

ME 343 Mechanical Laboratory I (Fall 2007)

Dr. P. Singh

MEC 313

Office Hours: TW 11:30-1:00, or by appointment

Tel: (973) 596-3326

Email: singhp@njit.edu

Teaching Assistant:

Sai Nudurupati

Tel : (973) 596-3342

Email: csn4@njit.edu

Textbook: J. P. Holman, Experimental Methods for Engineers, 7th Edition, McGraw Hill, 2001

References: Beckwith, Marangoni, and Lienhard, Mechanical Measurements, 5th Edition, Addison Wesley, 1993

R. J. Goldstein, Fluid Mechanics Measurements, Hemisphere Pub., 1983

Course Content

Topic	Reading Assignment	Key concepts
Introduction; Data analysis	15.4; 2.7, 3.3,3.4, 3.6, 3.8, 3.9, 3.11-3.14, Notes 1-3	Lab report writing; linear regression; Uncertainty analysis
Speed Measurements and Signal Filtration	4.12, 4.15 Notes 4-5	Filtration theory; Oscilloscope applications
Temperature measurements	8.5,8.6, 8.8, 8.9, 2.7 Notes 6-7	Thermocouple; thermo-resistance; pyrometers
Force and Torque Measurements (Strain gage)	10.3-10.8 Notes 8-9	Strain-stress relationship; strain gage; Wheatstone bridge
Control (PLC & PID)	Note 12; supplements	PLC, Ladder logic diagram; PID
Flowrate & Velocity Measurements	7.3, 7.4, 7.6, 7.13 Note 10; supplements	Bernoulli equation; Venturi meter; Pitot tube; Laser Doppler Velocimetry; Flow visualization
Acoustics	11.5; Note 11	Sound pressure level (dB); attenuation

Course Arrangement

Week	Lecture (T: 1:00 p.m.-2:25 p.m.)		Lab (T: 2:30 p.m. – 4:40 p.m.)	
	Topic	Homework	Topic	Report Due
1	Introduction: Chap 15, Chap 3	-	-	-
2	Data analysis Chap 3, Chap 4	HW#1	Rotation speed & signal filtration	-
3	Sample analysis of Rot. Sp. & Fil.	-		HW#1
4	Thermometry: Chap 8, Chap 2	HW#2	Temperature	Rot. Sp. & Fil.
5	Sample analysis of Temperature	-		HW#2
6	Strain gage: Chap 10	-	Strain 1; Mid-term	Temperature
7	Strain gage (continue)	HW#3		Strain 2
8	Sample analysis of Strain Gage	-	HW#3	
9	Control Theory (PLC; PID)	HW#4	PLC Control	Strain gage
10	Sample analysis			HW#4
11	Pressure and flow: Chap 7	HW#5	Flow	Control
12	Sample analysis of Flow	-		HW#5
13	Acoustics: Chap 11	-	Acoustics	Flow
14	Review	-	-	Acoustics (abstract)
Final Exam				