



University of Tehran
School of Electrical and Computer Engineering

Course:	8101000 – Wireless Ad Hoc Networks		
Course type:	Elective	EE/CE*	Credit: 3
Level:	Graduate		
Co-requisite(s):	None		
Prerequisite(s):	None		
Prerequisite by topic:	Basic concepts in data communication networks		
Textbook(s):	[1] C. S. R. Murthy and B. S. Manoj, <i>Ad Hoc Wireless Networks, Architectures and Protocols</i> , Prentice Hall, 2004 [2] Selected research articles.		
Coordinator:	Nasser Yazdani and Farshad Lahouti, Faculty members, School of ECE		
Goals:	This course is an advanced graduate course on the design and applications of wireless ad hoc and sensor networks. Due to the recent interest in the cross layer design of communication systems, the course takes such a perspective on the issues related to physical layer, data link layer, MAC layer, network layer, transport layer and the end-to-end data delivery in wireless ad hoc/sensor networks. The applications and future trends of communication and computing systems with wireless ad hoc connectivity will be explored. <i>The course is intended for students majoring in communications or computer engineering.</i>		
Outcome:	<p>Upon successful completion of the course, students will be able to</p> <ol style="list-style-type: none"> 1. Learn the characteristics of the wireless communications channel 2. Understand the architecture of cellular networks and their design and operations principles 3. Understand the architecture of wireless local and wide-area networks and their design and operations principles 4. Acquire basic knowledge on the physical layer of communications systems, and the role of modulation and channel coding 5. Acquire fundamental knowledge on centralized and decentralized MAC protocols in WAHN 6. Acquire fundamental knowledge on routing techniques in WAHN 7. Understand Quality of Service issues in WAHN 8. Understand energy management issues in WAHN 9. Acquire basic knowledge on sensor networks and hybrid ad hoc and cellular networks 10. Gain the scientific essentials and experience to conduct research 		

	in wireless ad hoc networks and related areas
Topics:	1- Introduction to Wireless Networks <ul style="list-style-type: none"> • A communications theory perspective • A networking perspective 2- Overview of Wireless Mobile Communications 3- Wireless LAN, WAN and Internet 4- Wireless Ad Hoc Networks <ul style="list-style-type: none"> • Hardware, architecture, physical layer, MAC layer • Network layer: Addressing, Routing • Transport layer for ad hoc networks, TCP, QoS • End-to-End data delivery: presentation layer and compression • Energy management in ad hoc wireless networks • Hybrid wireless ad hoc networks 5- Wireless sensor networks and their applications 6- Special Topics
Computer usage:	MATLAB for implementing coding algorithms in assignments
Assignments:	The course includes assignments, computer assignments as midterm exam, and a research-based course project.
Projects:	
Grading:	Assignments: 10% Project: 20% Computer Assignments: 20% Exams: 50%
Further readings:	[1] Selected research articles. [2] L. L. Peterson, B. S. Davie, <i>Computer networks: A systems approach</i> , Morgan Kaufmann Series in Networking, 2000. [3] Theodore S. Rappaport, <i>Wireless Communications principle and practice</i> , Prentice Hall, 2nd edition, 2001. [4] J. G. Proakis, M. Salehi, <i>Digital Communications</i> , McGraw Hill, 2008.
Prepared by:	Farshad Lahouti
Date:	October 2012

*EE: Electrical Engineering CE: Computer Engineering IT: Information Technology