

VU UNIVERSITY AMSTERDAM

FACULTY OF SCIENCES

TEACHING AND EXAMINATION REGULATIONS

B. Programme-specific section

Academic year 2014-2015

Master's Programme Chemistry



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Chapter 1. General Provisions

Article 1.1 – Definitions

In addition to part A, the following definitions are used in part B

- a. Course Education imparted in a series of lessons or meetings
- b. Personal Education Plan An individual study plan for the student's master programme.
- c. Examiner The person appointed by the Examinations Board for the purpose of holding examinations and determining their results, within the meaning of section 7.12c of the Act.

Article 1.2 – General information master's programme

1. The Master's programme Chemistry, CROHO 66857 BRIN 21 PL, is offered on a full-time and part-time basis and the language of instruction is English. The programme has a workload of 120 EC.
2. A component of the programme comprises 6 EC or a multiple thereof.
3. Within the programme the following tracks are offered:
 - Analytical Sciences;
 - AtoSim (joint operation with Ecole Normale Supérieure in Lyon and La Sapienza University in Rome);
 - Molecular Design, Synthesis and Catalysis;
 - Molecular Simulation and Photonics;
 - Science for Energy and Sustainability;
 - Sustainability - the Molecular Approach (Excellence track);
 - Science, Business and Innovation.
4. In each Master track the student may choose a profile (see Article 4.1).
 - Research
 - Communications
 - Social
 - Education
5. The student determines the content of the Master's programme in consultation with the coordinator of the Master's programme and according to the rules of Chapter 3. The coordinator of the Master's programme will lay down the content chosen by the student in a Personal Education Programme (PEP). The coordinator submits this PEP together with his recommendation to the Examinations Board. If the student wants to change the contents of the study programme, the student promptly consults with the coordinator of the study programme. If this results in a new PEP the student coordinator submits this to the Examinations Board.

Article 1.3 – Enrolment

The programme starts at the beginning of the first semester (September) and second semester (February) of the study year. This enrolment date ensures a programme that can be expected to be completed within the official period.

Chapter 2. Aim of the programme and exit qualifications

Article 2.1 – Aim of the programme

The aim of the programme is:

1. The master's programme in Chemistry aspires to be a study programme with international prestige, emanating from, and based on the strong research areas of the Department of Chemistry and Pharmaceutical Sciences. The aim of the Master's programme (MSc) in Chemistry is to:
 - a. educate students to become independent professionals, enabling them to conduct fundamental scientific research, to deal with current scientific knowledge, and to apply this knowledge in new and continuously changing practical situations;
 - b. actively stimulate interdisciplinary collaboration in the development of science, based on knowledge in the field of chemistry;
 - c. offer students the possibility to develop skills, knowledge and insight in a specialism in the field of chemistry, with emphasis on formulating relevant scientific questions and on the approach to find answers to these questions;
 - d. provide student-oriented education that is of a high, internationally recognised quality;
 - e. offer students the opportunity to gain knowledge and insight in an international setting;
 - f. provide an inspiring academic learning environment, and to offer feasible study tracks to a demanding and heterogeneously composed student population;
 - g. develop the ability in students to convey acquired knowledge to others.

Article 2.2 – Exit qualifications

1. The graduate of the Master's programme Chemistry has:
 - a. a thorough theoretical and practical knowledge of modern chemistry, including the knowledge of other disciplines required for that purpose;
 - b. a thorough knowledge of theoretical and experimental methods and research experience in at least one sub-area within the chemistry discipline;
 - c. the ability to become acquainted with other sub-areas of the discipline within a reasonable period of time;
 - d. the ability to formulate a research plan based on a realistic problem within the chemistry discipline;
 - e. the ability to analyse research results and to draw conclusions there from;
 - f. the ability to write a report or an internationally accessible scientific publication, and to participate in discussions on a topic in the field of study;
 - g. the ability to consult (international) professional literature in the relevant sub-areas and to apply the knowledge gained from that;
 - h. the ability to apply one's chemical knowledge in a broader (multidisciplinary) context;
 - i. the ability to deal with the safety and environmental aspects of chemistry;
 - j. an employability in those positions for which knowledge and research skills in the field of chemistry are a prerequisite;
 - k. sufficient knowledge and insight in the social role of chemistry in order to be able to make a sound choice regarding one's profession, as well as in the exertion of this profession;

- l. the ability to cooperate with, and to convey knowledge to other people and to give a presentation both to discipline specialists and to a broader audience.
 - m. Has good receptive and written productive skills in the English language.
2. In addition to paragraph 1, the student who has completed the track Analytical Sciences has obtained the following track-specific qualifications:
 - a. a thorough knowledge of and insight in the principles and performance of the main analytical methods and techniques;
 - b. the proficiency to select suitable strategies and methods for specific analytical questions;
 - c. the proficiency to translate analytical data into relevant information;
 - d. the ability to communicate with other about analytical questions and problems.
 3. In addition to paragraph 1, the student who has completed the track ATOSIM has obtained the following track-specific qualifications:
 - a. a thorough scientific knowledge of the field of atomic scale modelling;
 - b. a proficiency in analysing and solving scientific problems in the field of atomic scale modelling;
 - c. the ability to communicate with others about questions and problems in the field of atomic scale modelling.
 4. In addition to paragraph 1, the student who has completed the track Molecular Design, Synthesis and Photonics has obtained the following track-specific qualifications:
 - a. a thorough scientific knowledge of the field of molecular simulation and spectroscopy;
 - b. a proficiency in analysing and solving scientific problems in the field of molecular simulation and spectroscopy;
 - c. the ability to communicate with others about questions and problems in the field of molecular simulation and spectroscopy.
 5. In addition to paragraph 1, the student who has completed the track Science for Energy and Sustainability has obtained the following track-specific qualifications:
 - a. a thorough knowledge of the scientific, technological and societal challenges for our future associated with energy and sustainability problems;
 - b. a proficiency in analysing and evaluating the current energy and sustainability problems;
 - c. a proficiency in applying the acquired theoretical and practical insights in day-to-day practice at an institution, company or organization, strongly focused on providing scientific solutions to current and future energy and sustainability problems;
 6. The graduate of the regular programme:
 - Is able to independently design experiments including the corresponding controls, conducting and evaluating these within a given period of time;
 - is able to incorporate the obtained results and conclusions within the framework of the results of other scientists;
 - is able to form a view on the development of scientific research in the field of study;
 - is able to quantitatively and qualitatively analyse chemical processes, to incorporate data in existing or in new models, and to present the results at various levels of abstraction;
 - has insight in the role of chemistry in a sustainable society.

Chapter 3. Admission to the programme

Article 3.1 – Entry requirements

1. Students who have successfully completed the following degrees may be admitted:
 - the Bachelor's degree in *Scheikunde* (Chemistry), awarded by a Dutch University;
 - the Bachelor's degree in Pharmaceutical Sciences / Pharmacochemistry, awarded by the VU University Amsterdam;
 - the Bachelor's Degree in *Beta-gamma met een Scheikunde major* (Liberal Arts and Sciences with a Chemistry Major), awarded by the University of Amsterdam;
 - the Bachelor's degree in Bio-Exact *met een Scheikunde major* (Bio-Exact with a Chemistry Major), awarded by the University of Amsterdam;
 - the bachelor's degree in Science, Business and Innovation, awarded by the VU University Amsterdam, provided that the Examinations Board is of the opinion that/decides that this degree meets the entry requirements. (Deficiencies may be repaired before the start of the Master's program or by taking specified courses as part of the elective program of the student. See art. 3.1.4 and 3.2);
 - the HLO bachelor's degree Scheikunde (Chemistry), provided that the Examinations Board decides that this degree meets the entry requirements. (Deficiencies may be repaired before the start of the Master's program or by taking specified courses as part of the elective program of the student. See art. 3.1.4 and 3.2).
2. Without prejudice to the provisions of paragraph 1, the Examinations Board may grant admission to the study programme when concluding, that the previous education of the candidate is equivalent to the Bachelor's degree referred to in paragraph 1.
3. Without prejudice to the provisions of paragraphs 1 and 2 the Examinations Board may grant admission to a student whose previous education does not meet aforementioned requirements for admission to the study programme, when concluding that the candidate is able to meet the admission requirements within a reasonable period of time. At the request of a candidate, and when the Examinations Board has decided additional education feasible, the Examinations Board may draw up a Pre-Master's programme of maximum 30 EC as an admission requirement. After completion of this Pre-Master's programme a letter of admission will be issued, exclusively for the stated Master's programme (and track).
4. When the Admission Board decides that the additional required education for a candidate is for not more than 12 EC, direct admission to the master program can be granted. In this case the additional courses to be taken by the candidate will be part of the elective program of the student.
5. When the programme commences, the student must have fully completed the Bachelor's or pre-master programme allowing admission to this programme.

Article 3.2 – Pre-master's programme (only applicable for the track Analytical Sciences)

1. In addition to Article 3.1.3 the Examinations Board may draw up a Pre-master's programme of maximum 30 EC.
2. The Pre-master's programme consists of the components:
 - Structure and properties of molecules (6 EC)
 - Thermodynamics and kinetics (6 EC)

- Mathematics (6 EC)
- Organic Chemistry (3 EC)
- Academic Skills (9-12 EC)

Article 3.3 – Restrictions on the number of students admitted to the Master’s programme

Not applicable

Article 3.4 – Intake dates

A request for admission to the programme must be submitted to the Faculty and Master’s programme before 1 June in the case of EU students (including Dutch students) and before 1 March in the case of non EU/EEA students.

Article 3.5 – English Language Requirements

1. The proficiency requirement in English as the language of instruction can be met by the successful completion of the following examinations or an equivalent:

- IELTS: 6.5
- TOEFL paper based test: 580
- TOEFL internet based test: 92-93
- TOEFL computer based test: 237
- Cambridge Advanced English: A, B or C

Please note that the TOEFL-code for the Faculty is 7947.

2. Students possessing a Bachelor’s degree from a Dutch university satisfy the requirement of sufficient command of the English language.

Article 3.6 – Free curriculum

1. Subject to certain conditions, the student has the option of compiling a curriculum of his/her own choice which deviates from the curricula mentioned in article 4.1 of these Regulations. The concrete details of such a curriculum require permission of the Examinations Board.

2. In order to be considered for a degree of this programme, at least one half of the proposed curriculum has to consist of components of the regular study programme.

Chapter 4. Content and organisation of the programme

Article 4.1 – Organisation of the programme

1. The programme consists of the following components:

- a. compulsory units of study
- b. practical exercise
- c. electives

A complete list of courses provided by the Master’s programme can be found in Appendix 1. Every component will be tested. Within the Master’s programme different types of testing and different types of teaching methods are used. These are described per component in the Course Catalogue.

2. Regarding the profiles:

A profile consists of 60 EC. It has to be combined with a research programme, comprising at least 60 EC (courses, research project and literature review), and with the general compulsory components in order to meet the general requirements of the programme.

Regarding the Education profile:

Students who have completed an Educatieve Minor of 30 EC during their Bachelor's programme may submit a non-standard study programme for approval to the Examinations Board, after discussing this non-standard study programme with the coordinator of the Education profile and the coordinator of the Master's programme.

Article 4.2 – Compulsory components

The programme includes compulsory components with a maximum study load of 24 EC (18 in the E-C-S profiles). The contents and format of the compulsory components of the various programmes are further described in the Course Catalogue, stating the necessary entry requirements for successful participation in the component.

MSc Chemistry, Communication Variant

Educational component	Subject code	Number of credits	Period or semester	Teaching method	Examination format	Level
Qualitative and Quantitative Research Methods	AM_470582	6	1	h, w	t, o	400
Science and Communication	AM_470587	6	1	h, w	t, o	500
Internship Communication Specialisation	AM_471148	30	1,2,3,4,5,6	-	-	600
Literature thesis and Coll. Chem. C-var	X_432578	6	1,2,3,4,5,6	-	-	600
Master Research Project Chem. C-var	X_432586	36	1,2,3,4,5,6	pro	-	600

MSc Chemistry, Education Variant

Educational component	Subject code	Number of credits	Period or semester	Teaching method	Examination format	Level
Leraar voorbereidend hoger onderwijs in Scheikunde	OM1_LSK11	60	1,2,3,4,5,6	h,w, pr	-	500
Literature thesis and Coll. Chem. E-var	X_432579	6	1,2,3,4,5,6	-	-	600
Master Research Project Chemistry - Education Variant	X_432587	36	1,2,3,4,5,6	pro	-	600

MSc Chemistry, Research Variant AS

Educational component	Subject code	Number of credits	Period or semester	Teaching method	Examination format	Level
Separation Sciences	X_435609	6	1	h, pra	t, pres	400
Mass Spectrometry	X_435604	6	2	-	t	-
Fundamentals of Analytical Sciences	X_435059	6	4	h, w	t	400
(Bio)Molecular Spectroscopy	X_435062	6	5	h, pra	t	400
Literature thesis and Coll. Chem. BAS	X_432581	12	1,2,3,4,5,6	-	v, pres	600

MSc Chemistry, Research Variant MDSC

Educational component	Subject code	Number of credits	Period or semester	Teaching method	Examination format	Level
Literature thesis and Coll. Chem. OC	X_432583	12	1,2,3,4,5,6	-	v, pres	600

MSc Chemistry, Research Variant Molecular Simulation & Photonics

Educational component	Subject code	Number of credits	Period or semester	Teaching method	Examination format	Level
Lasers and Quantum Optics	X_422539	6	1	h	t	400
Quantum Theory of Molecules and Matter	X_428517	6	1	-	-	400
Statistical Theory of Complex Molecular Systems	X_428520	6	1	-	-	400

MSc Chemistry, Society Oriented Variant for Natural and Life Sciences

Educational component	Subject code	Number of credits	Period or semester	Teaching method	Examination format	Level
Analysis of Governmental Policy Communication, Organization and Management	AM_470571	6	1	h, w	t, v, pres	500
Internship Societal Specialisation	AM_470572	6	2	h, w	t, v	500
AM_471147	30	1,2,3,4,5,6	-	-	-	600
Literature thesis and Coll. Chem. M-var	X_432580	6	1,2,3,4,5,6	-	-	600
Master Research Project Chemistry - Society Oriented Variant	X_432588	36	1,2,3,4,5,6	pro	-	600

MSc Chemistry, Specialization Science for Energy and Sustainability

Educational component	Subject code	Number of credits	Period or semester	Teaching method	Examination format	Level
Current Sustainable Energy Technologies	X_422582	6	3	h, w	v, pres	500
Project Sustainable Future	X_432784	6	6	h, w	t, v, pres, o	500
Literature Thesis SES	X_432785	12	1,2,3,4,5,6	-	v, pres	600
Research project SES	X_432786	48	1,2,3,4,5,6	pro	-	600

MSc Physics, Specialization Science, Business & Innovation

Educational component	Subject code	Number of credits	Period or semester	Teaching method	Examination format	Level
Expertise and coördination in Knowledge Intensive Firms	X_432738	6	1	w	t	400
Management of Sustainable Innovation Networked Organizations and Communication	X_432739	6	2	h	t, o	400
S_NOC	6	2	h, w	t, v, pres	-	
Transdisciplinarity and Transition	X_430604	6	2	h	t, v, o	400
SBI Project & Master Thesis	X_432735	36	1,2,3,4,5,6	pro	-	600
Science project	X_422591	24	1,2,3,4,5,6	pro	v, pres	-

Article 4.3 – Practical components

1. In addition to, or instead of, classes in the form of lectures, the elements of the master's programme can include a practical component as defined in article 1.2 of part A. The VU Course Catalogue contains information on the types of classes in each part of the programme. Attendance during practical components is mandatory .
2. When performing practical components, students must adhere to the faculty's safety regulations.

- The programme consists of research-related components with a study load of at least 42 EC (36 in the E-C-S profiles). The research-related components always include the compulsory components:
 - a research assignment with a study load of at least 36 EC (30 in the E-C-S profiles);
 - a final report and a scientific presentation with a study load of 6 EC.

Article 4.4 – Elective components

- Students choose components in the field of the discipline according to the rules stated in the Course Catalogue.
- Students may make a choice out of components in the field of the discipline included in the Course Catalogue, and out of components offered by another Dutch or foreign university. These components should be of a comparable level according to the Examinations Board.
- A free elective component will only be seen as part of the programme if the Examinations Board has given its prior approval.

MSc Chemistry, Communication Variant

Optional Courses Communication Variant (18 credits required)

Educational component	Subject code	Number of credits	Period or semester	Teaching method	Examination format	Level
Communication, Organization and Management	AM_470572	6	2	h, w	t, v	500
Science in Dialogue	AM_1002	6	2	h, w	t, v, o	500
Science Journalism	AM_471014	6	2	h, w	t, o	500
Science Museology	AM_470590	6	3	h, w	t, pres, o	500

MSc Chemistry, Excellence Programme - Sustainability: the Molecular Approach

Compulsory Courses (choose 3 of 7) (18 credits required)

Educational component	Subject code	Number of credits	Period or semester	Teaching method	Examination format	Level
Physical-Organic Chemistry	X_435663	6	1	h, pra	v, pres, o	400
Quantum Theory of Molecules and Matter	X_428517	6	1	-	-	400
Statistical Theory of Complex Molecular Systems	X_428520	6	1	-	-	400
Synthetic Organic Chemistry	X_435665	6	4	-	-	500
(Bio)Molecular Spectroscopy	X_435062	6	5	h, pra	t	400
Homogeneous Catalysis	X_435668	6	5	-	-	400
Molecular Computational Chemistry	X_435666	6	5	h, pra	pres	400

Optional Courses (choose 6) (36 credits required)

Educational component	Subject code	Number of credits	Period or semester	Teaching method	Examination format	Level
Physical-Organic Chemistry	X_435663	6	1	h, pra	v, pres, o	400
Quantum Theory of Molecules and Matter	X_428517	6	1	-	-	400
Statistical Theory of Complex Molecular Systems	X_428520	6	1	-	-	400
Supramolecular Chemistry and	X_435653	6	1	-	-	400

Nanomaterials

Bio-Organic Chemistry	X_435669	6	2	h, w	t, o	400
Mass Spectrometry	X_435604	6	2	-	t	-
Scientific Computing and Programming	X_435076	6	2	h	o	500
Understanding Quantum Chemistry	X_422557	6	2	h, pra	t, v	400
Nuclear Magnetic Resonance	X_435667	6	4	-	t	500
Relativistic Quantum Chemistry	X_435113	6	4	h	t	500
Synthetic Organic Chemistry	X_435665	6	4	-	-	500
Electrochemistry and Bioelectrochemistry	X_432798	6	4,5,6	-	-	-
Modern Quantum Chemistry	X_432807	6	4,5,6	-	-	-
(Bio)Molecular Spectroscopy	X_435062	6	5	h, pra	t	400
Ab Initio Molecular Dynamics	X_435635	6	5	-	-	500
Homogeneous Catalysis	X_435668	6	5	-	-	400
Molecular Computational Chemistry	X_435666	6	5	h, pra	pres	400
Advanced Molecular Quantum Chemistry	X_432663	6	1,2,3,4,5,6	-	t	500
Applied Theoretical Chemistry	X_435612	6	1,2,3,4,5,6	h, pro	v	500
Catalytic Surface Science	X_432797	6	1,2,3,4,5,6	-	-	-
Density Functional Theory for Chemists	X_435111	6	1,2,3,4,5,6	-	t	500
Molecular Photodynamics	X_432702	6	1,2,3,4,5,6	-	-	500
Organometallic Chemistry and Homogenous Catalysis	X_432808	6	1,2,3,4,5,6	-	-	-
Photochemistry	X_432810	6	1,2,3,4,5,6	-	-	-
Vibrational Spectroscopy	X_432811	6	1,2,3,4,5,6	-	-	-
Solid State NMR	X_432809	6	2	-	-	500

Literature Study and Research Proposal (12 credits required)

Educational component	Subject code	Number of credits	Period or semester	Teaching method	Examination format	Level
Literature Study and Research Proposal Chemistry - AS - MSP	X_432800	12	1,2,3,4,5,6	-	-	-
Literature Study and Research Proposal Chemistry, MDSC - AS	X_432801	12	1,2,3,4,5,6	-	-	-
Literature Study and Research Proposal Chemistry, MDSC - MSP	X_432802	12	1,2,3,4,5,6	-	-	-

Major Research Project (42 credits required)

Educational component	Subject code	Number of credits	Period or semester	Teaching method	Examination format	Level
Major research project chemistry, AS - MSP	X_432803	42	1,2,3,4,5,6	pro	-	-
Major research project chemistry, MDSC - AS	X_432804	42	1,2,3,4,5,6	pro	-	-
Major research project chemistry, MDSC - MSP	X_432805	42	1,2,3,4,5,6	pro	-	-

Minor research project (choose 2) (12 credits required)

Educational component	Subject code	Number of credits	Period or semester	Teaching method	Examination format	Level
Minor research project Analytical Sciences (VU / UvA)	X_437031	6	1,2,3,4,5,6	pro	-	-
Minor research project Biological Chemistry (Leiden)	X_437032	6	1,2,3,4,5,6	pro	-	-
Minor research project Design and Synthesis (Leiden)	X_437033	6	1,2,3,4,5,6	pro	-	-
Minor research project Molecular Design, Synthesis and Catalysis (VU / UvA)	X_437034	6	1,2,3,4,5,6	pro	-	-
Minor research project Molecular Simulation and Photonics (VU / UvA)	X_437035	6	1,2,3,4,5,6	pro	-	-
Minor research project Physical and Theoretical Chemistry (Leiden)	X_437036	6	1,2,3,4,5,6	pro	-	-

MSc Chemistry, Research Variant AS**Optional Courses** (36 credits required)

Educational component	Subject code	Number of credits	Period or semester	Teaching method	Examination format	Level
Bio-analysis & Clinical Diagnostics	X_432765	6	1	h, pra	v, pres	400
Environmental Chemistry	X_437004	6	1	-	-	400
Chemical Analysis for Forensic Evidence	X_437003	6	2	-	-	500
High-Throughput Screening	X_435047	6	2	h, demo	t, v, pres	500
Advanced Separation Sciences	tba	6	3	pra	t	400
Biosystems Data Analysis	X_437001	6	3	-	-	400
Capillary electrophoresis	X_437002	6	3	-	-	400
Nuclear Magnetic Resonance	X_435667	6	4	-	t	500
Omics-procedures in molecular clinical Diagnostics	X_432766	6	5	h, pro	-	400
Protein Analysis	X_435045	6	5	h, pra	t	500
The analytical Chemist in Industry	X_437005	6	5	-	-	400
Advanced Spectroscopy	X_432767	6	6	h, w	t, v, pres	500
Minor Research Project Chemistry BAS	X_432649	18	1,2,3,4,5,6	pro	-	500
Minor Research Project Chemistry BAS	X_432650	24	1,2,3,4,5,6	pro	-	500
Minor Research Project Chemistry BAS	X_432651	30	1,2,3,4,5,6	pro	-	500
Minor Research Project Chemistry OC	X_432640	18	1,2,3,4,5,6	pro	v, pres, o	500
Minor Research Project Chemistry OC	X_432641	24	1,2,3,4,5,6	pro	v, pres, o	500
Minor Research Project Chemistry OC	X_432642	30	1,2,3,4,5,6	pro	prac	500
Minor Research Project Chemistry TC	X_432646	18	1,2,3,4,5,6	pro	v	500
Minor Research Project Chemistry TC	X_432647	24	1,2,3,4,5,6	pro	v	500
Minor Research Project Chemistry TC	X_432648	30	1,2,3,4,5,6	pro	v	500
Stage Biomolecular Analysis and Spectroscopy	X_432523	18	1,2,3,4,5,6	-	-	500
Stage Biomolecular Analysis and Spectroscopy	X_432524	24	1,2,3,4,5,6	-	-	500
Stage Biomolecular Analysis and Spectroscopy	X_432525	30	1,2,3,4,5,6	-	-	500

Stage Organic Chemistry	X_432529	18	1,2,3,4,5,6	-	v, pres, o	500
Stage Organic Chemistry	X_432530	24	1,2,3,4,5,6	-	v, pres, o	500
Stage Organic Chemistry	X_432531	30	1,2,3,4,5,6	-	v, pres, o	500
Stage Theoretical Chemistry	X_432532	18	1,2,3,4,5,6	-	v, pres, o	500
Stage Theoretical Chemistry	X_432533	24	1,2,3,4,5,6	-	v, pres, o	500
Stage Theoretical Chemistry	X_432534	30	1,2,3,4,5,6	-	v, pres, o	500

Compulsory Choice Ethics and portfolio academic skills (6 credits required)

Educational component	Subject code	Number of credits	Period or semester	Teaching method	Examination format	Level
Managing Science and Technology in Society	AM_470586	6	1	h, w	t, v, pro	600
Qualitative and Quantitative Research Methods	AM_470582	6	1	h, w	t, o	400
Science and Communication	AM_470587	6	1	h, w	t, o	500
Business and Innovation in Life Science	X_432539	3	1,3	h	t, v, pres	400
Business Management in Health and Life Sciences	AM_470584	6	2	h	t, v	500
Communication, Organization and Management	AM_470572	6	2	h, w	t, v	500
Entrepreneurship in Health and Life Sciences	AM_470575	6	2	h, w	t, o	500
Science in Dialogue	AM_1002	6	2	h, w	t, v, o	500
Science Journalism	AM_471014	6	2	h, w	t, o	500
Tutoring Students	X_432625	3	2	h	v	400
English Academic Course	X_437028	3	2,3,5,6	-	-	400
Scientific Writing in English	X_400592	3	2,6	h	o	400
Clinical development and clinical trials	AM_470585	6	3	h, w	t	500
Ethics in Life Sciences	AM_470707	3	3	h, w	t, pres	400
Science in Perspective	X_437030	6	4,5	-	-	400
Science and Society in Historical Perspective	X_400424	6	5	h	t, v, pres	-
Wetenschapscommunicatie voor Bèta-onderzoekers	AB_470185	6	5	h, w	t	-
Survival Guide for Scientists	X_428523	3	6	-	-	400
Ethics and Academic Skills	X_437556	6	1,2,3,4,5,6	-	-	400
Ethics and Academic Skills	X_432517	3	1,2,3,4,5,6	-	-	400
Ethics and Academic skills	X_432725	1	1,2,3,4,5,6	-	-	400
Ethics and Academic skills	X_432726	2	1,2,3,4,5,6	-	-	400
Ethics in Public Health	AM_470805	3	1,2,3,4,5,6	h, w	v	-
Teaching Assistant	X_432741	3	1,2,3,4,5,6	-	-	400
Teaching Assistant	X_432742	6	1,2,3,4,5,6	-	-	400

Research Project (42 credits required)

Educational component	Subject code	Number of credits	Period or semester	Teaching method	Examination format	Level
Master Research Project Biomol. Analysis and Spectr. ext	X_432637	12	1,2,3,4,5,6	pro	-	600

Master Research Project Biomol. Analysis and Spectr. ext	X_432680	6	1,2,3,4,5,6	pro	-	600
Master Research Project Chem. BAS	X_432594	42	1,2,3,4,5,6	pro	-	600
Master Research Project Chem. BAS - Ext	X_432595	18	1,2,3,4,5,6	pro	-	600

Deficiency Courses (0 credits required)

Educational component	Subject code	Number of credits	Period or semester	Teaching method	Examination format	Level
Organische Chemie voor HLO AS	X_437587	3	1	-	-	-
Mathematics for HLO bachelors	X_432806	6	1,2	-	-	-
Thermodynamica voor HLO	X_430600	3	2,3	-	-	-

MSc Chemistry, Research Variant MDSC

Deficiency Courses (0 credits required)

Educational component	Subject code	Number of credits	Period or semester	Teaching method	Examination format	Level
Anorganische chemie voor HLO-instituut	X_430520	3	2	h, w	t	400
Thermodynamica voor HLO	X_430600	3	2,3	-	-	-
Wiskunde voor HLO-instituut	X_430560	3	2,3	-	-	400
Organische chemie voor HLO-instituut	X_430519	3	3	h, w	t	400

Compulsory Choice (24 credits required)

Educational component	Subject code	Number of credits	Period or semester	Teaching method	Examination format	Level
Supramolecular Chemistry and Nanomaterials	X_435653	6	1	-	-	400
Physical-Organic Chemistry	X_435663	6	1	h, pra	v, pres, o	400
Coordination and Organometallic Chemistry	X_435664	6	2	-	-	400
Bio-Organic Chemistry	X_435669	6	2	h, w	t, o	400
Synthetic Organic Chemistry	X_435665	6	4	-	-	500
Nuclear Magnetic Resonance	X_435667	6	4	-	t	500
Molecular Computational Chemistry	X_435666	6	5	h, pra	pres	400
Homogeneous Catalysis	X_435668	6	5	-	-	400
Heterogeneous Catalysis	X_428013	6	3	-	-	-

Compulsory Choice Ethics and portfolio academic skills (6 credits required)

Educational component	Subject code	Number of credits	Period or semester	Teaching method	Examination format	Level
Managing Science and Technology in Society	AM_470586	6	1	h, w	t, v, pro	600
Qualitative and Quantitative Research Methods	AM_470582	6	1	h, w	t, o	400
Science and Communication	AM_470587	6	1	h, w	t, o	500
Business and Innovation in Life Science	X_432539	3	1,3	h	t, v, pres	400
Business Management in Health and Life Sciences	AM_470584	6	2	h	t, v	500
Communication, Organization and	AM_470572	6	2	h, w	t, v	500

Management

Entrepreneurship in Health and Life Sciences	AM_470575	6	2	h, w	t, o	500
Science in Dialogue	AM_1002	6	2	h, w	t, v, o	500
Science Journalism	AM_471014	6	2	h, w	t, o	500
Tutoring Students	X_432625	3	2	h	v	400
Scientific Writing in English	X_400592	3	2,6	h	o	400
English Academic Course	X_437028	3	2,3,5,6	-	-	400
Clinical development and clinical trials	AM_470585	6	3	h, w	t	500
Ethics in Life Sciences	AM_470707	3	3	h, w	t, pres	400
Science in Perspective	X_437030	6	4,5	-	-	400
Survival Guide for Scientists	X_428523	3	6	-	-	400
Ethics and Academic Skills	X_437556	6	1,2,3,4,5,6	-	-	400
Ethics and Academic Skills	X_432517	3	1,2,3,4,5,6	-	-	400
Ethics and Academic skills	X_432725	1	1,2,3,4,5,6	-	-	400
Ethics and Academic skills	X_432726	2	1,2,3,4,5,6	-	-	400
Ethics in Public Health	AM_470805	3	1,2,3,4,5,6	h, w	v	-
Teaching Assistant	X_432741	3	1,2,3,4,5,6	-	-	400
Teaching Assistant	X_432742	6	1,2,3,4,5,6	-	-	400

Research Project (42 credits required)

Educational component	Subject code	Number of credits	Period or semester	Teaching method	Examination format	Level
Master Research Project Chemistry - Organic Chemistry	X_432598	42	1,2,3,4,5,6	pro	v, pres, o	600
Master Research Project Chemistry - Organic Chemistry - Extension	X_432599	18	1,2,3,4,5,6	pro	v, pres, o	600
Master Research Project Chemistry - Organic Chemistry - Extension	X_432685	12	1,2,3,4,5,6	pro	-	600
Master Research Project Organic Chemistry ext	X_432618	6	1,2,3,4,5,6	pro	-	600

Recommended electives (12 credits)

Educational component	Subject code	Number of credits	Period or semester	Teaching method	Examination format	Level
Bio-analysis & Clinical Diagnostics	X_432765	6	1	h, pra	v, pres	400
Environmental Chemistry	X_437004	6	1	-	-	400
Chemical Analysis for Forensic Evidence	X_437003	6	2	-	-	500
High-Throughput Screening	X_435047	6	2	h	t, v, pres	500
Biosystems Data Analysis	X_437001	6	3	-	-	400
Capillary electrophoresis	X_437002	6	3	-	-	400
Omics-procedures in molecular clinical Diagnostics	X_432766	6	5	h, pro	-	400
Protein Analysis	X_435045	6	5	h, pra	t	500
The analytical Chemist in Industry	X_437005	6	5	-	-	400
Advanced Spectroscopy	X_432767	6	6	h, w	t, v, pres	500
Minor Research Project Chemistry BAS	X_432649	18	1,2,3,4,5,6	pro	-	500

Minor Research Project Chemistry BAS	X_432650	24	1,2,3,4,5,6	pro	-	500
Minor Research Project Chemistry BAS	X_432651	30	1,2,3,4,5,6	pro	-	500
Minor Research Project Chemistry OC	X_432640	18	1,2,3,4,5,6	pro	v, pres, o	500
Minor Research Project Chemistry OC	X_432641	24	1,2,3,4,5,6	pro	v, pres, o	500
Minor Research Project Chemistry OC	X_432642	30	1,2,3,4,5,6	pro	prac	500
Minor Research Project Chemistry TC	X_432646	18	1,2,3,4,5,6	pro	v	500
Minor Research Project Chemistry TC	X_432647	24	1,2,3,4,5,6	pro	v	500
Minor Research Project Chemistry TC	X_432648	30	1,2,3,4,5,6	pro	v	500
Stage Biomolecular Analysis and Spectroscopy	X_432523	18	1,2,3,4,5,6	-	-	500
Stage Biomolecular Analysis and Spectroscopy	X_432524	24	1,2,3,4,5,6	-	-	500
Stage Biomolecular Analysis and Spectroscopy	X_432525	30	1,2,3,4,5,6	-	-	500
Stage Organic Chemistry	X_432529	18	1,2,3,4,5,6	-	v, pres, o	500
Stage Organic Chemistry	X_432530	24	1,2,3,4,5,6	-	v, pres, o	500
Stage Organic Chemistry	X_432531	30	1,2,3,4,5,6	-	v, pres, o	500
Stage Theoretical Chemistry	X_432532	18	1,2,3,4,5,6	-	v, pres, o	500
Stage Theoretical Chemistry	X_432533	24	1,2,3,4,5,6	-	v, pres, o	500
Stage Theoretical Chemistry	X_432534	30	1,2,3,4,5,6	-	v, pres, o	500

MSc Chemistry, Research Variant Molecular Simulation & Photonics

Compulsory Choice Ethics and portfolio academic skills (6 credits required)

Educational component	Subject code	Number of credits	Period or semester	Teaching method	Examination format	Level
Managing Science and Technology in Society	AM_470586	6	1	h, w	t, v, pro	600
Qualitative and Quantitative Research Methods	AM_470582	6	1	h, w	t, o	400
Science and Communication	AM_470587	6	1	h, w	t, o	500
Business and Innovation in Life Science	X_432539	3	1,3	h	t, v, pres	400
Business Management in Health and Life Sciences	AM_470584	6	2	h	t, v	500
Communication, Organization and Management	AM_470572	6	2	h, w	t, v	500
Entrepreneurship in Health and Life Sciences	AM_470575	6	2	h, w	t, o	500
Science in Dialogue	AM_1002	6	2	h, w	t, v, o	500
Science Journalism	AM_471014	6	2	h, w	t, o	500
Tutoring Students	X_432625	3	2	h	v	400
Scientific Writing in English	X_400592	3	2,6	h	o	400
English Academic Course	X_437028	3	2,3,5,6	-	-	400
Clinical development and clinical trials	AM_470585	6	3	h, w	t	500
Ethics in Life Sciences	AM_470707	3	3	h, w	t, pres	400
Science in Perspective	X_437030	6	4,5	-	-	400
Survival Guide for Scientists	X_428523	3	6	-	-	400
Ethics and Academic Skills	X_432517	3	1,2,3,4,5,6	-	-	400
Ethics and Academic skills	X_432725	1	1,2,3,4,5,6	-	-	400

Ethics and Academic skills	X_432726	2	1,2,3,4,5,6	-	-	400
Ethics and Academic Skills	X_437556	6	1,2,3,4,5,6	-	-	400
Ethics in Public Health	AM_470805	3	1,2,3,4,5,6	h, w	v	-
Teaching Assistant	X_432741	3	1,2,3,4,5,6	-	-	400
Teaching Assistant	X_432742	6	1,2,3,4,5,6	-	-	400

Literature Thesis and Colloquium (12 credits required)

Educational component	Subject code	Number of credits	Period or semester	Teaching method	Examination format	Level
Literature thesis and Coll. Chem. PC	X_432582	12	1,2,3,4,5,6	-	-	600
Literature thesis and Coll. Chem. TC	X_432584	12	1,2,3,4,5,6	-	-	600
Literature thesis and Colloquium Chemistry Molecular Simulation and Photonics	X_432679	12	1,2,3,4,5,6	-	-	600

Research Project (42 credits required)

Educational component	Subject code	Number of credits	Period or semester	Teaching method	Examination format	Level
Master Research Project Chemistry - Molecular Simulation and Photonics	X_432681	42	1,2,3,4,5,6	pro	-	600
Master Research Project Chemistry - Molecular Simulation and Photonics - Extension	X_432682	6	1,2,3,4,5,6	pro	-	600
Master Research Project Chemistry - Molecular Simulation and Photonics - Extension	X_432683	12	1,2,3,4,5,6	pro	-	600
Master Research Project Chemistry - Molecular Simulation and Photonics - Extension	X_432684	18	1,2,3,4,5,6	pro	-	600

Optional Courses (choose 2 of 4) (12 credits required)

Educational component	Subject code	Number of credits	Period or semester	Teaching method	Examination format	Level
Understanding Quantum Chemistry	X_422557	6	2	h, pra	t, v	400
Understanding Molecular Simulation	X_432703	6	3	-	-	400
Ultrafast Laser Physics	X_422556	6	5	h	t	400
Advanced Experimental Techniques	X_432662	6	1,2,3,4,5,6	h	-	-

Recommended electives (30 credits)

Educational component	Subject code	Number of credits	Period or semester	Teaching method	Examination format	Level
Supramolecular Chemistry and Nanomaterials	X_435653	6	1	-	-	400
Scientific Computing and Programming	X_435076	6	2	h	o	500
Biomolecular Simulations	X_437019	6	4	-	-	500
Relativistic Quantum Chemistry	X_435113	6	4	h	t	500
Numerical Techniques	X_420082	0	4,5	-	-	400
Transport Phenomena	X_420075	6	4,5	-	-	500
Ab Initio Molecular Dynamics	X_435635	6	5	-	-	500

Advanced Molecular Quantum Chemistry	X_432663	6	1,2,3,4,5,6	-	t	500
Applied Theoretical Chemistry	X_432501	12	1,2,3,4,5,6	h, pro	v	500
Applied Theoretical Chemistry	X_435612	6	1,2,3,4,5,6	h, pro	v	500
Density Functional Theory for Chemists	X_435111	6	1,2,3,4,5,6	-	t	500
Density Functional Theory for Chemists	X_435112	12	1,2,3,4,5,6	-	t	500
Molecular Photodynamics	X_432701	3	1,2,3,4,5,6	-	-	500
Molecular Photodynamics	X_432702	6	1,2,3,4,5,6	-	-	500

MSc Chemistry, Society Oriented Variant for Natural and Life Sciences

Optional Courses (18 credits required)

Educational component	Subject code	Number of credits	Period or semester	Teaching method	Examination format	Level
Clinical development and clinical trials	AM_470585	6	3	h, w	t	500
Entrepreneurship in Health and Life Sciences	AM_470575	6	2	h, w	t, o	500
Qualitative and Quantitative Research Methods	AM_470582	6	1	h, w	t, o	400
Business Management in Health and Life Sciences	AM_470584	6	2	h	t, v	500
Disability and Development	AM_470588	6	2	h, w	t, v	500
Policy, Politics and Participation	AM_470589	6	2	h, w	v, pres	500
Science Museology	AM_470590	6	3	h, w	t, pres, o	500
Health, Globalisation and Human Rights	AM_470818	6	2	h, w	t, o	500

MSc Chemistry, Specialization Science for Energy and Sustainability

Compulsory Choice (at least 24 credits)

Educational component	Subject code	Number of credits	Period or semester	Teaching method	Examination format	Level
Big Issues in Energy Materials	X_422535	3	1	h	v, pres	400
BioSolar Cells	X_428531	6	1	h	pres, o	400
Environmental Chemistry	X_437004	6	1	-	-	400
Green Chemistry	X_430557	6	1	h	t, v, o	300
Management of Sustainable Innovation	X_432739	6	2	h	t, o	400
Photovoltaics	X_428516	6	2	-	-	400
Heterogeneous Catalysis	X_428013	6	3	-	-	-
Catalysis for sustainable energy	X_437027	6	4	-	-	500
Homogeneous Catalysis	X_435668	6	5	-	-	400
Photosynthesis and Energy	X_422553	6	5	h	v, pres	500

Compulsory Choice Ethics and portfolio academic skills

Educational component	Subject code	Number of credits	Period or semester	Teaching method	Examination format	Level
Managing Science and Technology in Society	AM_470586	6	1	h, w	t, v, pro	600
Qualitative and Quantitative Research Methods	AM_470582	6	1	h, w	t, o	400
Science and Communication	AM_470587	6	1	h, w	t, o	500

Communication, Organization and Management	AM_470572	6	2	h, w	t, v	500
Science in Dialogue	AM_1002	6	2	h, w	t, v, o	500
Tutoring Students	X_432625	3	2	h	v	400
English Academic Course	X_437028	3	2,3,5,6	-	-	400
Scientific Writing in English	X_400592	3	2,6	h	o	400
Science in Perspective	X_437030	6	4,5	-	-	400
Survival Guide for Scientists	X_428523	3	6	-	-	400

MSc Chemistry, Specialization Science, Business & Innovation

Compulsory Choice of 12 credits

Educational component	Subject code	Number of credits	Period or semester	Teaching method	Examination format	Level
Biomedical Modelling and Simulation	X_430112	6	1	h, w	t, pres, o	400
BioSolar Cells	X_428531	6	1	h	pres, o	400
Chemical Biology	X_432538	6	1	h, w	t, pres, o	400
Green Chemistry	X_430557	6	1	h	t, v, o	300
Principles of Pharmaceutical Sciences / Pharmacochimistry	X_435675	6	1	h, pra	t	400
Protein Science	AM_470145	6	1	h, w	t	400
Photovoltaics	X_428516	6	2	-	-	400
Innovation in Medical Technology to Improve the Health Care System	X_430602	6	6	h, w	v, pres	500
Project Sustainable Future	X_432784	6	6	h, w	t, v, pres, o	500

Compulsory Choice 1 out of 2

Educational component	Subject code	Number of credits	Period or semester	Teaching method	Examination format	Level
Business, Innovation and Value Creation in the Life Science Industry	X_432723	6	3	h	t, v, pres	500
Current Sustainable Energy Technologies	X_422582	6	3	h, w	v, pres	500

Recommended Choice

Educational component	Subject code	Number of credits	Period or semester	Teaching method	Examination format	Level
Technology and innovation processes	E_BA_TIP	6	2	-	-	-
Science and Society in Historical Perspective	X_400424	6	5	h	t, v, pres	-

Article 4.5 – Sequence and admission requirements

1. Participation in a course may be restricted to students that have completed certain other programme components. Details of such restrictions will be published in the Course Catalogue.
2. A student can start the Final Research Project only after having completed the compulsory theoretical components of the programme. The coordinator of the student's track can grant exemption of this rule.

3. In exceptional cases, the Examinations Board may, at the student's reasoned request, deviate from the order mentioned in paragraph 1 of this article, with or without stipulating conditions.

Article 4.6 – Participation practical training and tutorials

See Course Catalogue.

Article 4.7 – Exemption

1. At the written request of the student, the Examinations Board may exempt the student from taking one or more examination components, if the student:
 - a. Has passed a component of an academic or higher professional education programme that is equivalent in both content and level;
 - b. Has demonstrated through his/her work and/or professional experience that he/she has sufficient knowledge and skills with regard to the relevant component.
2. This exemption does not apply to the Master's thesis.
3. Exemptions from examinations (or parts thereof), if granted, will be valid for the same period as indicated in article 4.8.
4. A maximum of 30 EC in the programme in case of one-year programmes and 60 EC in the programme in the case of two-year programmes can be accumulated through granted exemptions.

Article 4.8 – Validity period of examinations

See article 4.8 of the Faculty section.

Article 4.9 – Degree

A student who passes the final examination of a programme is awarded a Master of Science degree. The degree awarded is stated on the diploma.

Article 4.10 – Double Master's programme (two-year programmes)

In order to be awarded two Master's degrees or to have stated on the Master's diploma that two Master's programmes have been completed within the discipline, the following requirements must be met:

1. The total programme of the candidate should amount to at least 180 EC.
2. The candidate's work for the programme (lectures, research work, etc.), must be of such a standard that all the compulsory requirements of each of the two programmes have been met.
3. The candidate must have conducted separate research work for both Master's degrees. This may consist of two separate research projects with supervisors from the respective study programmes. In the case of an integrated research project, this must be supervised by two staff members appointed from the two study programmes. Both staff members must assess the work as a pass.
4. The Examinations Boards of both study programmes must approve the student's double Master's programme before the student commences on the double Master's programme.

Article 4.11 – Participation in courses and rules for priority admission

1. Every student must enrol for every course component. To participate in courses, the student must enrol within the period indicated in the Course Catalogue and according to procedures mentioned there. The student may be refused the opportunity to participate if he/she does not enrol or fails to enrol in time.
2. Admission to courses with limited capacity takes place based on previously established and published admission criteria and rules for priority admission, on the understanding that students enrolled in the programme are given priority over others when enrolling for courses in the compulsory part of their programme.

Chapter 5. Transitional and final provisions

Article 5.1 – Amendments

1. The dean shall establish amendments to the part B of these Regulations by independent decision – having heard the board of studies and with due regard for the authority of the relevant advisory bodies
2. Amendments to these regulations take place following a recommendation by the board of studies relating to the regulations in their entirety, and with the endorsement of a joint meeting of those sections which do not relate to the subject of Article 7.13 paragraphs 2a to g, and paragraph 3 of the Act and the admission requirements for Master's programmes
3. Amendments to the part B of these Regulations do not apply to the current academic year unless they can be reasonably assumed not to damage the student's interest.

Article 5.2 – Cancelled programme components

Not applicable

Article 5.3 - Publication

1. The Faculty Board shall ensure a fitting publication of part A and B of these Regulations and the rules and guideline referred to in the Act.
2. These regulations can be accessed at the website of the Faculty.

Article 5.4 – Effective date

Part B of these Regulations shall come into force as of September 1st, 2014

Thus drawn up by the Faculty Board of the Faculty of Sciences on September 19th, 2014