ECE 413 – Sensors

Catalog Description: Overview of sensor technologies including materials, physics of operation, applications and system integration.

Credits: 3  Terms Offered: Spring

Prerequisites: ECE 322 and ECE 323

Courses that require this as a prerequisite: None

Structure: Three 50-minute lectures per week

Instructors: P. Dhagat (primary), A. Jander (secondary)

Course Content:
- Physics of transduction mechanism
- Materials and properties
- Sources of noise
- Important sensor parameters (e.g. sensitivity, accuracy, power consumption, hysteresis …)
- Signal conditioning

Measurable Student Learning Outcomes:
At the completion of the course, students will be able to…
1. Synthesize learning from various previous engineering classes to design a sensor system – including use of basic physics to explain the principle involved in sensing and transduction, and analysis of circuits and signals. (ABET outcomes a, c, k, q)
2. Research sensor components available in the market: compare data sheets and determine the relevance of the specifications in the context of a given application (ABET outcomes c, p, q)
3. Independently conduct literature research: choose a sensor, review recently published literature, and develop a written report addressing the relevant principles of physics, materials and properties, noise or signal-to-noise, sensor parameters and signal conditioning needed. (ABET outcomes g, l, j, o, p, q)
4. Give an effective oral presentation on their research topic. (ABET outcomes g)
5. Describe and explain concepts on noise and interference (e.g. 1/f noise and chopping techniques, impact of noise on detectivity, techniques to minimize interference) (ABET outcomes a, c, k, o, p, q)
6. Follow current research in sensor technologies (e.g. wireless sensor networks, MEMS sensors) (ABET outcomes h, j)
Evaluation of Student Performance:
- Homework (25%)
- Research Question (30%)
- Presentation (15%)
- Exam (30%)

Learning Resources:
- Pallàs-Areny and Webster, *Sensors and Signal Conditioning*, 2nd Edition

Students with Disabilities:
Accommodations are collaborative efforts between students, faculty and Disability Access Services (DAS). Students with accommodations approved through DAS are responsible for contacting the faculty member in charge of the course prior to or during the first week of the term to discuss accommodations. Students who believe they are eligible for accommodations but who have not yet obtained approval through DAS should contact DAS immediately at 737-4098.

Link to Statement of Expectations for Student Conduct:
[http://oregonstate.edu/admin/stucon/achon.htm](http://oregonstate.edu/admin/stucon/achon.htm)

Revised: Spring 2010