AA 320 COURSE DETAILS

TITLE:	Aerospace Instrumentation
CREDITS:	3
FORMAT & SCHEDULE:	Lecture, 2 hours / week; Lab 2 hours / week
FACULTY CONTACT:	Jim Hermanson

COURSE DESCRIPTION (Catalog Short Form, 50 words Max):

Hands-on laboratory experience for understanding the design and function of electronic circuits and instrumentation utilized in aerospace engineering. Topics include Ohm's law, Kirchoff's laws, DC and AC circuits, passive and active components, op-amps and comparators, sensors, signal conditioning, electromechanical systems and actuators, digital systems, and data acquistion.

COURSE OVERVIEW & LEARNING OBJECTIVES:

Course Objectives:

1. Students will understand the structure and requirements of technical report writing.
2. Students will be able to use and understand passive and active circuit components and sensors, and their characteristics.
3. Students will be able to design power supplies and simple circuits for aerospace instrumentation.
4. Students will understand sensor calibration and signal conditioning as applied to wind tunnels and other aerospace systems.
5. Students will understand bandwidth limitations of aerospace instrumentation circuits.

COURSE REQUIREMENTS

PREREQUISITES: PHYS 123

REQUIRED TEXTBOOK: Scherz, P. and Monk, S., *Practical Electronics for Inventors*, 4th Ed., McGraw-Hill, 2013.

COURSE SCHEDULE

Topics

Overview of electronic systems in aerospace

Basic concepts : voltage, current, Ohm's law, Kirchhoff's laws, resistors and resistor networks. Use of digital mulimeter.

Capacitors, RC circuits, temporal behavior ; Wheatstone bridge, filters. Use of oscilloscope and function generator.

Inductors, transformers, diodes, RL and RLC circuits, rectification, DC power supplies for aerospace applications.

Active components : transistors, op-amps, comparators ; gain and feedback. Switches, amplifiers, comparators, analog integrators and differentiators, signal conditioning for aerospace sensors.

Sensors for wind tunel and other aerospace applications : pressure sensors, strain gages, thermocouples, inclinometers. Sensor characteristics : signal level, dynamic range, accuracy.

Light sensors and optical communication, corrent-to-voltage converter.

Electromechanical systems and acuators, DC motor characteristics, control systems.