

**San José State University**  
**Department of Electrical Engineering**  
**EE 255, Mobile/Wireless Communications, Section 01,**  
**Fall, 2009**

<b>Instructor:</b>	Birsen Sirkeci
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<b>Office Hours:</b>	M/W 4.30pm-6.00pm Tu/Th 4.15pm – 5.15pm
<b>Class Days/Time:</b>	Tu/Th 3.00pm-4.15pm
<b>Classroom:</b>	Boccardo Business Center 125
<b>Prerequisites:</b>	Basic knowledge of communication theory, signal processing, and probability & random processes is required. MATLAB will be used in the homework and projects.

### **Faculty Web Page and MYSJSU Messaging**

Copies of the course materials such as the syllabus, assignment handouts, etc. may be found on my course web page accessible through the BlackBoard (<http://sjsu6.blackboard.com>).

**User Name:** Your 9 digit SJSU/Tower Card ID Number

**Password:** “fall”

If you have changed your password previously, continue to use it.

You are responsible for regularly checking with the messaging system through MySJSU or BlackBoard.

### **Course Description**

The goal of this course is to introduce fundamental ideas and techniques in wireless communications to the graduate students at a level accessible to them. The challenges in wireless environments, their models and the methods to handle these challenges will be covered. In particular, propagation models, multi-path propagation effects, noise and interference, digital modulation techniques, cellular radio systems, multiple access techniques (FDMA, TDMA, CDMA), OFDM, and diversity techniques are discussed. Modern wireless systems and standards are also covered.

### **Course Content Learning Outcomes**

Upon successful completion of this course, students will be able to:

- **LO1** Analyze the signal propagation in wireless channel
- **LO2** Describe and compare wireless channel models
- **LO3** Specify the challenges of wireless communication and tools to deal with them

- **LO4** Compare channel access techniques: TDMA, CDMA, FDMA, ALOHA, CSMA
- **LO5** Describe and implement various modulation schemes including OFDM
- **LO6** Identify, formulate and solve engineering problems that arise in wireless networks such as cellular system
- **LO7** Compare modern wireless systems and standards

## **Required Texts/Readings**

### **Textbooks**

Wireless Communications by A. Goldsmith, Cambridge University Press, Aug. 2005.

### **Supplemental Texts:**

- Wireless Communication: Principles and Practice (2nd ed.) by T.S. Rappaport, Prentice Hall, 2001.
- Fundamentals of Wireless Communication, by D. Tse and P. Viswanath, Cambridge University Press, May 2005
- Modern Wireless Communication by S. Haykin and M. Moher, Pearson Prentice Hall, 2005.
- Principles of Mobile Communications by G. L. Stuber, 2nd ed., 2001.
- Digital communications by J. G. Proakis, 4th ed., Boston : McGraw-Hill, c2001.

### **Other equipment / material requirements**

- Handouts posted on the webpage.

## **Classroom Protocol**

Students will turn their cell phones off or put them on vibrate mode while in class. They will not answer their phones in class. Students whose phones disrupt the course and do not stop when requested by the instructor will be referred to the Judicial Affairs Officer of the University.

## Dropping and Adding

Students are responsible for understanding the policies and procedures about add/drops, academic renewal, etc. [Information on add/drops are available at http://info.sjsu.edu/web-dbgen/narr/soc-fall/rec-298.html](http://info.sjsu.edu/web-dbgen/narr/soc-fall/rec-298.html). [Information about late drop is available at http://www.sjsu.edu/sac/advising/latedrops/policy/](http://www.sjsu.edu/sac/advising/latedrops/policy/). Students should be aware of the current deadlines and penalties for adding and dropping classes.

## Assignments and Grading Policy

There will be one midterm exam and a final exam. All exams are CLOSED book and notes. Students can bring a formula sheet (one page – both sides). Exams cover the assigned reading materials and class lecture notes. There will be no make-up exams. Exam solutions will be posted in the web site of the course. Homework assignments will be given regularly and will be due one week from the assigned date. Late homework will not be accepted.

<u>Assignment</u>	<u>Topics</u>	<u>Learning Objectives</u>
1	Signal propagation: pathloss and shadowing	LO1, LO2, LO3
2	Signal propagation: statistical fading	LO1, LO2, LO3
3	Digital modulation and performance over AWGN	LO3, LO5,
4	Diversity systems	LO3, LO6
5	Multicarrier transmission	LO5, LO6
6	Multiuser communication	LO4, LO6
7	Cellular systems	LO6, LO7

## Grades

Assignment + Quiz	15 %
Midterm (OCT 29 <sup>th</sup> )	25 %
Project (Due: DEC 3 <sup>rd</sup> )	25 %
Final exam (DEC 10 <sup>th</sup> )	35 %
<b>Total</b>	<b>100%</b>

## Grading Percentage Breakdown (tentative):

Z = your overall score- class overall average      S: class overall standard deviation

<u>Z</u>	<u>Letter grade</u>
above 1.4 S	A
0.8 S to 1.4 S	A-
0 to 0.8 S	B+
-0.8 S to 0	B
-1.4 S to -0.8 S	B-
below -1.4S	C+ to F

## **University Policies**

### **Academic integrity**

Students should know that the University's [Academic Integrity Policy is available at http://www.sa.sjsu.edu/download/judicial\\_affairs/Academic\\_Integrity\\_Policy\\_S07-2.pdf](http://www.sa.sjsu.edu/download/judicial_affairs/Academic_Integrity_Policy_S07-2.pdf).

Your own commitment to learning, as evidenced by your enrollment at San Jose State University and the University's integrity policy, require you to be honest in all your academic course work. Faculty members are required to report all infractions to the office of Student Conduct and Ethical Development. The website for [Student Conduct and Ethical Development is available at http://www.sa.sjsu.edu/judicial\\_affairs/index.html](http://www.sa.sjsu.edu/judicial_affairs/index.html).

Instances of academic dishonesty will not be tolerated. Cheating on exams or plagiarism (presenting the work of another as your own, or the use of another person's ideas without giving proper credit) will result in a failing grade and sanctions by the University. For this class, all assignments are to be completed by the individual student unless otherwise specified. If you would like to include in your assignment any material you have submitted, or plan to submit for another class, please note that SJSU's Academic Policy F06-1 requires approval of instructors.

### **Campus Policy in Compliance with the American Disabilities Act**

If you need course adaptations or accommodations because of a disability, or if you need to make special arrangements in case the building must be evacuated, please make an appointment with me as soon as possible, or see me during office hours. Presidential Directive 97-03 requires that students with disabilities requesting accommodations must register with the DRC (Disability Resource Center) to establish a record of their disability.

## EE 255 / Mobile/Wireless Communications, Fall 2009, Tentative Course Schedule

**Table 1 Tentative Course Schedule**

<b>Week</b>	<b>Date</b>	<b>Topics, Readings, Assignments, Deadlines</b>
1	Aug 25, 27	Introduction and overview of wireless communication systems
2	Sep 1, 3	Pathloss and Shadowing
3	Sep 8, 10	Pathloss and Shadowing
4	Sep 15, 17	Statistical Multipath Channel Models
5	Sep 22, 24	FURLOUGH DAY (Sep 22) and Statistical Multipath Channel Models
6	Sep 29, Oct 1	Digital Modulation and Detection
7	Oct 6, 8	Diversity systems: Time, frequency, and antenna diversity
8	Oct 13, 15	Multicarrier modulation
9	Oct 20, 22	Multiuser systems
10	Oct 27, 29	Multiuser systems
11	Nov 3, 5	Cellular systems
12	Nov 10, 12	Cellular systems
13	Nov 17, 19	Adhoc wireless networks
14	Nov 24, 26	Wireless standards + THANKS GIVING (Nov 26)
15	Dec 1, 3	Wireless standards
16	Dec 8	Review of Topics
Final Exam	Dec 10	14.45-17.00

## **EE Department Honor Code**

The Electrical Engineering Department will enforce the following Honor Code that must be read and accepted by all students.

“I have read the Honor Code and agree with its provisions. My continued enrollment in this course constitutes full acceptance of this code. I will NOT:

- Take an exam in place of someone else, or have someone take an exam in my place
- Give information or receive information from another person during an exam
- Use more reference material during an exam than is allowed by the instructor
- Obtain a copy of an exam prior to the time it is given
- Alter an exam after it has been graded and then return it to the instructor for re-grading
- Leave the exam room without returning the exam to the instructor.”

### **Measures Dealing with Occurrences of Cheating**

- Department policy mandates that the student or students involved in cheating will receive an “F” on that evaluation instrument (paper, exam, project, homework, etc.) and will be reported to the Department and the University.
- A student’s second offense in any course will result in a Department recommendation of suspension from the University.