San José State University
College of Engineering Computer Engineering Department
CMPE245 Embedded Wireless Systems, Section 01, Fall 2018

Instructor:	Hua Harry Li, Ph.D.
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Office Hours:	Mondays and Wednesdays 4:30-5:30 PM
Class Days/Time:	Mondays and Wednesdays 1:30 – 2:45 PM
Classroom:	Sweeney Hall 434
Prerequisites:	CMPE 242

Faculty Web Page and MYSJSU Messaging (Optional)

Copies of the course reference materials such as datasheets, project references etc. can be found on line at https://github.com/hualili and/or SJSU CANVAS .

Course Description

The course combines wireless communications and embedded system architecture. It covers basic communication theory and techniques (ASK, FSK, xPSK, xQAM, OFDM), as well as protocols (IEEE 802.11a/b/g/n etc) In addition, it covers embedded systems suitable for portable, wireless communications, such as ARM CPU and its derivatives. Total 4 to 5 hands-on design and implementation labs will be assigned.

Course Goals and Student Learning Objectives

Course Learning Objectives:

Course Learning Objectives (CLO):

CLO 1	Understand Embedded Wireless Systems Architecture

CLO 2	Understand Base Band Signal and its frequency characteristics;
CLO 3	Understand modulation techniques such as ASK, FSK, PSK and their implementations in IEEE wireless communication protocols.
CLO 4	To be able to design and implement MAC layer coding techniques and build real working embedded wireless systems

Required Texts/Readings

Textbooks

1. Reference: Wireless Network Evolution, 2G to 3G, V.K. Garg, Prentice Hall, PTR,2002.
2. Professor Li's handout materials on line https://github.com/hualili;
3. IEEE 802.11x standards
4. Datasheets, lab design reference materials will be posted on line at https://github.com/hualili .

References

1. The reference material for ARM CPU hardware features, application notes, class handouts and lab assignments and reports are posted at https://github.com/hualili and/or SJSU CANVAS.

Classroom Protocol

Students are required for participation, attendance will be checked on each class, and no late arrival is allowed. No food or drinks during the class, no cell phone use during the class.

Dropping and Adding

Students are responsible for understanding the policies and procedures about add/drop, grade forgiveness, etc. Refer to the current semester's Catalog Policies section at http://info.sjsu.edu/static/catalog/policies.html. Add/drop deadlines can be found on the current academic calendar web page located at http://www.sjsu.edu/academic_programs/calendars/academic_calendar/. The Late Drop Policy is available at http://www.sjsu.edu/aars/policies/latedrops/policy/**.** Students should be aware of the current deadlines and penalties for dropping classes.

Information about the latest changes and news is available at the Advising Hub at http://www.sjsu.edu/advising/.

Assignments and Grading Policy

Course Conduct

One evening lecture a week and one self-organizing lab session a week. Use development kit is required for the lab work.

Grading

Midterm Examination	30%
Laboratory	30%
Final Examination	40%

Policies on exams and late assignments

Quizzes, midterm and final are not postponed or retaken under any circumstances. The only exception is medical emergencies accompanied with doctor's report. The lab reports can be delayed under special circumstances. If you know you will delay a report for some unavoidable reason please see me as soon as possible.

University Policies

Academic integrity

Your commitment as a student to learning is evidenced by your enrollment at San Jose State University. The University's Academic Integrity policy, located at http://www.sjsu.edu/senate/S07-2.htm, requires 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 Student Conduct and Ethical Development website is available at 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 your assignment or any material you have submitted, or plan to submit for another class, please note that SJSU's Academic Policy S07-2 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 Disability Resource Center (DRC) at http://www.drc.sjsu.edu/ to establish a record of their disability.

CMPE 245 Embedded Wireless Systems Fall 2010
Course Schedule

Table 1 Course Schedule

Week	Topics, Readings, Assignments, Deadlines
1	Organizational Meeting and Introduction. Introduction to embedded wireless communications, overview of IEEE 802.11b standard and software defined radio to implement software for MAC layer functions. Concept of cognitive radio.
2	Design of a prototype system for software defined radios. Base band signals and its characteristics in frequency domain. Synchronization techniques.
3	Design and implementation of synchronization techniques, LISA algorithms for base band signals, and implementation of LISA on the prototype system. Fourier Transform, Modulation/Demodulation.
4	Scrambling and de-scrambling techniques for synchronization, and its software implementation on Rx/Tx RF modules of the prototype system.
5	Modulation/Demodulation. Introduction to ASK, FSK, and PSK techniques, prototype board implementation to spread the spectrum for better communication performance.
6	Time-Frequency domain analysis, Base-band signal analysis.
7	Source coding techniques, Huffman coding and arithmetic coding, and their implementation on the wireless prototype system.
8	Midterm Examination
9	Channel correction coding techniques. Linear Block Coding Techniques and its software implementation for the Rx/Tx RF modules.
10	Discussion of PSK modulation technique, and improvement of PSK, introduce BPSK, QPSK, and DQPSK techniques and system architecture for their modulation and demodulation.
11	CCK techniques and it mathematic description, software implementation of CCK technique.
12	Software implementation of CCK techniques and discussion of implementation of CCK on Rx and Tx RF modules, performance comparison.
13	Cognitive radio techniques, information theory and performance index for wireless communications, spread spectrum technique.
14	Implementation of Cognitive Radio and frequency hopping.

Week	Topics, Readings, Assignments, Deadlines
15	Comparison of IEEE 802.11a/b/g/n techniques.
16	Research project presentations and demos
Final Exam	Comprehensive final