

## Laboratory Reports

*Don't work hard – work smart!*

### Purpose of Laboratory Reports

#### The purpose of laboratory reports is . . .

. . . to help you digest the experience of conducting experiments and understand the experimental results with the help of the theoretical background acquired in lectures and from the textbook (did you read?!). Interpreting the experimental findings referring to appropriate theory and using adequate terminology will check and document your understanding of the subject and may provide valuable schemes or "templates" for later experiments of your own.

#### The purpose of laboratory reports is *not* . . .

. . . to help the instructor understand what he taught in lectures, or to reproduce sections of the textbook. When writing a report, your most important activity is to *think* about your individual experimental results, not to iterate the theoretical background you heard in the lecture or read in the textbook – this is what you should do *before* doing the experiment. Thus, instead of providing a stand-alone theory part, *apply* the theory to rationalize and interpret your particular, individual experimental results.

### How to organize your report

You do not have to follow a particular format, and different reports may require different approaches. The usual sequence of "experimental methods, results, discussion, conclusion" may work, but sometimes other approaches may be more appropriate to communicate your analysis of experimental observations, problems, interpretation of the data, and conclusions. Remember: laboratory experiments are meant to prepare you for "real" research projects. This means to be open for new findings and new approaches rather than strict application of established recipes.

**Look at your results!**

Instead of communicating general, “established” facts, look at your results. Look hard! How do you rate the quality of your measurements? Did you have experimental problems acquiring the data, and what were these problems? To what extent can you trust the data? Whenever possible, provide error limits! Are the results reproducible? Instead of presenting everything you’ve got, make a sensible choice. Limit the presentation to those experimental results that are most meaningful. Do not hesitate to look at the results of the other laboratory groups, too.

**Draw Conclusions!**

Think of a laboratory report as something you note down for *yourself*, not for the instructor. What are the most important insights *you* want to keep? What have you learned in this experiment? What was different from your expectations? What is worth documenting for later reference? What conclusions can you draw from the experimental results about the theory presented in the lectures? What are the apparent limitations? How can you explain potential deviations from the prediction of the theory presented in class? If you were to teach this course, what is it *you* would want students to remember?

**Grading**

Please do not assume that laboratory reports are graded by paper-weight. As mentioned above, your main task is to *think* – think critically about your experimental results. Cut the fat!

**Delivery**

Obviously, writing a good laboratory report requires time, no matter when you write it. However, organizing your thoughts will be much easier while the memory of the experiment is still fresh. So, it seems best to write the report soon after the experiment. Give yourself a rule – same night, next morning, . . .? If you postpone it, be sure why you will do better when you do it later. Usually, you should submit your report no later than one week after the experiment. To

account for exams etc., will allow a maximum of two weeks after the experiment. Given the relatively large number of 7 reports in this course, however, will not be able to accommodate (that is count in) late reports. After all, we need to train you for professional life!

Finally, do not burden yourself with inadequate tools. If you can, use state-of-the-art technology to facilitate and enhance authoring, data processing, and presentation of your report. Digital submissions by e-mail are most welcome, preferably in PDF format.

### **Finally...**

Provide feed back. Every course and every method of teaching can be improved. If you have any suggestions on how to improve the laboratory experiments, please to not hesitate to let us know. Please make constructive suggestions for changes rather than just pointing out what did not work. Let us know if you have any ideas for helping students appreciate these laboratory experiments and reports as a valuable and positive learning experience.