



## Course Specification

**Course Name:** [Wireless and Mobile Networks ]

**Course Code:** [IT 422]

### I. Basic Course Information

Major or minor element of program: [Elective]

Department offering the course: [Information Technology Department]

Academic level: [400]

Semester in which course is offered: [First (Fall) Semester]

Course pre-requisite(s): [Computer Networks 2 (IT 322) ]

Credit Hours: 3

Contact Hours Through:

Lecture	Tutorial *	Practical *	Total
2.5	1.0	0.5	4.0

\* 1.5 hours for **either** Tutorial or Practical

Approval date of course specification: September, [2014]

### II. Overall Aims of Course

[This course aims at providing comprehensive overview of wireless communication, satellite networks, mobile cellular networks, mobile ad-hoc networks and wireless sensor networks.]

### III. Program ILOs covered by course

Program Intended Learning Outcomes (By Code)			
Knowledge & Understanding	Intellectual Skills	Professional Skills	General Skills
[K6,K17,K23 ]	[I14,I15,I18 ]	[P12,P13,P18,P19 ]	[G1,G2,G6,G7 ]



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**IV. Intended Learning Outcomes of Course (ILOs)**

**a. Knowledge and Understanding**

On completing the course, students should be able to:

- K.1 Recognize the basics of wireless transmission including different antenna types along with their characteristics, satellite types, their characteristics and different types of satellite networks.
- K.2 Describe the operation of various types of mobile networks, mobile cellular networks, mobile ad hoc networks and wireless sensor networks.
- K.3 Describe various ad hoc networks protocols; medium access control, routing, multicasting and energy management.
- K.4 Describe various wireless sensor networks protocols. ]

**b. Intellectual/Cognitive Skills**

On completing the course, students should be able to:

- I.1 Compare between different antenna types; shapes and capabilities.
- I.2 Categorize satellite networks (according to the satellite altitude), cellular networks (according to generation, multiplexing method, architecture, capabilities, and channels).
- I.3 Analyze the performance of various ad hoc networks protocols and sensor networks protocols.
- I.4 Resolve different problems concerning, antenna, wireless communication and cellular networks. ]

**c. Practical/Professional Skills**

On completing the course, students should be able to:

- P.1 Build an Android program for a mobile (using a mobile simulator).
- P.2 Carry out a research in one of the subject related topics.
- P.3 Discuss different antenna types, satellite types.
- P.4 Discuss various wireless networks (cellular, ad hoc, sensor) nature, protocols, application. ]

**d. General and Transferable Skills**

On completing the course, students should be able to:

- G.1 Demonstrate the ability of self learning and time management.
- G.2 Gain various skills: organization, communication and presentation.
- G.3 Work effectively as a part of a team to build a mobile program.]

**V. Course Matrix Contents**

	Main Topics / Chapters	Duration (Weeks)	Course ILOs Covered by Topic (By ILO Code)			
			K & U	I.S.	P.S.	G.S.
1-	Antennas ]	1	K1	I1,I4	P3	
2-	Wireless Transmission ]	1	K1	I1,I4	P1	
3-	Satellite Communication ]	1.5	K1	I1,I4		
4-	Cellular Networks ]	4.5	K2,K3	I2,I4	P1	
5-	Ad hoc Networks ]	3	K3	I3	P1,P2,P4	G1,G2,G3
6-	Wireless Sensor Networks ]	2	K2,K3,K4	I3	P1,P2,P4	G1,G2,G3
	<b>Net Teaching Weeks</b>	<b>13</b>				



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VI. Course Weekly Detailed Topics / hours / ILOs

Week No.	Sub-Topics	Total Hours	Contact Hours	
			Theoretical Hours	Practical Hours *
1	* Antennas: Types, Radiation pattern	[ 3 ]	[ 3 ]	
2	* Antennas: Antenna gain * Wireless transmission: Propagation nodes, Line of sight transmission, Impairments, Fading * Problems * Mobile Programming ]	[ 4 ]	[ 2.5 ]	[ 1.5 ]
3	* Satellite: Definitions, Properties * Satellite: Classifications * Problems]	[ 4 ]	[ 2.5 ]	[ 1.5 ]
4	* Satellite: Satellite Networks * Problems * Mobile Programming ]	[ 4 ]	[ 2.5 ]	[ 1.5 ]
5	* Ad hoc networks: definition, applications, challenges * Ad hoc networks: MAC Problems) * Problems ]	[ 4 ]	[ 2.5 ]	[ 1.5 ]
6	* Ad hoc networks: MAC Protocols * Problems * Mobile Programming ]	[ 4 ]	[ 2.5 ]	[ 1.5 ]
7	<b>Midterm Exam</b>			
8	* Ad hoc networks: Routing Protocols * Problems ]	[ 4 ]	[ 2.5 ]	[ 1.5 ]
9	* Ad hoc networks: Routing Protocols * Ad hoc networks: Energy Management * Problems * Mobile Programming ]	[ 4 ]	[ 2.5 ]	[ 1.5 ]
10	* Cellular network: concept, cell characteristics, cell capacity, frequency reuse, architecture, phases of a cellular call * Problems ]	[ 4 ]	[ 2.5 ]	[ 1.5 ]
11	* Cellular Network: Handoff, Power Control * Problems * Mobile Programming ]	[ 4 ]	[ 2.5 ]	[ 1.5 ]
12	* Cellular network: Transmission modes, Generations * Problems]	[ 4 ]	[ 2.5 ]	[ 1.5 ]
13	* Wireless Sensor Networks: System, Applications, Communication modes * Problems * Mobile Programming ]	[ 4 ]	[ 2.5 ]	[ 1.5 ]
14	* Wireless Sensor Networks: Data Aggregation	[ 4 ]	[ 2.5 ]	[ 1.5 ]
15	<b>Final Exam</b>			
<b>Total Teaching Hours</b>		<b>51</b>	<b>33</b>	<b>18</b>

\* No Practical/Tutorial during the first week of the semester



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VII. Teaching and Learning Methods

Teaching/Learning Method	Selected Method	Course ILOs Covered by Method (By ILO Code)			
		K & U	Intellectual Skills	Professional Skills	General Skills
Lectures & Seminars	<input checked="" type="checkbox"/>	K1,K2,K3,K4	I1,I2,I3,I4	P3,P4	
Tutorials	<input checked="" type="checkbox"/>		I1,I4		
Computer lab Sessions	<input checked="" type="checkbox"/>			P1	G3
Practical lab Work	<input checked="" type="checkbox"/>			P1	G3
Reading Materials	<input checked="" type="checkbox"/>			P1,P2	G1,G3
Web-site Searches	<input type="checkbox"/>				
Research & Reporting	<input type="checkbox"/>				
Problem Solving / Problem-based Learning	<input checked="" type="checkbox"/>		I1,I4		G3
Projects	<input checked="" type="checkbox"/>			P1,P2,P4	G1,G2,G3
Independent Work	<input checked="" type="checkbox"/>				G1
Group Work	<input checked="" type="checkbox"/>			P1,P2,P4	G1,G3
Case Studies	<input type="checkbox"/>				
Presentations	<input type="checkbox"/>				
Simulation Analysis	<input type="checkbox"/>				
Others (Specify):	<input type="checkbox"/>				

VIII. Assessment Methods, Schedule and Grade Distribution

Assessment Method	Selected Method	Course ILOs Covered by Method (By ILO Code)				Assessment Weight / Percentage	Week No.
		K & U	I.S.	P.S.	G.S.		
Midterm Exam	<input checked="" type="checkbox"/>	K1,K3	I1,I3	P3,P4		15%	7
Final Exam	<input checked="" type="checkbox"/>	K1,K2,K3,K4	I1,I2,I3,I4	P3,P4		60%	15
Quizzes	<input checked="" type="checkbox"/>		I3,I4			10%	4,11
Course Work	<input type="checkbox"/>						
Report Writing	<input type="checkbox"/>						
Case Study Analysis	<input type="checkbox"/>						
Oral Presentations	<input type="checkbox"/>						
Practical	<input checked="" type="checkbox"/>		I3	P1	G2,G3	5%	All term
Group Project	<input checked="" type="checkbox"/>		I3	P1,P2	G1,G3	10%	11,12,13
Individual Project	<input type="checkbox"/>						
Others (Specify):	<input type="checkbox"/>						



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### IX. List of References

<b>Essential Text Books</b>	<ul style="list-style-type: none"><li>• [ ]</li></ul>
<b>Course notes</b>	<ul style="list-style-type: none"><li>• Power Point [ ]</li></ul>
<b>Recommended books</b>	<ul style="list-style-type: none"><li>• Wireless Communications and networks - William Stallings</li><li>• Wireless Communications And Networking - Mark, Jon W., Zhuang, Weihua</li><li>• Principles &amp; Applications of GSM - Vijay K. Garg, Joseph E. Wilkes</li><li>• 3G Wireless Networks - Daniel Collins, Clint Smith</li><li>• Wireless Network Evolution: 2G to 3G - Vijay K. Garg [ ]</li></ul>
<b>Periodicals, Web sites, etc ...</b>	<ul style="list-style-type: none"><li>• [ IEEE</li><li>• ACM</li><li>• Science Direct ]</li></ul>

### X. Facilities required for teaching and learning

<ul style="list-style-type: none"><li>• Data show</li><li>• White board</li><li>• Android Programming tool</li><li>• Lab [ ]</li></ul>
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**Course coordinator:** [Prof. Dr Imane Aly Saroit Ismail]

**Head of Department:** [Prof. Reda Abdel Wahab ]

**Date:** [September 2014]