Assessment Plan for the curriculum of the **Master's** degree programme in Nanoscience, 2025-2026

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Date advice Board of Examiners: 27 May 2025

Date approval Faculty Board: …

1. Vision on assessment

- Assessment guides and evaluates student learning in a multidisciplinary and international context to prepare them for a research career in Nanoscience.
- Assessment aims at stimulating excellent students to study actively and learn from their mistakes, combining specific knowledge and skills, while still stimulating helping each other studying and contributing to multidisciplinary research teams.
- Assessment stimulates transparent and effective use of materials and tools in learning, research and communication, as a guiding principle for lifelong learning.
- Assessment should teach students the real-world meaning of deadlines and ensure fair grading.

2. Assessment guidelines

Core courses:

- Individual course parts are assessed and must be passed independently to ensure that students have a good understanding of the full breadth of each course.
- All practicals are assessed through a written report with feedback to the students on development points. This is provided as explicit feedback written for each individual student on the grading form.
- For course parts dominated by hands-on practicals, the course grade is determined by the grade of the report. While the work is performed in teams, individual reports are handed in and graded individually.
- Core course parts not dominated by practicals are assessed through written or oral exams as assigned in the assessment plan. For resits, the examiner can always choose for oral examination.
- Students should, in consultation with their mentor and (intended) master project supervisor, select elective courses that support the master thesis project.
- Oral exams are graded using the dedicated oral exam grading form and an independent observer (preferably the preassigned second examiner) must be present during the full exam.
- Written exams must contain a standard first page with information on the grading scheme and exam conditions.
- For all course parts with a written exam, a mock exam (for example an exam from a previous year) must be available from the start of the course part.
- A Fail grade will be assigned to reports not handed in on time and the highest grade that can be obtained for the course part will be reduced from 10 to 7.5. Upon a second fail to meet a deadline the highest grade is further reduced to 6.5. This is done by linear scaling of grades between 5.5 and 10.

Individual projects:

- For all individual projects, midterm assessment with specific feedback on development points and self-reflection for each student must be provided. The feedback is documented on the dedicated form and shared with the coordinator of the individual project.
- In the individual projects, the students learn to give and make use of peer assessment.
- To ensure standardized and fair grading, all individual projects are assessed by the supervisor and a second examiner from another research unit than the supervisor, and someone who is not already closely involved in the project. For writing-assignments, the course coordinator acts as second examiner.
- In research projects, regular progress meetings (at least every week) with the daily supervisor will take place, in which the student will be given feedback and instructions on the day-to-day research. Progress meetings (at least every four weeks) with the supervisor should take place, in which the students will be given clear feedback on their progress.
- Supervisors should provide feedback on at least one full draft version of written assignments, provided the student meets the agreed deadline for handing in the full draft.
- All written assignments must be checked for plagiarism before grading.
- The three major individual projects of the programme (master thesis project, research paper, and small research project) must be on very different topics and with different supervisors.
- The students are instructed in the possible use and misuse of AI and online information tools with the focus on ethics, critical thinking, and proper referencing.

General:

- All assessment and feedback, final and day-to-day, is provided in English to prepare students for a research career with an international job market.

3. Learning outcomes of the degree programme

	Learning Outcomes *At the end of the programme, the graduate …*
1	is able to perform Nanoscience research in the international and interdisciplinary environment of a world-leading institute;
2	has the knowledge, skills, and attitude that are needed for successful entrance and participation in a PhD programme;
3	understands the importance of proper scientific conduct and responsible behaviour when performing research, and is aware of the social and ethical ramifications of scientific research and its applications;
4	can apply knowledge of those parts of the disciplines of physics, chemistry, and mathematics that are relevant to Nanoscience, as well as knowledge of a selection of topics within molecular biology and medicine that are relevant to Nanoscience;
5	is able to solve realistic scientific problems in the interdisciplinary field of Nanoscience, even on the basis of a rudimentary problem specification;
6	is capable of acquiring sufficient knowledge within a limited time span to work in a different speciality within Nanoscience;
7	is capable of critically using the scientific literature in their chosen speciality;
8	is capable of both performing scientific research, analysing the data, and of interpreting the results;
9	can effectively convey and discuss results of scientific research, orally and in written form, to specialists as well as non-specialists;
10	is able to plan and conduct research independently;
11	is able to perform research in a research team and work together with fellow students;
12	can formulate and defend a realistic and well-argued research plan on the basis of a rudimentary problem specification;
13	is able to adapt to the rapid changes occurring in the field of Nanoscience.

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

This table shows all the course units for each year of the programme and assessment methods.

Year	Period	Course	EC	Assessment methods	Does (part of the) assessment have a formative function?	Test moment(s) (e.g. mid-term, continuous assessment, exam week, etc)	First examiner and (second examiner)
1	1a – 1b	Guided Self-study in Nanoscience (WMNS003-06)	6	*WE* (*OR* option in case of resit)	Yes	exam week	Course coordinator: J. Ye Part Quantum Physics: C.H. van der Wal (G.R. Blake) Part Solid-state Physics: J. Ye (M.A. Loi) Part Organic Chemistry: T.L.C. Jansen (S. Otto) Part Inorganic Chemistry: L. Protesescu (B. Noheda)
1	1a – 1b	Preparation of Nanomaterials and Devices (WMNS013-06)	6	Part 1: *PR, R* Part 2: *PR, R* Part 3: *PR, R* Part 4: *PR*	Yes	exam week	Course coordinator: T. Banerjee Part 1. Thin-film growth: T. Banerjee (B.J. van Wees) Part 2. Preparation of inorganic devices: B.J. van Wees (C.H. van der Wal) Part 3. Preparation of solution processable devices: M.A. Loi (L.J.A. Koster) Part 4. The preparation of colloidal nanomaterials: L. Protesescu (G.R. Blake)
1	1a – 1b	Nanomaterial Design (WMNS015-05)	5	*WE* (all parts) (*OR* option in case of resit)	Yes	exam week	Course coordinator: S. Otto Part 1. Design of biomimetic mat.: D. Maniar/N.H. Katsonis (N.H. Katsonis/D. Maniar) Part 2. Ordered molecular structures: S. Otto (N.H. Katsonis) Part 3. Nanomedicine: A. Salvati/P.H.C. Aberg (P.H.C. Aberg/A. Salvati)
1	1a – 1b	Characterization of Nanomaterials and Devices (WMNS009-08)	8	*WE, PR, R* (all parts) (*OR* option in case of resit)	Yes	exam week	Course coordinator: B.J. Kooi Part 1. Surface and Single Molecule Techniques: W.H. Roos (R. Vlijm) Part 2. X-ray Diffraction: G.R. Blake/G. Portale (B. Noheda) Part 3. Optical Spectroscopy: R.M. Hildner (M.S. Pchenitchnikov) Part 4. Electron Microscopy: B.J. Kooi (G.R. Blake)
1	1a – 1b	Fundamental Properties of Nanomaterials and Devices (WMNS014-05)	5	Part 1: *WE, R* Part 2: *WE* Part 3: *WE* (*OR* option in case of resit)	Yes	exam week	Course coordinator: R.W.A. Havenith Part 1. Electronic Structure Properties: R.W.A. Havenith (T.L.C. Jansen) Part 2. Optical Properties: M.S. Pchenitchnikov (T.L.C. Jansen) Part 3. Magnetic Properties: J. Ye (G.R. Blake) Part 4. TV-lectures: T.L.C. Jansen (R.W.A. Havenith)
1	1a – 1b	Functional Properties of Nanomaterials and Devices (WMNS016-05)	5	Part 1: *WE* Part 2: *OR* Part 3: *WE* (*OR* option in case of resit)	Yes	exam week	Course coordinator: G. Portale Part 1. Surfaces and Interfaces: G. Portale (P. Rudolf) Part 2. Transport Properties in organic and hybrid materials: M.A. Loi (L.J.A. Koster) Part 3. Transport Properties in inorganic materials: B.J. van Wees (C.H. van der Wal)

Year	Period	Course	EC	Assessment methods	Does (part of the) assessment have a formative function?	Test moment(s) (e.g. mid-term, continuous assessment, exam week, etc)	First examiner and (second examiner)
1	2a – 2b	Small Research Project and Symposium (WMNS007-13)	13	*R, P, PR*	Yes	mid-term, end presentation	Course coordinator: C.H. van der Wal First examiner: C.H. van der Wal Second examiner: supervisor from list of examiners
1	2a	Review Paper (WMNS011-06)	6	*R*	Yes	peer review moment, paper deadline	Course coordinator: P.R. Onck First examiner: P.R. Onck Second examiner: supervisor from list of examiners
2	1a – 2b	PhD Research Proposal (WMNS012-06)	6	*R, P*	Yes	pitch, report deadline	Course coordinator: T.L.C. Jansen First examiner: T.L.C. Jansen Second examiner: supervisor from list of examiners
2	1a – 2b	Master Thesis (WMNS901-45)	45	*R, P, PR*	Yes	mid-term, chalk talk, end presentation, report deadline	Course coordinator: L. Protesescu First examiner: supervisor from list of examiners Second examiner: from list of examiners

The abbreviations for the relevant assessment methods are explained in the legend of the table:

- *Written Exam (WE)*
- *Multiple Choice (MC)*
- *Oral Exam (OR)*
- *Report (R)*
- *Presentation (P)*
- *Practical Work (PR)*
- *Assignment (AST)*

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

An X indicates which learning outcomes are assessed in which courses.
An ***X*** *means that the learning outcome is explicitly assessed (not merely addressed) in the course.*

		Learning outcomes of the degree programme												
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
Period	**Course**	**Year 1 – compulsory courses**												
1a – 1b	WMNS003-06				**X**		**X**							
1a – 1b	WMNS013-06				**X**		**X**		X	X				
1a – 1b	WMNS015-05				**X**		**X**							
1a – 1b	WMNS009-08				**X**		**X**		X	X				
1a – 1b	WMNS014-05				**X**		**X**		X	X				
1a – 1b	WMNS016-05				**X**		**X**			X				
2a – 2b	WMNS007-13	**X**	X	**X**		**X**	X	X	**X**	**X**	**X**	**X**	X	**X**
2a	WMNS011-06	X	X	**X**	X		**X**	**X**		**X**	**X**	X	X	**X**
Period	**Course**	**Year 2 – compulsory courses**												
1a – 2b	WMNS012-06	X	**X**	X	X	**X**	X	**X**		**X**	**X**		**X**	**X**
1a – 2b	WMNS901-45	**X**	**X**	X	X	**X**	X	**X**	**X**	**X**	**X**	**X**	**X**	**X**
Period	**Course**	**Year 1 and 2 electives* (15 ECTS, split over the second semester of the first year and the whole second year)**												
1a – 2b	See Ocasys				**X**		X							

** See the Ocasys course descriptions of the electives and the assessment plan of the responsible degree programme. The electives are chosen from other degree programmes. The students must choose at least three elective courses at master level (15 ECTS) that have relevance for their personal study programme, in particular in relation with the MSc thesis project. The electives are typically chosen from the master programmes of (Applied) Physics and Chemistry, but can also come from any other master programme of the Faculty of Science and Engineering. Before participating in these electives, the student must discuss and develop the choice with their mentor (staff member), and subsequently get it approved by the programme management. Before starting the Master Thesis (WMNS901-45), the students also ask approval from the supervisor of the Master Thesis. A list with approved electives is part of the Appendices of the Teaching and Examination Regulations for the Top Master Nanoscience and published on Ocasys for the students.*

6. List of examiners

Name staff member	Research group
Banerjee, T.	Spintronics of Functional Materials
Blake, G.R.	X-ray/Neutron Scattering and Spectroscopy
Chicca, E.	Bio-inspired Systems & Circuits
Covi, E.	Bio-inspired Systems & Circuits
Ehrler, B.	
Giessen, E. van der	Micromechanics
Giuntoli, A.	Micromechanics
Grubisic-Cabo, A.	Surfaces and Thin Films
Guimaraes, M.H.	Opto-Spintronics of Nanostructures
Hildner, R.	Optical Spectroscopy of Functional Nanosystems
Hoekstra, R.A.	Quantum Interactions and Structural Dynamics
Jansen, T.L.C.	Computational Spectroscopy
Kamperman, M.M.G.	Polymer Science
Kooi, B.J.	Nanostructured Materials and Interfaces
Koster, L.J.A.	Physics of Novel Semiconductors and Devices
Lo Conte, R.	Surfaces and Thin Films
Loi, M.A.	Photophysics and Opto-Electronics
Loos, K.U.	Macromolecular Chemistry and New Polymeric Materials
Maniar, D.	Polymer-based composite materials
Mostovoy, M.V.	Theory of Condensed Matter

Noheda, B	Nanostructures of Functional Oxides
Ocelik, V.	Microstructural Characterization of Materials
Onck, P.R.	Micromechanics of Biological and Active Materials
Palasantzas, G.	Surface Interactions and Nanostructures
Pchenitchnikov, M.S.	Ultrafast Dynamics in Molecular Systems
Portale, G.	Physical Chemistry of Polymeric and Nanostructured Materials
Protesescu, L.	Nanomaterials Chemistry
Roos, W.H.	Molecular Biophysics
Rudolf, P.	Surfaces and Thin Films
Schlathölter, T.A.	Gas Phase Biomolecules and Energetic Interactions
Slawinska, J.L.	Computational Materials Science
Tromp, M.	Materials Chemistry
Vlijm, R.	Molecular & Cellular Scale Biophysics
Wal, C.H. van der	Quantum Devices
Wees, B.J. van	Physics of Nanodevices
Wel, P.C.A. van der	Solid-state Nuclear Magnetic Resonance
Ye, J.	Device Physics of Complex Materials
Zaag, P.J. van der	Molecular Biophysics

Associate members from Research Groups Stratingh Institute of Chemistry (Stratingh)

Staff	Research Group
Browne, W.R.	Molecular Inorganic Chemistry
Feringa, B.L.	Synthetic Organic Chemistry
Harutyunyan, S.	Homogeneous Catalysis
Havenith, R.W.A.	(Bio) Organic Materials and Devices
Katsonis, N.H.	Active Molecular Systems
Klein, J.E.M.N.	Molecular Inorganic Chemistry
Kudernac, T.	Molecular Inorganic Chemistry
Minnaard, A.J.	Chemical Biology 2
Otten, E.	Molecular Inorganic Chemistry
Otto, S.	Systems Chemistry
Pollice, R.	(Bio) Organic Materials and Devices
Roelfes, J.G.	Biomolecular Chemistry & Catalysis

Associate members from Research Groups Biomolecular Sciences and Biotechnology Institute (GBB)

Staff	Research group
Driessen, A.J.M.	Molecular Microbiology
Marrink, S.J.	Molecular Dynamics
Poolman, B.	Membrane Enzymology
Slotboom, D.J.	Membrane Enzymology
Vries, de A.H.	Molecular Dynamics

Long-term research associates, but not listed above

Staff	Research Institute
Aberg, P.H.C.	Groningen Research Institute of Pharmacy, lecturer in Nanoscience core modules
Jaeger, H.	Bernoulli Institute for Mathematics, Computer Science and Artificial Intelligence; Note: only second examiner for research projects related to Computing in Cognitive Materials
Pei, Y	Engineering and Technology Institute Groningen; Note: only second examiner for research projects related to Advanced Production Engineering
Pescarmona, P.P.	Engineering and Technology Institute Groningen; research group Catalysis & Sustainability.
Rijn, P. van	Faculty of Medical Sciences; Note: only second examiner for research projects related to Nanobiotechnology and Advanced Therapeutic Materials
Salvati, A.	Groningen Research Institute of Pharmacy, lecturer in Nanoscience core modules
Stuart, M.C.A.	Stratingh Institute for Chemistry; Note: only second examiner for research projects regarding Advanced Software TEM Characterization
Taatgen, N.A.	Bernoulli Institute; Note: only second examiner for research projects regarding to Artificial Intelligence
Timmermans, R.G.E.	Van Swinderen Institute; Note: only second examiner for research projects regarding Theoretical Physics