ME 343-003 Mechanical Laboratory I
Spring 2025; ME 214 Lab

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Office hours: 5: 00 to 5:45 PM Thursday ME214 Lab

Textbook: J. P. Holman, Experimental Methods for Engineers, 8th Edition, McGraw Hill, 2011

Course Content

Topic	Reading Assignment	Key concepts
Introduction; Data analysis	2.7, 3.2-3.9, 3.11-3.14, Notes 1, 4	Random and precision errors; Least square method; Uncertainty analysis
Linear and Rotation Speed Measurements	Note 3	Cross-correlation theory; Oscilloscope applications Lab abstract writing
Signal Conditioning	4.12, 14.3	RC filtration; Power spectrum; Digital filtration
Temperature measurements	8.5,8.6, 8.8, 8.9, 2.7 Notes 3; 5	Thermocouple; thermo-resistance; pyrometers Full lab report writing
Force and Torque Measurements (Strain gage)	10.3-10.8 Notes 6-7; supplements	Strain-stress relationship; strain gage; Wheatstone bridge; Force and deformation of elastic collisions
Programmable Logic Control	Note 9; supplements	PLC, Ladder logic diagram
Flowrate & Velocity Measurements	7.3, 7.4, 7.6, 7.13 Note 8; supplements	Venturi, orifice & rotameter; Pitot tube, LDV and PIV; Flow visualization
Acoustics	11.5; Note 10	Sound pressure level (dB); Attenuation

Course Arrangement

Week	Lecture/Lab: Tuesday: 6:00 PM – 100 PM in MEC 214			
	Topic	HW/Lab	Topic	**Due (Thursday class)**
1	Introduction; Chap 3 Random data statistics; regression method	HW#1	Random error, least square regression	-
2	Linear and rotation speed measurements; Lab abstract requirement of rotation speed	Lab-1	Rotation speed;	HW#1
3	Uncertainty analysis; Chap 3	HW#2	RC Filtration	Lab 1
4	Signal Conditioning by RC Filter and Characteristics Analysis	Lab-2		HW#2
5	Thermometry: Chap 8, Chap 2	HW#3	Temperature	Lab 2 RC Filtration
6	Measurement of Temperature and Characteristics of Sensor	Lab-3	Temperature	HW#3
7	**Mid-term**		**Mid-term**	
8	Stress & strain; strain gage: Chap 10	HW#4	Strain gage & Dynamic force	Lab 3 Temperature
9	**Spring Break**			
10	Measurement of Mechanical Stress using Boned Strain Gages	Lab-4		HW#4
11	**Wellness Day**			
12	Flow rate: Chap 7 Measurement of Visualization of Flow	HW#5	Flow rate	Lab 4 Strain gage & dynamic force
13	Flow rate: Chap 7 Measurement of Visualization of Flow	Lab-5	Flowrate	HW # 5
14	Control Theory (PLC) Understanding of PLC Controllers and Applications	HW# 6 and Lab #6	PLC	Lab 5 Flowrate
15	Acoustics: Chap 11; Measurement of Acoustic Response	Lab7	Flow	HW 6 PLC Controllers
16	Review	Backup (Review)	-	Lab # 7
17	Final Exam			

Tentative Schedule of ME 343 Spring 2025 Semester

Week	Tuesday	Due
1	01/23 1st Lecture	
2	1/30 (lab-1)	HW-1
3	02/06 – 2nd Lecture	Lab-1
4	02/13- (lab-2)	HW-2
5	02/20 3rd Lecture	Lab-2
6	02/27 (lab-3)	HW-3
7	03/06 (Mid Term)	-
8	03/13 4th Lecture	Lab-3
9	03/20 Spring Break	
10	03/27 Lab 4	HW-4
11	04/03 Wellness Day	-
12	04/10 5th Lecture	Lab-4
13	04/17 5th Lab	HW -5
14	04/24 6th lecture & Lab 6	Lab-5
15	05/01 7th lecture & Lab 7	HW 6 and Lab 6
16	05/06 (backup)	Lab-7 & all re-sub
17	05/15 (Final Exam)	