

Lab instructions for AMP262 Fluid Mechanics Lab

Instructor: Prateek Gupta

1. Labs will be held on Mon/Tue/Thu/Fri of each week, between **3-5 pm at Fluid Mech lab**, located in Block III-Rm 238, First floor. Kindly visit the lab once BEFORE your first lab turn.
2. **Please be on time. Students who arrive after 3:05 pm will be marked late, and a 25% penalty will be applied to the lab report for the experiment performed on that day.**
3. **Attendance** will be taken more than once by the instructors and TAs to ensure that the students are attending for full 2 hours during each lab turn.
4. Each 2 hour lab turn is broken into 2 parts: 1 hour for carrying out the experiment and 1 hour for making lab report. Please look at the lab schedule for details.
5. **Safety: This lab contains rotating machinery, so you have to take some basic precautions. Please wear closed toe shoes to lab (i.e. no chappals/sandals allowed !). You will NOT be allowed in the lab if you are wearing open toe shoes like sandals, chappals etc, unless it is for a medical reason (in which case please bring the medical certificate !). Please also be extra careful near any rotating machinery if you have long hair or if you are wearing any loose clothing like scarf/muffler etc.**
6. Each batch will be divided into 2 groups. Each group will have 4-5 students. The composition of the group and the experiment to be performed by each group in each lab turn will be announced on moodle separately. The readings will be shared within each group.
7. In general **Make-up labs** will only be allowed for students who either have valid medical certificate from IIT Delhi hospital or academic reasons certified by Dean of Students Affairs or Dean Academics. These make-up labs will be held towards the end of the semester. Make-up labs will not be granted for other reasons like family functions or being late to lab.
8. Please read the lab manual chapters which discusses experimental techniques and uncertainty analysis. You should go through these chapters several times, since you will be needing these concepts for every lab turn.
9. Please carefully read the instructions for the experiment you will be performing on any given day. You may be penalized if we find that you have not looked at the manual before attending the experiment.
10. If your experiment gets over early then repeat it ! This will help you get a better idea about the reproducibility of the results and uncertainty. You will not be allowed to leave the lab before the two hour time period.
11. The template for lab report has been given at the end of this document. **Each student has to submit a separate hard copy of the lab report** to the FM lab TAs. Please staple the sheets and insert them into a binder before submitting the hard copy.
12. Each student is supposed to work independently on the lab report. Students found copying lab reports from each other will be severely penalized (e.g. zero for the lab report, along with a grade penalty).
13. Lab reports should be either neatly handwritten or typed on a wordprocessor (e.g.

LaTeX, MS word etc). Diagrams may be made in separate sheets if needed. Please avoid copy-paste any figures from the internet. Do not use AI based softwares for report writing.

14. Lab reports for an experiment conducted on lab turn N will be due **at the start of Lab turn N+2**. Lab report should be submitted to the TA of that experiment. The TA will return the report on turn **N+3**.
15. Graphs should be drawn in excel or matlab, printed and attached with the report. Each graph and table should be labeled with a table/graph number and cross referenced from the text.
16. Each group should bring a phone with **stopwatch** app installed. The least count should be less than 1 second. Most of the stopwatch apps have a least count of 0.01 sec.

Checklist of what to bring to lab

- Wear closed toed shoes
- Pen, notebook, calculator, ruler, laptop
- Stopwatch app in phone (for at least one member of the group)

List of experiments

Fluid Name of Experiment

- | | |
|------|--|
| F01 | Fully Developed Flow Through Pipes |
| F02 | Performance characteristics of Pelton turbine |
| F03 | Conservation of Mechanical Energy (Bernoulli's equation) |
| F04* | Study of the mean flow of a free air (submerged) jet |
| F05 | Performance characteristics of a free jet |
| F06 | Obstruction type flow meters |
| F07 | Performance Characteristics of Centrifugal Pump |
| F08 | Flow visualization |
| F09* | Flow around circular cylinder (GD lab under renovation) |

List of FM Lab TAs

PhD Scholars

- Md Waquar <amz248503@am.iitd.ac.in> (F01 and F03)
- Datti Ganapathi <amz218554@am.iitd.ac.in> (F01 and F03)
- Altaf Ahmed <amz218548@am.iitd.ac.in> (F02 and F06)
- Shubham Sharma <amz228607@am.iitd.ac.in> (F04 and F08)
- Mohd Naved <amz248502@am.iitd.ac.in> (F04 and F08)
- Sumit Kumar <amz188066@am.iitd.ac.in> (F05 and F07)
- Manav Sharma <amz238091@am.iitd.ac.in> (F05 and F07)
- Syed Twaha Irfan Ahmad <amz258200@am.iitd.ac.in> (F02 and F06)

MTech

- Sai Prasad <ama252016@am.iitd.ac.in>
- Vishal Malik <ama252017@am.iitd.ac.in>

TEMPLATE FOR LAB REPORT

Experiment Number (in manual) :

Title of Experiment:

Date of experiment:

Batch: Monday/Tuesday/Thursday/Friday

Group No.: (Can range from 1-32)

Name of student:

Objectives

In your own words, describe the experiment and its goal. Please do not simply copy from the manual !

Procedure

In your own words, and with the help of neat diagrams, explain the procedure for the experiment

Measured data

Present the raw data in the experiment in table format (as given in the manual). You may also plot the data as graphs.

Sample calculation

Here you can present the formula and sample calculation for a representative reading. For instance, if you have measured height difference in a manometer then you can present the calculation for obtaining velocity.

Results

Present results in tabular form as well as graphical form

Uncertainty Analysis

What is the approximate percentage error in the results ? Explain the origin(s) of this uncertainty. Refer to the introductory chapter of the lab manual, which explains how to calculate uncertainty.

Discussion

This should be the most insightful part of the report. You can do the following here:

1. What are the trends in the graphs that you have plotted ?
2. Compare the experimental results with the theory. Is the difference between the theory and results consistent with the uncertainty analysis ?
3. Explain any interesting/unexpected features in your results, and their origin. For instance, you may notice a maxima in the graph, which can be explained by the theory
4. Answer any other question(s) being posed in the lab manual