Assessment plan master's degree programme Chemistry 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 Chemistry. 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 assessment types used for all modules in the master's degree programme Chemistry.

   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 Chemistry 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

Course unit	Examiners (first / second)	Assessment type
Core programme		
Research Project	See list of examiners	R, P, PR
Second Research Project	See list of examiners / W.R. Browne	R, P, PR
Colloquium	See list of examiners	R, P
Final Examination	See list of examiners	OE
Reaction Mechanisms	T. Kudernac / S. Otto	WE
Structure Determination with Spectroscopic Methods	T. Canrinus / W.R. Browne	WE, AST
Scientific Integrity	program director	Att
Courses available for specializations		
Molecular Quantum Mechanics 1	R.W.A. Havenith / J.E.M.N. Klein	WE
Photochemistry and Photoredox catalysis	S.B. Beil / W.C.Szymanski	OE, AST
Advanced Biocatalysis	M.W. Fraaije / K.U. Loos	WE, P, R
Bioinspired designer materials	M. Kamperman / G. Portale	WE, P
Organometallic Chemistry	E. Otten / J.E.M.N. Klein	WE, AST
Photovoltaics Science and Energy	L.J.A. Koster / R.W.A. Havenith	WE, R, P
Physical Methods for Chemical analysis	W.R. Browne / M. Tromp	OE, AST
Stereochemistry	T. Kudernac / B. L. Feringa	WE, R
Advances in Chemical Biology	M.D. Witte / M.T.C. Walvoort	WE, P
Chemical Catalysis	S. Harutyunyan / R. Hage	WE
Molecular Quantum Mechanics 2	S.S. Faraji / R.W.A. Havenith	WE, AST
Organic Synthesis: Methods and Strategy 1	S. Harutyunyan / B.L. Feringa	WE
Topics in chemistry with Python	S.S. Faraji / R. Pollice	R, P, AST
Supramolecular Chemistry	S. Otto / M.M. Lerch	WE, P, PR
Sustainable electric energy storage	M. Tromp / W.R. Browne	OE, AST
Synthetic Biology & Systems Chemistry	M. Heinemann / S. Otto	WE, P, PR
Computational modelling in research	R.W.A. Havenith / J. Slawinska	OE, R
Organic Synthesis: Methods and Strategy 2	M.D. Witte / A.J. Minnaard	WE
Polymer Physics	G. Portale/ K.U. Loos	WE, R, P
Physical Chemistry of Polymers: theory and practice	M. Kamperman / D. Maniar	OE, R, PR
Protein and Enzyme Engineering (MBB)	See Assessment plan MMB	
Molecular Modeling and Analysis in Structural Biology (MMB)	See Assessment plan MMB	
Molecular Dynamics (MMB)	See Assessment plan MMB	
Biomaterials 2 (BME)	See Assessment plan BME	
Bio-based Products (CE)	See Assessment plan CE	
Interfacial Engineering (CE)	See Assessment plan CE	
Polymer Products (CE)	See Assessment plan CE	
Design of Industrial Catalysts (CE)	See Assessment plan CE	
Product Focused Process Design (CE)	See Assessment plan CE	
Skills in Science Communication (EC)	See Assessment plan EC	
Astrochemistry (AS)	See Assessment plan AS	
Properties of functional materials (PH)	See Assessment plan PH	
Structure at Macro, Micro and Nano Scale (PH)	See Assessment plan PH	
Characterisation of Materials (PH)	See Assessment plan PH	
Biophysical Imaging & Manipulation Techniques (PH)	See Assessment plan PH	
Track Science Business and Policy		
Introduction Science and Business (SE)	See Assessment plan SE	
Work Placement Business and Policy (SE)	See Assessment plan SE	
Introduction Science and Policy (SE)	See Assessment plan SE	

Examiners for individual projects:

Beil, S.B. *
Bianchi, F.
Blake, G.R.
Borschevsky, A *
Browne, W.R.
Canrinus, T.R.
Eisink, N.N.H.M.
Even, J.
Faraji, S.S.
Feringa, B.L.
Fraaije, M.W.
Fürst, M.J.L.J.
Hage, R. *
Harutyunyan, S.
Havenith, R.W.A.
Heinemann, M.
Incarnato, D. *
Kamperman, M.
Katsonis, N.
Klein, J.E.M.N.
Kudernac, T.
Lerch, M. *
Loos, K.U.
Maglia, G.
Marrink, S.J.
Mayer, C.
Maniar, D. *
Minnaard, A.J.
Noheda Pinuaga, B.
Otten, E.
Otto, S.
Pollice, R.
Poolman, B.
Portale, G.
Protesescu, L. *
Rijn, P. van
Roelfes, J.G.
Roos, W.H.
Slotboom, D.J.
Szymanski, W.C.
Thunnissen, A.M.W.H.
Tromp, M.
Tych, K.M.
Vries, A.H. de
Walvoort, M.T.C.
Witte, M.D.

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

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

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)

	General										CH		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**1**	**2**	**3**
Core programme													
Research project	x	x	x	x	x	x	x	x	x	x	x	x	
Second research project	x	x	x	x	x	x	x	x	x	x	x	x	x
Colloquium	x	x		x	x	x		x			x	x	x
Final examination		x			x	x					x		
Reaction mechanisms		x		x	x						x		
Structure determination with spectroscopic methods		x		x	x		x				x		
Scientific Integrity									x	x			
Courses available for specializations													
Molecular quantum mechanics 1		x			x			x			x		
Photochemistry and Photoredox catalysis	x	x		x							x		
Advanced Biocatalysis	x	x				x		x		x	x	x	x
Bioinspired designer Materials	x	x		x		x					x		
Organometallic chemistry		x			x						x		
Photovoltaics Science and Energy	x	x		x		x			x	x	x	x	
Physical methods for chemical analysis		x		x	x						x		
Stereochemistry	x	x		x	x	x			x		x		
Advances in chemical biology		x			x	x					x		
Chemical catalysis	x	x									x		x
Molecular quantum mechanics 2		x			x			x			x		
Organic synthesis: methods and strategy 1		x			x						x		
Topics in chemistry with Python	x	x	x	x			x			x	x		
Supramolecular Chemistry	x	x									x		x
Sustainable electric energy storage	x	x		x					x	x	x	x	
Synthetic biology and systems chemistry	x	x		x		x		x			x		x
Computational modelling in research	x	x			x	x		x			x		x
Organic synthesis: methods and strategy 2		x			x						x		
Polymer physics	x	x				x					x		
Physical Chemistry of Polymers: theory and practice	x	x	x	x	x	x	x				x		x

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

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

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 themself familiar with a subfield of their own discipline within a reasonable time span,
3. is able to formulate a research plan based on a problem description in a subfield of their 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 their 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 their own discipline in a sustainable society.

Specific academic knowledge and skills for the master's degree programme Chemistry.
The graduate:

1. has advanced knowledge of aspects of the coherent fields of knowledge within chemistry, such as:

- synthesis, characterization and properties of materials; the relation between chemical and physical properties of materials on the one hand and the nature of the chemical bonding, and molecular and symmetry on the other hand.
- reactions and interactions of molecules and the application of this insight in synthetic chemistry and catalysis as well as knowledge about sustainable chemistry.
- behavior and design of biochemical systems and their function properties. Synthetic biology as well as protein engineering.

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. Science, Business and Policy specialization: is prepared for a professional career in management and policy.