FREIE UNIVERSITÄT BERLIN

Advanced Lab Course
Master of Physics

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Advanced Lab: Objectives

Objectives of the course

- Prepare, conduct & present experimental work
- Experiments cover advanced topics and use advanced experimental techniques

Course requirements

- Successfully perform six (+1) experiments
- Prepare, defend, and correct experimental reports
- Present one experiment in the seminar
- Participate in the scientific discusison of the seminar

Mandatory course for the Ma in Physics

Advanced Lab: Who and where?

Course teachers

- Prof. Dr. Stephanie Reich
  room 1.2.42, phone 56162, email reich@physik.fu-berlin.de
- Dr. Ralph Püttner
  room 0.2.02, phone 56159, email ralph.puettner@physik.fu-berlin.de
- Dr. Niclas S. Müller
  room 1.2.34, email niclas.mueller@fu-berlin.de
- Lab supervisors from the physics department – see Wiki page of each experiment

Time & dates

- Experiments: Wed during term, start at 9 or 10am
- Consult course calendar: experiments start 23.04.2025 (some)
- Seminar: 2-4pm on Tue, starts 22.04.2024

Advanced Lab: Experiments

Solo experiment

- First experiment of term. Demonstrate your ability to experiment on an advanced level and prepare lab reports

Group experiments

- Explore various areas of modern physics, work as a research team

Seminar experiment

- Study one topic in depth, present your results in a talk followed by a scientific discussion

Advanced Lab: Experiments

Carefully read the *Rules for the Advanced Master Lab* and *TODO list*

Preparation

- Master the physics behind the experiment and understand the tools you will use

Experiment

- Conduct and document your experimental work

Lab report

- Write a report to present and discuss your results

Each step will be evaluated by us. At each step the experiment may be declared unsuccessful.

Experiments: Preparation

Group and course calendar

- Adv Lab website

Experiments: Preparation

Group and course calendar

- Check regularly. Schedule might change.

List of experiments & wiki

- Website – Requirements of each experiments
- Wiki – Background and reading material

Preparation – self study and discussion with your group partner

- Understand the physical concepts & the experimental methods
- Summary of the topic & theoretical background (2-5 pages)

- Get in touch with your tutor & submit your written prepartion:
  Two days before the experiment is scheduled

Day of Experiment

Prediscussion with tutor/supevisor

- Demonstrate your understanding of the experiment

Experiment

- Conduct & document the experiment
- If in doubt: Phone & ask!
- Finished by: Sign out by the supervisor

Experiment: Lab report

Lab report

- Introduction, background, data, interpretation/discussion
- Hand in: Solo experiment **1 week**, Group and seminar experiments **2 weeks**
- Discussion with lab supervisor (within **7 days** after submitted report)

- Feedback from tutor and corrections
- If corrections are satisfactory: Sing off of the lab report

Where do all these signatures go?

Advanced Lab: General

Group work
- Work as a team, meet and discuss
- Meet regularly, work on assignments together
- Every student has to work on every single experiment

Communicate
- When in doubt, better ask!
- Speak with your group partner, ask your supervisors
- Be nice & polite

Follow the rules
- Prepare for the meetings
- Hand in assignments on time

Advanced Lab: Seminar

Objectives

- Develop in-depth expertise on one experiment
- Learn how to present your own data in a talk
- Practice scientific discussions

During the seminar meeting

- Ask questions, give feedback, discuss.
- Discussion counts towards course requirements

Seminar: Preparation

Preparation

- Contact your seminar supervisor **well in advance** (4 weeks)
- Redo the seminar experiment, use this opportunity to discuss
- Prepare a presentation (30 minutes) on the experiment

Mock-up talk

- Present a finished talk
- Further improvement & refinement

- First mock-up talk with your seminar supervisor
- Second mock-up with Dr. Püttner, Dr. Müller, or Prof. Reich.
  At the latest one week before your seminar

Your scheduled seminar will be cancelled if you fail the first or second mock-up talk

Seminar: Presentation

Presentation

- Arrive early to test your equipment
- Stay on time
- Remember your audience
- Each student 15 minutes of presentation time
- Everybody not presenting: Ask questions, give feedback

First seminar weeks

- 16.04. & 29.04.2025 – Data analysis
- 22.04.2025 – Good scientific practice
- 27.05.2025 – First student presentation

Good scientific practice

Fundamental understanding

- Clearly mark contribution by others
- Cite your references, be specific
- Document your experimental data, hand in raw data with the reports
- Be honest when asked about your and your partners contributions

Enforcing of good scientific practice

- Types of violations include plagiarism, manipulatin and inventing data

- You will be failed for the experiment or your seminar
- Grave or repeated offences: You will be failed for the course
- Entire group is responsible for the lab reports and seminar slides

Next steps…

Read

- *Rules for the Advanced Master Lab* and *TODO list*

Go to

- Review of data analysis: Wed 16.04.2025 at noon-2pm, Lecture Hall B and 29.04.2025 at 2-4pm, Lecture Hall A
- Safety instructions: Wed 16.04.2025, 2pm, Lecture Hall B
  If you are not present, you will not be able to participate in the course
- Good scientific practice: Tue 22.04.2025, 2-4pm, Hörsaal A

Sign for

- Reading the Rules of the Advanced Lab and the TODO list
- Safety instruction
- Rules of good scientific practice