

## EE 577 - Wireless and Personal Communications

- **Prerequisites:** EE 571 or Consent of Instructor.
- **Instructor:** Dr. Salam A. Zummo  
Office: 59-1035 at Deanship of Graduate Studies, Phone: 2844 or 1634  
E-mail: zummo@kfupm.edu.sa  
Web Site: <http://faculty.kfupm.edu.sa/ee/zummo/courses.htm> or WebCT  
Office Hours: U.T. 4:00PM - 5:00PM
- **Course Description:** The cellular concept, cellular frequency planning, link control, handoffs, power control, traffic capacity, propagation modelling, digital transmission techniques, fading mitigation, multiple access techniques, wireless networking, examples of current and future wireless standards.
- **Course Outline:** (Time and emphasis may be adjusted as needed)
  - **Overview:** (1 lecture)
  - **Fundamentals of Cellular Systems:** (3 lectures)  
The cellular concept, basic building blocks of cellular systems, handoffs, power control, traffic engineering.
  - **Propagation Aspects:** (5 lectures)  
Antennas, large-scale effects, small-scale effects, propagation models.
  - **Speech Coding:** (1 lecture)  
Introduction to speech codecs that are used in mobile communication systems.
  - **Modulation Techniques:** (3 lectures)  
Digital modulation techniques, continuous phase modulation, minimum shift keying (MSK), GMSK,  $\pi/4$ -QPSK, spread spectrum modulation (direct sequence and frequency hopping), orthogonal frequency-division multiplexing (OFDM).
  - **Mitigation Techniques:** (4 lectures)  
Equalization, diversity, channel coding and MIMO systems.
  - **Multiple Access Techniques:** (3 lectures)  
Frequency division multiple access, time division multiple access, code division multiple access and random access techniques.
  - **Wireless Standards and Systems:** (7 lectures)  
GSM, IS-136, cdmaOne, UMTS, cdma2000, wireless LANs, Bluetooth, broadband wireless access, 4G wireless systems and standards evolution.
  - **Project Presentations:** (2 lectures)

- **Textbook:**

- Theodore Rappaport, *Wireless Communications: Principles and Practice*, Pearson Education Inc., 2nd edition, 2002.
- Lecture notes.

- **References:**

1. *IEEE Personal Communications Magazine*.
2. Gordon Stuber, *Principals of Mobile Communication*, 2nd Ed., Kluwer Academic Publishers, 2001.
3. S. Haykin and M. Moher, *Modern Wireless Communications*, Pearson Education Inc., 2005.
4. William Stallings, *Wireless Communications and Networking*, Prentice-Hall, 2002.
5. J. Proakis, *Digital Communications*, McGraw-Hill Prentice-Hall, 4th edition, 2001.
6. J. Gibson, *The Mobile Communications Handbook*, CRC press, 1996.
7. V. K. Garg and J. E. Wilkes, *Wireless and Personal Communications Systems*, Prentice-Hall, 1996.
8. K. Feher, *Wireless Digital Communications, Modulation and Spread Spectrum Applications*, Prentice-Hall, 1996.
9. R. Steele, *Mobile Radio Systems*, IEEE press, 1992.
10. S. Wilson, *Digital Modulation and Coding*, Prentice-Hall, 1995.
11. W. Jakes, *Microwave Mobile Communications*, IEEE press, 1975.

- **Homework Assignments** will be assigned frequently. Student collaboration is encouraged. However, the final submission should be prepared individually.

- **Grading Policy**

- Homework 20%
- Midterm Exam 25%                    **March 28, In-Class**
- System Presentation 10%
- Term Project 15%
- Final Exam 30%                    **June 15 at 7:00PM**

- **Term Project:**

- Projects are expected to have substantial design and simulation components.
- Students are invited to propose and define (with the aid of the instructor) tangible project topics and system presentations.
- Deadline for submitting a project proposal is **Saturday, March 21**.
- More details to follow.