

EE/EP 470 - Introduction to Sensors

Catalog Data **EE 470-4. Introduction to Sensors** (3hrs lecture plus lab) This course offers an overview of basic sensor technology to provide the engineering student with practical working knowledge of sensors. Course will include basic sensor operating principles, basic electronics, and measurement principles. Prerequisites: EE 303 or PHY 315.

Textbook Fraden, *Handbook of Modern Sensors*, 3rd Edition, Springer-Verlag, 2003.

Coordinator Doug Petkie, Assistant Professor of Physics

Course Objective This course is for the undergraduate engineering student to gain experience with transducers, sensors and instrumentation. Resistive, capacitive, inductive, optical, thermal and other sensing methods are examined in terms of physics of operation, capabilities and some selected sensors and instrumentation and sampling techniques for sensor systems.

Topical Prerequisites Each student should

- know the basic principles of DC and AC circuit analysis (Kirchoff's laws and equivalent circuit theorems)
- know the operating principles of operational amplifiers
- have laboratory experience with designing, building and testing basic circuits
- know linear differential equation techniques
- know the basic principles of physics: mechanics, electricity and magnetism, thermodynamics and optics

Learning Objectives For each student to

- understand sensor characteristics and specifications such as sensitivity, linearity, dynamical characteristics and transfer functions
- understand and recognize the physical principles of operation based on the classification of sensors, such as resistive, capacitive, inductive, optical and thermal
- be familiar with the applications of sensors, such as the measurement of position, displacement, temperature, light intensity, force and acceleration.
- be able to design, analyze and implement basic instrumentation and signal conditioning interface circuits for sensors

Laboratory Weekly projects are conducted with the assistance of faculty and/or a teaching assistant and are based on course content

Computer Usage Students will use Matlab (or the equivalent) for some of the homework assignments.

Estimated ABET Category Content Engineering Science
Engineering Design

Program Outcomes													
a1	a2	a3	b1	b2	c	d	e	f	g	h	i	j	k
3	3	3	2	3	2		2		2		1	2	