

الوصف التفصيلي للمادة الدراسية – إجراءات تنفيذ مهام لجنة الخطة الدراسية/ كلية العلوم و تكنولوجيا المعلومات
Course Detailed Description – Procedures of the Course Plan Committee/ Faculty of Science
& Information Technology

QF01/0408-1.0

Department	علم الحاسوب	القسم
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الشبكات اللاسلكية	Course Name	اسم المادة الدراسية	رقم المادة. Course No
	(Prerequisite)	المتطلب السابق للمادة	Credit Hours
	رقم وتاريخ اعتماد الخطة الدراسية Number & date of course plan approval	أنظر النموذج QF01/0409	الوصف المختصر Brief Description

<ol style="list-style-type: none"> This course addresses the fundamental aspects of wireless networks with emphasis on current and next-generation wireless networks. The main aim of this course is to introduce the students to state-of-the-art wireless network protocols and architectures. This course will introduce the students to wireless networking research and guide them to investigate novel ideas in the area. It provides an overview of existing and emerging wireless network communications. 	أهداف المادة: (Course Objectives)
<p>Various aspects of wireless networking will be covered including: Introduction to wireless network, Types of wireless networks, fundamentals of cellular communication, mobile radio propagation, Existing Wireless Systems, Wireless LAN/MAN/ PAN standards, mobile ad-hoc networks, wireless sensor networks, and routing in wireless and mobile networks, recent advances (Femtocell Network, UWB), Push-to-Talk (PTT) Technology for SMS. During the course, the students are to look at industry trends and discuss some innovative ideas that have recently been developed. Some of the course material will be drawn from research papers, industry white papers and Internet RFCs. The course should provide the students with a good understanding of the wireless networking concepts and research directions.</p>	موضوعات المادة: (Course Topics)
<p>Textbook: Dharma Prakash Agrawal and Qing-An Zeng, <i>Introduction to Wireless and Mobile Systems</i>, Tomson, 2010, 3rd edition (ISBN-13: 978-1-4390-6205-0; ISBN-10: 1-4390-6205-6).</p>	الكتاب المعتمد: (Text Book)
<ol style="list-style-type: none"> Vijay K. Grag and Joseph E. Wilkes, <i>Wireless and Personal Communications Systems</i>, 1996 (ISBN: 0-13-234626-5). Christian Huitema, <i>Routing in the Internet</i>, Prentice Hall, 1995 (ISBN: 0-13-132192-7). Garg V.K., <i>Wireless Communications and Networking</i>, 2007, Elsevier, ISBN-13: 978-0-12-373580-5. Mobile Wireless Communications. Mischa Schwartz. Paperback (2013) ISBN: 9781107412712. Cambridge University Press. 	المراجع العلمية: (References)
<p>امعمال السنة = Course Work %50 (تقارير، أبحاث، امتحانات يومية)</p>	<p>طريقة التقييم للمواد العملية: <input type="checkbox"/></p>
<p>المشاركة = Participation %20 Midterm %30</p>	<p>طريقة التقييم للمواد النظرية: <input type="checkbox"/></p>

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(Reports, Term Papers, Quizes) %50 =Final Exam الامتحان النهائي	(Practical Course Grade Determination)	%20 = Participation %30=Midterm Exam	(Grade Determination)
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تاريخ الاعتماد Date of Approval	د. محمد عبد الله	اعتمدت من قبل رئيس القسم Approved by Dept. Chair
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معلومات إضافية: (يتم تحديثها في كل فصل دراسي وتعبأ من قبل مدرس المادة)

Extra Information: (Updated every semester and filled by course instructor)

د. أحمد أبو سخن	مدرس المادة Course Instructor
326	رقم المكتب Office No.
ahmad.abusukhon@zuj.edu.jo	البريد الإلكتروني Email
س (10-9)	الساعات المكتبية

Student Workload:

This is a combined lecture/discussion and research course. Material will be presented by the instructor and students are expected to participate in class discussions. The students are also expected to write a research proposal.

Topics

Week of	Topics	Suggested reading
Week 1	Syllabus, course mechanics, term project, Introduction to wireless network, Types of wireless networks, Cellular Systems – Introduction (History, Characteristics, Fundamentals and Infrastructure of Cellular system). Satellite Systems, Network Protocols, Ad Hoc Networks, Sensor Networks, Wireless LANs, MANs, and PANs, Recent Advances).	Chapter 1+2
Week 2	Mobile Radio Propagation Introduction, Types of Radio Waves, Propagation Mechanisms, Free Space Propagation, Land Propagation, Path Loss, Slow Fading, Fast Fading, Statistical Characteristics of Envelope, Characteristics of Instantaneous Amplitude, Doppler Effect, Delay Spread, Intersymbol Interference, Coherence Bandwidth, Cochannel Interference.	Chapter 3
Week 3	Cellular Concept , Introduction, Cell Area, Signal Strength and Cell Parameters, Capacity of a Cell, Frequency Reuse, How to Form a Cluster, Cochannel Interference, Cell Splitting, Cell Sectoring.	Chapter 5
Week 4	Multiple Radio Access: Introduction, Multiple Radio Access Protocols, Contention-Based Protocols, Pure ALOHA, Slotted ALOHA, CSMA, CSMA/CD, CSMA/CA	Chapter 6
Week 5	Mobile Communication Systems , Introduction, Cellular System Infrastructure, Registration, Handoff Parameters and Underlying Support, Parameters Influencing Handoff, Handoff Underlying Support, Roaming Support, Home Agents, Foreign Agents, and Mobile IP, Rerouting in Backbone Routers, Multicasting, Security and Privacy, Encryption Techniques, Authentication, Wireless System Security, Firewalls and System Security.	Chapter 10
Week 6	Existing Wireless Systems (Introduction, AMPS , Characteristics of AMPS, Operation of AMPS, General Working of AMPS, Phone System, IS-41 , Introduction Support Operations, GSM , Frequency Bands and Channels, Frames in GSM, Identity Numbers Used by a GSM System, Interfaces, Planes, and Layers of GSM, Handoff Short Message Service (SMS), PCS , Chronology of PCS Development, Bellcore View of PCS. IS-95 , Power Control, IMT-2000 (International	Chapter 11

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	Spectrum Allocation, Services Provided by Third-Generation Cellular Systems), Harmonized 3G Systems Multimedia Messaging Service (MMS), Universal Mobile Telecommunications System (UMTS).	
Week 7	Satellite Systems: Introduction, Types of Satellite Systems, Characteristics of Satellite Systems, Satellite System Infrastructure, Call Setup, Global Positioning System, Limitations of GPS, Beneficiaries of GPS, A-GPS and E 911	Chapter 12
Week 8	Midterm Exam	
Week 9	Ad Hoc Networks: Introduction, Characteristics of MANETs, Applications, Routing, Need for Routing, Routing Classification, Table-Driven Routing Protocols Destination-Sequenced Distance-Vector Routing, Cluster Head Gateway Switch Routing, Wireless Routing Protocol, Source-Initiated On-Demand Routing Ad Hoc On-Demand Distance Vector Routing, Dynamic Source Routing, Temporarily Ordered Routing Algorithm, Associativity-Based Routing,	Chapter 13
Week 10	Signal Stability-Based Routing, Hybrid Protocols, Zone Routing, Fisheye State Routing Landmark Routing (LANMAR) for MANET with Group, Mobility Location-Aided Routing: Distance Routing Effect Algorithm for Mobility, Relative Distance Microdiscovery Ad Hoc Routing Power Aware Routing, Multipath Routing Protocols, Vehicular Area Network (VANET), Security Issues in Mobile Ad Hoc Networks (MANETs) , Security Approaches, Requirements for an Intrusion Detection System for Mobile Ad Hoc Networks, Intrusion Detection Architecture Based on a Static Stationary Database, Logging Module, Network Simulators, ns-2 362 Other Network Simulators. [see GNS3, OPNet].	Chapter 13
Week 11	Sensor Networks Introduction DARPA Efforts toward Wireless Sensor Networks Other Applications of Wireless Sensor Networks Fixed Wireless Sensor Networks Wireless Sensor Networks Sensor Deployment Randomly Deployed Sensor Networks Regularly Deployed Sensor Networks Network Characteristics Classification of Sensor Networks Fundamentals of MAC Protocol for Wireless Sensor Networks Flat Routing in Sensor Networks	Chapter 14
Week 12	Design Issues in Sensor Networks Sensor Databases Collaborative Information Processing Power-Efficient Gathering in Sensor Information Systems (PEGASIS) Multipath Routing in Sensor Networks Service Differentiation 403 Multipath Routing-Based Service Differentiation Energy Hole Problem Data Aggregation and Operating System Operating System Design Secured Communication Symmetric Key-Based Encryption Intrusion Detection Schemes.	Chapter 14

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Week 13	<p>Wireless LANs, MANs, and PANs Introduction Wireless Local Area Networks (WLANs) IEEE 802.11 An Overview of IEEE 802.11 Series Protocols Enhancement for IEEE 802.11 WLANs Issues in MAC Protocols ETSI HiperLAN HomeRF Wireless Metropolitan Area Networks (WMANs) using WiMAX and Mesh Networks IEEE 802.16 based WiMAX Mesh Networks Ricochet Wireless Personal Area Networks (WPANs) Introduction IEEE 802.15.1 (Bluetooth) IEEE 802.15.3 IEEE 802.15.4 ZigBee</p>	Chapter 15
Week 14	<p>Recent Advances Introduction, Femtocell Network, Introduction, Technical Features Challenges , Concluding Remarks, Ultra-Wideband Technology UWB System Characteristics, UWB Signal Propagation Current Status and Applications of UWB, Technology Difference Between UWB and Spread Spectrum, Techniques UWB Technology Advantages, UWB Technology Drawbacks Challenges for UWB Technology Future Directions Push-to-Talk (PTT) Technology for SMS PTT Network Technology PTT in iDEN Cellular Networks PTT in Non-iDEN Cellular Networks: PoC Limitations of Current Services RFID Cognitive Radio Multimedia Services Requirements Media Codecs File Formats HTTP Media Control Protocols SIP Multimedia Messaging Service Multimedia Transmission in MANETs Heterogeneous Wireless Networks Mobility and Resource Management for Integrated Systems DDoS Attack Detection Covariance Analysis Method</p>	Chapter 16
Week 15	<p>Mobility Management Resource Management Recent Advances in Resource Management Multicast in Wireless Networks Recent Advances in Multicast over Mobile IP Reliable Wireless Multicast Protocols Broadcasting, Multicasting, and Geocasting in Ad Hoc Networks Future Directions</p>	



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	Directional and Smart Antennas Types of Antenna Smart Antennas and Beamforming Smart Antennas and SDMA WiMAX and Major Standards IEEE 802.16j IEEE 802.16m Low-Power Design	
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Guidelines for Submission of Assignments:

- All work must be submitted on "A4" papers (computer print). Please do not submit papers torn-off from the spiral notebooks.
- The solutions to the homework problems must be arranged sequentially. Each solution must be clearly labeled and separated from the previous and the next solution.
- Assignments must be turned-in in the class before the start of the class on due dates. A late submission will not be accepted and will receive a grade of 'zero' unless a time extension is approved by the instructor in advance, or an emergency had occurred.

Other Important Notes:

- No questions will be answered on the date of a test/exam.
- Any disagreement with grading on tests must be pointed out immediately after the class period.
- A make-up test/exam can be given *only* when the student presents a *valid* reason for missing the test/exam.

Wish You All the Success