Faculty of
Science & Technology

UNIVERSITEIT TWENTE.

Programme-specific appendix to the programme part of the students' charter, including the education and examination regulations of the Nanotechnology (NT) Master's Programme

(art. 7.13 and 7.59 WHW)

Contents

Preamble

a. The rules in this appendix apply to the full-time Master's programme Nanotechnology (Croho number 60028).
b. Together with the General Section (TNW/21.679/jg), this programme-specific appendix forms the programme part of the student charter, including the Education and Examination Regulations for the Master's programme Nanotechnology of the faculty Science and Technology at the University of Twente.
c. The programme is subject to the legislation of the Dutch Higher Education and Research Act (WHW).

Reference: TNW/21.697/fl/jg
Date: 8 July 2021

Article 1 Programme Mission, Profile and Objectives

The discipline of nanotechnology aims to design and develop functional materials, structures and systems by manipulating or measuring materials at the nanometre length scale and to use new phenomena and properties on this length scale. Research and development in this field concerns the manipulation of nano-scale structures and their integration in larger components, systems and architectures.

The Nanotechnology programme aims to train students at an internationally recognised high academic master level, to be pro-active researchers, designers and engineers who are able to develop, propagate and apply innovative knowledge in the field of nanotechnology.

The Nanotechnology programme offers students a curriculum that allows them to acquire skills in nanotechnology and to further develop their knowledge, skills and insight in the various sub-areas of nanotechnology. The final level aims to provide graduates with sufficient competencies to be able to act at a high academic level and in a professional and independent manner. Graduates will be able to successfully enter a variety of professional fields, such as scientific research, process and product development, and professional training in nanotechnology or related disciplines.

The Nanotechnology Master's programme focuses on the design, manufacture and characterisation of functional nanomaterials, nanodevices and systems. The subjects are closely related to the research subjects of the various groups that are part of the research institute MESA+ Institute for Nanotechnology.

Article 2 Intended learning outcomes

The intended learning outcomes have been described on the basis of the 3TU Academic Competencies, better known as the Meijers' Criteria[1]. These criteria have been approved by the NVAO[2] and provide an excellent framework that systematically defines the general intended learning outcomes of an academic master's programme, in which specific aspects for individual programmes may also be included.

A university graduate in a technical field can be characterised using seven competence areas. He or she:

1. is competent in one or more scientific disciplines
2. is competent in doing research
3. is competent in designing
4. has a scientific approach
5. possesses basic intellectual skills
6. is competent in cooperating and communicating
7. takes account of the temporal and the social context

The competence areas are elaborated in the various competences. For each competence, it is indicated whether the emphasis is on knowledge (k) skills (s) or attitude (a).

The master's graduate Nanotechnology:

1. Has thorough knowledge of a sub-area of nanotechnology.
A graduate NT is familiar with current scientific knowledge and has the competence to extend this knowledge by means of (independent) study.

1a	Has a thorough understanding of the basic knowledge of the relevant disciplines and is versed in the areas of the disciplines that are in the forefront of the knowledge of nanotechnology and underlying disciplines, such as (nano)physics, (nano)chemistry, (nano)devices and materials science (latest theories, methods, techniques and topical questions). [ks]
1b	Actively looks for structure and connections in the relevant disciplines [ksa]
1c	Has the knowledge, skills and attitude to independently, in the context of more advanced ideas or applications in nanotechnology: - develop theories and models, - interpret texts, problems, data and results, - conduct experiments, and collect and simulate data, - make decisions based on the data and the modelling. [ksa]

[1] A.W.M. Meijers, C.W.A.M. van Overveld, J.C. Perrenet, Criteria for Academic Bachelor's and Master's Curricula, TU/e 2005 (also available via http://www.jointquality.org/ descriptors special descriptors).

[2] Accreditation Organisation of the Netherlands and Flanders (NVAO).

1d	Has experimental skills in areas of relevant disciplines, such as - nanotechnology: the manufacture of nanomaterials, qualitative and quantitative characterization of chemical and physical properties, including working in a cleanroom. - in one of the research areas: solid state matter, (bio)molecular matter and soft matter combined with components and systems. [ksa]
1e.	Has the ICT skill to create and edit text, data and models. [ksa]
1f.	Is aware of the presuppositions of standard methods and their importance; is able to reflect on these methods and presuppositions; is able to challenge them; is able to propose changes and is able to assess their impact. [ksa]
1g.	Is able to independently identify gaps in their knowledge, and to enhance and extend their knowledge through study. [ksa]

2. Is able to conduct research in one or more sub-areas of nanotechnology.

A graduate NT has the competence to acquire new scientific knowledge through research. Research here means: developing knowledge and new insights in a targeted and methodical manner.

2a.	Is aware of the complex nature of the research methodology in nanotechnology. [ksa]
2b.	Is able to independently conduct research at master level, and to - analyse research issues of a complex nature in nanotechnology, - make use of the relevant knowledge base, - define research targets and, if relevant, define suitable hypotheses, - define a research plan, including the required theoretical and experimental steps, assumptions and methods, - carry out the various activities of the research plan, - analyse and evaluate the research results in relation to the defined problem, - assess the scientific value of the research results, - defend these results against others. [ksa]
2c.	Is perceptive and has the creativity and the ability to discover specific connections and new viewpoints and to use these new viewpoints for new applications. [ksa]
2d.	Is able to work at different levels of abstraction and selects the appropriate level for the process stage of the research problem. [ksa]
2e.	Is able to assess the scientific merit of research in nanotechnology, to systematically collect such research, and to analyse and process it. [ksa]
2f.	Is able to and has the attitude to involve other disciplines in their research as and when necessary. [ksa]
2g.	Is able to handle changeability of the research process due to external circumstances or progressive insights. Is able to adjust this process accordingly. [ksa]
2h.	Is able to contribute independently to the development of scientific knowledge of one or more sub-areas of nanotechnology. [ks]

3. Is skilled in designing in one or more sub-areas of nanotechnology.

Apart from conducting research, many graduates NT will also create designs. This concerns in particular the design of measuring installations, methods, materials or systems that are required for research, but also the design of processes for nano-manufacturing and for the production of nanotechnology products. Designing is a synthetic activity that aims at the realisation of new or changed artefacts or systems, with the objective of creating value in conformity with pre-defined requirements and wishes.

3a.	Is able to independently design at master level, and to: - analyse complex design issues in connection with measuring installations, methods, materials or systems. - integrate the relevant knowledge base in a design. - formulate design requirements, objectives and conditions, and takes into account safety, environmental and economic aspects, and describes and translates these requirements into quantitative design parameters. - formulate a design plan on a general and detailed level, including the steps, assumptions and methods.

	- analyse and evaluate a design and decision steps in a systematic manner with respect to the defined requirements. - make a technical and economic analysis of the selected design. - defend these results against others. [ksa]
3b.	Is able to systematically collect, analyse and process relevant design information from literature, patents, databases and websites, and is able to identify missing information. [ks]
3c.	Is creative and has synthetic skills with respect to design problems. [ksa]
3d.	Is able to work at different levels of abstraction and selects the appropriate level for the process stage of the design problem. [ksa]
3e.	Is able to handle changeability of the design process due to external circumstances or progressive insights. Is able to adjust this process accordingly. [ksa]
3f.	Is able to and has the attitude to involve other disciplines in their design as and when necessary. [ksa]
3g.	Is able to phrase new research questions on the basis of a design problem. [ks]

4. Takes a scientific approach.

A graduate NT uses a systematic approach, characterised by the development and use of theories, models and consistent interpretations; has a critical attitude and has insight into the nature of nanoscience and nanotechnology.

4a.	Is able to identify and take in relevant developments. [ksa]
4b.	Uses a systematic approach, characterized by the development and use of theories, models and consistent interpretations and is able to subject these to a critical assessment in the area of their final master's project. [ksa]
4c.	Is in possession of extensive skills in using, developing and validating models; is able to make a considered choice between modelling methods. [ksa]
4d.	Has insight in the nature of science and technology (purpose, methods, differences and similarities between scientific disciplines, nature of laws, theories, explanations, role of the experiment, objectivity, etc.) and is familiar with current discussions. [k]
4e.	Has insight in scientific practice (research system, relationship with clients, publications system, importance of integrity, etc.) and is familiar with current discussions on the subject. [k]
4f.	Is able to adequately document the research results and design, with the purpose to contribute to the development of knowledge within and outside the discipline, and is able to publish the results. [ksa]

5. Has intellectual skills.

A graduate NT is competent in reasoning, reflecting and forming an opinion. These are skills that are trained and improved in the context of nanotechnology, and that are generally applicable, afterwards.

5a.	Is able to critically and independently reflect on his/her own thinking, decision making, and acting and is able to make adjustments. [ksa]
5b.	Can reflect on their strong and weak points in connection with research, design, organization and teaching/advising activities, and can make adjustments on the basis of this. [ks]
5c.	Is able to reason logically within nanotechnology and is able to recognize modes of reasoning (induction, deduction, analogy, etc.); is able to recognize fallacies, and is able to apply the modes of reasoning. [ksa]
5d.	Is able to ask adequate questions and takes a critical, but constructive attitude when analysing and resolving complex problems in nanotechnology. [ks]
5e.	Is able to achieve a substantiated opinion in case of incomplete of irrelevant data or inaccuracies, taking into consideration the manner in which the data was created. [ks]
5f.	Is able to express a point of view in a scientific argument in nanotechnology and is able to make a critical judgement. [ksa]

6. Is able to cooperate in projects, and communicate with specialists in the chosen track and other stakeholders.

A graduate NT is able to work with and for others. This requires not only adequate interaction, a sense of responsibility, and leadership, but also good communication with colleagues and other stakeholders. He is also able to participate in a scientific or public debate in English.

6a.	Is able to perform project-based work for complex projects: is able to develop a project plan and planning, is able to deal with limited sources, is able to deal with risks. [ks]
6b.	Has insight into, and is able to deal with, team roles and social dynamics; is able to work within an team with disciplinary and cultural diversity; is pragmatic and has a sense of responsibility; is able to make compromises. [ksa]
6c.	Is able to communicate in writing and verbally in English about research and solutions to problems with colleagues, non-colleagues and other involved parties. [ksa]
6d.	Is able to interpret English written scientific literature and textbooks and to understand discussions and scientific debates in English. [s]
6e.	Is familiar with professional behaviour. This includes: reliability, commitment, accuracy, perseverance and independence as well as respect for others irrespective of their age, social economic status, education, culture, philosophy of live, gender, race or sexual nature. [ksa]

7. Takes the current and social context into account.

Nanoscience and nanotechnology do not exist in isolation; they exist in a current and social context. Points of view and methods have their origin in society and, in time, decisions made will have consequences for society. A graduate NT is aware of this and has the competence to integrate these insights in their scientific work.

7a.	Is aware of social, environmental, sustainability and safety aspects of nanotechnology; is able to analyse and understand these aspects and integrates elements of them in his/her scientific work. [ksa]
7b	Has an eye for the various roles of a nanotechnology professionals in society: researcher, designer, manager, adviser/teacher and chooses a professional position in society. [ksa]
7c.	Is able to analyse the social consequences (economic, social, cultural) of new developments in nanotechnology, to discuss the subject with colleagues, non-colleagues, and to integrate the consequences in his/her scientific work. [ksa]
7d.	Is able to analyse the ethical and normative aspects of the consequences and the assumptions of scientific thought and actions within nanotechnology, to discuss the subject with colleagues, non-colleagues (in research, design and applications), and to integrate this in his/her scientific work. [ksa]

Article 3 Admission Committee

1. An admission committee is appointed by the dean of the Faculty of Science and Technology for the admission of students to the master's programme.
2. The Executive Board has delegated the authority to accept or reject students for the master's programme (S&C/387.191/lk) to the board mentioned under paragraph 1.
3. The admission committee consists of at least two members:
   a. the Programme Director,
   b. the Programme Coordinator;

   The admission committee is chaired by the Programme Director.
   If the chair deems it necessary, the faculty internationalisation coordinator , the secretary of the Examination Board and/or the study advisor can join the admission committee.

Article 4 Admission to the Programme

1. Admission to the programme is granted to:
   a. Students in possession of a degree in Electrical Engineering, Chemical Engineering, Biomedical Engineering, Applied Physics, Physics or Chemistry from a Dutch university subject to the condition that their education included sufficient attention to quantum mechanics, solid state physics or inorganic materials science, organic materials science and spectroscopy. This assessment is made by the admission committee.
   b. Students in possession of a degree for the Bachelor's programme Advanced Technology (AT), ATLAS, Biomedische Technologie (BMT), Electrical Engineering or Chemical Science and Engineering (CSE) of the University of Twente can be admitted to the regular Master's programme if they successfully passed the modules Condensed Matter Physics (15 EC, B3 programme AT) and Materials Science and Engineering (15 EC, B2 programme AT) or Materials Science and Technology (15 EC, B2 programme CSE) in their Bachelor's programme.
   c. Other students who meet at least one of the following requirements:
      - The student is in possession of a bachelor's degree or equivalent in a study programme which, in the opinion of the admission committee, enables the candidate to complete the Master's programme within the defined period.
      - The student is in possession of a master's degree or equivalent in a study programme which, in the opinion of the admission committee, enables the candidate to complete the Master's programme within the defined period.
      - If the student has no qualification in the above sense, but does have an education and/or additional experience which, as a whole, is regarded by the admission committee as equivalent to one of the above degrees and the board is of the opinion that this education and experience enable the candidate to complete the Master's programme within the defined period, the admission committee may decide to admit the candidate.

   The admission committee issues a proof of admission to the programme if the conditions under section a, b or c are met.
2. During assessment of the application for admission to the Master's programme, the admission committee can demand that some subjects must be passed before proof of admission to the master's programme can be issued.
3. When proof of admission to the Master's programme is issued, the admission committee may propose to grant exemption for particular parts of the programme, with exception of the final master's project. The proposal has to be submitted to the Examination Board for approval.
4. A student with a bachelor degree in one of the bachelor's programmes of the University of Twente, who has passed one or more compulsory parts of the Master's programme Nanotechnology before entering the programme or passed subjects that may be approved by the Examination Board as an elective in the Master's programme Nanotechnology, may be granted exemption for those parts by the Examination Board. The exemption is only for the parts concerned, the student will not be granted a reduction of the total study load of 120 EC of this Master's programme.
5. Proof of admission to the Master's programme granted by the admission committee may be subject to the condition of particular deficiency courses as defined in Article 5. Consequently, the total programme of the student's Master's programme may exceed 120 EC. The conditions will be mentioned in the admission letter.

6. The following applies for students with a qualification in higher professional education (university of applied sciences, HBO) in Electrical Engineering, Chemical Technology, Nanotechnology or Applied Physics:
   a. They may be admitted to the Master's programme after they have completed a transfer programme. The content of the transfer programme is determined by the admission committee.
   b. They will be admitted to a transfer programme of at least 24 EC.

   The transfer programmes selected for the student by the Examination Board are defined in Article 8 of this programme-specific appendix. After successfully completing the transfer programme students will be admitted to the Master's programme.

7. Students with another bachelor's degree than mentioned under article 4.6 of a university of applied sciences, can also be admitted to the transfer programme after approval of the admission committee. After successfully completing the transfer programme they will be admitted to the Master's programme.

8. Students with a previous education at a foreign institution must demonstrably have sufficient language skills in spoken and written English. A requirement for their admittance to the programme may be a sufficient score in a recognised test. This means a total score of 6.5 or higher for the IELTS test, or a score of 90 or higher for the Internet-based TOEFL test[3]. Students in possession of a bachelor's degree from a country where English is the main language in higher education[4] are exempt from this requirement.

Article 5 Regular Master's Programme

The programme outlined in this article applies to cohort 2017/2018 and later.
The programme applicable to cohort 2016/2017 is outlined in the programme-specific appendix to the Education and Examination Regulations (TNW17057/bb/ae/vdh, dated 20/07/2017), supplemented by a transition arrangement drawn up by the Programme Director.
The programme applicable to cohorts 2015/2016 and earlier is outlined in the programme-specific appendix to the Education and Examination Regulations (TNW150105/mb/vdh, dated 20/08/2015), supplemented by a transition arrangement drawn up by the Programme Director.

The Master's programme consists of two years. The first 3 quarters of the first year consist of subjects and the fourth quarter consists of an Internship & Job Orientation Project. The remaining (compulsory) subjects and the final master's project take place in the second year. The total study workload is at least 120 EC.

1. The programme has the following structure:

The following compulsory subjects are offered in the first year (55 EC):

- Fabrication of nanostructures (7,5 EC, 201600042)
- Characterization of nanostructures (7,5 EC, 201600043)
- Nanoscience (5 EC, 193400050) or Nanophysics[5] (5 EC, 193530010)
- Nano-Lab: Fabrication & Characterization (5 EC, 201600041)
- Nanotechnology design project (10 EC, 201600044)
- The Internship & Job Orientation Project is with an external company, external research institute or a university abroad (20 EC, 201700174)

The second year consists of the compulsory subject (40 EC):

- The final master's project is supervised by a professor of one of the nanotechnology research groups participating in MESA+ (40 EC).

---

3 IELTS: International English Language Testing System; TOEFL: Testing of English as a Foreign Language; see the UT website on admittance to the master's programme's: https://www.utwente.nl/en/education/master/admission-requirements/international-degree.

4 The list of countries can be found at https://www.utwente.nl/en/education/master/admission-requirements/international-degree/countries/.

5 Students in possession of a degree for the Bachelor's programme Advanced Technology (AT), Applied Physics (AP) or Chemical Science and Engineering (CSE) of the University of Twente can also decide to do Nanophysics (5 EC; 193530010) instead of Nanoscience (5 EC; 193400050). Other students with proven skills and knowledge of nanoscience can also take part in the course Nanophysics instead of Nanoscience after consultation with the lecturer. Students may follow both courses consecutively.

The remaining 25 EC consist of optional subjects.15 EC must consist of the following subjects from three categories:

(Application of) Solid State Matter:

- Nano-optics (5 EC, 193400131)
- Nanomaterials Research (5 EC, 201900042)
- Nano-electronics (5 EC, 193400141)
- AMM Inorganic Materials Science (5 EC, 193700040)

(Bio)Molecular Matter:

- Bionanotechnology (5 EC, 193400111)
- Nanomedicine (5 EC, 201200220)
- (Bio)molecular Chemistry & Technology (5 EC, 193700020)

Nano-engineered Devices

- Lab on a Chip (5 EC, 201600046)
- Nanofluidics (5 EC, 193400121)
- Micro Electro Mechanical Systems (MEMS) Design (5 EC, 191211300)
- Advanced Colloid & Interfaces (5 EC, 201800083)

The other 10 EC are optional and can be used for one of the above mentioned subjects or subjects from other master programme's (also non-technical subjects) at the University of Twente.

The combination of subjects requires the approval of the supervising professor and the Examination Board.

2. Deficiency courses

a. International students and students of the university of applied sciences have to follow a workshop regarding academic skills (0,5 EC; 201700158).
b. Students with no proven skills and knowledge in instrumentation, have to follow an introductory module A First Practical Course in Electronics (1 EC; 201900246).
c. Students with no proven skills and knowledge in Matlab, have to follow the introductory course Matlab for pre-master ET (2,5 EC 202001389).

3. The Internship & Job Orientation Project

a. The objective of the Internship & Job Orientation Project is to let the students gain experience in the field of Nanotechnology and apply the knowledge and skills they have acquired thus far into practice, by completing an assignment in an external organisation.
b. The Internship & Job Orientation Project must be of nanotechnology nature and must be supervised by a research group that is represented in the discipline committee Nanotechnology. If a student wants to deviate from this rule, he/she can ask the Examination Board for permission to be supervised by a lecturer outside of the discipline.
c. The Internship & Job Orientation Project can be done at a company or research institute abroad or in the Netherlands or at a foreign university.

4. The Final Master's project

a. The objective of the assignment is for students to learn how to independently complete a research assignment of a certain size and degree of complexity.
b. The final master's project is assessed with two grades:
   - One for the scientific and technological aspects (201700240, 20 EC), consisting of the problem analyses (familiarising oneself with a field of study, evaluation of the context, and formulating the research questions and approach), the realisation (the theoretical and experimental approach and realisation), and the results analysis (analysis of the results and their relevance);
   - One for the general aspect of the reporting (193409200, 20 EC). The general aspects consist of independence, commitment, collaboration, originality and creativity. Reporting consists of the oral reporting (presentation and discussion of the research) and the written report (the final master's project report). Part of the general aspects is also an analysis of the societal embedding of the project. To help students with this part a couple of lecturers are planned in the third quarter. This part has to be handed in separately.
c. Approval of the final master's project by the Examination Board must be requested in time by means of the form 'MSc final project contract and course list Nanotechnology' (no later than 1 month before the start of the assignment). The final master's project must be of a nanotechnological nature. The student must indicate the nanotechnological aspects of the assignment in the proposal.

d. For the purpose of monitoring progress, the student must draw up a mid-term evaluation, in which the acquisition of information, the problem analysis, progress and the direction of the final master's project are reported. This report will be discussed with the master assignment committee.
e. The final master's project has to be carried out at a research group of the Nanotechnology department at the University of Twente. If a student wants to deviate from this rule, he/she can ask the Examination Board for permission to carry out the final Master's project outside of the University of Twente, provided that there is a good collaboration and communication plan between the external party and the research chair. It is not possible to carry out the MSc assignment at the same place where the internship took place.

Article 6 Two master's degree programme

A two-master's degree programme is a combination of two separate UT master's programmes which the student follows in parallel and involves a joined final master's project and a joined internship and job orientation project.
When the student has successfully met all requirements for his two master's programme, the student will be granted a certificate for both master's programmes.

1. Article 2.1 paragraph 7 from the general section of the Education and Examination Regulations is applicable: 'The student who is following two master programmes, the administration provided by CES and if applicable the admission committee, are required to inform the Examination Board concerned as soon as possible of the fact that the student is following two master programmes.'
2. Article 2.1 paragraph 6 from the general section of the Education and Examination Regulations is applicable: 'In case of a student following two master's programmes, including at least one master's programme of the faculty Science and Technology, the student has to submit his/her programme for approval to the Examination Board.'
3. The exam programme (course list) has to be submitted at the start of the two master's degree programme (Rules of the Examination Board, article 12).
4. For the exam programme of a two master's degree programme, the following rules apply:
   a. The total programme is 180 EC,
   b. The study load of the joined final master's project is 60 EC,
   c. The composition of the assessment committee of the Final Master's Project should meet the requirements of Rules of the Examination Board (article 12 and 13),
   d. The study load of the joined Internship & Job Orientation Project is 30 EC, the joined internship and job orientation project should have two assessors,
   e. The internship and the examiners should meet the requirements of Rules of the Examination Board (article 14). The two assessors should originate from and be representative for the two master's programmes concerned.

Article 7 Double degree (DD) programme with University of Technology Łodz (TUL), Poland

A student's specific programme, including any exemptions to be granted, must be approved beforehand by the Examination Board. The following rules apply:

1. This programme is only applicable for students of TUL after finalising the first semester of the Master's programme Nanotechnology successfully.
2. The UT-part of this DD programme consists of at least 75 EC, consisting of 35 EC for subjects and 40 EC for the final master's project.
3. Students admitted to the Double Degree Programme will be granted exemption for the compulsory subject 'Design Project'.
4. After finalising the UT-part the student still has to fulfil a Research & Development project as part of the TUL Curriculum.

This is an overview of the Double Degree Programme:

- Fabrication of nanostructures (7,5 EC, 201600042)
- Characterization of nanostructures (7,5 EC, 201600043)
- Nanoscience (5 EC, 193400050)
- Nano-Lab: Fabrication & Characterization (5 EC, 201600041)
- The final master's project is supervised by a professor of one of the nanotechnology research groups participating in MESA+ (40 EC)

and 10 EC from the following subjects:

(Application of) Solid State Matter:

- Nano-optics/photonics (5 EC, 193400131)
- Nanomaterials Research (5EC, 201900042)
- Nano-electronics (5 EC, 193400141)
- AMM Inorganic Materials Science (5 EC, 193700040)

(Bio)molecular Matter:

- Bionanotechnology (5 EC, 193400111)
- Nanomedicine (5 EC, 201200220)
- (Bio)molecular Chemistry & Technology (5 EC, 193700020)

Nano-engineered Devices

- Lab on a Chip (5 EC, 191211120)
- Nanofluidics (5 EC, 193400121)
- Micro Electro Mechanical Systems (MEMS) Design (5 EC, 191211300)
- Advanced Colloid & Interfaces (5 EC, 201800083)

Article 8 Programme for students with a qualification in higher professional education

1. The transfer programme is as follows:

Transfer programme students with a physics or electrical engineering background		**Transfer programme students with a chemistry background**	
Name	*EC*	*Name*	*EC*
Calculus A	5	Calculus A	4
Calculus B	4	Calculus B	3
Calculus C	3	Calculus C	3
Matlab for pre-masters ET[1]	2/2.5	Matlab for pre-masters ET	2
Intro Solid State Physics[2]	5	A first practical course in electronics	2
Molecular Structure and Spectroscopy[2]	2.5	Intro Solid State Physics[2]	5
Physical Chemistry[3]	4	Molecular Structure and Spectroscopy[2]	2.5
Chemistry & Technology of Materials[3]	4	Electricity & Magnetism	5
Workshop Academic Skills	0.5	Chemistry & Technology of Materials[3]	4
		Workshop Academic Skills	0.5
Total	30/30.5	*Total*	31

[1] Depending on the capacity of the course students will follow this course either during Q1 (2 EC) or during Q2 (2.5 EC)
[2] Part of Module 9 of BSc AT
[3] Part of Module 6a (Materials Science and Engineering) of BSc AT

2. Students must complete the transfer programme within a period of 1 year and will be given 2 opportunities to take the exam.
3. After completion of the transfer programme, if the student is in possession of a qualification in higher professional education in Electrical Engineering, Chemical Technology, Applied Physics or Nanotechnology, he/she will be admitted to the Nanotechnology Master's programme.
4. Instead of the transfer programme mentioned above, students of the University of Applied Sciences can also attend a transfer minor of 30 EC (Kies-Op-Maat minor) during their higher professional education. Paragraph 2 and 3 also apply to these students.

   The transfer minor is as follows:

Transfer programme students with a physics or electrical engineering background		**Transfer programme students with a chemistry background**	
Name	*EC*	*Name*	*EC*
Calculus A	5	Calculus A	4
Calculus B	4	Calculus B	3
Calculus C	3	Calculus C	3
Matlab for pre-masters ET[1]	2.5	Matlab for pre-masters ET	2.5
Intro Solid State Physics[2]	5	A first practical course in electronics	2
Molecular Structure and Spectroscopy[2]	2.5	Intro Solid State Physics[2]	5
Physical Chemistry[3]	4	Molecular Structure and Spectroscopy[2]	2.5
Chemistry & Technology of Materials[3]	4	Electricity & Magnetism	5
Workshop Academic Skills	0.5	Chemistry & Technology of Materials[3]	4
		Workshop Academic Skills	0.5
Total	30/30.5	*Total*	31

[1] Depending on the capacity of the course students will follow this course either during Q1 (2 EC) or during Q2 (2.5 EC)
[2] Part of Module 9 of BSc AT
[3] Part of Module 6a (Materials Science and Engineering) of BSc AT

Article 9 Transition arrangement

1. In the event of a change to programmes included in Articles 5, 7 and 8 of this appendix, or of a change to one of the other articles in the general section or in this programme-specific appendix, a transitional arrangement will be defined and announced by the Programme Director.
2. Article 8.4 of the general section states the conditions to be met by a transition arrangement.
3. The transition arrangement will be published on the website of the Nanotechnology programme.

Article 10 Safety

Working in a laboratory is subject to safety requirements. Students must acquaint themselves with these rules[6] and abide by them.

Article 11 Sequence of Study Units

1. Prior to starting a programme unit, the student must meet the knowledge requirements of the programme unit.

d. The student can only start the internship & job orientation project when he/she has successfully completed at least 30 EC of the Master's programme. If a student is following a two master's programme he/she only can start with the Internship & job Orientation Project when he/she has successfully completed at least 45 EC of the Master's programme.

e. The student can only start the final master's project when he/she only has 10 EC of courses left to do (not including the final master's project). If a student is following a two master's programme he/she can only start the final master's project when he/she only has 15 EC of courses left to do.

2. Prior to the examination on the final master's project, the student must have successfully completed all other programme units.
3. The Examination Board is authorised to grant exemption from the conditions in paragraphs 1 to 4 of this article if strict application of those terms would result in an unreasonable delay in study progress. The student can submit a request to this end to the Examination Board.

Article 12 Flexible degree programme

Contrary to the provisions in article 5 of this appendix, the student can request the permission of the Examination Board to compose a flexible degree programme in the sense of Art. 7.3h of the law. The Examination Board assesses whether the programme is appropriate and consistent within the domain of the programme and whether the level is high enough in the light of the intended learning outcomes of the programme.

Article 13 Student Counselling

The task of the study adviser is to individually advise students on all aspects of their studies, and to inform the Programme Director on the study progress of the students.

[6] See the rules on occupational health and safety and the environment, at http://www.tnw.utwente.nl/intra/diensten/amh/ .

Article 14 Quality Assurance and Evaluation

1. The programme management is responsible for the evaluation of the programme.

2. The quality assurance is coordinated by the quality assurance coordinator of the Science & Technology faculty, cluster Science. The quality assurance coordinator advises the programme (staff) on the internal quality assurance.

3. The execution of the evaluation of the Master's programme Nanotechnology takes place using PDCA procedures by the coordinator Quality Assurance of the Science & Technology faculty/Science & Technology cluster and the programme director/ programme coordinator.

4. The following evaluation tools are used:
    a. Panel meetings with students;
    b. Web surveys of the master's courses[7];
    c. Web survey of the master's final assignment.

5. The results of the internal quality assurance activities will be published in the following manner:
    a. Summary of the web surveys and response of the lecturer regarding the evaluation will be shared with the programme committee;
    b. Summary of web surveys and the response of the lecturer will be placed in the Canvas course 'Quality Assurance and Evaluation NT' which is accessible for all students and lecturers of the master's programme Nanotechnology.

6. To evaluate the curriculum and the master's programme in its entirety the following internal and external evaluations are used:
    a. All information obtained using the tools which are mentioned in 14.4;
    b. The National Student Survey (NSE)[8];
    c. The National Alumni Survey (NAE)[9].

    The programme director will respond to the evaluations, and provide a written reaction focusing on plans for improvement.

7. The programme director and the programme committee decide on which actions need to been taken on course level or curriculum level in order to improve the programme. These actions will be recorded in an 'Action List Quality Assurance and Evaluation'.

8. Every academic year the programme director writes an improvement plan, based on the internal and external evaluations and new insights.
    a. The improvement plan will be discussed with the programme committee;
    b. The improvement plan will be included in the faculty's annual report;
    c. The faculty's annual report will be discussed with the university's executive board by the dean of the faculty and the portfolio holder for education during the autumn meetings.

Article 15 Effectuation and Changes

These regulations will come into effect on 1 September 2021 and replace the regulations dated 1 September 2020.

Established by the board of the Faculty, after advice from the Faculty Council and the Programme Committee and after consent of the Programme Committee with articles 2, 5, 7, 8, 10 and 14.

Enschede, 8 July 2021.

7 Not all courses are evaluated using a web survey every year.

8 The NSE is taken every year.

9 The NAE is taken every year.