AA 448 COURSE DETAILS

TITLE:	Control Systems Sensors and Actuators
CREDITS:	4
FORMAT & SCHEDULE:	Lecture, 3 hours / week; Lab 3 hours / week
FACULTY CONTACT:	Kristi Morgansen

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

Overview of feedback control. Study of control systems components and formulation of their mathematical models. Discussion and analysis of amplifiers, DC servomotors, magnetic-actuators, accelerometers, potentiometers, shaft encoders and resolvers, proximity sensors, and force transducers. Experimental determination of component models and model parameters. Includes hands-on laboratory component.

COURSE OVERVIEW & LEARNING OBJECTIVES:

Course Objectives:

1. Students will understand how data acquisition systems work.
2. Students will be able to model a real system using mathematical approximations.
3. Students will understand how to design experiments to identify system parameters for a given mathematical model.
4. Students will be able to actively control a hardware system in real time.
5. Students will be able to compare experimental data with simulations.

COURSE REQUIREMENTS

PREREQUISITES: A A 447

REQUIRED TEXTBOOK: NONE

COURSE SCHEDULE

Topics

Review of modeling dynamic systems-Laplace transform, traditional methods for solving differential equations, transfer function and state space representations, deriving equations of motion for mechanical and electrical systems.

Review of electromechanical laboratory practices.

Basic measuring and measurement recording devices.

Elements of electromechanical system modeling.

Modeling and analysis of dynamical systems in time and frequency-domains.

Analog and digital sensors for motion measurements.

Force and torque sensors.

Digital transducers.

Actuators: DC motors, electromagnets, etc.

Analog and digital filtering controllers.

Design of controllers including PID and state feedback systems.

Microcontroller (Arduino) software and hardware development.