

TLEN 5510 - Wireless & Cellular Communications

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Office Hours: By appointment

Textbook: Class notes and presentations will be provided. No textbook required.

Course Information: Approximately 10 homework assignments (25%). Assigned Wednesday, due following Wednesday before class starts. (Homeworks turned in late lose significant credit; homework turned in more than a day late will not be graded. One exception may be made but repeated lateness will not be tolerated.)

Some collaboration allowed between a couple of students, but all students must work on all problems (do not share tasks!), and every student must work on his own solution to submit.

Exams: One Midterm (25%); one final (25%). During midterm and final week per academic calendar. Exams must be taken at scheduled time, no makeup exams. Local students must take exams on-campus.

Final project: To be chosen with instructor's consent (25%). Any research project that deals with wireless is acceptable (suggestions given in class). If project justifies it, and given instructor's consent, two students may work on term project together. A one-page outline is due within weeks (so start early), a detailed outline is due mid semester, and final paper and presentation is due before last day of class.

Course Outline

Wireless Overview

- Brief History
- Today's facts
- Wireless systems: cellular, satellite, higher frequency
- Spectrum: properties, regulations, licensed and unlicensed bands

Cellular Systems

- Coverage and Capacity for FDMA, TDMA, CDMA
- Speech coding
- Handoff
- Interference mitigation
- Diversity
- 2G, 3G, 4G evolution

Radio Propagation

- Wireless propagation basics
- Path loss, shadowing, and fading
- Propagation models
- Outdoor, indoor, and outdoor-to-indoor modeling
- Link budgets

Modern Radio Techniques

- Digital Modulation
- BER vs. spectral efficiency
- Equalization
- Diversity
- Channel coding

CDMA

- Overview and explanation of concepts
- IS-95
- IS-2000
- WCDMA
- High-speed data standards

OFDM and OFDMA

- Overview and explanation of concepts
- Wi-Fi
- WiMAX
- LTE
- Case studies and comparison

Wireless Underlying Network

- 2G-3G-4G networks
- Mobility
- Evolution to IP, and IMS
- Further integration

Standard CU Policy Statements

Disability Services

If you qualify for accommodations because of a disability, please submit to me a letter from Disability Services in a timely manner so that your needs may be addressed. Disability Services determines accommodations based on documented disabilities. Contact: 303-492-8671, Willard 322, and www.Colorado.EDU/disabilityservices

Conflicts with Religious Holidays

Campus policy regarding religious observances requires that faculty make every effort to reasonably deal with all students who, because of religious obligations, have conflicts with scheduled exams, assignments or required attendance. Notify me at least two weeks in advance of any conflict between a religious holiday and a class activity (especially exams). In the case of a conflict with an exam, I will treat it as a missed exam due to a legitimate excuse and base your grade on the remaining exams.

Classroom Behavior

Students and faculty each have responsibility for maintaining an appropriate learning environment. Students who fail to adhere to such behavioral standards may be subject to discipline. Faculty have the professional responsibility to treat all students with understanding, dignity and respect, to guide classroom discussion and to set reasonable limits on the manner in which they and their students express opinions. Professional courtesy and sensitivity are especially important with respect to individuals and topics dealing with differences of race, culture, religion, politics, sexual orientation, gender variance, and nationalities. Class rosters are provided to the instructor with the student's legal name. I will gladly honor your request to address you by an alternate name or gender pronoun. Please advise me of this preference early in the semester so that I may make appropriate changes to my records.

Discrimination and Sexual Harassment

The University of Colorado at Boulder policy on Discrimination and Sexual Harassment (<http://www.colorado.edu/policies/discrimination.html>) applies to all students, staff and faculty. Any student, staff or faculty member who believes s/he has been the subject of discrimination or harassment based upon race, color, national origin, sex, age, disability, religion, sexual orientation, or veteran status should contact the Office of Discrimination and Harassment (ODH) at 303-492-2127 or the Office of Judicial Affairs at 303-492-5550. Information about the ODH and the campus resources available to assist individuals regarding discrimination or harassment can be obtained at <http://www.colorado.edu/odh>

CU Boulder Honor Code

All students of CU Boulder are responsible for knowing and adhering to the academic integrity policy of this institution, without exception. Violations of this policy may include: cheating, plagiarism, aid of academic dishonesty, fabrication, lying, bribery, and threatening behavior. All incidents of academic misconduct shall be reported to the Honor Code Council (honor@colorado.edu; 303-725-2273). Students who are found to be in violation of the academic integrity policy will be subject to both academic sanctions from the faculty member and non-academic sanctions (including but not limited to university probation, suspension, or expulsion). Other information on the Honor Code can be found at <http://www.colorado.edu/policies/honor.html> and at <http://www.colorado.edu/academics/honorcode/>.

Policy for Attendance

Attendance is a requirement for all in-class students. You will be allowed an excuse from attendance of any given class only if you seek and obtain prior written approval from the professor. Your grade may be penalized as much as 5% per missed course (if unexcused).