ECE 510 Instrumentation and Measurements II
Course Description: Physics-Engineering based introduction to wireless instrumentation and remote measurement hardware at the graduate level. Topics include: Sensor platform interference and noise; wireless sensor link budgets; wireless microphones and sonobouys; position and velocity sensing with modulated scatterers; mechanical and electrical fabrication techniques using the Prototyping Lab; remote sensing platforms--UAVs USVs...

Course Outcomes Students will be able to:
Quantify the local electromagnetic and acoustic interference environment on sensor platforms.

Specify wireless link budgets for communicating data from remote sensors to a signal processing base.

Design, build, measure and deploy a simple RF link from a remote sensor to a base station receiver.

Design, build, measure and deploy a modulated scatterer (RFID type) sensor for precision local position and velocity sensing in the near field.

Design, build, and measure sensor hardware using basic electronic and mechanical fabrication tools in the Prototyping Laboratory.

Demonstrate familiarity with power budgets, environmental constraints, and mission length of Sonobouy, AUV, UAV, USV and MicroSatellite sensor platforms.

Comfortably report results of graduate level hardware projects in technical presentation and written form.

Schedule--Sprint Quarter 2013
Monday and Wednesday 4:40 - 6:30 p.m. on campus
Supplementary Textbooks:
2013 Handbook for Radio Communications, ARRL, chapters 8, 13, 20
Op-Amp Applications Handbook, Jung editor, Newnes, chapters 2, 3, 4, 5
Low Level Measurements 5th Edition, Keithley, chapters

Problem sets and study guides:
Each topic will include a weekly problem set and study guide, available online at web.cecs.pdx.edu/~campbell under ECE510 IM 2 Study guides. Each week’s study guide is posted Monday, and due in class the following Monday. Collaboration on the study guides is expected and encouraged.

One In-class midterm, Final presentation
In-class exam questions are taken from the study guides. Exams are closed-book without notes, calculators, or assistance. Final presentation includes short technical presentation and practice technical interview discussion.

Classroom environment
Each class will include a lecture and active discussion. After the mid-term exam classes will include live student project demonstrations. Class participation attendance are necessary and expected.

Projects and Demonstrations
The emphasis is on making a connection between fundamental physics and working instrumentation and measurement hardware. Students select and develop a full-quarter hardware remote measurement project from a suggested list. Once the projects have been selected, weekly study guides are fine tuned to provide background to the full class. The lab component of the course is exploratory and informal. Projects are student-owned, and expected to continue beyond the context of the class.

Prerequisite
ECE510 Instrumentation and Measurement I or permission of instructor