The English version of the curriculum for the „Master's Programme in Chemistry“ is not legally binding and is for informational purposes only. The legal basis is regulated in the curriculum published in the Bulletin of the University of Innsbruck of 25th November 2008, issue 12, No. 80. Decision of the Curriculum Committee of the Faculty of Chemistry and Pharmacy on 16.10.2008, approved by Senate Decree on 06.11.2008.

On the basis of § 25 para. 1 no. 10 University Organisation Act 2002, BGBl. I (Federal Law Gazette) No. 120, most recently amended by Federal Law BGBl. I (Federal Law Gazette) No. 134/2008 and § 32 Section "Regulations of Study Law", republished in the University of Innsbruck Bulletin of 3 February 2006, issue 16, No. 90, most recently amended by the University of Innsbruck Bulletin of 7 May 2008, issue 42, No. 272, the following is decreed:

Curriculum for the **Master's Programme in Chemistry** at the Faculty for Chemistry and Pharmacy of the University of Innsbruck

§ 1 Qualification profile

(1) The Master's Programme in Chemistry is classified as part of the cluster of natural science studies.

(2) The Master's Programme in Chemistry aims to deliver the training required to qualify chemists by imparting the special subject knowledge, competencies and methods of chemical science research and the responsible behaviour expected of their profession. The Master's MSc Programme is the basis for entry to the profession of chemist in the fields of research, technology, the environment and areas of chemical relevance to the public authorities. Graduates are qualified to carry out autonomous scientific research in chemical subjects and to function in leading positions as well as to make use of their acquired competencies on an interdisciplinary basis in order to solve chemical problems.

(3) The Master's Programme in Chemistry lays the foundations to study for a doctorate in Chemistry or related disciplines.

(4) The Master's Programme in Chemistry is conceived so that its focus lies on the current fields of research with close links between theoretical training and experimental/practical competencies. The Master's Programme in Chemistry offers a thematically comprehensive training in Chemistry while, through the choice of appropriate content, allowing a far-reaching specialisation in line with the student's abilities and interests. Together with the acquisition of advanced knowledge in the sub-disciplines of Chemistry, in line with the current state of knowledge in the subject, the MSc degree also fosters key inter-disciplinary competencies while imparting a responsible awareness of the possibilities and risks of scientific research and its applications.

§ 2 Scope and length of the programme

The Master's Programme in Chemistry counts for 120 ECTS points (known henceforth as ECTS-AP) which represents a workload of four semesters. One ECTS-AP corresponds to a workload of 25 hours.

§ 3 Admission

(1) Admission to the Master's Programme in Chemistry depends on successful completion of a Bachelor's Degree in an appropriate subject or an appropriate Baccalaureat in a college of higher education or an equivalent study programme in an Austrian or foreign post-secondary educational institution.

(2) Successful completion of the Bachelor's Programme in Chemistry at the University of Innsbruck also counts as a qualification under paragraph 1.

§ 4 Types of course and maximum number of participants

(1) Lectures (VO) have the function of imparting concepts, an overview of the subject, specialist knowledge and current developments in the respective subject areas. Maximum number of participants: 120

(2) Lab courses (PR) are teaching courses with continuous assessment where the stress is on the autonomous experimental work of students in selected, practical methods and problem areas. The student's independent experimental work may also be done in groups. The results are gathered in a laboratory report. This serves to ensure standardised scientific documentation of data and results and the learning of document presentation techniques that go beyond subject knowledge. Maximum number of participants: 10

(3) Seminars (SE) are teaching courses evaluated by continuous assessment in which students work through and present in a subject-oriented way their own content. Seminars help students present a topic scientifically, encourage the discussion of specific topics and critical reflection on the current state of knowledge while they also promote communication skills, presentation techniques and project management. The grading of seminar work by the course leader takes into consideration the value to the subject and its methodology of the data and results presented, as well as the quality of the presentation and subject-centred discussion.. Maximum number of participants: 60

(4) Courses (KU) are teaching courses with continuous assessment in which general competencies are practised with the active participation of students. Maximum number of students per course: 60

§ 5 Procedure for the allocation of places in courses with a restricted number of participants

(1) In the case of teaching courses with a restricted number of participants, places are allocated as follows:
   1. Students who have prolonged their studies because of a study deferment are to be given priority.
   2. Students for whom the course is mandatory.
   3. Students from other subject areas.
   4. If the criteria in sections 1 and 2 above on the regulation of admission to a course do not suffice, the available places are drawn out by lots.

(2) Where necessary, parallel courses may be provided, but they must be held during normally course-free time.

§ 6 Mandatory and elective modules

(1) The Master's Programme in Chemistry is divided into the following groups of modules:

1. The elective modules of the sub-disciplines of Chemistry Analytical Chemistry, Inorganic Chemistry, Biochemistry, Organic Chemistry, Physical Chemistry and Theoretical Chemistry. From these 6 elective modules, 5 are to be successfully completed with a total of 62,5 ECTS-AP.
2. Elective modules worth a total of 15 ECTS-AP chosen from the intensified subjects of the 6 sub-disciplines of Chemistry mentioned above are to be completed successfully.
3. Elective modules in the general competencies. From these 9 elective modules a total equivalent to 10 ECTS-AP are to be completed successfully.
4. The defence of the Master's Thesis (2.5 ECTS-AP) is a mandatory module.

(2) The elective modules of the sub-divisions of Chemistry Analytical Chemistry, Inorganic Chemistry, Biochemistry, Organic Chemistry, Physical Chemistry and Theoretical Chemistry. From these 6 elective modules, 5 are to be successfully completed with a workload of 62.5 ECTS-AP:

1.	**Elective Module: Analytical Chemistry**	**SST**	**ECTS-AP**
a.	**VO Fundamentals and Applications of Modern Separation Techniques** The emphasis is on separation techniques like filtration, centrifugation, dialysis, distillation, liquid-liquid and solid phase extraction as well as on electrophoretic column chromatography (zone electrophoretics, 2D-gel electrophoresis, isotachophoresis, isoelectric focussing) and chromatographic separation techniques like TLC, GC, GPC and HPLC as well as on preparative column chromatography (fundamentals, phase systems, instrumentation, case studies).	2	3
b.	**VO Bioanalysis and Coupling Methods** Separation techniques for biomolecules (chromatography, electrophoresis), the structural analysis of biomolecules, coupling with mass spectrometry nuclear magnetic resonance spectroscopy	1	1,5
c.	**VO Methods of Spectroscopic Analysis** Fundamentals and theory of UV-, MIR-, NIR and Raman spectroscopy, examples of applications in industry and research	1	1,5
d.	**VO Modern Applications of Electroanalysis** Evaluation of redox mechanisms, special methods for trace analysis, corrosion tests, selective and sensitive detection methods for chromatography and capillary electrophoresis	1	1,5
e.	**PR Instrumental Analytical Lab Practice for Advanced Students** Literature search and selection of suitable methods for a given analytical problem, selected examples from the fields of environment, food products, bio-, polymer- and industrial analysis using electrophoresis, chromatography, electrochemical, atom spectroscopic and molecular spectroscopic methods of analysis, coupling methods, sample preparation methods of real samples prior to analysis, evaluation of data and comparison of methods	5	5
	Total	**10**	**12,5**
	Aims of the Module:		

	The students of this module acquire a deep knowledge of all current methods of analysis. They are enabled to apply this knowledge independently to real problems and to consider the strengths and limits to the application of the various methods. They acquire the ability to establish a tailor-made method of analysis for a specific problem and to evaluate and interpret the results achieved.
	Admission Requirements: none

2.	**Elective Module: Inorganic Chemistry**	**SST**	**ECTS-AP**
a.	**VO Inorganic Functional Materials** Introduction to the "Inorganic Functional Materials" relevant to material science with the emphasis on hard materials, alloys and Nano-scale working materials. Together with synthesis, the technically relevant, electronic, optical and magnetic qualities of these materials are highlighted.	2	3
b.	**VO Organometallic Chemistry and Homogeneous Catalysis** The classification, production, structure, stability, stoechiometric and catalytic reactivity, applications of organometallic compounds and industrially relevant processes as well as current developments and challenges of organometallic chemistry.	3	4,5
c.	**PR Lab Practice on Inorganic Chemistry for Advanced Students** Independent experimental work on current research topics in a working group of inorganic chemistry, the practical application of advanced synthesis methodology as well as spectroscopic and diffractionsmetric characterisation of materials; choice of emphasis on organometallic chemistry and catalysis, coordination chemistry, magnetochemistry, photochemistry, material science and solid state chemistry.	5	5
	Total	**10**	**12,5**
	Aims of the Module: Students acquire advanced knowledge and competencies in inorganic chemistry with particular attention to concrete applications of inorganic functional materials in technology and industry. Students get to know the many various structural and property relationships between inorganic materials and are enabled to apply at a practical level the functions and properties of molecular and solid state compounds, using the wide range of synthetic methods of inorganic chemistry.		
	Admission Requirements: none		

3.	**Elective Module: Biochemistry**	**SST**	**ECTS-AP**
a.	**VO Advanced Biochemistry I** Advanced treatment of the structure and function of proteins, with particular emphasis on: chemistry of amino acid building blocks; peptide bond; protein analysis; conformation, folding, and dynamic function of proteins; allosteric proteins; mechanisms of enzymatic catalysis; protein sequence motifs (bioinformatics).	2	3
b.	**VO Advanced Biochemistry II** Advanced treatment of biochemical regulatory and signal transduction pathways, in particular: amino acid metabolism, cholesterol metabolism,	2	3

	steroid hormones, isoprenoid compounds; chemical attributes of DNA; gene-protein relation; gene regulation; protein targeting; mitogenic signal transduction; molecular basis of carcinogenesis.		
c.	**VO Introduction to the Laboratory Course in Advanced Biochemistry** Theoretical background of modern biochemical and gene technological methods, in particular: recombinant protein expression, protein purification, protein-DNA interactions, analysis of gene expression, gene transfer, cell transformation.	1	1,5
d.	**PR Laboratory Practice in Advanced Biochemistry** Research related practical training in modern biochemical and gene technological methods, in particular: recombinant protein expression, protein purification, protein-DNA interactions, analysis of gene expression, gene transfer, cell transformation.	5	5
	Total	**10**	**12,5**
	Aims of the Module: Students acquire profound knowledge of aims and methods in modern biochemical and gene technological research with emphasis on a deepened treatment of the chemical and biological properties of nuclear acids and proteins, representing important biomolecules involved in the flow of genetic information. Moreover, students learn how to apply biochemical and gene technological methods for medical relevant issues, in particular the molecular bases of physiological and pathophysiological processes, and the usage of structural biological methods to determine the functions of biomolecules.		
	Admission Requirements: none		

4.	**Elective Module: Organic Chemistry**	**SST**	**ECTS-AP**
a.	**VO Advanced Organic Synthesis** Modern synthesis concepts (e.g. atom-economic synthesis, biomimetic synthesis, green synthesis chemistry, etc.): synthesis strategies (e.g. linear vs. block construction, solution vs. solid phase synthesis, use of natural materials (from the chiral pool) and stereoselective synthesis, pericyclic reactions, biocatalysis, etc.) and synthesis methods (thermo-, photo-, electro-synthesis, synthesis with organometallic complexes and radicals, protective group techniques, etc.) as well as total syntheses of natural materials	2	3
b.	**VO Bio-Organic Chemistry** Fundamentals of bio-organic chemistry; organic-chemical synthesis as access to natural material analogues, which leads to the deliberate manipulation of the properties of biological systems; structural basis of biocatalysis and special stereochemical aspects	2	3
c.	**SE Seminar on Biological Organic Chemistry** Working through and presenting current topics of organic chemistry with the emphasis on “Structure, Reactivity & Synthesis“ as well as on chemical-biological efforts; training programme on use of primary literature and discussion of lectures	1	1,5

d.	**PR Lab Practice Organic Synthesis** Practical execution of organic-chemical steps in synthesis using modern strategies and methods to bring about selective chemical transformations. *Organisation*: rotation principle, leading through the current research topics of organic chemistry, practical application of advanced synthesis methodology and spectroscopic-analytical material characterisation	5	5
	Total	**10**	**12,5**
	Aims of the Module: Students acquire advanced knowledge and competencies in organic chemistry with special attention to the actual uses of modern synthesis, of bio-organic chemistry and of other attempts of organic chemistry to throw light on molecular and biological issues. Independent work in current research areas of organic chemistry, perfecting presentation techniques, autonomous experimental work together with complex, practice-oriented issues and with questions of basic research.		
	Admission Requirements: none		

5.	**Elective Module: Physical Chemistry**	**SST**	**ECTS-AP**
a.	**VO Solid Materials** Translation symmetry and space groups of crystalline solids, band theory and electronic properties, lattice vibrations, transport properties	2	3
b.	**VO Kinetics and Catalysis** Complex reaction kinetics, non-linear and oscillating systems, microscopic foundations of kinetics	2	3
c.	**SE Current Topics of Physical Chemistry** New materials, sustainable energy systems and interface phenomena, modern methods of physical chemistry	2	3,5
d.	**PR Experiments from Applied Physical Chemistry** Fuel cells, corrosion, surface melting and ellipsometry, nano friction and roughness (AFM), mass spectrometry	2	2
e.	**PR Thin Film Technology** Design and deposition of functional thin film systems	1	1
	Total	**9**	**12,5**
	Aims of the Module: Students work on structural aspects of solid state chemistry and physics and acquire deepened knowledge of electronic structures and of lattice dynamics as well as of the resulting macroscopic material properties. They learn how to describe complex reactions that occur in actual processes and acquire insights into microscopic mechanisms. They occupy themselves autonomously with current, socially relevant research areas of physical chemistry and perfect their presentation techniques. Students carry out their own experiments on complex practice-oriented problems.		
	Admission Requirements: none		

6.	Elective Module: Theoretical Chemistry	SST	ECTS-AP
a.	**VO Molecular Modelling** Molecular mechanics (empirical force field methods), energy minimisations, conformation analysis, molecular design	1	1,5
b.	**VO Simulation Methods** Molecular dynamic-simulations, quantum mechanics, hybrid methods, Monte-Carlo simulations; free energy calculations	2	3
c.	**VO Theoretical Treatment of Macromolecules** Prediction of protein structures, sequence analysis, protein foldings, prediction of RNA/DNA structures	1	1,5
d.	**VO Advanced Methods in Quantum Chemistry** Advanced methods to calculate correlation energy and gradients	1	1,5
e.	**PR Advanced Exercises on Theoretical Chemistry and Computer-Chemistry** Applications of the calculation methods presented in the Master's Programme	5	5
	Total	**10**	**12,5**
	Aims of the Module: Students acquire a full understanding of molecules and their interactions through classical mechanics, the use of computer-based chemical methods for modelling materials, and quantum mechanical forces to describe dynamic processes as well as to predict thermodynamic quantities; MC and MD procedures; theoretical treatment of DNA, RNA and proteins, sequence analysis; prediction of protein and nuclear acid structures, advanced calculation methods of quantum chemistry, the use of methods presented in the lectures applied to examples of scientific research.		
	Admission Requirements: none		

(3) Elective modules for intensification of the sub-divisions of Chemistry Analytical Chemistry, Inorganic Chemistry, Biochemistry, Organic Chemistry, Physical Chemistry and Theoretical Chemistry

From the following 14 elective modules, modules totalling 15 ECTS-AP are to be successfully completed:

7.	Elective Module: Intensification of the Subject Analytical Chemistry A	SST	ECTS-AP
a.	**VO Methods of Materials Analysis** Traditional processes: mercury porosimetry, BET, RFA; new methods of materials analysis, infrared- and Raman spectroscopy	1	1,5
b.	**VO Sensors** Construction, measuring principles and functions of various types of sensors; applications of electrochemical and optical sensors, semi-conductor gas sensors, biosensors; modern developments and miniaturisation based	1	1,5

	on field effect transistors and sensor arrays		
c.	**VO Drug Analysis** Methods of extraction of natural materials (e.g. microwave extraction, PLE, SFE etc.) and the purification of samples (solid phase extraction, LLE etc.); separation of natural materials with special emphasis on coupling with mass spectrometry	1	2
	Total	**3**	**5**
	Aims of the Module: Students acquire advanced competencies in the field of material characterisation, the various measurement principles in the area of sensor technology as well as the analysis of plant material substances and drugs. Students are familiarised with the current and most modern analysis procedures for the separate subject areas.		
	Admission Requirements: none		

8.	**Elective Module: Intensification of the Subject Analytical Chemistry B**	**SST**	**ECTS-AP**
a.	**VO Trends in Separation Techniques** Stationary phases for liquid chromatography (synthesis, characterisation, choice and optimisation of methods); detection methods; miniaturisation of separation processes, e.g. chip technologies for electrophoresis and chromatography	1	1,5
b.	**VO Laboratory-Diagnosed Analysis Processes** Taking of samples; analysis diagnosis (blood, urine, liquids), molecular-biological methods of analysis (PCR diagnostics, mutation diagnostics, ELISA processes), immunological processes (enzyme immuno assays – EIA), biomarker analysis (MALDI, SELDI, MELDI) in the areas of genomics, proteomics and metabolomics	1	1,5
c.	**VO Industrial Analysis** Introduction to the problems of analytical chemistry in industry, demands on analysis processes, prerequisites for establishment, evaluation and validation of analysis processes, legal requirements	1	2
	Total	**3**	**5**
	Aims of the Module: Students acquire deepened insights into current development trends in separation methods and applications of modern analysis procedures in laboratory diagnostics and in industry.		
	Admission Requirements: none		

9.	**Elective Module: Intensification of the Subject Analytical Chemistry C**	**SST**	**ECTS-AP**
	PR Radiation Protection and Exercises Basics of radiation physics, dosimetry, radiation legislation, radiation biology, practical application of local testing level devices	3	2,5
	Total	**3**	**2,5**

	Aims of the Module: Students learn current radio-chemical and radio-analytical methods in environmental technology and also how to use and evaluate laboratory medicine.
	Admission Requirements: none

10.	**Elective Module: Intensification of the Subject Inorganic Chemistry A**	**SST**	**ECTS-AP**
a.	**VO Solid State Chemistry** Intensification of the subject area solid state chemistry concentrating on modern synthesis strategies, high temperature and high pressure syntheses, insights into modern solid state characterisation methods and introduction to current research areas and applications of solid state chemistry	1	2
b.	**PR Lab Practice on Applied High Pressure Solid State Chemistry** Experimental execution of modern high pressure synthesis, (multi-anvil technology), the focus on issues in the synthesis of new functional materials	3	3
	Total	**4**	**5**
	Aims of the Module: Students are familiarised with the latest research areas in modern solid state chemistry. Students also acquire advanced practical competencies in the production of functional materials through high pressure synthesis.		
	Admission Requirements: none		

11.	**Elective Module: Intensification of the Subject Inorganic Chemistry B**	**SST**	**ECTS-AP**
a.	**VO Functional Hybrid Materials** Design, function and areas of applications of ionic liquids, metal-organic frameworks, sol-gel materials, dendrimers and energetic materials	1	2
b.	**VO Photochemical Conversion of Solar Energy** Principles, uses and current state of technology of the photochemical obtention of solar energy by means of supramolecular systems, the production of photoelectrical energy from solar energy by means of supramolecular systems; the production of photoelectrical energy from solar energy (photovoltaics, Graetzel cells); comparison with the natural systems of photosynthesis in the framework of coordination chemistry and Markus theory.	1	1,5
c.	**VO Heteronuclear NMR Spectroscopy** Uses and methods of metal heteronuclear NMR spectroscopy as well as ^{1}H- and ^{13}C-NMR in organometallic chemistry and coordination chemistry.	1	1,5
	Total	**3**	**5**
	Aims of the Module: Students acquire advanced knowledge on applications of inorganic hybrid materials and co-		

	ordination compounds in current research fields of material science. Students are familiarised with the methods of structure determination by means of metal/heteronuclear NMR-spectroscopy.
	Admission Requirements: none

12.	**Elective Module: Intensification of the Subject Inorganic Chemistry C**	**SST**	**ECTS-AP**
a.	**VO X-Ray Diffraction on Single Crystals and Powders** Principles, methods, characteristics and state of technology in X-ray structure analysis of single crystals and powders	1	1
b.	**PR Lab Practice on Diffraction Methods** Methods of single crystal X-ray structural analysis, independent execution of single crystal structure analyses of selected coordination compounds, organometallic compounds and solid state materials, interpretation and computer-assisted assessment and visualisation of data and the structural characterisation of inorganic materials in the solid state	2	1,5
	Total	**3**	**2,5**
	Aim of the Module: Students acquire theoretical and practical competencies in the methods and applications of X-ray diffractometry on single crystals and powders.		
	Admission Requirements: none		

13.	**Elective Module: Intensification of the Subject Biochemistry**	**SST**	**ECTS-AP**
a.	**VO Advanced Biochemistry III** Regulation of gene expression, gene silencing, gene mutation, DNA-microarray technology, gene isolation, gene transfer, gene therapy	1	1
b.	**PR Specialized Laboratory Course in Advanced Biochemistry** Training in modern biochemical and gene technological methods for the isolation, structural characterisation and functional analysis of specific target genes and their protein products	2	1,5
	Total	**3**	**2,5**
	Aims of the Module: Students acquire deepened knowledge of modern gene technological methods relevant for applications in basic research and medicine.		
	Admission Requirements: none		

14.	**Elective Module: Intensification of the Subject Organic Chemistry A**	**SST**	**ECTS-AP**
a.	**VO Catalysis of Organic Reactions** Introduction to the catalysis of organic reactions, acid base catalysis versus transition metal catalysis versus biocatalysis; heterogeneous versus	1	1,5

	homeogeneous catalysis with reference to solid phase synthesis of organic compounds, catalysis through proteins and nucleic acids – current problems		
b.	**VO Mechanisms of Organic Reactions** Mechanistic bases and methods (isotope effects, linear free energy relation, partition function correlation, etc.), influence of the medium, stepwise versus synchronic reactions (reactive intermediates, pericyclic reactions), current problems	1	1,5
c.	**VO Supramolecular Chemistry and Nano Chemistry** The "Supramolecule", its internal and external organisation principles and functions, presentation of examples from Lego-chemistry and molecular biology, use in biological synthesis and in the production of "functional" nano materials and current examples	1	2
	Total	**3**	**5**
	Aims of the Module: Students acquire advanced knowledge of the reactivity of organic compounds in current chemical, chemical-biological and nano-chemical research fields. Students are familiarised with the analysis of reaction methods and can apply modern concepts in synthesis planning (ranging from simple chemical compounds to biomolecules and polymer materials).		
	Admission Requirements: none		

15.	**Elective Module: Intensification of the Subject Organic Chemistry B**	**SST**	**ECTS-AP**
a.	**VO Organic Structural Chemistry I** Spectroscopic characterisation of organic compounds, nano materials and biomolecules through NMR spectroscopy	1	1,5
b.	**VO Organic Structural Chemistry II** Spectrometric characterisation of organic compounds, nano materials and biomolecules through modern mass spectrometric methods	1	1,5
c.	**PR Lab Practice for Organic Strutural Chemistry** Characterisation of a synthesis product or a natural material through (heteronuclear) NMR-spectroscopy, mass spectrometry, UV-VIS-, CD-, IR- and fluorescence spectroscopy	3	2
	Total	**5**	**5**
	Aims of the Module: Students acquire advanced knowledge of the structural analysis of organic compounds in current chemical-biological and nanochemical research fields. Students can apply modern methods in the structural analysis of lower molecular compounds, biomolecules and polymer materials.		
	Admission Requirements: none		

16.	Elective Module: Intensification of the Subject Organic Chemistry C	SST	ECTS-AP
	PR Lab Practice on Solid Phase Synthesis & Natural Materials Isolation & Nano Chemistry Experimental work on current research topics in a working group in organic chemistry, the practical execution of an automated solid phase synthesis, of the isolation of a natural material, of a targeted natural material transformation or of a nano chemical synthesis	2	2,5
	Total	**2**	**2,5**
	Aims of the Module Students acquire advanced laboratory skills in the modern methods of solid phase synthesis, of natural material isolation and transformation and of nano chemical synthesis.		
	Admission Requirements: none		

17.	Elective Module: Intensification of the Subject Physical Chemistry A	SST	ECTS-AP
a.	**VO Kinetics and Dynamics of Surface Reactions** Adsorption/desorption kinetics and dynamics, potential energy surfaces, eletronic processes and molecular orbital description of adsorption, statistics of the ad- and desorption processes and of the adsorbed phase	1	1
b.	**VO Nano-Structured Materials and Heterogeneous Catalysis** Physical chemistry properties of nano-structured materials, application of metallic and oxide nano particles in heterogeneous catalysis, exhaust gas purification, energy technology and process optimisation	1	1,5
c.	**VO Atmospheric Chemistry** Basic principles of atmospheric chemistry and the role of heterogeneous catalytic processes in the balance of pollutants	1	1
d.	**VO Phase Transitions** Thermodynamic description and classification of phase transitions, Landau theory of phase transitions, order parameters and critical phenomena, nucleation and surface melting, glass transition; experimental methods for the observation of phase transitions	1	1,5
	Total	**4**	**5**
	Aims of the Module: Students acquire deepened knowledge of nano sciences and in heterogeneous catalysis. Students are familiarised with significant processes in atmospheric and environmental chemistry and acquire detailed knowledge in the area of phase transitions with practical applications in materials sciences.		
	Admission Requirements: none		

18.	Elective Module: Intensification of the Subject Physical Chemistry B	SST	ECTS-AP
a.	**VO Interfaces and Materials Analysis**	1	2

	Methods to determine the chemical composition of surfaces, interfaces and layered systems: AES, XPS, depth profile analysis and adsorption spectroscopy as well as materials analysis by means of impedance spectroscopy		
b.	**PR Lab Course on Spectroscopy in Materials Analysis and Catalysis** Surface and depth profile analysis with X-ray photoelectron spectroscopy, impedance spectroscopical characterisation of oxides and catalysts, adsorption spectroscopy	2	3
	Total	**3**	**5**
	Aims of the Module Students acquire theoretical and practical knowledge of the use of modern techniques of surface and materials analysis with technically relevant problems.		
	Admission Requirements: none		

19.	**Elective Module: Intensification of the Subject Physical Chemistry C**	**SST**	**ECTS-AP**
a.	**VO Scanning Probe and Transmission Electron Microscopy** Principles and operation modes of scanning probe microscopy, atomic force microscopy, surface potential microscopy, electric force microscopy, friction microscopy and transmission electron microscopy	1	1,5
b.	**PR Lab Course on Electron and Scanning Probe Microscopy** Characterisation of surfaces on the nano scale and with atomic resolution using scanning probe methods, examination of nano particles and layered materials with transmission electron microscopy, low-energy electron diffraction (LEED) experiments in ultra-high vacuum and high energy electron diffraction in the transmission electron microscope (TEM-SAED); nano lithography	2	1
	Total	**3**	**2,5**
	Aims of the Module: Students get acquainted with modern microscopic techniques and electron diffraction methods to examine nano materials.		
	Admission Requirements: none		

20.	**Elective Module: Intensification of the Subject Theoretical Chemistry**	**SST**	**ECTS-AP**
a.	**VO Computer Design of Materials** Methods of computer chemistry to obtain material properties, the calculation of relationships between molecular topology, electronic structure and chemical properties (QSEPR), application of these relationships in the design of new compounds/materials	1	1
b.	**PR Computer Methods to Investigate Physico-Chemical Properties** Use of quantum mechanical and semi-classical methods to calculate structural, dynamic and spectroscopic properties of chemical systems, practical applications of QSEPR methods and material design	2	1,5

	Total	**3**	**2,5**
	Aims of the Module: Students acquire knowledge of the application of quantum mechanics methods, modelling-procedures and simulation techniques of all kinds while also learning about the most relevant approaches to get quantitative structural quality relationships as the basis for the design of new compounds and materials.		
	Admission Requirements: none		

(4) Elective modules on general competencies

From the following 9 elective modules, modules totalling 10 ECT-AP are to be successfully completed:

21.	**Elective Module: Patent and Chemical Law**	**SST**	**ECTS-AP**
	KU Law on Patents and Chemicals Inventions, protection of inventions, patents registration, patents, effects and consequences of patents, protection certificates, Austrian and European chemical law, registration, assessment and approval of chemicals	2	2,5
	Total	**2**	**2,5**
	Aims of the Module: Students acquire a basic understanding of the law on intellectual property as it affects chemists together with an overview on legal regulations of chemicals.		
	Admission Requirements: none		

22.	**Elective Module: Project Management**	**SST**	**ECTS-AP**
	KU Project Management Project definition, project management approaches and processes, practice-oriented tools for the planning, organisation, implementation and supervision of projects, case studies of relevance for chemistry, from the worlds of research and industry.	2	2.5
	Total	**2**	**2,5**
	Aims of the Module: Students get to know the status, methodology and success factors of modern project management and how to use management processes and helpful tools for their own projects. The acquired skills should enable students to undertake an active role in a project organisation.		
	Admission Requirements: none		

23.	Elective Module: Presentation Techniques and Application Strategies	SST	ECTS-AP
a.	**KU Presentation Techniques** Perception; memory, cognitive, emotional and interactional aspects of presentations, prerequisites for comprehensibility, presentation and rhetoric, opportunities and limits of various presentation techniques	1	1,5
b.	**KU Application Strategies** Perception of persons and social perception, self-presentation, human communication, credibility, dynamics of application discussions, control of stress, opportunities and limits of various application strategies	1	1
	Total	**2**	**2,5**
	Aims of the Module: Students acquire basic knowledge on the theory and practice of presentations and self presentation in the professional context, reflect on their own behaviour in these respects and increase and improve their skills in these areas.		
	Admission Requirements: none		

24.	Elective Module: Lecture Series GÖCh/CMBI/Material and Nano Sciences	SST	ECTS-AP
	KU Lecture Series of GÖCh/CMBI/Materials and Nano Sciences Attendance of the invited-lecture series organised by the Society of Austrian Chemists (GÖCh) and/or the Centre of Molecular Biosciences Innsbruck (CMBI) and/or the research platform Advanced Materials and Nano Sciences	2	2,5
	Total	**2**	**2,5**
	Aims of the Module: Through participation in the lectures students are familiarised with the current research topics of external experts and learn how current topics are presented and discussed on a scientific level. Contact with the invited professors allows students to get to know the Scientific Community.		
	Admission Requirements: none		

25.	Elective Module: Gender Studies in the Natural Sciences	SST	ECTS-AP
	KU Gender Studies in the Natural Sciences Knowledge of gender research in the natural sciences: "Women in Science": professional and sociological aspects/"Gender in Science": Gender aspects of the production of knowledge, product creation, consumption, use, politics of chemicals/scientific theory	2	2,5
	Total	**2**	**2,5**
	Aims of the Module: Consideration of gender-specific aspects in the natural sciences imparts to students knowledge of the social context of their subject. They learn to recognise attempts made at		

	various levels to analyse the connections between the natural sciences and gender relations. Their sense of responsibility for the uses and risks and of the social implications of their subject are thus strengthened.
	Admission Requirements: none

26.	Elective Module: Computer-Assisted Data Bank Research	SST	ECTS-AP
	KU Computer-Assisted Data Bank Research Structuring and information content of chemical-scientific data banks (SciFinder, Beilstein CrossFire, Science of Synthesis – Houben Weyl, esp@cenet, Cambridge Crystallographic Data Centre, etc.); strategies for literature searches, search algorithms and search profiles, data management	2	2,5
	Total	**2**	**2,5**
	Aims of the Module: Students acquire practice-oriented knowledge on the content of and search for information in data banks relevant to chemistry.		
	Admission Requirements: none		

27.	Elective Module: Computer-Assisted Control of Experiments	SST	ECTS-AP
	PR Computer-Assisted Control of Experiments Basic components of A/D- and D/A-conversion, programming in LABVIEW	3	2,5
	Total	**3**	**2,5**
	Aims of the Module: Participants are familiarised with hard- and software (programming) for automatic data acquisition and computer control of experiments.		
	Admission Requirements: none		

28.	Elective Module: Processing of Metals and Ceramics for Laboratory Use	SST	ECTS-AP
	PR Metal and Ceramics Processing for Laboratory Uses Independent work in the precision mechanics workshop	5	5
	Total	**5**	**5**
	Aim of the Module: Participants learn refined mechanical methods and skills and can independently produce their own mechanical precision parts and devices.		
	Admission Requirements: none		

29.	Elective Module: Glass Processing for Laboratory Use	SST	ECTS-AP
	PR Glass Processing for Laboratory Use Independent practice with glass-blowing and the production of glass devices for use in the laboratory	5	5
	Total	**5**	**5**
	Aims of the Module: Participants learn the methods of working with glass and how to independently produce glass devices for use in the laboratory.		
	Admission Requirements: none		

(5) Mandatory module: Defense of the Master's Thesis (2,5 ECTS-AP):

30.	Mandatory Module: Defense of the Master's Thesis	SST	ECTS-AP
	Presentation and defense of the student's own Master's Thesis (Defensio) in the framework of a 20-minute scientific lecture followed by a scientific discussion and questioning by members of the Senate Examination Commission		2,5
	Total		**2,5**
	Aims of the Module: To show that the student can present and defend the results of their Master's Thesis in the form of an academic lecture.		
	Admission Requirements: Positive grades in the prescribed modules and in the Master's Thesis.		

§ 7 Master's thesis

(1) The Master's Programme is to include a Master's Thesis equivalent to 30 ECTS-AP. The Master's Thesis is a scientific work that testifies to the student's ability to work on a scientific topic independently and adequately, as far as content and method are concerned.

(2) The topic of the Master's Thesis can be chosen from the areas of Analytical Chemistry, Inorganic Chemistry, Biochemistry, Organic Chemistry, Physical Chemistry or Theoretical Chemistry. Before announcing the topic of the Master's Thesis, the student must provide evidence of achieving at least 60 ECTS-AP in the elective modules.

(3) Master's Theses are to be presented in the written and electronic forms laid down by the Director of Studies.

§ 8 Examination regulations

(1) With the exception of the defense of the Master's Thesis module, modules are successfully completed through positive participation in the relevant courses.

(2) For lectures a written or oral test is to be taken on the total content of the course. The course leader announces the type of examination at the start of the course.

(3) Assessment of courses with continuous assessment is based on the regular written, oral and/or practical/experimental contributions of the student; students are to be informed of the assessment criteria by the course leader before the course begins.

(4) The Master's Programme in Chemistry is completed by the defense of the Master's Thesis in front of a Senate Examination Commission consisting of three persons. In a 20-minute lecture students present the results aimed at in their thesis. The defense of the Master's Thesis is followed by the student answering the questions put by the members of the commission. Assessment by the Senate Examination Commission is based on the student's lecture and on the answers given to the questions posed.

§ 9 Academic Degree

Students successfully completing the Master's Programme in Chemistry are to be awarded the title of "Master of Science", shortened to "MSc".

§ 10 Coming into force

This curriculum comes into force on 1st October 2009.

For the Curriculum Committee:	For the Senate:
Ao. Univ.-Prof. Dr. Benno Bildstein	Univ.-Prof. Dr. Ivo Hajnal

Attachment 1: Recommended study plan

As a result of the wide range of electives for the Chemistry Master's Programme, a detailed study plan with a list of courses chosen is not very useful. The time sequence for the chosen subjects is in line with the semester course offerings (winter or summer semester) and the actual choice of modules is decided by the students themselves. Below is an overview plan in line with the relative workload in terms of ECTS-AP:

<table>
<tr><th>1st Semester (Winter Semester)</th><th>2nd Semester (Summer Semester)</th><th>3rd Semester (Winter Semester)</th><th>4th Semester (Summer Semester)</th></tr>
<tr><td colspan="3">Elective Module Subject 1st Choice
(12,5 ECTS-AP)
Choice from Modules 1 – 6</td><td rowspan="8">Master’s Thesis
(30 ECTS-AP)

Defense of the Master’s Thesis
(2,5 ECTS-AP)

Module 30</td></tr>
<tr><td colspan="3">Elective Module Subject 2nd Choice
(12,5 ECTS-AP)
Choice from Modules 1 – 6</td></tr>
<tr><td colspan="3">Elective Module Subject 3rd Chocie
(12,5 ECTS-AP)
Choice from Modules 1 – 6</td></tr>
<tr><td colspan="3">Elective Module Subject 4th Choice
(12,5 ECTS-AP)
Choice from modules 1 – 6</td></tr>
<tr><td colspan="3">Elective Module Subject 5th Choice (12,5 ECTS-AP)
Choice from modules 1 – 6</td></tr>
<tr><td colspan="3">Choice in Subject Intensification
(15 ECTS-AP)
Choice from modules 7 – 20</td></tr>
<tr><td colspan="3">Choice in General Competencies
(10 ECTS-AP)
Choice from modules 21 – 29</td></tr>
</table>