Master degree programme Chemistry
Appendices to the Teaching and Examination Regulations

Appendix A Teaching outcomes of the degree programme (art. 1.3)

The objectives of the master's degree programme Chemistry are:

- to prepare students for an independent professional career; in this context this means being able to carry out fundamental or applied scientific research, as well as applying state of the art scientific knowledge in a wide variety of new practical situations,
- to make students develop skills, knowledge and insight in a specialization area of the field of study, with a focus on insight in and approach to scientific problems,
- to make students develop the ability to clearly and concisely communicate the acquired knowledge to others.

The objectives of the programme result in the following learning outcomes

G. General academic skills for the master's degree programme Chemistry

The graduate

1. is able to keep up with and make use of professional literature in relevant subfields,
2. is able to make himself/herself familiar with a subfield of the own discipline within a reasonable time span,
3. is able to formulate a research plan based on a global problem description in a subfield of the own discipline,
4. is able to analyze, interpret using state of the art information, and draw conclusions from research results,
5. is able to operate effectively in a position in which knowledge and research skills within the field of the own discipline are required,
6. is able to perform in a multidisciplinary team, transfer knowledge to others, give oral presentations, write a report or internationally accessible scientific article, and take part in a scientific discussion,
7. is able to design, conduct and evaluate experiments and the necessary checks and balances independently,
8. is able to relate his/her own results and conclusions to results already available in the literature,
9. has sufficient understanding of the role of the own discipline in society to come to a well-considered choice and practice of profession,
10. has an understanding of the role of the own discipline in a sustainable society.

CH. Specific academic knowledge and skills for the master's degree programme Chemistry

The graduate

1. has advanced knowledge of aspects of one of the following fields of knowledge:
    - Polymer Sciences: synthesis, characterization and properties of polymer molecules and materials.
    - Molecular Chemistry: reactions and interactions of molecules and the application of this insight in synthetic chemistry, catalysis, materials, nanotechnology, systems chemistry, and chemical biology.
    - Chemical Physics: behavior and design of novel materials and their functional properties, with emphasis in those of interest in electronics; the relation between chemical and physical properties of condensed matter on the one hand and the nature of the chemical bonding, and molecular and crystal symmetry on the other hand.
2. is able to judge whether the properties of created products and possible side or waste products can result in undesired side effects in the short or long term,
3. is able to work at academic level on a research problem in an area of chemistry, which is not his/her own main field of study,
4. (M-variant) is prepared for a professional career in management and policy.

Appendix B Specializations of degree programme (art. 2.2)

The degree programme has the following specializations:

- Chemical Physics
- Molecular Chemistry
- Polymer Science
- Science, Business and Policy
- Within the degree programme qualified students can follow the Erasmus Mundus programme Theoretical Chemistry and Computational Modelling (TCCM). For this programme the Erasmus Mundus TCCM regulations, as laid down in the consortium agreement of the programme, the student agreement and the SGA agreement with the EACEA, apply.

Appendix C Content of degree programme (art. 2.3)

Specialization Chemical Physics

The programme comprises 120 ects. The research project and second research project together comprises minimal 45 ects and maximal 60 ects.

module	ECTS	assessment	practical
Research Project in Chemical Physics	30-45	assessment of performance, report, presentation	x
Second research project or traineeship	15-30	assessment of performance, report, presentation	x
Colloquium	10	report, presentation	x
Symmetry and Spectroscopy	5	written examination	
Solid State Phase Transitions	5	written examination	
Optional courses in Chemical Physics	40-55	see appendix D	see app. D

Specialization Molecular Chemistry

module	ECTS	assessment	practical
Research Project in Molecular Chemistry	45	assessment of performance, report, presentation	x
Second research project or traineeship	15	assessment of performance, report, presentation	x
Colloquium	10	report, presentation	x
Reaction Mechanisms	5	written examination	
Workshops in Molecular Chemistry	5	attendence, performance, report	x
Structure Determination with Spectroscopic Methods	5	written examination	
Organic Synthesis: Methods and Strategy 1	5	written examination	
Final examination in Molecular Chemistry	5	oral examination	
Optional courses in Molecular Chemistry	25	see appendix D	see app. D

Specialization Polymer Science

module	ECTS		practical
Research Project in Polymer Science	30	assessment of performance, report, presentation	x
Second research project or traineeship	30	assessment of performance, report, presentation	x
Colloquium	10	report, presentation	x
Polymer Science Lab 3	5	report	x
Thermodynamics of Polymer Systems	5	written examination	
Nanochemistry	5	written examination	
Advanced Polymer Chemistry	5	written examination	
Biomaterials 2	5	written examination	
Colloid and Interface Science	5	written examination	
Polymer Physics	5	written examination, report, presentation	x
Polymer Surfaces and Interfaces	5	written examination	
Structure and Properties of Polymers	5	written examination	
Optional Courses in Polymer Science	5	see appendix D	see appendix D

Specialization Science, Business and Policy

module	ECTS	assessment	practical
Modules in one of the fields Chemical Physics, Molecular Chemistry, Polymer Science to be determined on individual basis	30	as indicated for the corresponding specialization	as indicated for the corresponding specialization
Research Project in one of the fields Chemical Physics, Molecular Chemistry, Polymer Science	30	assessment of performance, report, presentation	x
Course Science, Business and Policy	20	assignment, exam, attendance	x
Internship Science, Business and Policy	40	assessment of performance, reports, attendance	x

Erasmus Mundus programme Theoretical Chemistry and Computational Modelling (TCCM)

The first year of the programme is arranged locally at the home university of the student, and must comply with the Erasmus Mundus TCCM regulations. In the first year the student must attend courses and pass related exams for 60 ECTS credits. The first year for those students whose home university is the University of Groningen is as follows:

Module	ECTS	assessment	practical
Fundamental and functional properties of nanosystems	3	as indicated in appendix C or D of the OER of the corresponding programme	as indicated in appendix C or D of the OER of the corresponding programme
Molecular Quantum Mechanics 1	5	written examination	
Molecular Quantum Mechanics 2	5	written examination	
Symmetry and Spectroscopy	5	written examination	
Selected topics in theoretical Chemistry	5	written examination	
Programming and Numerical Methods	3-6	as indicated in appendix C or D of the OER of the corresponding programme	as indicated in appendix C or D of the OER of the corresponding programme
Colloquium	10	report, presentation	x
Second European Language	5	depending on the chosen course	depending on the chosen course
Molecular Dynamics	5	as indicated in appendix C or D of the OER of the corresponding programme	as indicated in appendix C or D of the OER of the corresponding programme
Electives	11-14	see appendix D	see appendix D

The second year of the programme is divided into two modules:
International Intensive Course (24 ECTS): a 4-week international intensive course and 10 weeks of tutorial-related home work.
Master Thesis (36 ECTS): devoted to research activity associated with a co-tutored work thesis, part of which (a minimum of 18 ECTS) is to be developed abroad, in a laboratory of a partner University.

Appendix D Optional modules (art. 2.4)

Optional modules in Chemical Physics

module	ECTS	assessment	practical
Selected topics in theoretical Chemistry	5	written examination	
Computational Methods in Quantum Chemistry	5	report	x
Computational Physics	5	assignments, report	x
Magnetism and Conductivity	5	report	
Mesoscopic Physics	5	written examination	
Molecular Dynamics	5	assignments, reports, presentation	x
Molecular Quantum mechanics 1	5	written examination	
Molecular Quantum mechanics 2	5	written examination	
Non Linear Optics	5	written examination, assignments	x
Device Physics	5	written examination, case study	x
Physics of Lasers	5	written examination	x
X-ray Diffraction	5	written examination	x
Solid State Physics 1	5	written examination	
Surfaces and Interfaces	5	written examination	
Organometallic chemistry	5	written examination	
Structure determination with spectroscopic methods	5	written examination, report	x

Optional modules in Molecular Chemistry

module	ECTS	assessment	practical
Organometallic Chemistry	5	written examination	
Organic Synthesis: Methods and Strategy 2	5	written examination	
Supramolecular Chemistry	5	written examination	
Organic Materials	5	written examination	
Homogeneous Catalysis	5	written examination	
Stereochemistry	5	report	x
Biomolecular Chemistry	5	written examination	

Optional modules in Polymer Science

module	ECTS	assessment	practical
Supramolecular Chemistry	5	written examination	
Homogeneous Catalysis	5	written examination	
Polymer Products	5	report, presentation	x
Surfaces and Interfaces	5	written examination	
Surface Characterization	5	report, presentation, oral examination	x

Optional modules in Erasmus Mundus programme Theoretical Chemistry and Computational Modelling (TCCM)

In the first year of the programme, 12 ects out of the total of 60 ECTS credits may be required to a levelling courses for those students who, on the advice of their local tutor, need to upgrade their level in at most two of the following fields Mathematics, Physics or Chemistry.

Elective courses complete the total number of ects of the first year of the programme to 60 ects. Students whose home university is the University of Groningen can take these courses in the field of nanoscience, solid state science, astro- or atmospheric chemistry, bio-/organic/inorganic/polymer chemistry, reactivity, programming and numerical methods or applied mathematics.

Appendix E Entry requirements (art. 3.2)

For students admitted to the programme there are no entry requirements for the individual modules.

Appendix F Admission to the degree programme and different specializations (art. 4.1.1 and 4.2)

Holders of the following Bachelor's degrees from the University of Groningen are considered to have sufficient knowledge and skills and will be admitted to the Master's degree programme in Chemistry on that basis:
- BSc Scheikunde

Appendix G Application deadlines for admission for international students (art. 4.5.1)

Deadline of Application	**Non-EU students**	**EU students**
MSc Chemistry	April 1st 2013	May 1st 2013

Decision deadlines (art. 4.5.3)

Deadline of Decision	**Non-EU students**	**EU students**
MSc Chemistry	June 1st 2013	June 1st 2013