

# MECH 420: Sensors and Actuators – Fall 2010

**Instructor:** Boris Stoeber  
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**Office Hours:** Tu 4-5, Th 10-11

**Prerequisites:** MECH360, MECH364, MECH366

## Course Overview:

- Engineering principles of sensor and actuator systems
- Sensing principles for the measurement of position, velocity, acceleration, angular velocity, strain, torque, force, pressure, flow rate
- Actuator principles and applications
- Practical experience with sensor and actuator systems

## MECH 420 Laboratory

**TAs:** Iman Mansoor  
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Hadi Mansoor  
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## Lab Schedule

Lab	Week of	Title
# 1	Sept 20 2010 Sept 27 2010	Data Acquisition and Proximity Sensors for Object Detection
# 2	Oct 04 2010 Oct 11 2010	Optical Encoder and Torque Sensor
# 3	Oct 18 2010 Oct 25 2010	Dynamic Transducer Transfer Characteristics – Time Domain
# 4	Nov 01 2010 Nov 08 2010	Dynamic Transducer Characteristics – Frequency Domain
# 5	Nov 15 2010 Nov 23 2010	Hydraulic System with Servo Valves and Sensors

time: W 11am-1pm, 1-3pm, 4-6pm, F 10-12, location: 1210 Fred Kaiser Building

Each lab report needs to be turned in with the TA or with the instructor no later than 1 week after carrying out your MECH420 laboratory session.

## MECH 420 Class Outline

Date	Subject
W 09/08/2010	Introduction
F 09/10/2010	Sensors: definitions, transfer characteristics
W 09/15/2010	Static transfer characteristics
F 09/17/2010	Dynamic transfer characteristics
W 09/22/2010	Potentiometers, strain gauges
F 09/24/2010	Wheatstone bridge, compensation, resistive pressure sensor
W 09/29/2010	Load cell, piezoresistive accelerometer, 4-pt probe measurement
F 10/01/2010	Resistive temperature sensors
W 10/06/2010	Capacitive sensors: position, pressure, acceleration, microphone
F 10/08/2010	Inductive sensors
W 10/13/2010	Magnetic sensors
F 10/15/2010	<b>Midterm 1</b>
W 10/20/2010	Electrostatic actuators
F 10/22/2010	Electrostatic resonators and gyroscopes
W 10/27/2010	Piezoelectric transducers
F 10/29/2010	Piezoelectric transducers
W 11/03/2010	Electrodynamic systems
F 11/05/2010	Electromagnetic transducers
W 11/10/2010	Magnetostrictive actuators
F 11/12/2010	Thermoelectric transducers
W 11/17/2010	Resonators and acoustic wave devices
F 11/19/2010	<b>Midterm 2</b>
W 11/24/2010	Flow sensors
F 11/26/2010	Flow sensors
W 12/01/2010	Actuator/Sensor systems
F 12/03/2010	Actuator/Sensor systems

time: 3-4 pm, location: CEME 1215

**Assignments** are posted on WebCT on a regular basis. They need to be turned in with the instructor.

**Final Exam:** TBA

### Marking Scheme:

Laboratory:	15%
Midterm 1:	15%
Midterm 2:	15%
Assignments:	5%
Final:	50%

According to UBC Mechanical Engineering policies, the combined written exams need to be passed to pass the course.

### Optional Textbook:

Sensors and Actuators: Control System Instrumentation, C. W. de Silva, CRC Press, ISBN: 1420044834, 2007.