Assessment plan for the curriculum of the Master's degree programme in Chemistry, 2026-2027

Programme director : M.D. Witte

Date advice Board of Examiners : 21-04-2026

Date approval Faculty Board :

1. Vision on assessment

1. The use of formative and summative assessment should be appropriate to the course unit but overall, a blend of assessment tools should be used over the course of the program; including but not limited to written examinations, oral examinations, oral and poster presentations, essays, practical reports, practical work (e.g., a program). MCQ based exams should not be used as a method of assessment except where appropriate in consideration of the Dublin descriptors.
2. Formative assessment is used in practical courses to enable students to learn from mistakes and successes in their work. The outcome of formative assessment should not as a rule contribute to summative grades for a course unit.
3. Formative assessment stimulates students to write independently and respond to critical feedback towards improvement.
4. Summative assessment is used to ascertain that the student has been able to demonstrate sufficient competence in regard to the learning objectives of individual course units. Summative assessment will be in line with the preparation of the students made during the course unit.
5. Summative assessment will be transparent and should stimulate students to reflect on their performance in a course unit.
6. By definition, successful completion of a degree programme requires individual success in all stages, a key skill in research is the ability to accept apparent failure - not every experiment will work as expected. Hence, assessment of practical work is focused on process and reflection primarily.

2. Assessment guidelines

1. Summative assessment comprises preferably of at least 2 distinct activities.
2. Oral examinations should be conducted in accordance with FSE policy on oral examination using the standard form.
3. Written examinations have to be performed onsite; other summative assessment forms are performed onsite when possible and appropriate.
4. Formative assessment is intended to provide feedback to students in preparation for summative assessments. The formative nature of the assessment must be communicated to the students at the start of the module.
5. Formative assessment can be performed onsite, online, as well as take home and collaborative work.

6. Formative assessment should not be used towards passing a course but can contribute to a final course grade where the summative component is already sufficient, where this contributes to stimulating learning, e.g., non-mandatory homework assignments.
7. Resits should in principle have the same form as the original assessment. In specific cases, resits may differ from the original assessment method as long as the result of the resit remains valid and reliably assesses the students' mastery of the LOs and the board of examiners, the examiners and the student agree with the change in assessment form.
8. Grading should use valid and reliable grading tools, as described in the test matrix/grading scheme.
9. Students should be given the opportunity to view their work and the test matrix used. Clarification of how their grade was decided on should be provided when requested.
10. Individual grades must be provided in group assignments and determined using assessment of work done by the individual student.
11. In group presentations the assessor assures that each student presents equal parts of the presentation during the presentation.
12. For practical reports a maximum of two feedback rounds (one on parts, one on the first draft) are organized, if a third round of feedback is needed to guide students to sufficient quality, the maximum grade is a 7.
13. For research reports formative assessment through the project should be provided before the report writing stage.
14. In assignments in which students generate written reports or programs, the scope to which AI tools can be used and should be documented should be defined for all stages of the writing process.

3. 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 track: is prepared for a professional career in management and policy.

4. Overview of assessment methods, test moments for course units, and examiners

*(**WE**: Written Exam, **OE**: Oral Exam, **M**: Midterm, **R**: Report, **PR**: Practical Work, **AST**: Assignment, **P**: Presentation, **PRW**: Peer Review, **GD**: Group Discussions)*

Period	Course Code	Course Name	EC	Assessment*	Ass. with formative function	Test moment(s)	First examiner	Second examiner
1a	WMBE001-05	Biomaterials 2	5	See assessment plan BE				
1a	WMBS003-05	Molecular Dynamics	5	See assessment plan BS				
1a	WMBS021-05	Molecular Modeling and Analysis in Structural Biology	5	See assessment plan BS				
1a	WMCE005-05	Polymer Products	5	See assessment plan CE				
1a	WMCH006-05	Reaction Mechanisms	5	WE		End	T. Kudernác	S. Otto
1a	WMCH007-00	Scientific Integrity	0	AST	AST	End	M.D. Witte	T. Kudernac
1a	WMCH008-05	Structure Determination with Spectroscopic Methods	5	WE,AST		End	T.R. Canrinus	W.R. Browne
1a	WMCH033-05	Advanced Biocatalysis	5	WE,P		End	M.W. Fraaije	K.U. Loos
1a	WMCH037-05	Molecular Quantum Mechanics	5	WE		End	R.W.A. Havenith	J.E.M.N. Klein
1b	WMBS004-05	Protein and Enzyme Engineering	5	See assessment plan BS				
1b	WMBS006-05	Advanced Genetic Engineering	5	See assessment plan BS				
1b	WMBS023-05	Next-generation sequencing methods and data analysis	5	See assessment plan BS				
1b	WMCE003-05	Interfacial Engineering	5	See assessment plan CE				
1b	WMCE021-05	Processes and Products for a Sustainable Carbon Cycle	5	See assessment plan CE				
1b	WMCH009-05	Bioinspired Designer Materials	5	WE,P		End	M.M.G. Kamperman	G. Portale
1b	WMCH011-05	Photovoltaics Science and Energy	5	WE,R,P		Half,end	L.J.A. Koster	G. Portale
1b	WMCH042-05	Advanced Methods in Spectroscopy	5	OE, AST		End	W.R. Browne	M. Tromp
1b	WMCH013-05	Stereochemistry	5	WE,AST		End	T. Kudernác	B.L. Feringa
1b	WMCH018-05	Organometallic Chemistry	5	WE,AST	GD	End	E. Otten	J.E.M.N. Klein
1b	WMCH032-05	Photochemistry and Photoredox Catalysis	5	WE			N.H. Katsonis	J.E.M.N.Klein
1b	WMPH020-05	Structure at Macro, Meso and Nano Scale	5	See assessment plan PH				

Period	Course Code	Course Name	EC	Assessment*	Ass. with formative function	Test moment(s)	First examiner	Second examiner
1b	WMPH051-05	Properties of Functional Materials	5	See assessment plan PH				
1b	WMCH043-05*	Programming in Chemistry	5	R,P		End	R.W.A. Havenith	R. Pollice
2a	WMCE009-05	Design of Industrial Catalysts	5	See assessment plan CE				
2a	WMCE011-05	Product Focused Process Design	5	See assessment plan CE				
2a	WMCH014-05	Advances in Chemical Biology	5	WE,P		End	M.D. Witte	C. Mayer
2a	WMCH015-05	Chemical Catalysis	5	WE			S. Harutyunyan	R. Hage
2a	WMCH017-05	Organic Synthesis: Methods and Strategy 1	5	WE			S. Harutyunyan	B.L. Feringa
2a	WMCH020-05	Supramolecular Chemistry	5	WE,P,PR		Half,end	S. Otto	M.M. Lerch
2a	WMCH021-05	Synthetic Biology and Systems Chemistry	5	WE,P,PR	P, PR	Half	M. Heinemann	S. Otto
2a	WMCH029-05	Sustainable Electric Energy Storage	5	OE,AST			M. Tromp	W.R.Browne
2a	WMCH038-05	Quantum Chemistry Methods I	5	OE		End	R.W.A. Havenith	J.L. Slawinska
2a	WMEC006-05	Skills in Science Communication	5	See assessment plan EC				
2a	WMPH021-05	Characterisation of Materials	5	See assessment plan PH				
2a	WMPH029-05	Statistical Mechanics	5	See assessment plan PH				
2b	WMAS018-05	Astrochemistry (23/24)	5	See assessment plan AS				
2b	WMCH024-05	Organic Synthesis, Methods and Strategy 2	5	AST		End	M.D. Witte	A.J. Minnaard
2b	WMCH025-05	Polymer Physics	5	WE,R,P		End	G. Portale	K.U. Loos
2b	WMCH034-05	Physical Chemistry of Polymers	5	WE,R,PR	R, PR	Half, end	D. Maniar	M.M.G. Kamperman
2b	WMCH039-05	Quantum Chemistry Methods II	5	OE,PR		End	A. Borschevsky	R.W.A. Havenith
2b	WMPH047-05	Biophysical Imaging & Manipulation Techniques	5	See assessment plan PH				
All	WMCH001-05	Colloquium	5	P, AST	AST	Half,end	Approved Examiner	Approved Examiner
All	WMCH002-05	Final Exam	5	OE		End	R.W.A. Havenith	G.R. Blake
Multiple	WMCH026-30	Intensive Course Theoretical Chemistry and Computational Modelling (TCCM)	30	WE,R		End	R.W.A. Havenith	M.Witte
All	WMCH901-40	Master Research Project Chemistry	40	R,P,M,PR	M	Half, end	Approved Examiner	Approved Examiner
Multiple	WMCH902-30	Master Research Project TCCM	30	P, M, PR, R	M		R.W.A. Havenith	W.R. Browne
Multiple	WMCH904-30	SBP: Master Research Project Chemistry	30	R,P,PR	M	Half, end	M.D. Witte	Approved examiner

Period	Course Code	Course Name	EC	Assessment*	Ass. with formative function	Test moment(s)	First examiner	Second examiner
All	WMCH903-20	Second Research Project	20	R,P,PR		End	M.D. Witte	C. Mayer, E. Otten, D. Maniar
All	WMCH041-01	MSc CH: Career Skills	1	AST	AST		T.R. Canrinus	M.D. Witte

*__Note__: In the case of a low amount of student registrations <10 the form of assessment might be adjusted accordingly. This will be clearly communicated to the students at the first lecture of the course.

**Note: Programming in chemistry is only available to students of the EM TCCM and the specialization theoretical chemistry and computational modelling

Examiners for individual projects

Bianchi, F.
Belyy, A.
Blake, G.R.
Borschevsky, A
Browne, W.R.
Canrinus, T.R.
Eisink, N.N.H.M.
Even, J.
Feringa, B.L.
Fraaije, M.W.
Fürst, M.J.L.J.
Gale, P.*
Hage, R. *
Harutyunyan, S.
Havenith, R.W.A.
Heinemann, M.
Incarnato, D.
Jansen, T.L.C.
Kamenz, J.L.
Kamperman, M.M.G.
Katsonis, N.H.
Klein, J.E.M.N.
Kudernac, T.
Lerch, M.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.
Wel, P.C.A. van der,
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.

5. Relationship between course units and details of the learning outcomes

(X: the learning outcome is explicitly assessed in the course.)

	Course	Compulsory courses												
Learning outcomes		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**1**	**2**	**3**
all	Research project	x	x	x	x	x	x	x	x	x	x	x	x	
all	Second research project	x	x	x	x	x	x	x	x	x	x	x	x	x
all	Colloquium	x	x		x	x	x		x			x	x	x
all	Final examination		x			x	x					x		
1a	Reaction mechanisms		x		x	x						x		
1a	Scientific Integrity									x	x			
1a	Structure determination with spectroscopic methods		x		x	x		x				x		
	Course	**Specialization courses**												
Learning outcomes		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**1**	**2**	**3**
1a	Molecular Quantum Mechanics		x			x						x		
1a	Advanced Biocatalysis	x	x				x		x		x	x	x	x
1b	Bioinspired designer Materials	x	x		x		x					x		
1b	Photovoltaics Science and Energy	x	x		x		x			x	x	x	x	
1b	Advanced Methods in Spectroscopy		x		x	x						x		
1b	Stereochemistry	x	x		x	x	x			x		x		
1b	Organometallic chemistry		x			x						x		
1b	Programming in Chemistry	x	x	x	x			x			x	x		
2a	Advances in chemical biology	x	x	x	x	x	x					x		
2a	Chemical catalysis	x	x									x		
2a	Organic synthesis: methods and strategy 1		x			x						x		
2a	Supramolecular Chemistry	x	x			x	x					x		x
2a	Synthetic biology and systems chemistry	x	x		x		x		x			x		x
2a	Sustainable electric energy storage	x	x		x					x	x	x	x	
2a	Quantum Chemistry Methods I	x	x			x	x		x			x		x

2b	Organic synthesis: methods and strategy 2		x			x	X		X			x		
2b	Polymer physics	x	x				x					x		
2b	Physical Chemistry of Polymers	x	x	x	x	x	x	x				x		x
2b	Quantum Chemistry Methods II		x			x			x			x		
	Course	**Electives**												
Learning outcomes		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**1**	**2**	**3**
1b	Photochemistry and Photoredox Catalysis	x	x		x							x		