

Study plan M.Sc. Chemistry

The Master's programme is divided into modules offered by the divisions of the Institute of Chemistry. The degree programme opens up both the possibility to specialise within chemistry and to study the broad scope of the subject.

Please note that the language of instruction is German.

Semester 1-3		Semester 4
Elective modules totalling 90 ECTS → approx. 30 ECTS per semester Please note that some courses are offered either in the summer term or in the winter term. Please also note the elective options within the modules (see text below the overview). Students can freely choose between the following modules:		30 ECTS
Elective modules	Department	Master's degree module (Master's thesis and final colloquium)
	Organic Chemistry che400: Advanced Organic Chemistry, 9 CP che430: Research Laboratory Organic Chemistry, 15 CP che480: Modern NMR Spectroscopic and Mass Spectrometric Methods in Organic Chemistry, 6 CP	
	Inorganic Chemistry che440: Advanced Inorganic Chemistry, 9 CP che420: Research Laboratory Inorganic Chemistry, 15 CP che450: Structure Elucidation of Inorganic Compounds with Modern Methods, 6 CP	
	Physical Chemistry che411: Physical Chemistry of Interfaces, 9 CP, 9 CP che414: Research Laboratory Physical Chemistry ¹ , 15 CP <i>or</i> che472: Research Laboratory Theoretical Chemistry ¹ , 15 CP che471: Theoretical Chemistry, 6 CP	
	Technical Chemistry che501: Heterogeneous Catalysis and Materials, 9 CP che492: Advanced Research Laboratory Technical Chemistry, 15 CP che491: Chemical Engineering, 6 CP	
	Miscellaneous optional: module from another degree programme up to 6 CP On application to the Master's Examination Board, further modules of up to 24 CP may be taken from other degree programmes, provided that they are equivalent in level to the MSc Chemistry and complement the qualifications in the chemical subjects in a reasonable way. The application must be submitted before taking the modules in order to ensure creditability.	
	Semester abroad A semester abroad is recommended. A learning agreement must be concluded prior to stays abroad. The corresponding application must be submitted formless to the examination board. You can find further information in the examinations regulations .	

¹ Only one of the two modules che414 Research Laboratory Physical Chemistry and che472 Research Laboratory Theoretical Chemistry can be taken.

Distribution of courses over the summer and winter term

Organic Chemistry	
che400	<p>Advanced Organic Chemistry</p> <p>The students choose three lectures from the series "Organic Chemistry for Advanced Students", whereby several lectures can be heard in one semester. The lecture series "Advanced Organic Chemistry" includes the following topics (up to three lectures in one semester according to the announcements of the respective lecturers):</p> <ul style="list-style-type: none"> • Naturstoffchemie (Doye) • Naturstoffsynthese (Doye) • Stereochemie organischer Verbindungen (Doye) • Chemie der Heteroaromaten (Doye) • Metallorganische Reagenzien und Katalysatoren in der Organischen Synthese (Christoffers) • Aromaten und Heterocyclen (Christoffers) • Synthesepaltung (Christoffers) • Naturstoffe (Christoffers) • Asymmetrische Synthese und Katalyse – Prinzipien und Anwendungen (Hilt) • Reduktionen und Oxidationen – von klassischen Methoden zu modernen Aspekten der Redoxchemie (Hilt) • Naturstoffsynthese (Hilt) <p>In the final oral examination, questions will be asked on three lectures of the students' choice, regardless of which of the three professors has read the lecture and/or is taking the examination.</p>
che430	<p>Research Laboratory Organic Chemistry</p> <p>The practical course takes place all year round in the research laboratories of the working groups and is not bound to the lecture times. Registration is possible by contacting one of the three professors of organic chemistry. During the practical course, participation in the seminar of the working group is required.</p>
che480	<p>Modern NMR Spectroscopic and Mass Spectrometric Methods in Organic Chemistry</p> <p>The module consists of an internship and an associated course. In the practical course, the students each prepare four analyses, of which two analyses per person are presented in the associated event. The module only takes place in the winter term.</p>
Inorganic Chemistry	
che440	<p>Advanced Inorganic Chemistry</p> <p>The following three lectures must be attended:</p> <p>Winter term: Organic Chemistry of the Main Group Elements Winter term: Materials science aspects of the subgroup element chemistry Summer term: Sustainable Chemistry & Homogeneous Catalysis</p>
che420	<p>Research Laboratory Inorganic Chemistry</p> <p>The practical course takes place all year round in the research laboratories of the working groups and is not bound to the lecture times. Registration is possible by contacting one of the three professors of organic chemistry. During the practical course, participation in the seminar of the working group is required.</p>

che450	<p>Structure Elucidation of Inorganic Compounds with Modern Methods The module consists of a lecture, a seminar and a practical course and takes place in the summer term.</p> <ul style="list-style-type: none"> • Lecture: Modern Resonance Spectroscopic Methods in Inorganic Chemistry • Seminar: Analysis of Powder and Single Crystal X-ray Diffraction Data • Practical course: X-ray Diffraction Experiments on Powders and Single Crystals
Physical Chemistry	
che411	<p>Physical Chemistry of Interfaces 3 lectures are chosen from a range of currently 5 lectures, whereby at least 2 lectures from the permanent offer must be attended.</p> <p>Permanent offer: Winter term: Structure of Interfaces and their Characterization Summer term: Solid-Gas Interfaces in Theory and Application Summer term: Integrated Chemical Systems</p> <p>Additional offer: Summer term: Spectroscopy for Particle and Interface Analytics Summer term: Physical Chemistry of Unusual Reaction Media</p>
che414	<p>Research Laboratory Physical Chemistry In the research practical course in physical chemistry, 3 methods courses (2 full days each) are taken from a selection of currently 5 methods courses. The individual research work stage in the Al-Shamery or Wittstock working groups corresponds to 9 CP.</p> <p>Methods courses Winter term: Transmission electron microscopy Summer term: X-ray photoelectron spectroscopy Summer term: Polarisation modulation infrared reflection absorption spectroscopy Summer term: Scanning electrochemical microscopy Summer term: Electrochemical impedance spectroscopy</p> <p>The practical research work can be conducted in the summer term or in the winter term.</p>
che472	<p>Research Laboratory Theoretical Chemistry The module consists of a seminar and a practical block including two block courses. In each of the two block courses, the students are given a programming task in which the contents of the lectures from module che471 are practically implemented. Winter term: Theoretical course Summer term: Dynamikum</p> <p>In the practical course, the students are subsequently given a research task individually, which is documented and scientifically elaborated. The results are presented in the working group seminar, which is taken alongside the practical course. The practical course is not bound to a semester cycle.</p>
che471	<p>Theoretical Chemistry The module consists of two lectures and two exercises. Winter term: Introduction to Quantum Chemistry (lecture + exercise) Summer term: Theoretical Chemistry: Molecular Reaction Dynamics (lecture + exercise)</p>

Technical Chemie

che501	<p>Heterogeneous Catalysis and Materials</p> <p>The module consists of three lectures, an internship and a business field trip, for which a share of the costs is required. It is usually offered in the winter term.</p> <p>Lectures</p> <ul style="list-style-type: none"> • Heterogeneous Catalysis (3 CP) • Sustainability in Industry (block course, via teaching assignment, 1.5 CP) • Materials science (1.5 CP) • Catalysis practical course (2 CP) • 3-day excursion to 2 companies active in the field of catalysis (1 CP)
che492	<p>Advanced Research Laboratory Technical Chemistry</p> <p>Students can choose between an experimentally-oriented practical course in the research groups of Dr. Momotenko or Prof. Wark (start possible at any time) or a practical course designed for chemical-process engineering simulations (Dr. Böwer, mostly July to September). Depending on the subject area/environment in which the research practical is carried out, one of the following seminars (3 CP each) must be attended to accompany the practical: Characterisation of Solids (Wark), Fluid Chemistry (Momotenko) or Mixed Phase Thermodynamics (Böwer). Furthermore, the technical-chemical seminar (3 CP) must be attended. The practical course parts correspond to 9 CP each.</p>
che491	<p>Chemical Engineering</p> <p>The module consists of two lectures and is offered in the winter term.</p> <p>Lectures</p> <ul style="list-style-type: none"> • Reaction Engineering (3 CP) • Basic Operations of Process Engineering (3 CP incl. exercise)