

ELEC 6100/6106 - WIRELESS COMMUNICATIONS SYSTEMS

2002 Catalog Data: ELEC 6100/6106. WIRELESS COMMUNICATIONS SYSTEMS (3) LEC. 3. Pr., ELEC 3400, ELEC 3320. Introduction to mobile cellular radio and wireless personal communications, cellular concept, mobile radio propagation, modulation techniques, multiple access techniques, wireless systems and standards.

Textbook: Wireless Communications: Principles and Practice, T.S. Rappaport, Prentice-Hall, 1996.

Reference: Wireless and Personal Communications Systems, V.K. Garg and J.E. Wilkes, Prentice-Hall, 1996.

Coordinator: J.K. Tugnait, Professor of EE

Goals: This course provides a basic introduction to mobile cellular radio and wireless personal communications.

Prerequisites by topic:

1. Introductory probability.
2. Introductory communication theory.
3. Basic electromagnetics.

Topics:

1. Fundamentals of cellular communications: geometry of hexagon cells, system design fundamentals, frequency reuse, cochannel interference, trunking and grade of service, improving capacity -- cell splitting and sectoring, handoff strategies. (9 classes)
2. Fundamentals of mobile radio propagation: multipath characteristics of a radio wave, large-scale path loss models, small-scale fading and multipath, parameters of mobile multipath channels. (9 classes)
3. Modulation techniques for mobile radio: angle modulation (analog signals), digital modulation techniques (PSK, FSK, QAM, constant envelope modulation). (8 classes)
4. Equalization and diversity techniques. (4 classes)
5. Multiple access techniques: FDMA, TDMA and spread spectrum multiple access, system capacity. (9 classes)
6. Wireless systems and standards. (4 classes)
7. Tests (2 classes)

Typical methods for evaluating student performance:

Homework	20%
Tests (2)	50%
Final examination	30%

Computer usage:

Homework will require use of standard software packages on SUN workstations to solve problems and carry out simulations.

Laboratory projects (including major items of equipment and instrument used): None

Class attendance: Class attendance and its effect on course grade is the prerogative of the individual instructor and will be part of the course outline and announced the first day of class.

Policy on unannounced quizzes: Unannounced quizzes and their effect on course grade are the prerogative of the

individual instructor and will be part of the course outline and announced the first day of class.

ABET category content as estimated by faculty member who prepared this course description:

Engineering science: 2.5 credits or 83%

Engineering design: 0.5 credits or 17%

Students who need special accommodations should make an appointment to discuss their needs as soon as possible.

Justification for Graduate Credit:

This course contains material that builds on two undergraduate course sequences in communications, culminating in ELEC 3400, and in electromagnetics, culminating in ELEC 3320. This material is not typically included in undergraduate electrical engineering curricula, and will be appropriate for both advanced undergraduate students and graduate students.

Prepared by: J.K. Tugnait Date: June 26, 1998