

School of Sciences

Manual for Physics Laboratory

Introduction:

A laboratory manual will provide the necessary information to perform the experiments in a reasonable time. It cannot substitute reading of relevant literature nor will it work as a "cookbook" – experimental expertise has to be acquired through your own exercise and careful thoughts about the experiments. However, if well prepared and applying very careful experimental skills the student can expect results which can compare with the standard value.

General Remarks:

The aim of a Practical course in the Physics are

1. Learn physics by proper preparation for the experiments and by doing.
2. Learn experimental techniques.
3. Working in experiment requires techniques at the technical limits and the knowledge can be acquired by training.
4. The better experimental results may be obtained with precision by using theoretical knowledge in the laboratory.
5. Training with established classical experiments should give the students confidence that physics “works” and enables them later to explore new fields.
6. Learn how to review the results critically and to get a realistic estimate of uncertainties.
7. Learn some practical experiences in applied fields: electronics and signals, data processing with computers, appropriate presentation of results.
8. Homework Time is required for appropriate preparation of the laboratory

9. Use the precious laboratory time for measurement and learning.
10. The final evaluation of the measurements and the writing of the reports is mainly a homework.
11. Few diagrams and preliminary results should be obtained in the laboratory immediately after the measurement, to get an idea whether the measurement was right.
12. Questions about the evaluation and the writing of the reports should be discussed with the teaching personnel/staff.
13. All measures are taken in international standards, the SI-system (95% of the world's population and all scientists are using it).
14. The experiments are performed by the students in groups of two.
15. Each group has to come prepared about the theory of the experiment before the laboratory starts. The students should understand the experiment before they start with setup and measuring.
16. Each group writes down all important information in a bound logbook, which is a document and a laboratory diary. All information which can be plotted should be shown graphically already during the laboratory.
17. Finishing of an experiment needs to be approved by the Professor
18. After the laboratory an experimental report has to be written and submitted after completion of the experiment as a first draft. This draft will be corrected by the Professor.
19. All set-ups using electronic equipment should be performed by using an oscilloscope and by watching and understanding the signals. No trials without understanding! Ask the Professor!
20. For most of the experiments an appropriate selection of electronic units has been made which warrants a successful measurement and good results. One may try out something different, discuss it first with the Professor
21. Follow the safety rules given below.
22. Do not change the computer-settings, don't install or download your own software; repairs of damaged computer software are a waste of time and we need our time for you.

General Policies:

1. Refrain from smoking, eating, drinking, and littering in all physics Laboratories.
2. Stay inside the laboratory only during laboratory classes. Only officially enrolled students are permitted inside the laboratory.
3. Use all laboratory fixtures properly. Do not sit on tables and do not open cabinets or lockers unless there is an instruction to do so.
4. Turn off all electrical appliances in the laboratory if they are not being used. If you are the last person to leave the laboratory, turn off the lights and fans/ACs, lock the doors, and close the windows.
5. Use only the computers in the physics laboratory for purposes related to experiments performed.
6. Maintain the cleanliness of the laboratory at all times. Always observe proper safety procedures in the laboratory.

Use of Equipment:

1. All pieces of equipment necessary for physics experiments may be borrowed from the Physics Stockroom.
2. Fill up a borrowing form which is available in the laboratory at the Physics Stockroom.
3. Borrow only the pieces of equipment which are specified in your experiment or are required by the laboratory instructor.

4. The borrower and his/her group are held responsible for all pieces of equipment borrowed from the Physics Stockroom.
5. Pieces of equipment borrowed must be returned upon completion of the experiment.
6. The learner will take responsibility for any damage or loss of the borrowed equipment.

Laboratory Safety:

1. Students are advised to read all precautionary notes on all pieces of equipment before using them. All questions about safety precautions on the equipment being used must be addressed to the Professor.
2. The laboratory instructor/ Professor must first check the set-up for experiments requiring the use of electrical components before any of these are plugged in or turned on. In case of faulty equipment, the instructor must be informed immediately so that a replacement can be made.
3. Experiments involving the use of boiling water, heaters, and the like must be performed close to the water sinks in the laboratory. Proper safety procedures must be employed when performing such experiments.
4. Chemicals used in some experiments must be handled with utmost care. Used and unused chemicals must be returned to the Stockroom as soon as the experiment is finished. Chemicals should never be thrown into the water sinks or the trash bins.
5. All injuries, however minor, must be reported to the laboratory instructor/Professor.
6. In case of a minor injury, the instructor and/or the laboratory technicians may administer first aid. The student may be sent by the instructor to the university clinic accompanied by a person designated by the instructor.
7. If the instructor and/or the laboratory technicians feel they cannot administer the proper first-aid treatment, the student must be brought to the clinic immediately, if possible accompanied by a laboratory technician.

Breakage, Loss, and Damage to Laboratory Equipment:

1. Any incident of breakage, loss, or damage to any laboratory equipment must be reported immediately to the laboratory instructor.
2. The borrower and his/her group members are responsible for the replacement or payment of the broken, lost, or damaged equipment.
3. The cost of the damage to the equipment is assessed by the laboratory coordinator and technicians and a billing statement is forwarded to the borrower.
4. Students must pay for, repair, or replace the broken, lost, or damaged equipment on or before completion of the semester; otherwise, they would not be cleared from the laboratory and not be allowed to enroll in the following semester. Furthermore, they would not be given their final grade for that laboratory subject.
5. Once the equipment has been paid for, replaced or repaired, students would be issued a clearance by the laboratory coordinator.

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