

 **Jerash University**

 **Faculty of Computer Science and Information Technology**

 **Computer Sciences Department**

 **Semester**: Fall Semester 2018/2019

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| **Course symbol and number:** 1003350  | **Course Name:** الشبكات اللاسلكيةWireless Networks |
| **Teaching Language:** English | **Prerequisites:** . **1003250** |
| **Credits:** 3 hours**.** | **Course Level:** 3 |

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| **Course Description**  |
| This course provides basic principles and fundamental topics concerning the technology and architecture of the Wireless Networks. Basic concepts of Wireless Networks: Wireless Personal Area Networks (WPAN), Wireless Local Area Networks (WLAN), Wireless Metropolitan Area Networks (MANs), and Wireless Wide Area Networks (WWAN). Satellite communications and applications with a focus on the Global Positioning System (GPS) are described. The mobile networks evolution is thoroughly presented including: GSM, GPRS, HSCSD, EDGE, UMTS, HSDPA, HSUPA, and 4G. This course introduces the mobile TCP/IP suite and Wireless Access Protocol (WAP). Additionally, the mobile devices are described in terms of the main components, architectures, operating systems. Physical layer standards, medium access control, building and securing WLAN, Wide Area Networks including cellular networks and cellular data networks. |

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| **Course Objectives**  |
| • Introduce students with the importance of Wireless Networks (WN).• Distinguish between Wired and Wireless concepts. • Explain the IEEE standards of WNs.• Understand available types of WNs and distinguish between different architectures,• components and coverage capacity.• Introduce the students with the generations of cellular networks and discuss related performance factors.• Understand satellite communications. • Discuss the latest mobile applications and explain ways of efficient mobile technology utilization. |

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| **Learning Outcomes**  |
| Upon completion of this course, the student will be able to: 1. Employ the physical security of network infrastructure components using National Institute of Standards and Technology (NIST) Guidelines and other best practices. 2. Develop backup procedures to provide for data security. 3. Use network operating system features to implement network security. 4. Identify computer and network threats and vulnerabilities and methods to prevent their effects. 5. Use tools to enhance network security. 6. Use encryption techniques to protect network data. |

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|  | **Text Book(s)**  |
| **Title**  | Introduction to Wireless and Mobile Systems, |
| **Author(s)**  | Tomson |
| **Publisher**  | 2015 |
| **Year**  | 2015 |
| **Edition**  | Fourth |

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|  | **References**  |
| **Books**  | Wireless Communications and Networks, 2rd Ed., William Stallings, Printice Hall, 2005 |
| **Internet links**  |  http://www.jpu.edu.jo/lms |
| **Course link**  | [Click here](http://www.jpu.edu.jo/lms) |

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|  | **Instructors**  |
| **Instructor**  |   |
| **Office Location**  | الطابق السادس - 611 |
| **Office Phone**  | 666 |
| **E-mail**  |  |

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| **Topics Covered**  |
| **Topics**  | **Chapters in Text**  | **Week number**  | **Teaching hours**  |
| **Introduction**• Definitions and Goals• Principles of Wireless Networks• Wireless Network Applications• Wireless Communication Technology | CH1 (TB+R1) | 1-3 | 2  |
| **Wireless Transmissions*** Frequencies, Signals, Antennas.
* Signal propagation.
* Multiplexing.
* Spread spectrum
* Modulation.

Cellular systems. | pp.38–78 | 4, 5, 6  | 7  |
| **Wireless Medium Access Control Techniques*** Collision avoidance.
* CDMA, SAMA, SDMA, FDMA, TDMA.

Aloha, Reservation schemes. | pp.79-118 | 8,9, 10  | 7  |
| **Wireless PAN Technology*** (Definition, Components, Structure and Applications.
* IEEE 802.15 Standard.
* Bluetooth (structure and operation)
* Bluetooth Applications

RFID, IRDA, ZigBee | pp.119-152 | 11  | 3  |
|  **Wireless LAN Technology*** Definition, Components, Structure and Applications.
* CSMA/CA and Spread Spectrum.
* IEEE 802.11 Protocol Layers and Architecture.
* IEEE 802.11 Standards.

IEEE 802.11 WLAN Topologies. | pp.153-188 | 12  | 3  |
| * **Lab Work**Configure and verify basic wireless LAN access.

Configure and troubleshoot wireless client access. | pp.189-224 | 13,14 | 4 |
| **Wireless MANs Technology*** Definition, Components, Structure and Applications).
* IEEE 802.16 Standards
* Wireless Mesh Networks

WiMax | pp.225-264 | 15 | 3 |
|  **Satellite Communications*** Evolution of Satellite Communications
* Satellite Basics (Types, Segments, Orbits)
* Usage and Configurations.
* Capacity Allocation
* Satellite Services & Applications

The Global Positioning System (GPS). |  |  |  |
| **Cellular Wireless Networks*** Principles, Components and Sub-systems.
* Mobile networks generations

Quality of Service (QoS) |  |  |  |
| **Mobile Network Layer*** Mobile IP.
* Principles behind Mobile IP,
* Security, DHCP.

Routing in Ad-hoc Networks. |  |  |  |
| **Mobile Transport Layer*** TCP-mechanisms
* Indirect TCP
* Snooping TCP

Mobile TCP |  |  |  |
|  | Handout |  |  |

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|  | **Evaluation**  |  |
| **Assessment Tool**  | **Expected Due Date**  | **Weight**  |
| Programming assignments and LMS |   | 20 %  |
| First Exam  |   | 20 %  |
| Second Exam  |   | 20 %  |
| Final Exam  | According to the University final examination schedule  | 40 %  |

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|  | **Policy**  |
| **Attendance**  | Attendance is very important for the course. In accordance with university policy, students missing more than the allowed absence rate of total classes are subject to failure. Penalties may be assessed without regard to the student's performance. Attendance will be recorded at the beginning or end of each class.  |
| **Exams**  | All exams will be CLOSE-BOOK; necessary algorithms/equations/relations will be supplied as convenient.  |

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| **Class Schedule & Room**  |

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| **Office Hours**  |
|  Sun: 11 – 12.30 Mon: 11 - 12:30  Tues: 11- 12.30  Wed: 11 – 12:30 |
|  | \* Or by an appointment through email |   |

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|  | **Teaching Assistant**  |
| To announced later on.  |  |

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|  | **Prerequisites**  |
| **Prerequisites by course**  |  |