FACULTY OF SCIENCES

EDUCATION AND EXAMINATION REGULATIONS

PART B

Academic year 2015-2016

MASTER'S PROGRAMME CHEMISTRY

Chapter 1. General Provisions

Article 1.1 – Definitions

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

Personal Education Plan	An individual study plan for the student's Master's programme.
Research Project	Compulsory internship-Master's thesis always resulting in a written report

Article 1.2 – General information Master's programme

1. The Master's programme Chemistry, CROHO 66857 is offered on a full-time basis.
2. The programme has a workload of 120 EC.
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, Business & Innovation;
   - Science for Energy and Sustainability.

   In each Master track the student may choose a variant (see Article 4.1).
   - Research
   - Communication
   - Societal
   - Education
4. 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 Plan (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 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 research areas of Chemistry. 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 discipline of chemistry;
   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 discipline of chemistry;
   e. the ability to analyse research results and to draw conclusions therefrom;
   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 knowledge of chemistry 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 others 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 Simulation 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 Molecular Design, Synthesis and Catalysis has obtained the following track-specific qualifications:
   a. a thorough scientific knowledge and understanding of the field of synthesis and catalysis;
   b. a proficiency in analysing and solving problems in the field of synthesis and catalysis;
   c. ability to communicate questions and scientific results in the field of synthesis and catalysis.
6. 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;
7. In addition to paragraph 1, the student who has completed the track Science, Business & Innovation has obtained the following track-specific qualifications:
   a. a thorough knowledge of the specific natural scientific and social scientific aspects of business innovation trajectories in the area of human life and health care (track Life & Health) or in sustainable energy technology (track Energy & Sustainability);
   b. a proficiency in analysing and solving problems with respect to business innovation trajectories in drug development and health diagnostic instruments (track Life & Health) or in sustainable energy technology (track Energy & Sustainability);
   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 natural science- and social science-based solutions that enable business innovation trajectories in drug development and health diagnostic instruments (track Life & Health) or in sustainable energy technology (track Energy & Sustainability);
8. 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 *Farmaceutische wetenschappen* (Pharmaceutical Sciences), awarded by the VU University Amsterdam;
   - the Bachelor's Degree in *Bèta-gamma met een Scheikunde major* (Liberal Arts and Sciences 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's programme 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's programme allowing admission to this programme.

Article 3.2 – Pre-Master's programme

1. In addition to Article 3.1.3 the Examinations Board may draw up a Pre-Master's programme of maximum 30 EC. The Pre-Master's programme will be offered in the first semester.
2. The Pre-Master's programme consists of a selection of the following components:
   - Structure and properties of molecules (6 EC) X_432842
   - Thermodynamics and kinetics (6 EC) X_430600
   - Mathematics (6 EC) X_432806
   - Organic Chemistry (3 EC) X_437587
   - Chemical Bonding (3 EC)
   - Inorganic and Coordination Chemistry (3 EC) X_430520
   - Academic English / Scientific Writing (3 EC) X_437028

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 Master's programme starting in September must be received before June 1st in the case of EU students (including Dutch students) and non-Dutch students with a Dutch degree and before March 1st in the case of non-EU/EEA students. Non-Dutch students with an international degree should apply before April 1st.

For the programme starting in February, applications must be received before November 1st for all students who did not obtain their Bachelor's degree at VU University Amsterdam and before January 31st. Under exceptional circumstances, the Examinations Board may consider a request submitted after this closing date.

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 at least 6 on each sub-score (listening/reading/writing/speaking)
   - TOEFL paper based test: 580
   - TOEFL internet based test: 92
   - TOEFL computer based test: 237
   - Cambridge Certificate in Advanced English (CAE): A, B
   - Cambridge Certificate of Proficiency in English (CPE): A, B, 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.
3. Exemption is granted from the examination in English referred to in the first paragraph to students who:
   - had previous education in secondary or tertiary education in an English-speaking country as listed in the Regulations Application and Admission.
   - have an English language 'international BSc' diploma.

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 curriculum comprises the following:

Study Load in EC	Variant			
Components	**Research**	**Societal**	**Communication**	**Education**
Compulsory courses (per specialization)	24-42*	18	18	18
Research project (per specialization; incl. final report and presentation)	42	36	36	36
Literature study and colloquium	12	6	6	6
S, C or E programme	-	60	60	60
Optional programme, - elective courses - deficiency courses - research project extension	18-36*	-	-	-
Total Study Load	120	120	120	120

*) Depends on the track: Molecular Simulation & Photonics requires 30-42 EC compulsory courses with 18-30 EC optional programme, other tracks require 24 EC compulsory courses with 36 EC optional programme.

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. The student may choose between different variants:
- Research (R)
- Societal (S)
- Communication (C)
- Education (E)

The programme which is specific for the S-C-E variants consists of 60 EC. Students combine this with 60 EC of the research programme (research project, literature study and the general compulsory courses) in order to meet the general requirements of the Master's programme.

Regarding the Education variant:
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 variant and the coordinator of the Master's programme.

Article 4.2 – Compulsory components
The programme includes compulsory components with a study load of 24 EC (18 in the S-C-E variants). The contents and format of the compulsory components of the various tracks are further described in the Course Catalogue, stating the necessary entry requirements for successful participation in the component.

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

Article 4.4 – Elective components

1. Students choose components in the field of the discipline according to the rules stated in the Course Catalogue.
2. 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, that are according to the Examinations Board of a comparable level.
3. Course components successfully completed elsewhere or that are not included in Appendix 1 during the programme may supplement the student's examination programme, subject to prior permission from the Examinations Board.
   a. The courses have to be followed at an accredited university or institute
   b. The course has to be relevant to the Master chosen.
4. In exceptional cases students may choose Bachelor's-level free elective components as part of their programme. The Examinations Board will determine whether a free elective component at the Bachelor's level will be seen as part of the programme and the number of credits that will be allocated to the elective component.
5. In terms of content, elective components must not show too much similarity to other components of the student's curriculum. The acceptable degree of similarity will be decided by the Examinations Board.
6. A free elective component will only be seen as part of the programme if the Examinations Board has given its prior approval.

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.
4. In cases where the result of a component has not been determined within the time periods mentioned in Article 4.4 of part A, this component may not be required as prior knowledge for the subsequent component.

Article 4.6 – Participation practical training and tutorials
Not applicable

Article 4.7 – Exemption

1. At the written request of the student, the Examinations Board may exempt the student form 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 60 EC can be accumulated in the programme through granted exemptions.

Article 4.8 – Validity of examinations
See part A.

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 credits.
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 registration terms indicated on the website/on VUnet 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.

Article 4.12 – Academic skills

1. Academic skills are an integral part of course components (compulsory and elective) of the Master's programme.

2. The student may participate in Academic Skills components as part of the elective courses.

Article 4.13 – Final research project and final report

1. At the end of the final research project and after handing in the final report the responsible lecturer checks on the basis of the assessment form, if the student has sufficiently achieved the set exit qualifications.
2. For the assessment of the final research project and the final report the advice of a second staff member is always obtained.
3. Students, proficient in the Dutch language write a short non-specialist summary in Dutch; students who do not have a sufficient command of the Dutch Language write this summary in English.

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 entirely, 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 dean 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 take effect as of 31 August, 2015.

Recommendations of the Programme Committees, 4 June 2015

Consent granted by the consultation body FSr, 15 July 2015

Thus adopted by the Faculty Board of the Faculty of Sciences on 21 August 2015

Appendix 1 Description of the content and study load of the components

This list comprises the curriculum components of the Chemistry Master's programme tracks in the academic year 2015-2016. The contents of the components are described in the Course Catalogue.

Teaching method: h: lectures; w: tutorials; cp: computer lab; lit: literature study; as: assignment; pra: experimental work
Examination format: t: written exam; o: oral exam; pres: presentation; v: report

Analytical Sciences:

Compulsory components	Subject code	Number of credits	Period or semester	Teaching method	Examination format	Level
(Bio)Molecular Spectroscopy	X_435062	6	5	h, w	t	400
Fundamentals of Analytical Sciences	X_435059	6	4	h, w, cp	t, pres	400
Literature thesis and Colloquium AS	X_432581	12	1-6	-	v, pres	600
Mass Spectrometry	X_435604	6	2	h, w	t	400
Research project AS	X_432594	42	1-6	pra	v, pres	600
Separation Sciences	X_435609	6	1	h, w, lit	t, pres	400
Elective components						
Advanced Separation Sciences	X_432844	3	3	h, w	t	500
Advanced Spectroscopy	X_432767	6	6	h, w	t, v, pres	500
Advanced Statistics for Analytical Chemistry	X_437589	6	1	h, w, cp, as	t, pres	500
Bio-Analysis and Clinical Diagnostics	X_432765	6	1	h, w, as	t, v	500
Chemical Analysis for Forensic Evidence	X_437003	6	2	h, w	t	500
Environmental Chemistry	X_437004	6	1	h, w	t	400
High-Throughput Screening	X_435047	6	2	h, w, as	o, pres, v	500
Nuclear Magnetic Resonance	X_435667	6	4	h, w	t	500
Protein Analysis	X_435045	6	5	h, w, as	t, pres	500
The Analytical Chemist in Industry	X_437005	6	5	h, w, as	v, pres	400
Research Project AS Extension 6 EC	X_432680	6	1-6	pra	-	600
Research Project AS Extension 12 EC	X_432637	12	1-6	pra	-	600
Research Project AS Extension 18 EC	X_432595	18	1-6	pra	-	600

ATOSIM:

Compulsory components	Subject code	Number of credits	Period or semester	Teaching method	Examination format	Level
Quantum Theory of Molecules and Matter	X_428517	6	1	h, cp	v	400
Scientific Programming	52548SCP6Y	6	2	h, cp	v	400
Statistical Theory of Complex Molecular Systems	X_428520	6	1	h, w	t	400
Understanding Molecular Simulation	X_432703	6	3	h, cp, as	t, v	400
Understanding Quantum Chemistry	X_422557	6	2	h, pra	t, v	400

Components Rome and Lyon[a]	-	30	1-6	-	-	500
Elective components						
Applied Theoretical Chemistry	X_435612	6	4	cp	v	500
Density Functional Theory for Chemists	X_435111	6	4	lit	o	500
Relativistic Quantum Chemistry	X_435113	6	4	-	t	500
Transport Phenomena	X_420075	6	4,5	h	o	500
Components Rome and Lyon[a]	-	18	1-6	-	-	500

[a] Rome: La Sapienza University, Rome, Italy; Lyon: École Normale Supérieure Lyon, France.

Molecular Design, Synthesis and Catalysis:

Constrained choice components	Subject code	Number of credits	Period or semester	Teaching method	Examination format	Level
Bio-Organic Chemistry	X_435669	6	2	h	t	400
Coordination and Organometallic Chemistry	X_435664	6	2	h	t	400
Heterogeneous Catalysis	X_428013	6	3	h, w, pra	t	400
Homogeneous Catalysis	X_435668	6	5	-	t	400
Literature thesis and Colloquium OC (compulsory)	X_432583	12	1-6	-	v, pres	600
Molecular Computational Chemistry	X_435666	6	5	h, cp, pra	t	400
Nuclear Magnetic Resonance	X_435667	6	4	h, w	t	500
Physical-Organic Chemistry	X_435663	6	1	h, pra	v, pres	400
Research Project Organic Chemistry (compulsory)	X_432598	42	1-6	pra	v, pres	600
Supramolecular Chemistry and Nanomaterials	X_435653	6	1	h	t	400
Synthetic Organic Chemistry	X_435665	6	4	h, w, pra	t	500
Elective components						
Research Project OC Extension 18 EC	X_432599	18	1-6	pra	-	600
Master Research OC Extension 12 EC	X_432685	12	1-6	pra	-	600
Master Research OC Extension 6 EC	X_432618	6	1-6	pra	-	600

Molecular Simulation and Photonics:

Compulsory components	Subject code	Number of credits	Period or semester	Teaching method	Examination format	Level
Lasers and Quantum Optics	X_422539	6	1	h, w, as	t	400
Quantum Theory of Molecules and Matter	X_428517	6	1	h, w, as	t	400
Literature thesis and Colloquium MSP	X_432679	12	1-6	-	v, pres	600
Research Project MSP	X_432681	42	1-6	pra	v, pres	600
Statistical Theory of Complex Molecular	X_428520	6	1	h, w	t	400

Systems

Constrained choice components						
Advanced Experimental Techniques	X_432662	6	6	h, as	t	400
Ultrafast Laser Physics	X_422556	6	4	h	t	400
Understanding Molecular Simulation	X_432703	6	3	h, cp, as	t, v	400
Understanding Quantum Chemistry	X_422557	6	2	h, pra	t, v	400
Elective components						
Ab Initio Molecular Dynamics	X_435635	6	5	h, as	v	500
Advanced Quantum Chemistry	X_432663	6	6	h, lit	t	500
Applied Theoretical Chemistry	X_435612	6	4	cp	v	500
Biomolecular Simulations	X_437019	6	4	h, cp	t, v	500
Density Functional Theory for Chemists	X_435111	6	4	lit	o	500
Medical Imaging	5354MEIM6Y	6	4	h	t, v	500
Numerical Techniques	X_420082	6	4	h, cp, as	v	400
Scientific Programming	X_435076	6	2	h, cp	v	500
Soft Condensed Matter and Biological Physics	53548SCM6Y	6	2	h, as	t	500
Supramolecular Chemistry and Nanomaterials	X_435653	6	1	h, w	t, v	400
Transport Phenomena	X_420075	6	4,5	h	o	500

Science for Energy and Sustainability:

Compulsory components	**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 and Colloquium SES	X_432785	12	1-6	-	v, pres	600
Research project SES	X_432786	48	1-6	pra	v, pres	600
Elective components						
Big Issues in Energy Materials	X_422535	3	1	h	v, pres	400
BioSolar Cells	X_428531	6	1	h	pres, o	400
Catalysis for sustainable energy	X_437027	6	4	h, lit, as	t, v	500
Coordination and Organometallic Chemistry	X_435664	6	2	h	t	400
Energy & Climate Change	5264ECCS6Y	6	2	h, pra	v, pres	-
Environmental Chemistry	X_437004	6	1	h, w,	t	400
Green Chemistry	X_430557	6	1	h	t, v, o	300
Heterogeneous Catalysis	X_428013	6	3	h, w, pra	t	400
Homogeneous Catalysis	X_435668	6	5	h	t	400
Open Innovation in Science & Sustainability	X_422598	6	2	-	-	400

Organic Photovoltaics	X_422590	6	2	h, prac	pres	400-
Photosynthesis and Energy	X_422553	6	5	h	v, pres	500

Specialization Science, Business & Innovation:

Compulsory components	**Subject code**	**Number of credits**	**Period or semester**	**Teaching method**	**Examination format**	**Level**
Management of Sustainable Innovation	X_432739	6	2	h	t, o	400
Networked Organizations and Communication	S_NOC	6	2	h, w	t, v, pres	-
SBI Project & Master Thesis	X_432735	36	1-6	pra	-	600
SBI Research Methodology	X_432846	6	1-6	-	-	-
Transdisciplinarity and Transition	X_430604	6	2	h	t, v, o	400
Elective components (1 out of 2)						
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
Elective components (24 EC or 12 EC + 12 EC track courses from elective components)						
Business and Innovation Project	X_432723	24	1-6	-	-	500
Science project	X_400424	24	1-6	-	-	400
Researching science research	X_432850	12	4-5	-	v, pres	400
Elective components (2 out of 9)						
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
Innovation in Medical Technology to Improve the Health Care System	X_430602	6	6	h, w	v, pres	500
Organic Photovoltaics	X_225905	6	2	h, prac	pres	400
Principles of Pharmaceutical Sciences / Pharmacochemistry	X_435675	6	1	h, pra	t	400
Project Sustainable Future	X_432784	6	6	h, w	t, v, pres, o	500
Protein Science	AM_470145	6	1	h, w	t	400
Materials for energy and environmental sustainability	X_432850	12	4-5	-	v, pres	400
Elective components						
Expertise and Coordination in Knowledge Intensive Firms	X_432738	6	1	-	-	400
Science and Society in Historical Perspective	X_400424	6	5	h	t, v, pres	400
Technology and Innovation Processes	E_BA_TIP	6	2	-	-	400

Academic skills components for all tracks:

Component	Subject code	Number of credits	Period or semester	Teaching method	Examination format	Level
Science in Perspective	X_437030	6	4,5	h, as	t, v	400
Critical Thinking (UvA)						-
English Academic Course (UvA),						-
Tutoring Students	X_432625	3	2	h, w	v	400
Scientific Writing in English	X_400512	3	4	w, as	as	400
Scientific Writing in English	X_400592	3	2,6	w, as	as	400
Business and Innovation in Life Science	X_432539	3	3	h, as	t, pres	-