

Macao Polytechnic Institute

School of Applied Sciences

Master of Science in Big Data and Internet of Things

Module Outline

Academic Year 2021/2022 Semester 1

Learning Module	Research Methodology			Class Code	COMP6123
Pre-requisite(s)	Nil				
Medium of Instruction	English			Credit	3
Lecture Hours	45 hrs	Lab/Practice Hours	0 hrs	Total Hours	45 hrs
Instructor	K. L. Eddie Law		E-mail	eddielaw@ipm.edu.mo	
Office	M541, Meng Tak, Main Campus		Telephone	8599-3287	

Description

The learning module will review research philosophies, investigate practical research methodology, and discuss documentation and transferrable skill. Particularly, it would be important to apply the understanding of the nature of knowledge and research to applied science such as those in computing technology and engineering. In the module, we shall discuss research methodologies, research design, ethnics, and techniques pertaining to data collection and analysis. It also covers the devise of research proposals, risk management and various management skill.

Learning Outcomes

After completing the learning module, students will be able to:

1. Design and execute an advanced research project following an ethical and professional research methodology; (ET1fl, ET4fl, ET5fl, EA3fl, EP4fl)
2. Contrast and assess various types of research philosophies and methodologies; (ET3fl)
3. Identify the distinct research activities required over the research project cycle; (ET3fl, ET4fl)
4. Assess the research progress and risks involved at different stages over the course of project; (ET4fl, ET6fl)
5. Analyze and describe the technical and socio-economic contexts under which the research is performed; (ET2fl, ET5fl, ET6fl)
6. Identify the roles and responsibilities of individuals in a research team, and play an active role either as a member or a team leader; (EP4fl)
7. Discuss the contemporary developments and applications in Big-Data and IoT. (SM2fl, SM3fl, EP2fl, EP3fl)

Content

1. Ethics (9 hours)
 - 1.1 Elaborate ethics and integrity
 - 1.2 Understand human subject issues
 - 1.3 Discuss unethical issues in research, including plagiarism and self-plagiarism
 - 1.4 Discuss different scenarios using case studies
2. Research theoretical rationale (6 hours)
 - 2.1 What is research?
 - 2.2 Understand the basic research models: the research onion, and the wheel of science
 - 2.3 Discuss different research philosophy (the worldviews) – positivism, interpretivism, etc.
 - 2.4 Outline the concepts of ontology and epistemology
3. Research methodology (3 hours)
 - 3.1 Interpret the research onion
 - 3.2 Understand quantitative and qualitative research
 - 3.3 Interpret the wheel of science
4. Literature Review (3 hours)
 - 4.1 Roles of literature review or survey
 - 4.2 Why the need for literature review?
 - 4.3 How to carry out a literature review
 - 4.4 A session at MPI library on available search tools
5. Research Cycle: A Five-step Procedure for Research (9 hours)
 - 5.1 Research problem formulation – why the need for this?
 - 5.2 What are the criteria for selecting a problem?
 - 5.3 Causation, independent and dependent variables
 - 5.4 Evaluating problems
6. Scientific Approach (6 hours)
 - 6.1 Problems and objectives identification
 - 6.2 Research oriented or problem-solving problems
 - 6.3 Availability of resources and feasibility
 - 6.4 Data collection
7. Writing Research Proposals (3 hours)
 - 7.1 Thesis research proposals
 - 7.2 Research grant applications
 - 7.3 How to write good research proposals?
8. Scientific Approach: Analysing Data and Interpreting Results (6 hours)
 - 8.1 Review of basic statistics
 - 8.2 Functions of hypothesis testing
 - 8.3 Evaluating results and drawing conclusion

Teaching Method

Lectures, case studies, group discussion

Attendance

Attendance requirements are governed by the “Academic Regulations Governing Master’s Degree Programmes of Macao Polytechnic Institute”. Students who do not meet the attendance requirements for the module shall be awarded an ‘F’ grade.

Assessment

The learning module is graded on a 100 point scale, with 100 being the highest possible score and 50 being the passing score.

Item	Description	AHEP3 LO	Percentage
1. Assignments	Knowledge assessment	EA3fl, ET3fl,ET4fl	35%
2. Test	Knowledge assessment	SM2fl, SM3fl,ET2fl	25%
3. Group Project	Knowledge assessment	SM2fl,SM3fl,EP2fl,EP3fl, EP4fl,ET1fl,ET2fl, ET4fl, ET5fl, ET6fl	40%
Total Percentage:			100%

Teaching Material(s)

Textbook(s)

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

Reference

Reference book(s)

1. Ethridge D. (2004) Research Methodology in Applied Economics, 2nd Ed.
2. Trochim W. M. K., Connelly J. P., Arora K. (2015) The Research Methods Essential Knowledge Base, 2nd Ed., Wadsworth Publishing.
3. Walliman N. (2011) Operating Research Methods - The Basics, Routledge (Taylor & Francis Group).
4. Deb D., Dey R., Balas V. E. (2019) Engineering Research Methodology - A Practical Insight for Researchers, Springer Nature Singapore.
5. O’Leary Z. (2017) The Essential Guide to Doing Your Research Project, 3rd Ed., SAGE Publications Ltd.

Website(s)

6. The European Code of Conduct for Research Integrity,
http://www.esf.org/fileadmin/Public_documents/Publications/Code_Conduct_ResearchIntegrity.pdf