniel, L. (2023), Learning Java: An Introduction to Real-World Programming with Java

2.    Bloch, J. (2018), Effective Java (3nd Edition.). Upper Saddle River, NJ: Addision-Wesley

3.    https://dev.java/

**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/.