Fall 2020

ME 343-001: Mechanical Laboratory I

Pushpendra Singh

ME 343 Mechanical Laboratory I

Instructor: Dr. P. Singh

Synchronous online course: Monday 11:00 am-3:20 pm
The class will meet online with all students attending remotely via webex

Webex address: link on Canvas home page or https://njit.webex.com/meet/singhpnjit.edu

Online Office Hours: by appointment
Office: 316 MEC
Phone: 973-596-3326
Email: singhp@njit.edu

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

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 aggression; 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
Flow rate & Velocity Measurements	7.3, 7.4, 7.6, 7.13 Note 10; supplements	Bernoulli equation; Venturi meter; Pitot tube; Laser Doppler Velocimetry; Flow visualization
Control (PLC & PID)	Note 12; supplements	PLC, Ladder logic diagram; PID
Acoustics	11.5; Note 11	Sound pressure level (dB); attenuation

Course Arrangement

Week				
	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	-		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	Pressure and flow: Chap 7	HW#4	Flow	Strain gage
10	Sample analysis of Flow	-		HW#4
11	Acoustics: Chap 11	-	Acoustics	Flow
12	Control Theory (PLC; PID)	HW#5	PLC Control PID Control	Acoustics (abstract)
13	Sample analysis			HW#5, PLC (Abstract)
14	Review	-	-	PID (Abstract)
	Final Exam			

ME 343 Mechanical Lab I

Course requirements and grading

(1) Grading:

50% Lab Report (5) and 5% Lab Abstract (1)
- Lab attendance is required

5% Class Attendance (14)
10% Homework (5)
15% Midterm Examination
15% Final Examination

Final Grade:
90% and above "A" grade; and below 60% "F" grade.

(2) Lab Report Requirement

All reports should be completed individually and submitted on canvas on time. Group discussions are encouraged, but you must write your own report. Resubmitted Lab reports will be accepted (final grade will be the average of the grades on the original and resubmitted reports)

(3) Homework and Lab Report Requirements

(a) Five Assignments will be given, with 4-5 problems per assignment.
(b) Assignments are due biweekly and must be submitted on canvas on time
(c) Late submission will be accepted, but you will lose 50% points.
(d) Homework grade will be based on the effort.
(e) Homework will be returned in about one week.

(4) Midterm/Final Exam Requirement

(a) Mid-term exam: It will cover the following topics: Uncertainty Analysis, Filtration Theory, and Theory for Temperature Measurement.
(b) Final exam: It will cover the following topics: Strain-gage Theory, Theory of Flow Measurement, PLC & PID Control Concept, and Theory of Acoustics Measurement.
(c) Examinations will be conducted online using canvas
(d) Both exams will be open book/notes