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

**FACULTY OF APPLIED SCIENCES**

**DOCTOR OF PHILOSOPHY IN COMPUTER APPLIED TECHNOLOGY**

**LEARNING MODULE OUTLINE**

| | | | |
|---|---|---|---|
| Academic Year | 2025/2026 | Semester | 1 |
| Module Code | PETI8123 | | |
| Learning Module | Innovations in Technology and Education | | |
| Pre-requisite(s) | Nil | | |
| Medium of Instruction | English | | |
| Credits | 3 | Contact Hours | 45 |
| Instructor | Patrick Pang | Email | patrickpang@mpu.edu.mo |
| Office | N46B, Wui Chi Building, Main Campus | Office Phone | 8599 6886 |

**MODULE DESCRIPTION**

The module aims to share and explain various educational technologies that can be implemented in formal classroom instruction and informal learning outside of schools, including Learning Management Systems, MOOCs, Learning Analytics, Artificial Intelligence, Virtual Reality, and Augmented Reality. Moreover, guided by theories and practices, this module identifies and explains the effective and less effective features in the design, use and evaluation of learning technologies.

**MODULE INTENDED LEARNING OUTCOMES (ILOS)**

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

| | |
|---|---|
| M1. | Apply instructional design models and cutting-edge learning technologies to the development of learning experiences. (AHEP4-M2, AHEP4-M16) |
| M2. | Design, select, modify, pilot, and evaluate digital technologies and learning management systems to support learning. (AHEP4-M3, AHEP4-M16) |
| M3. | Design and revise an implementation process or mechanism in the context of online, offline and blended learning. (AHEP4-M3, AHEP4-M16) |
| M4. | Apply data mining techniques to the design and evaluation of learning experiences. (AHEP4-M3) |

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

| **PILOs** | | **M1** | **M2** | **M3** | **M4** |
|---|---|---|---|---|---|
| P1. | Understand methodologies in conducting research in the field of EdTech | | | | |
| P2. | Understand knowledge and in-depth understanding of a wide range of learning technologies | ✓ | | ✓ | |
| P3. | Acquire essential knowledge and hands-on experience of analysis, assessment and solutions of EdTech related issues | ✓ | ✓ | ✓ | |

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|---|---|---|---|---|---|
| P4. | Acquire essential knowledge and application of EdTech-related methodologies in both online and offline learning environments | | ✓ | ✓ | |
| P5. | Initiate original research in EdTech related fields, both individually and collaboratively in a team | ✓ | ✓ | | |
| P6. | Plan, design, execute and manage a scholarly research project | | | | |
| P7. | Critically evaluate an advanced issue in EdTech related fields | | ✓ | ✓ | ✓ |
| P8. | Communicate research findings, both orally to diverse audiences and in writing through publishing research papers of scholarly values | | | | |
| P9. | Gather and disseminate knowledge at the postgraduate level and beyond | | | | |
| P10. | Demonstrate advanced knowledge, competence and research capability in learning technologies and innovation | ✓ | ✓ | | ✓ |
| P11. | Illustrate a global vision on knowledge advancement and dissemination | | | | |
| P12. | To demonstrate professional integrity and the spirit of challenge | | | | |
| P13. | To advocate professionalism in workplaces and the society at-large | | | | |
| P14. | To communicate professionally and effectively both in speaking and in writing | | | | |

**MODULE SCHEDULE, COVERAGE AND STUDY LOAD**

| Week | Content Coverage | Content Hours |
|---|---|---|
| 1 | 1. Introduction | 3 |
| | 1.1 Brief History of Educational Technologies | |
| | 1.2 Interaction Design and Educational Innovations | |
| 2 | 2. Prototyping | 3 |
| | 2.1 Low Fidelity Prototyping | |
| | 2.2 High Fidelity Prototyping | |
| 3-4 | 3. Evaluation of Technologies | 6 |
| | 3.1 Planning an Evaluation | |
| | 3.2 Types of Evaluations | |
| | 3.3 User Acceptance Models | |
| 5 | 4. Social and Persuasive Computing | 3 |
| 6 | 5. Examples of Integrating Educational Technology into Teaching | 3 |
| | 5.1 Using Online Technologies | |
| | 5.2 Using Gaming Environments | |
| | 5.3 Using Virtual Reality (VR) and Augmented Reality (AR) | |

| | | |
|---|---|---|
| | 5.4 Generative AI in Education | |
| 7-15 | 6. Learning Analytics and Educational Data Mining with Python | 27 |
| | 6.1 Python Introduction and Basics | |
| | 6.2 Working with pandas | |
| | 6.3 Exploratory Data Analysis | |
| | 6.4 Clustering | |
| | 6.5 Prediction | |
| | 6.6 Web Crawling | |
| | 6.7 Natural Language Processing (NLP) Basics and Word-based Analysis | |

**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** |
|---|---|---|---|---|
| T1. Lectures and tutorials | ✓ | ✓ | ✓ | ✓ |
| T2. Project including presentation | | ✓ | ✓ | ✓ |
| T3. Online discussion | ✓ | ✓ | ✓ | |

**ATTENDANCE**

Attendance requirements are governed by the Academic Regulations Governing Doctoral 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. Online discussion 1 | 25 | AHEP4-M2, AHEP4-M3, AHEP4-M16 | M1, M2, M3 |
| A2. Online discussion 2 | 25 | AHEP4-M2, AHEP4-M3, AHEP4-M16 | M1, M2, M3 |
| A3. Project including presentation | 50 | AHEP4-M2, AHEP4-M3 | M2, M3, M4 |

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.

**REQUIRED READINGS**

Lecture notes and slides.

**REFERENCES**

**Reference book(s)**

1. Hamilton, B. (2022). *Integrating technology in the classroom: Tools to meet the needs of every student*. International Society for Technology in Education.
2. Selwyn, N. (2016). *Education and technology: Key issues and debates*. Bloomsbury Publishing.
3. Roblyer, M., & Doering, A. H. (2007). *Integrating educational technology into teaching*. USA: Pearson, 2007.

**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/.