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

FACULTY OF APPLIED SCIENCES

MASTER OF SCIENCE IN SPORTS TECHNOLOGY AND INNOVATION

MODULE OUTLINE

Academic Year	2025/2026	Semester	1
Module Code	COMP6142		
Learning Module	Data Analytics		
Pre-requisite(s)	Nil		
Medium of Instruction	English		
Credits	3	Contact Hours	45 hrs
Instructor	Dr. Wenwang Rao	Email	raoww@mpu.edu.mo
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MODULE DESCRIPTION

Data Analytics is a vital course, unlocking secrets in sports data. You'll first learn fundamental concepts: descriptive stats to summarize key data like athlete performance, and inferential stats to predict and conclude about larger groups, e.g., assessing new training's effect on endurance. Mastering these skills helps analyze complex data accurately, optimizing training, evaluating performance, and making data - driven management decisions, advancing sports science.

MODULE INTENDED LEARNING OUTCOMES (ILOS)

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

M1.	Apply the basic concepts of statistics; (APEP4-M1)
M2.	Design graphical displays based on numeric and categorical data; (APEP4-M2)
M3.	Analyze numeric and categorical data by computing descriptive statistics; (APEP4-M2)
M4.	Use hypothesis testing; (APEP4-M1)
M5.	Differentiate various statistical techniques and identify an appropriate technique for a given set of variables; (APEP4-M3)
M6.	Choose an appropriate statistical method for each type of data. (APEP4-M3)

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

PILOs		**M1**	**M2**	**M3**	**M4**	**M5**	**M6**
P1.	Acquire essential knowledge in specific fields of sports science, including sports physiology and biomechanics, enabling a comprehensive understanding and evaluation of sports technology solutions to complex problems.						

P2.	Demonstrate a deep understanding of the principles, concepts and advancements in sports technology, encompassing exercise training, sports performance analysis, injury prevention, and rehabilitation.						
P3.	Develop proficiency in applying data science and artificial intelligence techniques and tools such as data analysis, statistical inference, data visualization, and predictive modelling, to sports-related data for actionable insights.	✓	✓	✓	✓	✓	✓
P4.	Design and integrate innovative sports technologies effectively, considering their potential impact to the environment and the society while providing solutions to complex user, societal, and business needs.						
P5.	Evaluate and select sports technology solutions, taking into account factors such as user requirements, societal implications, safety, privacy issues, and ethical considerations						
P6.	Develop a global vision on the critical development and new application of sports technology.						
P7.	Collaborate in interdisciplinary teams to address complex sports technology challenges, leveraging diverse perspectives and expertise and be able to critically evaluate team and their own performance.						
P8.	Communicate technically and effectively in both speaking and writing to both technical and non-technical audiences.						
P9.	Have a positive attitude towards society and the environment.						
P10.	Uphold high moral standards, professionalism, and a commitment to excellence in life-long learning.						

MODULE SCHEDULE, COVERAGE AND STUDY LOAD

Week	Content Coverage	Contact Hours
1-2	1. Introduction to Statistics	6
	1.1 An Overview of Statistics	
	1.2 Data Classification	
	1.3 Experimental Design	
3-5	2. Descriptive Statistics	9
	2.1 Frequency Distribution and Their Graphs	
	2.2 More Graphs and Displays	
	2.3 Measures of Central Tendency	
	2.4 Measures of Variation	
	2.5 Measures of Position	
6	3. Statistical Inference and Hypothesis Testing	3
	3.1 Probability and Probability Distributions	
	3.2 Confidence Intervals	

	3.3 Hypothesis Testing	
7-8	4. Student's t-test and Analysis of Variance	6
	4.1 Introduction to T-test	
	4.2 Applications of T-test	
	4.3 Introduction to F-test	
	4.4 Applications of F-test	
9	5. Chi-Square Tests	3
	5.1 Introduction to X^2 test	
	5.2 Applications of X^2 test	
10	6. Nonparametric Tests	3
	6.1 Introduction to Nonparametric Tests	
	6.2 Applications of Nonparametric Tests	
11-12	7. Correlation and Regression	6
	7.1 Introduction to Correlation	
	7.2 Applications of Correlation	
	7.3 Introduction to Simple Regression	
	7.4 Applications of Simple Regression	
13	8. Multiple Linear Regression	3
	8.1 Introduction to Multiple Linear Regression	
	8.2 Applications of Multiple Linear Regression	
14	9. Multiple Logistic Regression	3
	9.1 Introduction to Multiple Logistic Regression	
	9.2 Applications of Multiple Logistic Regression	
15	10. Multiple Cox regression	3
	10.1 Introduction to Multiple Cox regression	
	10.2 Applications of Multiple Cox regression	

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**
T1. Lectures	✓	✓	✓	✓	✓	✓
T2. In-class exercises	✓	✓	✓	✓	✓	✓

ATTENDANCE

Attendance requirements are governed by the Academic Regulations Governing Master'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	AHEP4-M1, M2	M1, M2, M3, M4
A2. Test	20	AHEP4-M1, M2	M1, M2, M3, M4
A3. Personal Project	20	AHEP4-M1, M2, M3	M1, M2, M3, M4, M5, M6
A4. Group Project	40	AHEP4-M1, M2, M3	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 will fail the module even if the overall score for the module is 50 or above.

Students with a score of less than 35 in the final examination will fail the module even if the overall score for the module is 50 or above.

REQUIRED READINGS

There is no official text for this module. PPTs will be uploaded in the Canvas.

REFERENCES

Larson, R. & Farber, B. (2018). Elementary Statistics: Picturing the World (7th ed.). Pearson.

Larson, R. (2022). Elementary Statistics: Picturing the World (8th ed.). Pearson.

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/.