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

FACULTY OF APPLIED SCIENCES

BACHELOR OF SCIENCE IN COMPUTING

LEARNING MODULE OUTLINE

Academic Year	2023/2024	Semester	1
Module Code	COMP405		
Learning Module	Mobile Computing and Wireless Networks		
Pre-requisite(s)	COMP123 Data Communications		
Medium of Instruction	English		
Credits	3	Contact Hours	45 hrs
Instructor	Dr. Yue Liu	Email	yue.liu@mpu.edu.mo
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MODULE DESCRIPTION

This learning module covers the fundamental principles of mobile computing and wireless networks. Topics include wireless communication systems, radio propagation, wireless media access, mobile IP, mobile applications and services, wireless LANs, wireless network security and the next generation of wireless networks.

MODULE INTENDED LEARNING OUTCOMES (ILOS)

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

M1.	Utilize general knowledge of wireless communication technologies; (EA1p)
M2.	Identify the principles of the current wireless networking and mobile computing; (EA1p)
M3.	Rate the structures of wireless physical layers and MAC protocols; (EP1p, EP2p)
M4.	Evaluate current mobile wireless applications; (EP4p, EP6p, EP9p)
M5.	Create examples of future mobile wireless applications. (EP2p, EP4p)

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 specialisation) 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 specialisation) 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	1. Transmission fundamentals	3
2-3	2. Antennas and radio wave propagation	6
	2.1 Antennas and propagation modes	
	2.2 Line-of-sight transmission	
	2.3 Fading in the mobile environment	
4-5	3. Signal encoding techniques	4.5
	3.1 Analog modulation	

	3.2 Digital modulation	
5-7	4. Multiple access techniques	6
	4.1 Multiplexing	
	4.2 CDMA	
	4.3 OFDMA	
7-8	5. Coding and error control	4.5
	5.1 Cyclic redundancy check (CRC) codes	
	5.2 Block interleaving	
	5.3 Convolutional codes and Turbo codes	
9-10	6. Cellular wireless networks	4.5
	6.1 Principles of cellular networks	
	6.2 1G, 2G, 3G and 4G systems	
10-11	7. Mobile IP and Wireless Access Protocol	4.5
	7.1 Mobile IP	
	7.2 Wireless application protocol	
12-13	8. WiFi and wireless LAN standard	6
	8.1 IEEE 802.11 protocol	
	8.2 Security issues in wireless networks	
14	9. Short-range wireless communication networks	3
15	10. Next generation of wireless networks	3
	10.1 5G networks	
	10.2 Smart City and Internet of Things	

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 tutorials or 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. Assignments	10%	EA1p	M1, M2
A2. Project	20%	EP1p, EP2p, EP4p, EP6p, EP9p	M3, M4, M5
A3. Test	20%	EA1p	M1, M2
A4. Examination	50%	EA1p, EP6p	M1, M2, 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.

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 text for this module. Lecture notes are distributed in the class.

REFERENCES

1. Stallings, W. (2013). *Wireless Communications & Networks* (Pearson New International Edition, 2nd ed.). Prentice Hall.

2. C. Beard and Stallings, W. (2016). *Wireless Communication Networks and Systems* (Global ed., 1st ed.). Prentice Hall.

3. Forouzan, B. A. (2022) *Data Communications and Networking* (6th ed.). McGraw-Hill.

4. Stallings, W. (2013) *Data and Computer Communications* (10th ed.). Pearson.

5. Stallings, W. (2021). *5G Wireless: A Comprehensive Introduction* (1st 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/.