

**DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING  
UNIVERSITY OF ALBERTA**

**ECE 780 A1 Fall 2009: Advanced Topics in Communications  
“Wireless Communication Networks”**

**Lectures: Monday and Wednesday from 2:30 to 3:50pm in ECERF W3-087**

**Calendar Description:**

\* This course is concerned with the architecture, protocols, modeling, and evaluation of wireless communication networks in transport of multimedia traffic. Specifically, this course studies queueing theory, traffic and channel modeling, radio resource allocation, call admission control, access control, multiple access, and mobility management in existing and emerging advanced wireless networks.

<b>Wireless Communication Networks</b>		
<b>Topic</b>	<b>Time in Weeks</b>	<b>Concepts to be Learned</b>
Introduction to wireless communication networks	0.5	Packet switching versus circuit switching, open system interconnection (OSI) reference model, wireline networks versus wireless networks.
Queueing theory	2	Markov Chain, Birth-death process, Little’s Law, M/M/1 queue, M/M/1/N queue, M/M/N queue
Cellular communications	1	Cellular concept and frequency reuse, cochannel and adjacent channel interference, trunking and grade of service, mechanisms for capacity increase
Routing	0.5	Shortest path routing algorithm
Multimedia traffic modeling	1	Voice on-off model, voice fluid model. video fluid model
Call admission control	1	Admission control with and without access buffer
Centralized multiple access	1.5	Time-division multiple access (TDMA), frequency-division multiple access (FDMA), code division multiple access (CDMA)
Mobility management	1	Handoff management, location management, signaling
Random access	1	Carrier sense multiple access (CSMA), wireless local area networks (WLANs)
Access control	2	Token bucket policing, fluid analysis
Advanced wireless networks	0.5	cognitive radio

**Course Texts**

M. Schwartz, *Broadband Integrated Networks*, Prentice Hall, 1996.

J. W. Mark and W. Zhuang, *Wireless Communications and Networking*, Prentice Hall, 2003

D. Bertsekas and R. Gallager, *Data Networks*, Prentice Hall, 1992.

S. M. Ross, *Introduction to Probability Models*, Academic Press, 9<sup>th</sup> Edition.