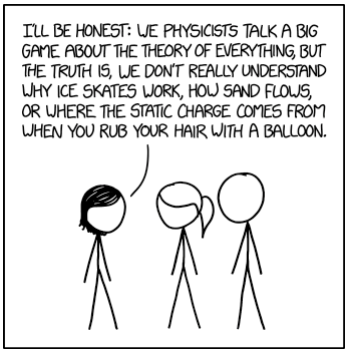
Advanced Master Lab Course

rules, regulations, and advice



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PLAGIARISM AND USE OF ARTIFICIAL INTELLIGENCE

This course – just like the scientific community in general -- has zero-tolerance policy towards plagiarism. Plagiarism is defined as **any copying without attribution**. For example: using paragraphs of the text found online, copying three sentences from a previous report, reproducing from a textbook, or getting a figure from a colleague, copying a few sentences from Wikipedia for a pre-experiment report.

Any kind of plagiarism, either in pre-experiment or final reports results in failing the experiment. The experiment needs to be repeated in the next term. A case of repeated plagiarism results in failing the course. Even if you did not know what plagiarism is! All cases of plagiarism will be referred to the course instructors.

One important goal of the course is to learn and practice scientific writing. Therefore, the use of artificial intelligence is not allowed in the preparation of lab reports.

GENERAL INFORMATION

The course is designed to give a glimpse into life of an experimentalist: You will carry out the measurements, analyse data and sources of errors, collaborate, prepare reports, and give presentations. On the course website you find the list of the experiments, contact information for tutor of each experiments, and the schedule of the experiments that you are assigned to.

The experiments take place during the semester on Wednesday and for particular experiments in the first weeks of the semester break. The seminar is on Monday, participation in it is mandatory.

During the course, each student will carry out one experiment alone and 5 experiments (on 6 dates) in a group of two. The experiments are from different areas of physics. You will write reports on these experiments, and present the results of one experiment in front of your peers during the seminar. For the experiment were you give the seminar talk we reserve two dates, so that on the 2nd date you can come, reinsure what you have learned, take photographs and finalize the talk and slides. At the end of this day you should present your talk to the tutor.

AT THE BEGINNING OF THE CLASS

To take part in the class, you must attend the general introductory meeting, the safety lecture, and the lecture on good scientific practice.

If you did not attend the above meetings, **for any reason**, you will not be able to take the part in the course. You will be assigned to your first experiment at the beginning of term. After its successful completion, we will form groups of students and assign you to the experiments. We will try to satisfy

your suggestions in forming the groups, choosing partners, and experiments. However, beware that assignment of partners/experiment is a semi-random process. The schedule for the experiments will be posted online.

BEFORE THE EXPERIMENT – PRE-EXPERIMENT REPORTS

To prepare for the experiment, consult the detailed descriptions found at https://wiki.physik.fu-berlin.de/fp/doku.php as well as other literature. It is your responsibility to prepare for the experiment and to understand the underlying physical concepts. The website lists the concepts and techniques we expect you to master for each experiment.

Two days before the experiment, send an email with the **written introduction to the experiment** (pre-experiment report) to the tutor for that experiment.

The **written introduction** should

- concisely describe the fundamental physics of the experiment
- contain a schematic draft of the experimental setup and the guidelines for the execution of the experiment.
- Do not exceed five pages in length, normally two pages are enough.

The supervisor WILL reject students **without sufficient written introductory part and knowledge of the basic ideas of the experiment**; they can reject them also **in case they come too late**. A compensatory appointment can be agreed upon discussion with the tutor and organizer responsible for the course.

On the day of the experiment, you will have a preliminary discussion with the tutor of the experiment. The discussion will be based on the pre-experiment report. Each student within a group should take actively part in this preparation process. Be prepared to answer the questions regarding the background of the experiment, related physics, and equipment involved.

DURING THE EXPERIMENT

The experiment begins usually at 9:00 - 10:00 h. The tutor will ask questions, discuss with the students the experiment, and instruct the students in operating the experimental equipment. The students are allowed to use it only after approval of the tutor. The tutor will not perform the experiment! During the execution of the experiment the students should prepare clearly arranged data sheets which have to be attached to the final report.

The protocol should in principle be finished at the day of the experiment. It is worth pointing out that it is not the intention of the advanced lab course to force students to work on unfinished protocols at home for several days after the end of the experiment. The biggest part of the report should be completed during the preparation process so that it should be clear, e.g., which quantities are going to be measured and how they should be presented. After the end of the experiment the supervisor attests the proper execution of the experiment by **signing the participation paper**. This signature is mandatory.

AFTER THE EXPERIMENT

Each group should prepare an experimental report (final report) describing the scientific basics, methods, the results and conclusions of each experiment (Think of the report as a mini-scientific paper on the topic of your experiment). The final report **(<15 pages in length**) should contain:

- the name of the experiment, dates, and the names of the participants.

- a short description of the relevant questions and an explanation of the subjects of the experiment as well as the physical quantities to be measured. It should be originally drafted by the students. It should include answers to open questions from the script.
- the experimental data (mind the units!) as well as the description of the evaluation procedure and used formulas. It should be possible to follow the procedure that leads to the final results. Original graphics and diagrams have to be included.
- a discussion of the error sources (systematic, random) affecting the results of the measurements.
- a summary of the results as a separate section. Here a discussion of the measurements and of the involved physical quantities can be included along with possible critiques concerning the experiment.
- **One sentence contribution statement** stating which participant did what part of the work (e.g. wrote parts of the experiment, analysed the data, plotted some figures, etc)

The final reports have to be handed in to the tutor within two weeks after the end of the experiment. Reports handed in later than two weeks after the experiment without proper justification will be considered insufficient. Even in that case they have to be submitted to the tutors. Each group can prepare one common protocol, provided that each of the students contributes to and fully understands it. In case one of the students in a group is not able to work on the protocol, the partner has to finish it alone.

The supervisor is expected to correct the reports within seven days. In case of any deficiencies, the report will be returned once for corrections and amendments. No more than seven days can be allowed for that.

Finally, the report is certified as finished by the tutor, if all the corrections are adequately made and the students presented their understanding of the experiment in a final discussion. The certification will only be given if the experiment has been well executed and the report is of quality and fully understandable. (Our criterion: the final report should read at least as a reasonable quality scientific publication in specialized journal)

Note: If **four weeks** after the experiment the report has not been finished and approved, the experiment will be considered unsuccessful. In this case the students will have to carry out a different experiment, upon agreement with course organizers.

SEMINAR PRESENTATION

Each group will prepare a presentation about one of the experiments that they carried out. For this experiment there will be a second appointment, so that you have plenty of time to reinsure what you have learned.

During the presentation, all students should contribute equally. The presentation time is 30 min. The presentation should be rehearsed **TWICE** – once with the tutor of the experiment, at the day of the 2nd appointment, and once – with course instructors (Dr. Püttner, Prof. Reich, and Dr. Müller) **one week before the presentation**. These rehearsals will give the group a chance to improve their presentation; the instructor will decide after the second rehearsal whether the talk is good enough to be presented in the seminar. Students are responsible for setting up the rehearsal. An adequate seminar presentation is necessary to pass the course. Some advice regarding presentations:

- Arrive >5 min before the class starts, test your laptop connection!
- Target an audience of your peers, Master students, who are not experts in your topic

- Start with a clear and easy-to follow "*Introduction*" section. The question you should answer there: what will you tell the audience and why should the audience care?
- During the introduction, you do not need to show many long formulas and especially include formula derivations. One-two key formulas should be enough!
- In the second part of the talk, "*Experiment*", you should clearly explain the experimental setup, methodologies
- At the end of the talk, in "*Conclusion*" section, discuss problems of the experiments, main conclusions, and possible applications.
- Always label each axis of each graph!
- Use simple fonts (Arial) and font big enough (>20pt) to be seen from the back row. Do not read from the slides. Do not use excessive colors/italics/bold/fonts. Do not have more than two graphs per slide.
- If you use any graph/illustration/reference that is not made by you, reference them -- otherwise, it is plagiarism!

PASSING THE COURSE
To pass the course, you need to do ALL of the following:

- Complete one individual experiment. Complete 5 experiments as group of two students.
- Submit an experimental report for each experiment, go through tutors' corrections, and obtain tutor's signature certifying report acceptance
- Present one talk at the seminar about one of the experiments at the satisfactory level
- Participate actively in the seminars by asking questions or providing comments

The final certificate of the advanced lab course as a whole will be provided by the course organizer, typically at the end of the semester. Alternative experiments for not approved ones have to be carried out within the same semester. If the advanced lab course is not successfully completed, please contact the organizer for a possible partial approval.

SUGGESTIONS…
…are welcome!

Last updated: Stephanie Reich, April 2025