FACULTY OF APPLIED SCIENCES

BACHELOR OF SCIENCE IN COMPUTING

LEARNING MODULE OUTLINE

Academic Year	2023/2024	Semester	2
Module Code	MATH322		
Learning Module	Mathematics for Gaming Technology		
Pre-requisite(s)	MATH211 Statistics I		
Medium of Instruction	English		
Credits	3	Contact Hours	45 hrs
Instructor	Dr. Edmund Yung	Email	edmundyung@mpu.edu.mo
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MODULE DESCRIPTION

This learning module introduces gaming mathematics, also referred as the mathematics of gambling. Topics cover probability theory basics, Bayes' Theorem, discrete random variables and probability distribution, and combinatorics. A thorough examination of odds versus probability, learning how to convert from probability to odds or vice-versa, and calculating the expectation and house edge. This learning module details the history, the rules, the different bets available, the payoffs, the odds, the winning strategies and the etiquette for classic casino games like roulette, blackjack, craps, baccarat, and slot machines. This learning module also explores different betting systems.

MODULE INTENDED LEARNING OUTCOMES (ILOS)

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

M1.	Point out all the supporting mathematics needed for gambling applications; (SM2p, SM3p, EA3p)
M2.	Differentiate between odds and probability; (SM2p, EA3p)
M3.	Determine expectation and house edge; (SM2p, EA3p)
M4.	Tell the rules, odds, strategies and etiquette for each respective game; (SM2p, EA3p)
M5.	Compare the different types of betting systems. (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

Week	Content Coverage	Contact Hours
1-3	1. The Supporting Mathematics	9
	1.1 Probability basics	
	1.2 Types of probability	

	1.3 Mutually exclusive versus non-mutually exclusive events	
	1.4 Independent versus dependent events	
	1.5 Bayes' theorem	
	1.6 Discrete probability distributions	
	1.7 Combinatorics	
4	2. Odds and House Edge	3
	2.1 Probability versus odds	
	2.2 Games of chance and skill	
	2.3 True odds versus casino odds	
	2.4 Expectation	
	2.5 House edge	
5-6	3. Roulette	6
	3.1 The history	
	3.2 Object of the game	
	3.3 The rules	
	3.4 General odds	
	3.5 Winning strategies	
	3.6 Etiquette	
7-8	4. Blackjack	6
	4.1 The history	
	4.2 Object of the game	
	4.3 The rules	
	4.4 General odds	
	4.5 Winning strategies	
	4.6 Etiquette	
9-10	5. Craps	6
	5.1 The history	
	5.2 Object of the game	
	5.3 The rules	

	5.4 General odds	
	5.5 Winning strategies	
	5.6 Etiquette	
11-12	6. Baccarat	6
	6.1 The history	
	6.2 Object of the game	
	6.3 The rules	
	6.4 General odds	
	6.5 Winning strategies	
	6.6 Etiquette	
13-14	7. Slot Machines	6
	7.1 The history	
	7.2 Object of the game	
	7.3 The rules	
	7.4 General odds	
	7.5 Winning strategies	
	7.6 Etiquette	
15	8. Money Management	3
	8.1 Betting systems	
	8.2 Gambler's ruin	

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	10%	SM2p, SM3p, EA3p	M1, M2, M3, M4, M5
A2. Tests	40%	SM2p, SM3p, EA3p	M1, M2, M3, M4, M5
A3. Examination	50%	SM2p, SM3p, EA3p	M1, M2, M3, 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

1. Bollman, M. (2017). Basic Gambling Mathematics: The Numbers behind the Neon. Chapman and Hall/CRC.

REFERENCES

1. Packel, E. (2006). The Mathematics of Games and Gambling. The Mathematical Association of America.
2. Barboianu, C. (2008). Probability Guide to Gambling: The Mathematics of Dice, Slots, Roulette, Baccarat, Blackjack, Poker, Lottery and Sport Bets. Infarom.

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/.