

**MIAMI UNIVERSITY  
SCHOOL OF APPLIED SCIENCE  
DEPARTMENT OF ENGINEERING TECHNOLOGY**

**ENT 401                      Computerized Instrumentation                      3**

---

<b>Course Number</b>	<b>Title</b>	<b>Credit Hours</b>
----------------------	--------------	---------------------

**PREREQUISITES BY COURSE:**

MTH 151, ENT 311

**DESCRIPTION:**

Overview of the requirements for the design of servo-mechanisms including stability, transfer functions, loop dynamics, and digital signal processing. Covers digital and analog signal conditioning, transducers, and controllers.

Periods per week : 2 Lecture Hours, and 2 Laboratory Hours.

**GENERAL OBJECTIVES:**

After completing this course, the student will have:

- An understanding of the general aspects of measurement systems.
- An understanding of the electrical instrumentation systems.
- An understanding of computerized data acquisition systems.
- An understanding of Fourier Analysis and the sampling rate theorem.
- An understanding of statistical methods related to instrumentation.
- An understanding of various transducers used to measure different forms of energy.

In order to meet these objectives, the student will gain knowledge of computerized instrumentation system elements including measurement techniques, discrete sampling, sensors and transducers, and measuring instrument characteristics.

**TOPICAL OUTLINE**

Week 1	General Characteristics of Measurement Systems
Week 2	Measurement Systems with Electrical Signals
Week 3,4	Computerized Data Acquisition Systems
Week 5,6	Discrete Sampling and Analysis of Time-Varying Signals
Week 7	Discrete Filtering Methods
Week 8	Statistical Analysis of Experimental Data
Week 9-10	Measurement of Solid Mechanical Quantities
Week 11-14	Speed, Position, and Torque Measurements
Week 15	Measuring Pressure, Temperature, and Humidity

**TEXT MATERIAL:**

Wheeler, Anthony, Introduction to Engineering Experimentation, Second Edition, Merrill, 2004. ISBN-10: 0130658448

**REFERENCES:**

Johnson, Curtis, Process Control Instrumentation Technology,

Seventh Edition, Wiley, 2002.

**PREREQUISITES BY TOPIC:**

Process Control Interface Design, Calculus I

**COMPUTER USAGE:**

Labview

**METHOD OF PRESENTATION**

Lecture, demonstration, problem solving, and related laboratory experiences are integrated into the course. The student is encouraged to engage in dialogue as topics are presented and/or when understanding is not complete.

**METHOD OF EVALUATION**

The student will be evaluated on homework, class participation, performance on quizzes, a final examination, and written laboratory reports.

Tests	40%
Homework and class participation	10%
Labs	20%
Presentation	10%
Final exam	20%

**Miami University Learning Community:**

Miami University is committed to fostering a supportive learning environment for all students irrespective of individual differences in gender, race, national origin, religion, handicapping conditions, sexual preferences, or age. Students should expect, and help create, a learning environment free from all prejudice. Disparaging comments, sexist or racist humor, or questioning the academic commitment of students based upon these individual differences are behaviors that undermine our learning community. If such behaviors occur in class, please seek the assistance of your instructor or department chair.

D. Hergert  
7/08

## Weekly Syllabus

<b>Week</b>	<b>Topic</b>	<b>Homework</b>
1	Module 1: Chapter 1,2	2.2,10,15,22,25,32
2	Lab 1 Digital Review Lab Lab 2 RC Filter	
3	Module 2 Chapter 3 Lab 3 Butterworth Filter*	3.1,6,13,15,20
4	Module 3 Chapter 4 Test 1	4.1,3,6,8,13,17
5	Lab 4 Relative Encoder/Tachometer Lab Part 1 Lab 5 Accelerometer Lab Part 1	
6	Chapter 4	
7	Module 4 Chapter 5 Lab 6 Aliasing Lab	5.1,11
8	Chapter 5 Lab 7 DFT Lab	5.13,22
9	Module 5 Discrete Filtering Methods Lab 8 Load Cell Lab	TBA
10	Module 6 Chapter 6 Test 2	6.3,61,63,65,68,69,70
11	Module 7 Chapter 8	8.1,3,12,23,28,31,37,41
12	Relative Encoder/Tach Lab Part 2*	
13	Accelerometer Lab Part 2* Lab 9 Torque Measurements	
14	Module 8 Chapter 9	
15	Module 9 Chapter 10	

\* Requires a formal lab report. All other labs require a demonstration of the correctly operating lab.