Appendix Master degree programme Chemical Engineering

Appendix I Learning outcomes of the degree programme (art. 3.1)

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

A. General academic skills for the master's degree programme Chemical Engineering

The graduate

A1. is able to keep up with and make use of professional literature in relevant subfields,
A2. is able to make himself/herself familiar with a subfield of the own discipline within a reasonable time span,
A3. is able to formulate a research plan based on a global problem description in a subfield of the own discipline,
A4. is able to analyze, interpret using state of the art information, and draw conclusions from research results,
A5. is able to operate effectively in a position in which knowledge and research skills within the field of the own discipline are required,
A6. 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,
A7. is able to design, conduct and evaluate experiments and the necessary checks and balances independently,
A8. is able to relate his/her own results and conclusions to results already available in the literature,
A9. has sufficient understanding of the role of the own discipline in society to come to a well-considered choice and practice of profession,
A10. has an understanding of the role of the own discipline in a sustainable society.

B. 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

B1. 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,
B2. 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

B3. 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.

B4. 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 Tracks/Specializations of the degree programme (art. 3.5)

The degree programme has the following specializations:

- Bio-based Products
- Industrial Catalysts
- Polymeric Products
- Advanced Process Technology

One extra specialization is defined in collaboration with the master Chemistry: Catalysis and Green Chemistry

Appendix III Content of degree programme (art. 3.6)

Practicals are defined as lab practicals

Course unit	**ECTS**	**Practical**	**Entry requirements**
Research project	45	x	Passed 35 ECTS of the Master's degree programme of Chemical Engineering
Internship	20	x	
Advanced Product Engineering	5		
Bio-based Products	5		
Interfacial Engineering	5		
Polymer Products	5		
Particulate Products	5	x	
Catalysis for Engineers	5		
Scientific Integrity	-		
One of the 4 specialisations (packages of 3 electives each) must be chosen • Bio-based Products • Industrial Catalysts • Polymeric Products • Advanced Process Technology	25	See separate tables	

The Internship is 20 ECTS and could be extended, before the start of the project, to 25 ECTS (at the expense of one elective course) after approval of the Board of Examiners.

Polymeric Products	**ECTS**	**Practical**	**Entry requirements**
Biomaterials 2	5		
Food Pharma Products	5		
Advanced Polymer Processing	5		
Electives	10	See course unit	

Bio-based Products	ECTS	Practical	**Entry requirements**
Sustainability for Engineers	5		
Food Pharma Products	5		
Product focused Process Design	5		
Electives	10	See course unit	

Industrial Catalysis	ECTS	Practical	**Entry requirements**
Sustainability for Engineers	5		
Design of Industrial Catalysts	5		
Homogeneous catalysis	5		
Electives	10	See course unit	

Advanced Process Technology	ECTS	Practical	**Entry requirements**
Advanced Process and Energy Technologies	5		
Advanced Polymer Processing	5		
Product focused Process Design	5		
Electives	10	See course unit	

Besides the four specialisations above, fully chemical engineering oriented, one extra is defined in collaboration with the master Chemistry.

Specialization Catalysis and Green Chemistry

Course unit	**ECTS**	**Practical**	**Entry requirements**
Research project	45	x	Passed 35 ECTS of the Master's degree programme of Chemical Engineering
Internship	20	x	
Advanced Product Engineering	5		
Bio-based Products	5		
Interfacial Engineering	5		
Polymer Products	5		
Particulate Products	5	x	
Catalysis for Engineers	5		
Green Chemistry and Biocatalysis	5		
Homogeneous Catalysis	5		
Organic Synthesis: Methods and Strategy 1	5		
Electives	10	See App. IV	

Appendix IV Electives (art. 3.7)

Course unit	ECTS	Practical	Entry requirements
Functional properties	5		
Photovoltaics Science and Energy	5		
Analysis and Control of Smart Systems	5		
Management of Product Innovation	5		
Compressible Flows	5		
CFD for Engineers	5		
Management of Product Innovation	5		
Electives on individual approval of the Board of Examiners		See course unit	

Appendix V Entry requirements and compulsory order of examinations
(art. 4.4)

Entry requirements are mentioned in tables appendices III and IV.

Appendix VI Admission to the degree programme and different tracks/specializations
(art. 2.1.1 + art. 2.2)

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 Chemical Engineering

Appendix VII Transitional provisions (art. 7.1)

For cohort 2018-2019

Course	May be replaced with	Reason
Internship 15 ECTS (CHTR-10)	Internship 20 ECTS (WMCH19002)	Curriculum change in 2019-2020: second course in new curriculum, first course is no longer offered as of 2019-2020
Research Project in Chemical Engineering 50 ECTS (CHRPCHE-10)	Research Project in Chemical Engineering 45 ECTS (WBCH19006)	Curriculum change in 2019-2020: second course in new curriculum, first course is no longer offered as of 2019-2020

Appendix VIII Application deadlines for admission (art. 2.6.1 en 2.6.3)

Programmes starting on 1 September

Programme	Deadline of Application	Deadline of decision
Behavioural and Cognitive Neurosciences	1 May 2019	1 June 2019
Biology	1 May 2019	1 June 2019
Biomedical Engineering	1 May 2019	1 June 2019
Biomedical Sciences	1 May 2019	1 June 2019
Biomolecular Sciences	1 May 2019	1 June 2019
Ecology and Evolution	1 May 2019	1 June 2019
Energy and Environmental Sciences	1 May 2019	1 June 2019
Human-Machine Communication	1 May 2019	1 June 2019
Marine Biology	1 May 2019	1 June 2019
Medical Pharmaceutical Sciences	1 May 2019	1 June 2019
Nanoscience: for non-EU/EEA students	1 February 2019	1 June 2019
Nanoscience: for EU/EEA students	1 May 2019	1 June 2019

Programmes starting on 1 September and 1 February

Programme	Deadline of Application for 1 September	Deadline of decision for 1 September	Deadline of Application for 1 February	Deadline of decision for 1 February
Applied Mathematics	1 May 2019	1 June 2019	15 October 2019	15 November 2019
Applied Physics	1 May 2019	1 June 2019	15 October 2019	15 November 2019
Artificial Intelligence	1 May 2019	1 June 2019	15 October 2019	15 November 2019
Astronomy	1 May 2019	1 June 2019	15 October 2019	15 November 2019
Chemical Engineering	1 May 2019	1 June 2019	15 October 2019	15 November 2019
Chemistry	1 May 2019	1 June 2019	15 October 2019	15 November 2019
Computing Science	1 May 2019	1 June 2019	15 October 2019	15 November 2019
Farmacie	1 May 2019	1 June 2019	15 October 2019	15 November 2019
Industrial Engineering and Management	1 May 2019	1 June 2019	15 October 2019	15 November 2019
Mathematics	1 May 2019	1 June 2019	15 October 2019	15 November 2019
Physics	1 May 2019	1 June 2019	15 October 2019	15 November 2019