

### **ECE 5664 Cellular Radio and Personal Communications (3C)**

Fundamental theory and design of high capacity wireless communications systems. Topics include trunking, propagation, frequency reuse, modulation, coding, and equalization.

What is the reason for this course?

The wireless telecommunications industry has grown tremendously since the first cellular system was deployed in 1983. New digital techniques were introduced in 1993 to accommodate the huge boom in U.S. subscribers of portable telephone service in the mid 1990's. The same growth has occurred in Europe and Japan, creating a need for researchers and engineers with knowledge about cellular radio systems and digital wireless communication techniques. Wireless systems that provide personal communications in offices, cities, and continents are beginning to emerge and research in this area is of vital importance. This course will provide important knowledge to graduate students who wish to work in wireless communications, or who wish to enter the telecommunications industry. The course supplements the department research in wireless communications.

Typically offered: Spring. Program Area: Communications.

*Prerequisites: ECE 4634. Prerequisite or corequisite: ECE 5605.*

Why are these prerequisites or corequisites required?

Knowledge of analog and digital communications (as covered in ECE 4634) and stochastic signal analysis (as covered in ECE 5605) is required.

#### **Department Syllabus Information:**

##### **Major Measurable Learning Objectives:**

- design, analyze and compare different types of mobile, multi-user systems,
- evaluate the technical issues related to wireless communication systems, including coverage distances, carrier to interference analysis, trunking efficiency, and modulation and multiple access tradeoffs in the world standards.

<b>Course Topics</b>	
<b>Topic</b>	<b>Percentage</b>
Introduction to cellular systems, trunking, handoff Urban propagation, Doppler shift, channel sounding	15%
Path loss, signal contours, co-channel interference, signal strength prediction, cellular layout, diversity	10%
Modulation, review of basics, spectral efficiency, digital modulation, spectral efficiency, equalization	15%
Speech coding, introduction to multiple access	10%
Multiple access: TDMA/FDMA/CDMA, CAPACITY, reuse	10%
Real Systems: U.S. Analog FM, Cellular, UDPC, CT2, U.S. Digital Cellular, CDMA Cellular, GSM	15%
Network considerations, packet radio, ISDN in mobile radio	10%
Future personal communications, micro-indoor cellular, RLAN's, Mobile Sat, LEO, PASS	15%