ME 343-101 Mechanical Laboratory I

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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
Flowrate & Velocity Measurements	7.3, 7.4, 7.6, 7.13 Note 8; supplements	Venturi, orifice & rotameter; Pitot tube, LDV and PIV; Flow visualization
Programmable Logic Control	Note 9; supplements	PLC, Ladder logic diagram
Acoustics	11.5; Note 10	Sound pressure level (dB); Attenuation

Course Arrangement

Week	Lecture/Lab: Thursday: 6:30 p.m. – 10:00 p.m.			
	Topic	HW/Lab	Topic	**Due**
1&2	Introduction; Chap 3 Random data statistics; regression method	HW#1	Random error, least square regression; Rotation speed;	-
3	Linear and rotation speed measurements; Lab abstract requirement of rotation speed	Lab-1	Rotation speed;	HW#1
4	Uncertainty analysis; Chap 3	HW#2	RC Filtration	Rotation (Lab1)
5	Signal Conditioning by RC Filter and Characteristics Analysis	Lab-2		HW#2
6	Thermometry: Chap 8, Chap 2	HW#3	Temperature	RC Filtration (Lab 2)
7	Measurement of Temperature and Characteristics of Sensor	Lab-3		HW#3
8	**Mid-term**		**Mid-term**	
9	Stress & strain; strain gage: Chap 10 ;Mechanical Stress using Boned Strain Gages	HW#4	Strain gage & Dynamic force	
10	**Spring Break**			
11	Stress & strain; strain gage: Chap 10 ;Mechanical Stress using Boned Strain Gages	Lab-4		Strain gage & dynamic force HW #4
12	Flow rate: Chap 7 ;Measurement of Visualization of Flow	HW#5	Flow	Strain gage & dynamic force Lab #4
13	Flow rate: Chap 7 ;Measurement of Visualization of Flow	Lab-5	Flow	Flow rate HW #4
14	Control Theory (PLC) Understanding of PLC Controllers and Applications	Lab-6 &HW#6	PLC	Flow rate (Lab -5)
15	Acoustics: Chap 11; Measurement of Acoustic Response	Lab-7 & HW #7	Acoustics	PLC Controllers (Lab 6) &HW6
16	Backup Class	Backup		Acoustics (lab-7)
	Final Exam			

Tentative Schedule of ME 343

Week	Thursday	Due
1&2	01/18 &25 - 1st Lecture	
3	02/01 - lab 1	HW-1
4	02/08 - 2nd Lecture	Lab-1
5	02/15- Lab 2	HW-2
6	02/2 3rd Lecture	Lab-2
7	02/29- (lab-3)	HW-3
8	03/07 - (Mid Term)	-
9	03/14 4th Lecture	Lab-3
10	Spring Break	
11	03/21 Lab 4	HW-4
12	03/28 5th Lecture	Lab 4
13	04/05 Lab 5th	HW-5
14	04/12 - 6th Lecture & Lab6	-
15	04/19 7th Lecture & Lab 7	Lab -6 and HW 6
16	04/26 Backup	Lab7
17	05/03(Final Exam)	All lab dues