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## Teaching Laboratory Classes in the Natural Sciences (5)

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### 5. Assessment & Grading

When you develop an assessment strategy for your laboratory class, start with the **intended student learning outcomes**: “*What should my students know and be able to do after completing the course?*” Once you have an answer, the next question is: “*How can I measure their knowledge and competences using various assignments?*” It is important to make the **assessment and grading requirements as transparent as possible** because students will use these as reference for their learning strategies. Clearly communicating what you consider most important about a practical experiment or a lab report helps students use this information to achieve better learning gains. You are required to include **the weight of assignments** in the final grade, which is also important information for students, in the course directory. Many departments use **rubrics** that allow students to see the details of how an assignment is assessed.

**Typical challenges to lab class assessment** include the following:

- **Considering all student learning outcomes when designing assessment:** Student learning outcomes in lab classes are often diverse and include developing motor and practical skills, strategic and analytical thinking, as well as understanding concepts. This can mean that you may not be able to include all your learning outcomes in your assessment design.<sup>[1]</sup> It is thus **necessary to focus** on specific competencies, whose level of difficulty should increase, as students progress in their study programme.
- **Workload for teachers:** Grading multiple lab assignments is time and labour intensive. **Selective or exemplary assessment** can help to reduce the workload, as not every experiment has to be graded.
- **Possible plagiarism by means of data manipulation:** Fearing negative consequences (lower grade), some students may use the results from another group in cases of unsuccessful experiments or when they doubt their measurements, without reporting or explaining these actions in their lab report. Explain to your students the benefits of learning from both their successes and their errors or mistakes they may have committed. In your assessment design, include a way for students to recover at least most of their points by analysing and discussing these errors,<sup>[2]</sup> especially if the time frame of the lab does not allow students to repeat an unsuccessful experiment.
- **Assess group work:** see chapter “Group Work in the Laboratory”

**Common laboratory class assignments:**

- **Experiments:** Be systematic when you observe students’ experimental competences (e.g. by using a rubric) and take regular notes in order to avoid relying on memory and subjective and biased perceptions. You may combine observations with short conversations with students in which they explain the reasons for their procedures. If you prefer not to grade all experiments, you may want to limit assessment to one or two experiments per student throughout the semester.
- **Lab reports:** The laboratory reports students write about their experimental work after a lab session are crucial for assessment in lab classes. When you design the assessment criteria for lab reports, consider how to weigh individual elements. These elements may include: comprehension of concepts, successful completion of the experiment, discussion of results, compliance with directions on format (orthography, correct labelling of diagrams, etc.).
- **Tests:** You may use tests or short quizzes at any point during laboratory classes. These may be in written or oral form during class or online on Moodle as preparation for the upcoming session. Test results can provide you with important feedback on student learning. It may be useful to react to the results in subsequent classes by discussing common misunderstandings and misconceptions. Tests and quizzes can focus on the following aspects:
  - competencies in planning experiments;
  - detailed knowledge of upcoming experiments including safety issues;
  - understanding of how experiments relate to concepts and theories;
  - math skills.

■ **Lab notes:** Students record detailed information on the procedure while performing experiments. You may keep the grading simple by assigning a “submitted” or “not submitted” (or a “1 point” or “0 points”). By grading lab notes, teachers convey notes’ significance in research, and communicate transparency and replicability as central characteristics of empirical work in the natural sciences. Some teachers allow students to use their lab notes during written tests.

We recommend **combining various graded assignments** because they reveal the extent to which students have achieved the respective learning outcomes. At the University of Vienna, study law requires classes with continuous assessment to have at least two graded assignments. However, we suggest avoid having too many small assignments, as some students may experience the lab class as a permanent testing situation, in which they see few, if any, opportunities to ask clarifying questions. In addition to phases in which students are tested, they need time periods during which they can learn new material and do not feel pressure to have understood everything already.

### Continue reading

Laboratory Classes (6): Group Work in the Laboratory (</en/start-page/course-types-disciplines/teaching-laboratory-classes-in-the-natural-sciences/6-group-work-in-the-lab/>)

### References

[1] Teaching @ UNSW Australia. *Assessing Laboratory Learning*. Version: 08.10.2012, <https://teaching.unsw.edu.au/assessing-laboratory-learning> [last accessed on 01.09.2020].

[2] Teaching @ UNSW Australia, *Assessing Laboratory Learning* [1].

### Recommended citation

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