

THE REFORMED INTRODUCTORY AND INTERMEDIATE PHYSICS LABORATORY COURSES AT THE UNIVERSITY OF HELSINKI

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We review the introductory (first year) and intermediate (second/third year) physics laboratory courses held at the Department of Physics of the University of Helsinki. We give a brief overview of the courses, discuss our design ideas, highlight some examples and discuss student feedback.

Both laboratory courses were redesigned over the recent years. Our aim was to design laboratory courses in which the students could learn and develop skills essential for an experimental physicist. These skills, for example, include designing an experiment, analysis of data, presentation of results and collaboration skills.

The instructions for the experiments are on purpose concise. In most cases students can freely design the experimental method for solving the given problem. The design process and the analysis of the experimental data often leads to interplay with the theoretical skills from synchronous lecture courses. Students can solve the problems iteratively via refining their ideas in the laboratory over two-three weeks in small groups. We believe that this arrangement emulates actual experimental physics research.

For each laboratory exercise the learning goals are stated via a grading matrix. This serves as a guide both for the students learning the skills and assistants grading the students. The intermediate laboratory course is additionally accompanied with weekly tutorial sessions and a problem sets. This aids the students to learn, for example, data-analysis skills which subsequently can be applied to the experimental problem.

Presentation skills are developed via incrementally increasing the requirements for written reports. For one of the intermediate laboratory problems a poster is designed and presented instead of a writing a report.

According to the extensive student feedback gathered on the courses the reform has been received positively.