



FACULTY OF APPLIED SCIENCES
BACHELOR OF SCIENCE IN COMPUTING
LEARNING MODULE OUTLINE

Academic Year	2023/2024	Semester	2
Module Code	COMP408		
Learning Module	Selected Topics III – Advanced Statistics with Applications		
Pre-requisite(s)	Nil		
Medium of Instruction	English		
Credits	3	Contact Hours	45 hrs
Instructor	Dr. Chi-Kin Lam	Email	cklamsta@mpu.edu.mo
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MODULE DESCRIPTION

This course provides an understanding and appreciation of the essential statistical concepts, as well as equips students with the ability to construct and evaluate statistical models using popular computing software, such as R. Topics include probability for statistics, concepts of statistical inference, regression modelling, Analysis of variance, and drawing conclusions from data. Emphasis will be on exposing students to the core concepts and the applications of computing software, and illustrating them largely through examples.

MODULE INTENDED LEARNING OUTCOMES (ILOS)

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

M1.	Demonstrate an understanding of the probability concepts and models as tools for studying random phenomena and for statistical inference, and the statistical concepts underlying methods. (SM2p, EA3p)
M2.	Analyze data using appropriate, modern statistical methods (SM2p, EA3p)
M3.	Conduct statistical analysis using R and other statistical software (SM2p, EA3p)
M4.	Develop the ability to interpret results and critically evaluate the methods used (SM2p, EA3p)
M5.	Demonstrate the capability to deploy established approaches accurately to analyze and solve real-life problems using a reasonable level of skill in calculation and manipulation of statistical models. (SM2p, EA3p)



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 specialization) 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 specialization) 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

1 - 2	1. Random variables and expectation	6
	1.1. Random variables, expectation and variance	
	1.2. Expectation and variance	
	1.3. Special random variables	
	1.4. Generating random numbers and calculating probabilities in R	
3 - 4	2. Distributions of sampling statistics	6
	2.1. The sample mean and variance	
	2.2. The central limit theorem	
	2.3. Data analysis in R	
5 - 6	3. Parameter estimation	6
	3.1. Maximum likelihood estimators	
	3.2. Interval estimates	
7 - 9	4. Hypothesis testing	9
	4.1. Significance levels	
	4.2. Tests concerning the mean of a normal population	
	4.3. Testing the equality of means of two normal populations	
	4.4. Hypothesis testing in R	
10 - 12	5. Regression	9
	5.1. Least squares estimators of the regression parameters	
	5.2. Statistical inference about the regression parameters	
	5.3. Logistic regression models	
	5.4. Regression analysis in R	
13 - 15	6. Analysis of variance	9
	6.1. One-way analysis of variance	
	6.2. Two-factor analysis of variance	
	6.3. Analysis of variance in R	

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. 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 (%)	AHEP3 LOs	ILOs to be Assessed
A1. Assignment / Classwork	25%	SM2p, EA3p	M1, M2, M3, M4, M5
A2. Tests	25%	SM2p, EA3p	M1, M2, M4, M5
A3. Examination	50%	SM2p, EA3p	M1, M2, M4, M5

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 required readings for this module. Module notes are distributed in the class.

REFERENCES

1. Ross, Sheldon M. *Introduction to Probability and Statistics for Engineers and Scientists*. Academic press, 2020.

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/.