

Fall 2023

ME 405-101: Mechanical Lab II

Sahidur Rahman

Follow this and additional works at: <https://digitalcommons.njit.edu/mie-syllabi>

Recommended Citation

Rahman, Sahidur, "ME 405-101: Mechanical Lab II" (2023). *Mechanical and Industrial Engineering Syllabi*. 444.

<https://digitalcommons.njit.edu/mie-syllabi/444>

This Syllabus is brought to you for free and open access by the NJIT Syllabi at Digital Commons @ NJIT. It has been accepted for inclusion in Mechanical and Industrial Engineering Syllabi by an authorized administrator of Digital Commons @ NJIT. For more information, please contact digitalcommons@njit.edu.

Department of Mechanical and Industrial Engineering
ME 405-101 -- MECHANICAL LAB II
Fall 2023

Instructor: Dr. S. Rahman

E-mail: rahman@njit.edu

Office: FENS 205

Catalog Description: ME 405 (1-2-2)

Laboratory emphasizes the use of fundamental principles and instrumentation systems for the analysis and evaluation of mechanical components within a system.

Prerequisites: ME 343 – Mechanical Laboratory – I
ME 312 – Thermodynamics II
ME 304 – Fluid Mechanics

Co-requisite: ME 407 – Heat Transfer

Software usage: Microsoft Word, Microsoft Excel

Course Objectives:

1. To develop the skills in acquiring and processing experimental data
2. To develop skills in analyzing experimental errors and assessing the accuracy of the engineering measurements
3. To develop the skills in applying the principles of potential flows for describing and designing mechanical components, including pumps and turbines
4. To develop skills in describing transient temperature measurements using analytical and numerical approaches
5. To develop skills in analyzing pressure measurements and use such measurements to reconstruct the flow velocity profiles
6. To develop skills in preparing written technical reports
7. To develop skills in working on an engineering project as a group

Lab Experiments:

- (1) Drag and pressure distribution on a cylinder
- (2) Performance test of a Centrifugal Pump
- (3) Performance test of a Gear Pump
- (4) Performance test of an Impulse Turbine (Pelton Wheel)
- (5) Transient heat conduction in bodies of finite length

Course Outcomes:

Objective 1

Students will develop an ability to process experimental data using theoretical concepts of fluid mechanics, heat transfer, and thermodynamics

Objective 2

Students will develop an ability to quantify and analyze experimental errors, separate between systematic and statistical errors, and determine the reliability of measurements

Objective 3

Students will learn using generic data processing software to process experimental data and describe the measurements using engineering models

Objective 4

Students will learn how to characterize and test mechanical components including pumps and turbines

Objective 5

Students will demonstrate an ability to prepare comprehensive written technical reports

GRADING POLICY	Lab reports & class participation	50 %
	Midterm Tests (2x12.5%)	25 %
	Final Exam (cumulative)	25 %

Note: There are two midterm tests and a final exam during the semester. Make-up exams are given only in some special cases approved by the Dean of Students.

ACADEMIC INTEGRITY NJIT has a zero-tolerance policy regarding cheating of any kind and student behavior that is disruptive to a learning environment. Any incidents will be immediately reported to the Dean of Students. In the cases the Honor Code violations are detected, the punishments range from a minimum of failure in the course plus disciplinary probation up to expulsion from NJIT with notations on students' permanent record. Avoid situations where honorable behavior could be misinterpreted. For more information on the honor code, go to <http://www.njit.edu/academics/honorcode.php>

CLASS HOURS:

Monday 6:00 PM – 8:50 PM ME 110

OFFICE HOURS (FENS 205 FACE-TO-FACE OR VIRTUAL)

Monday 10:00 AM – 01:00 PM
Tuesday 10:30 AM – 01:00 PM
Wednesday
Thursday 10:00 AM – 01:00 PM (by appointment only)
Friday 10:00 AM – 01:00 PM

By appointment contact in advance: (973) 596-6072 or rahman@njit.edu

NJIT ONLINE INFORMATION

The instructor will discuss these requirements on the first day of the course and/or post on their Learning Management System (LMS). Please become familiar

- Webex: <http://ist.njit.edu/webex>
- Online Proctoring: <https://ist.njit.edu/online-course-exam-proctoring>

COURSE ACTIVITY SCHEDULE (Tentative)

Date	Activities
9/11	Introduction Theories of lab 1
9/18	Groups A & B – perform lab 1 and Groups C & D – perform lab 2
9/25	Groups D & C – perform lab 1 and Groups B & A – perform lab 2
10/2	Sample calculations – lab 1, due on the same day Lab report format discussion
10/9	Theories of labs 2, 3 & 4 Sample calculations – lab 2, due on the same day
10/16	Review and Midterm I (labs 1 & 2)
10/23	Answers of Midterm I discussion Groups A & B – perform lab 3, Group C – perform lab 4 Lab report 1 due
10/30	Groups C & D – perform lab 3, Groups B & A – perform lab 4 Lab report 2 due
11/6	Group D – perform lab 4 Sample calculations – lab 3, due on the same day
11/13	Sample calculations – lab 4, due on the same day
11/20	Perform lab 5 Theories of Heat Transfer (lab 5) Lab report 3 due
11/27	Review and Midterm II (Labs 3 & 4)
12/4	Answers of Midterm II discussion Heat Transfer problems Lab report 4 due
12/11	Review
12/18	Final Exam (cumulative)