

Fall 2019

ME 343-005: Mechanical Laboratory I

Alexandre Ermoline

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NEW JERSEY INSTITUTE OF TECHNOLOGY - MECHANICAL & INDUSTRIAL ENGINEERING

ME 343 - Mechanical Laboratory I

Fall 2019

Instructor: Dr. Alexandre Ermoline
Office: N/A
Office Phone: N/A
Official E-mail: alexandre.ermoline@njit.edu
Office Hours: By appointment
Class Meets: Mechanical Engineering Building 214
Class Meeting Times: MR from 8:30 to 10:35 AM

Course Description: This course introduces the basic instrumentation and measurement in mechanical engineering, as well as the basic training on data analysis and lab report writing. Focus topics include the sensing of rotation speed, temperature, mechanical stresses and loads, flow pattern and rates, programmable logic controls and feedback controls, and sound pressure level. Particular attention also goes to the applicability of related measurement methods, as well as uncertainty analysis of measurement systems.

Required Textbook: J. P. Holman, Experimental Methods for Engineers, McGraw Hill, New York, NY, 8th Edition, 2012. ISBN 0-07-352930-3.

Supplemented Material (not required): J. Stenerson, Fundamentals of Programmable Logic Controllers, Sensors, and Communications, Prentice Hall, 3rd Edition, 2004.
D. Beer, A Guide to Writing as an Engineer, Wiley, 2nd Edition. ISBN 0-471-43074-0.

Computer Usage: Data acquisition; data analysis and graphic presentation; lab report writing

Required Software: Microsoft Office

Course Prerequisite: ECE 405 - Electrical Engineering Principles; Math 225 - Survey of Probability and Statistics; ME 236 - Dynamics

Course Corequisite: ME 304 - Fluid Mechanics

Grading:	Lab Reports	55 %
	Homework	10 %
	Mid-Term Exam	15 %
	Final Exam	20 %
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	Total=	100 %

Letter Grades (Tentative - Subject to Change): **A** → 90 - 100% ; **B+** → 84 - 89% ; **B** → 78 -83% **C+** → 72 - 77% ; **C** → 66 - 71% ; **D** → 60 - 65%; **F** → 0 - 59%

Course Policy:

Lab manuals, lecture notes, and some other useful material will be uploaded in Canvas: <http://canvas.njit.edu> - Please, check this site and your e-mail often.

Groups will be formed during the first class. All labs will be performed in groups.

Lab reports should be individually completed and submitted before due. Group discussion is encouraged but not for "Group Report". Submitting identical reports will be considered cheating.

Lab reports must follow the formal report format (see lecture notes). Lab abstract should follow the extended abstract format (see lecture notes).

Attendance will be taken. Students are expected to attend all classes and on time. Lab attendance is a must for each lab experiment! More than 30-min delay will be considered as absence. Missed lab report will not be accepted except for a legitimate reasons (illness, jury duty, etc.). These cases will be treated depending on situation: either report using the group's data will be accepted or time for the lab (with the TA supervision) will be arranged.

Late report submission will be accepted, with a 50% grade deduction. For resubmission, the final grade will be the average with the original grade. Last day of late or resubmission is the last day of class (not the final exam day!)

A 1.5 hour mid-term exam will be given, mainly covering topics of Uncertainty Analysis, Filtration Theory, and Theory for Temperature Measurement.

A 2.5-hour final exam will be given, mainly covering topics of Strain-gage Theory, Theory of Flow Measurement, PLC & PID Control Concept, and Theory of Acoustics Measurement.

The exams are open textbook and notes unless otherwise specified.

No exam makeup will be given.

A letter grade is based on the weighted average score, a table of average score-letter grade categories. The scale converting numerical to letter grades may be changed.

If a student has questions about the grade he/she has received on an exam, homework, or lab report, he/she must talk to the instructor (or the teaching assistant where appropriate) no later than a week after the graded activity has been returned to students. No grade change will be made after the one week period.

Academic Integrity:

Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree that you are working on. As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the academic code of integrity policy that is found at: <http://www5.njit.edu/policies/sites/policies/files/academic-integrity-code.pdf>.

Please note that it is my professional obligation and responsibility to report any academic misconduct to the Dean of Students Office. **Any student found in violation of the code by cheating, plagiarizing or using any online software inappropriately will result in disciplinary action. This may include a failing grade of F, and/or suspension or dismissal from the university.** If you have any questions about the code of Academic Integrity, please contact the Dean of Students Office at dos@njit.edu

Below is a TENTATIVE class session schedule. This schedule is subject to change at any time. Please be aware of any changes that are announced in class by either contacting a classmate or else by contacting me via e-mail.

DAY	CLASS MATERIAL	READING	HW	DUE
SEP 05	Introduction	15.4		
SEP 09	Random data statistics; regression method	3.6-3.9 3.11-3.14	HW 1	
SEP 12	Lab1: Rotation speed & general data analysis			
SEP 16	Signal conditioning Lab report requirements of Lab-1	4.12, 4.15		
SEP 19	Lab1: Rotation speed & general data analysis			HW 1
SEP 23	HW#1 Solution Uncertainty analysis	3.1 - 3.5	HW 2	
SEP 26	Thermometry	8.5, 8.6, 8.8, 8.9, 2.7		
SEP 30	Lab2: Temperature measurement & sensor characteristics			Lab 1
OCT 03	Signal response & sensitivity Lab report requirements of Lab 2			
OCT 07	Lab2: Temperature measurement & sensor characteristics			HW 2
OCT 10	HW#2 Solution Stress & strain; strain gage	10.3-10.8	HW 3	
OCT 14	Lab 3: Force measurement by strain gages			Lab 2
OCT 17	Strain gage calibration & rosette Lab report requirements of Lab 3	10.3-10.8		
OCT 21	Lab 3: Force measurement by strain gages			HW 3
OCT 24	HW#3 Solution Review of Data Analysis			

OCT 28	Mid-Term		
OCT 31	Mid-term solution		
Nov 4	Pressure and flow	7.3, 7.4, 7.6, 7.13	HW 4
Nov 7	Lab 4: Flow Measurements		Lab 3
Nov 11	Lab report requirements of Lab 4		
Nov 14	Lab 4: Flow Measurements		HW 4
Nov 18	HW#4 Solution Control Theory (PLC) Abstract requirements of Lab 5 (PLC)	Lecture Notes	
Nov 21	Lab 5: PLC Control		Lab 4
Nov 25	Control Theory (PID) Abstract requirements of Lab 6 (PID)	Lecture Notes	HW 5
Nov 26	Lab 6: PID Control		Lab 5
DEC 02	Acoustics Abstract requirements of Lab 7	11.5	
DEC 05	Lab 7: Acoustics		HW 5 Lab 6
DEC 09	HW#5 Solution Review		Lab 7 All resubmissions
TBA	Final Exam		