Course Specifications

Program(s) on which this course is given:	Electronics & Electrical Communications Engineering
Major or Minor element of programs:	Elective
Department offering the program:	Electronics & Electrical Communications Engineering
Department offering the course:	Electronics & Electrical Communications Engineering
Academic year / Level:	4th Year (Senior)
Date of original/modified specification approval:	2011
Semester of course offering:	Spring 2011

A- Basic Information

1.a. Title:	Wireless Computer Networks		**1.b. Code:**		ELC 463			
2. Units/Credit hours per week:	2.a. Lectures	3	2.b. Tutorial	1	2.c. Practical	0	2.d. Total	4

B- Professional Information

1. Overall Aims of the Course:	The course aims at providing an introduction to wireless networking issues of state-of-the-art and emerging wireless communication systems. The course covers various aspects of wireless networks design. Topics include Introduction to wireless networks, Fundamentals of Wireless MAC, WLAN MAC protocols, Mobile IP, WiMAX, Cognitive Radios and Sensor Networks.
2. Intended Learning Outcomes of Course (ILOs):	**a) Knowledge and Understanding**
	1. Explain the fundamental concepts behind the design of wireless networks (1.2, 1.7).
	2. Identify different types of wireless networks (1.2, 1.7).
	3. Understand the fundamentals of wireless multiple access and its difference from wired MAC (1.2, 1.7).
	4. Explain the concept of wireless interference and its modeling approaches in wireless networks (1.2, 1.7).
	5. Explain distributed power control algorithms and their critical role in balancing wireless interference (1.2, 1.7).
	6. Explain Aloha and S-Aloha protocols and their performance analysis (1.2, 1.7).
	7. Explain WLAN MAC protocols; CSMA, CDMA/CA (1.2, 1.7).
	8. Explain Mobile IP as a technique towards handling mobility and handoffs in IP networks (1.2, 1.7).
	b) Intellectual Skills
	1. Differentiate between different types of wireless networks.
	2. Utilize the physical and protocol models of interference in solving MAC problems (3.2, 3.7).
	3. Identify and distinguish different types of emerging wireless networks (3.1, 3.4).
	4. Solve power control problem using the centralized and distributed algorithms and contrast the two approaches (3.2, 3.7).
	5. Conduct performance analysis and understand trade-offs of Aloha and S-Aloha (3.4).
	6. Examine limitations of CSMA, CSMA/CD and CSMA/CA and the role of virtual carrier sensing in reducing collisions (3.3, 3.4).
	7. Analyze mobility scenarios in IP networks and how the introduced approaches may be best for particular scenarios (3.1, 3.2, 3.3, 3.4, 3.5).
	8. Reach engineering judgments considering balanced costs, benefits, safety, quality,

	reliability, and environmental impact. (3.5).
	c) Professional and Practical Skills
	1. Stress the fundamental concept of trade-offs and the engineer's role to best strike a balance between different trade-offs, e.g. cost-performance, cost-reliability, performance-reliability, etc (2.1, 2.6).
	d) General and Transferable Skills
	1. Develop presentation and technical discussion and critique skills (4.9, 4.7). 2. Be prepared for the job market by getting introduced to practical wireless standards and networking protocols used in practice (4.9).

3. Contents

Topic	Total hours	Lectures	Tutorial/ Practical
Introduction to the Course	6	6	0
Introduction to Different types of Wireless Networks	8	6	2
MAC Fundamentals	10	6	4
MAC Protocols for Wireless Networks	10	6	4
Mobile IP	9	9	0
Routing in Wireless Multi-hop Networks	13	9	4

4. Teaching and Learning Methods	Lectures (Y)	Practical Training/ Laboratory (N)	Seminar/Workshop (N)
	Class Activity (Y)	Case Study (Y)	Projects (Y)
	E-learning (N)	Assignments /Homework (N)	Other:

5. Student Assessment Methods

5.a. Method	To assess (with reference to the ILOs)
-Class test	a1, a2, a3, a6, b1, b3, b5
-Project Assignment	a1, a4, a5, b3, b4
-Presentations	d1
-Final Exam	a1, a2, a3, a4, a5, a6, a7, a8, b1, b2, b3, b4, b5 , b6, b7, b8, c1, d2

5.b. Assessment Schedule	Week
-Assessment 1; Class test	4
-Assessment 2; Project Assignment	3
-Assessment 3; Presentations	9-10
-Assessment 4; Final Exam	15

5.c. Weighting of Assessments	
-Final-term Examination	70 %
-Project	10 %
-Class Test	5 %
-Presentation	15 %
-Total	100 %

6. List of References

6.a. Course Notes: Powerpoint Slides
6.b. Essential Books (Text Books): None
6.c. Recommended Books. five books on different aspects of wireless networks
A. Leon-Garcia and I. Widjaja, "Communication Networks: Fundamental Concepts and Key Architectures," 2nd Edition, McGraw Hill, 2004 **[Ch. 6]**   W. Stallings, "Wireless Communication and Networks," Prentice-Hall, 2nd Edition, 2005 **[Ch. 14]**   I. Marsic, "Wireless Networks: Local and Ad Hoc Networks," Rutgers University **[Ch. 3]**   T. Rappaport, "Wireless Communication:," 2nd Edition, Prentice-Hall, 2002 **[Ch. 4 and 5]**   C. Siva Ram Murthy and B.S. Manoj, "Ad Hoc Wireless Networks: Architectures and Protocols", Prentice-Hall PTR (NJ) (2004)
6.d. Periodicals, Web Sites, … etc
7. Facilities Required for Teaching and Learning
Class room equipped with projector.

Course Coordinator:	**Dr. Ahmed Shalash and Dr. Tamer ElBatt**
Head of Department:	**Prof. Mahmoud El-Hadidi**
Date:	**12/6/2011**