

**MECH 520**  
**CONTROL SENSORS AND ACTUATORS**  
**3 Credits, First Semester**

**Meeting Time & Place:** MWF 10:00 a.m. ó 11:00 a.m., WOOD B75

**Instructor**

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**Prerequisites**

- For engineering graduate students: motivation
- For undergraduate students: A course in feedback controls + consent of the instructor

**Introduction**

Actuators are needed to perform control actions as well as to directly drive a plant (process, machine, engine). Sensors and transducers are necessary to measure output signals for *feedback control*, to measure input signals for *feedforward control*, to measure process variables for system monitoring, diagnosis and supervisory control, and for a variety of other purposes of measurement. The approach taken in the course will be to treat a selected set of control sensors and actuators, as employed in robotic and mechatronic systems, while giving due consideration to the fact that various components in a control system have to function as an interdependent and interconnected group. General and practical issues of sensors and actuators in a control system will be discussed. Operating principles, modeling, design considerations, ratings, specifications, selection, and applications of typical sensors and actuators will be studied.

**Course Outline**

Introduction; Performance Specification; Component Matching; Control Instrumentation Design; Bandwidth Issues; Analog Motion Sensors; Torque, Force and Tactile Sensors; Digital Motion Sensors; Stepper Motors; DC and AC Motors; Hydraulic Actuators; Mechatronics and Design Issues.

**Grade Composition**

Intermediate exam	=	30%
Project proposal	=	10%
Attendance/Participation	=	10%
Final Take-Home Exam Project	=	<u>50%</u>
		100%
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**Textbook**

De Silva, C.W., *Sensors and Actuators—Control System Instrumentation*, Taylor & Francis, CRC Press, Boca Raton, FL, 2007.

## Course Plan

<b>Week</b>	<b>Starts</b>	<b>Topic</b>	<b>Read</b>
1	Jan. 08	Introduction	Chapter 1
2	Jan. 15	Performance Specification, Control Instrumentation Design	Chapter 3
3	Jan. 22	Component Matching	Chapter 2
4	Jan. 29	Bandwidth issues	Chapter 3
5	Feb. 05	Analog Motion Sensors	Chapter 4
6	Feb. 12 <b>Project proposals due.</b>	Torque, Force, and Tactile Sensors	Chapter 4
7	Feb. 19	Midterm Break	
8	Feb. 26	Digital Motion Sensors	Chapter 5
9	Mar. 05	Stepper Motors	Chapter 6
10	Mar. 12	DC and AC Motors	Chapter 7
11	Mar. 19 <b>(Exam on Mar. 20)</b>	Hydraulic Actuators	Chapter 7
12	Mar. 26	Mechatronics and design issues.	
13	Apr. 02	<b>Project presentations.</b>	
14	Apr. 09	<b>Project presentations.</b>	

**Note: Final Take-Home Exam Project Report due in MECH office on April 16<sup>th</sup>.**