Assessment plan master's degree programme Chemical Engineering 2023-2024

Introduction

This assessment plan is a systematic description of the type of assessment used in the various modules of the master's degree programme Chemical Engineering. This assessment plan fits within the assessment policy of the Faculty of Science and Engineering [1], and the protocol used by the Board of Examiners of the degree programme [2].

The assessment plan is based on:

- the learning outcomes of the degree programme (Appendix 1);
- the Teaching and Examination regulations of the degree programme;
- the description of the various modules of the degree programme in the digital course catalogue *Ocasys*, including:
    - Objective of the module;
    - Course content;
    - Lecturers and examiners;
    - Assessment method used;
    - Lecture format.

The assessment plan contains two parts:

1. An overview of the examiners and the assessment types used for all modules in the master's degree programme Chemical Engineering.

   The following types of assessments are distinguished in this scheme:
   - Written examination (WE)
   - Multiple choice (MC)
   - Interim Test (IT)
   - Oral examination (OE)
   - Assignment (AST)
   - Report (R)
   - Assessment of Practical work, including laboratory and computer work (PR)
   - Presentation (P)
   - Mandatory Attendance (Att)

2. Matrices describing the relation between the various modules of the master's degree programme Chemical Engineering and the learning outcomes of the degree programme.

[1] FSE Quality Assurance Manual 2018-2019

[2] Quality Assurance Guide for the Board of Examiners 2015

Part 1: Examiners and assessment type of course units in the degree programme (examiner in bold is first examiner)

Course unit	Examiners (first / second)	Assessment type
Core programme		
Master Research Project	See list of examiners	R, P, PR
Internship	See list of examiners	R, P, PR
Scientific Integrity and Safety	P.P. Pescarmona / P.J. Deuss	AST
Bio-based Products	P.J. Deuss / J. Xie	R, P
Catalysis for Engineers	H.J. Heeres / J. Xie	WE
Interfacial Engineering	P. Raffa/ F. Picchioni	WE, AST
Electrochemical Systems & Engineering (**ME**)	See assessment plan ME	
Polymer Products	R.K. Bose / F. Picchioni	R, P, AST
Advanced Product Engineering	F. Picchioni / R.K. Bose	R, P
Advanced process technology		
Microfluidics (**ME**)	See assessment plan ME	
Advanced polymer processing	D. Parisi / P. Druetta	WE, PR, AST
Product focused Process Design	G.F. Versteeg / J.G.M. Winkelman	OE, R
Advanced Process and Energy Technologies	J. Yue / V. Kyriakou	R, P, IT
Bio-based Products and Processes		
Food Pharma Products (**IEM**)	See assessment plan IEM	
Design of Industrial Catalysts	P.P. Pescarmona / V. Kyriakou	IT, R, P
Product focused Process Design	See above	OE, R
Biocatalysis for engineers	E. Jurak / J.G.M. Winkelman	R, P
Industrial Catalysis		
Design of Industrial Catalysts	See above	
Homogeneous Catalysis	S.B. Beil / R.Hage	WE
Biocatalysis for engineers	See above	
Engineered nanomaterials for industry	L. Protesescu / P.P. Pescarmona	P, AST
Polymeric Products		
Food Pharma Products (**IEM**)	See assessment plan IEM	
Advanced polymer processing	See above	
Circular Polymers	R. Duchateau / F. Picchioni	WE. P
Renewable Energy		
Photovoltaics Science and Energy (**CH**)	See assessment plan CH	
Sustainable electric energy storage (**CH**)	See assessment plan CH	
Hydrogen, Fuels and Electrolysers (**ME**)	See assessment plan ME	
Design of Industrial Catalysts	See above	
Advanced Process and Energy Technologies	See above	
Electives		
Compressible Flows	P. Druetta / F. Picchioni	WE, R, AST, PR
CFD for Engineers	P. Druetta / F. Picchioni	WE, R, AST
Electives from other programmes		
Biomaterials 2 (**BME**)	See Assessment plan BME	
Advanced Processing for Complex Materials (**ME**)	See Assessment plan ME	
Bioinspired designer materials (**CH**)	See Assessment plan CH	
Functional properties (**PH**)	See Assessment plan PH	
Sustainable Energy Supply (**FEB**)	See Assessment plan FEB	
Advanced LCA for Sustainability **(IEM)**	See Assessment plan IEM	
Characterisation of Materials (**PH**)	See Assessment plan PH	
Sustainable Industrial Practice (**IEM**)	See Assessment plan IEM	
Management of Product Innovation (**FEB**)	See Assessment plan FEB	

Examiners with UTQ for individual projects:

Acuautla Meneses, M.I.
Bose, R.K.
Deuss, P.J.
Duchateau, R.*
Druetta, P.
Euverink, G.J.W.
Heeres, H.J.
Jurak, E.
Kamperman, M.M.G.
Karka, P.*
Kottapalli, A.G.P*
Kyriakou, V*
Morales Hernández, D.M.*
Parisi, D.*
Pescarmona, P.P.
Picchioni, F.
Protesescu, L.*
Raffa, P.
Versteeg, G.F.*
Winkelman, J.G.M.
Xie, J.X.*
Yue, J.

* Examiners without UTQ, should be accompanied by a certified examiner

An examiner for the Master Research Project of the master Chemistry can act as a second supervisor for the Master Research Project of the master Chemical Engineering.

Part 2: Relation between the learning outcomes and the curriculum

x: learning outcomes achieved in a particular course unit of the curriculum
(for the learning outcomes see Appendix 1)

	G										CE			
	1	2	3	4	5	6	7	8	9	10	1	2	3	4

Core programme														
Master Research Project	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Internship	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Scientific Integrity and Safety									x	x				
Bio-based Products	x			x		x						x	x	x
Catalysis for Engineers	x	x		x	x			x	x	x	x	x	x	x
Interfacial Engineering				x								x	x	x
Polymer Products	x	x		x	x	x			x	x		x	x	x
Advanced Product Engineering	x	x		x	x	x						x	x	x
Electrochemical Systems & Engineering	x	x	x	x					x	x			x	x
Advanced process technology														
Advanced Polymer Processing	x	x		x	x			x			x	x	x	x
Product Focused Process Design	x	x				x			x		x		x	x
Advanced Process and Energy Technologies	x	x		x				x		x	x	x	x	x
Bio-based products and processes														
Design of Industrial Catalysts	x	x		x	x	x		x	x	x		x	x	x
Product Focused Process Design	See above													
Biocatalysis for Engineers	x	x	x	x		x		x	x	x	x	x	x	x
Industrial catalysts														
Design of Industrial Catalysts	See above													
Homogeneous Catalysis	x	x										x		
Biocatalysis for Engineers	See above													
Engineered nanomaterials for industry	x	x		x		x		x	x			x	x	x
Polymeric products														
Advanced Polymer Processing	See above													
Circular Polymers	x	x			x	x				x		x	x	x
Renewable Energy														
Design of Industrial Catalysts	See above													
Advanced Process and Energy Technologies	See above													
Electives														
Compressible Flows	x	x		x		x	x				x			
CFD for Engineers	x	x		x		x	x	x			x			

Appendix 1: Learning outcomes of the master's degree programme Chemical Engineering

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

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.

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

- 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 and the related processes** based on a multidisciplinary approach (chemical and technological aspects). More specifically, the graduate
    3. has knowledge on product formulation, specifications, catalytic systems, analytical methods, interactions between components and relevant physical and mechanical methods for the manufacture of chemical- or biotechnological products.

4. is able to design a realistic chemical product and associated process. 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.