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## **Lecture-coordinated project-based laboratory course**

A project-based laboratory course was introduced to promote synergies by coordinating a chemistry lecture with a laboratory course and to strengthen the autonomy and critical thinking of the students.

We introduced a project-based laboratory course in the 4th semester of the material science curriculum of the Department of Materials. The course is held parallel to the lecture Chemistry IV such that the topics of the projects could be well adapted to the lecture contents.

Instead of detailed instruction for a synthesis or experiment, the students receive a short introduction into the topic along with a problem to be solved. Thus, they have to plan their experimental work largely autonomously while working in teams of four persons. There are two main objectives of the course: (1) Application, deepening and repetition of important aspects of the associated lecture. We expect that the learning process of the lecture contents is supported by practical work. (2) Promotion of critical thinking and of a systematic working in a laboratory. Particularly, we would like to facilitate the transition from classical laboratory courses to autonomous research (e.g. in Bachelor and Master theses).

We believe that project-based laboratory courses are a promising approach to promote autonomy of students. However, planning and running such courses can be difficult and requires much more experience than classical laboratory courses. In our opinion, a good laboratory course can be achieved with both classical instructions and a project-based approach. However, project-related courses seem to be more sensitive and error-prone and therefore need to be well thought out.

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