

# Quality concept Master Chemistry

## Program objectives

The overriding aim of the master's program is to

- lead students to the borders of the current state of knowledge in the discipline Chemistry and
- prepare them for independent scientific activities, e.g. a future doctoral research project
- as well as to train them for tasks surrounding the application and further development of chemical technologies, especially in the diverse non-university career fields open to chemists.

Besides deepening fundamental principles, this calls in particular for developing knowledge on latest lines of research in chemistry that generate new knowledge and are potentially relevant for future technological or scientific developments. The themes selected are based on existing areas of chemical research in Bremen: This ensures that students come into contact with practice-oriented examples of working methods located at the cutting-edge of science.

In the interest of developing as broad a view as possible on the subject of Chemistry and working methods in the discipline a special focus is put on:

- **Networking:** By focusing on in-depth training within existing areas of chemical research in Bremen, students receive a broad education in chemistry that trains them to develop a view of the discipline encompassing different lines of research as well as different paradigmatic concepts. This enables them to acquire the competence to illuminate issues from different points of view.
- **Developing knowledge on scientific method:** For students to arrive at an in-depth understanding of the subject calls for sharpening their view for unresolved problems and unanswered questions as well as developing appropriate approaches for their resolution. An important step in preparation for scientific work is to show students that a scientific approach does not merely mean accumulating as many facts as possible, but rather to develop a critical approach and the ability to constantly question hypotheses and paradigmatic concepts as well as their verification by way of experiment in the quest to understand the underlying nature of things.

A prerequisite for students to arrive at such an in-depth understanding of Chemistry is adequate foundation knowledge of the subject. In the main, this master's program therefore aims at the consecutive education of students who already possess a Bachelor's Degree in Chemistry. Building on sound foundational knowledge in central areas of chemistry and in order to arrive at a comprehensive view of chemical processes, the master's program focuses on complex substances with a special emphasis on identifying the reactions or systemic correlations between the various aspects dealt with in bachelor studies. In the frame of a study program containing significant practice-oriented components, students progressively learn how to independently conduct scientific work.

In the course of studies oriented to independent scientific work, in addition to subject-related skill sets students also acquire general competences in

- Project planning (planning for research practicals and the master's thesis),
- Knowledge management (researching sources, procurement, analysis and evaluation of literature),
- Documentation (report writing and master's thesis) and
- Presentation techniques (presentation of written assignments, defense of own work).

These objectives are achieved especially in the practice-oriented modules. At the same time, via an intensive occupation with original literature, students acquire skills in English – the lingua franca of science. Building on the competences in subject-related English already acquired from reading textbooks and basic scientific writings during bachelor studies, this is achieved by literature search as well as the reading, analysis, and evaluation of primary literature in English.

### Evaluation concept

The program's compact block structure and small classes ensure there is ongoing direct contact between teaching faculty and students. As a result, many potential problems can be identified and dealt with directly in classes. In this way, and in particular during tutorials in the foundation modules and small-group classes in the electives, course progress can be tailored to students' learning progress, problems of comprehension dealt with, and changes made to the organization of practicals.

The examination board convenes at least once a semester, more often if needs be, to discuss any upcoming issues. These are mostly of a general nature. This procedure, especially the dialog with students, has proven to be highly positive: It gives rise to new approaches, adjustments to curricula, and improvements in organization forms. The resolutions passed by the board are communicated to students through publication on the homepage of the master's program <https://www.uni-bremen.de/mscchemie/>.

In particular the first-semester modules have many cross-linkages between the specialties of professors teaching on the program. This also fosters dialog between the professors. At regular discussions held by the professors, any weak links that may exist between their specialties are identified and dealt with by making accordant adjustments to the content of courses and tutorials.

In addition to this, annual meetings of the program's teaching staff offer opportunities for collective reflection and direct action to implement suggestions for improvement.

All compulsory first-semester modules are subjected to evaluation performed either by means of the course management system Stud.IP or anonymized written questionnaires distributed under the aegis of the program coordinator at the end of the course. As a rule, evaluation is implemented by means of a standard questionnaire that can be supplemented or adapted to fit the module in question. The evaluation feedback is documented and at the end of semester the results are collected and submitted to the Academic Teaching Committee and the QM Commission for perusal and possible action. Students are involved actively in the ongoing optimization process. Criticism of individual courses and persons is subsequently discussed with the persons responsible for the study program and the individuals affected. As these matters/talks are confidential, their details are not recorded.

Every twelve months, at the end of the first and third semesters, the study program coordinator convenes a general student assembly. During the first-semester assembly, students receive information on the elective modules planned for their second semester studies, while the third-semester assembly allows an in-depth reflection on how students have appropriated their studies so far, especially with regard to the elective modules. The minutes of these assemblies are also made available to the Academic Teaching Committee and the QM Commission. Due to the habitually low student attendance, caused among other things by research practicals[D1] in the third semester, no attempt is made at the third-semester assembly to distribute evaluation questionnaires. Criticism and suggestions are noted by the Office of the Study Dean and passed on to the teaching staff.