Master degree programme Chemical Engineering
Appendices to the Teaching and Examination Regulations

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

The objectives of the master's degree programme Chemical Engineering 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 Chemical Engineering

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.

CE. Specific academic knowledge and skills for the master's degree programme Chemical Engineering.

Engineering knowledge and skills:

- the graduate has acquired specific knowledge and skills in the area of **fundamental and applied engineering sciences**. More specifically, the graduate
    1. is able to design a realistic process including specifying the sub-steps, like drawing flow charts, describing equipment and process flows, and calculating the behavior of process equipment; as well as to provide alternatives for these separate steps,
    2. has an understanding of i) process-product relations ii) ways to minimize byproduct and waste streams iii) manufacturing routes for classes of molecules and products.

Academic knowledge and skills in the product and process technology:

- the graduate is able to **design chemical products** based on a multidisciplinary approach (chemical and technological aspects). More specifically, the graduate
    3. has knowledge on product formulation, specifications, analytical methods, interactions between components and relevant physical and mechanical methods for the manufacture of chemical- or biotechnological products within one of the 'product sectors' bio-based products, industrial catalysts or polymeric products.
    4. is able to design a realistic product and associated process within one of the 'product sectors' bio-based products, industrial catalysts or polymeric products . This includes an analysis and design of all sub-steps, including specification of product properties, product flow diagrams, a description of process and processing equipment, as well as to provide alternatives for these steps.

Appendix II Specializations of degree programme (art. 2.2)

The degree programme has the following specialization:

- Product Technology
- Catalysis and Green Chemistry

Appendix III Content of degree programme (art. 2.3)

Specialization Product Technology

Module	ECTS	Assessment	Practical
Master Thesis	50	Assessment of performance, report, presentation	x
Internship	15	Assessment of performance, report, presentation	x
Advanced Product Engineering	5	Report, presentation	x
Bio-based Products	5	Report, presentation	x
Interfacial Engineering	5	Written examination	
Polymer Products	5	Report, presentation, assignment	x
Particulate Products	5	Written exam, report, assignment	x
Catalysis for Engineers	5	Assignments, presentation	
One of three Product sectors to be chosen • Bio-based Products • Industrial Catalysts • Polymeric Products	25	See separate tables	See separate tables

Product sector Polymeric Products	ECTS	Assessment	Practical
Biomaterials 2	5	Written exam	
Formulation	6	Presentation, report	x
Sustainability for Engineers	5	Assignments, report, presentation	x
Electives	10	See App. IV	See App. IV

Product sector Bio-based Products	ECTS	Assessment	Practical
Biomaterials 2	5	Written exam	
Chemical Catalysis	5	Written exam	x
Product focused Process Design	5	Report, presentation, discussion	x
Electives	10	See App. IV	See App. IV

Product sector Industrial Catalysis	ECTS	Assessment	Practical
Sustainability for Engineers	5	Assignments, report, presentation	x
Design of Industrial Catalysts	5	Oral exam, presentation	x
Product focused Process Design	5	Report, presentation, discussion	x
Electives	10	See App. IV	See App. IV

Specialization Catalysis and Green Chemistry

Module	ECTS	Assessment	Practical
Master Thesis	50	Assessment of performance, report, presentation	x
Internship	15	Assessment of performance, report, presentation	x
Advanced Product Engineering	5	Report, presentation	x
Bio-based Products	5	Report, presentation	x
Interfacial Engineering	5	Written examination	
Polymer Products	5	Report, presentation, assignment	x
Particulate Products	5	Written exam, report, assignment	x
Catalysis for Engineers	5	Assignments, presentation	
Green Chemistry and Biocatalysis	5	Written exam, presentations	x

Chemical Catalysis	5	Written exam	
Organic Synthesis: Methods and Strategy 1	5	Written exam	
Electives	10	See App. IV	See App. IV

Appendix IV Optional modules (art. 2.4)

Optional modules

Electives	ECTS	Assessment	Practical
Compulsory modules of one of (the other) Product sectors	See App. C	See app. III	See App. III
Organic Materials	5	Written exam	
Solar Cells	5	Written exam, presentation, report	x
Advanced Polymer Chemistry	5	Written exam	
Management of Product Innovation	5	Written exam, assignment	x
Optional modules on individual approval of the Board of Examiners		As indicated in app. III or IV of the corresponding programme	As indicated in app. III or IV of the corresponding programme

Appendix V Entry requirements (art. 3.2)

A student is allowed to start with the Master Thesis with a maximum of 25 ECTS to be still booked from the compulsory and optional programme.

Appendix VI 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 Chemical Engineering on that basis:
- BSc Scheikundige Technologie