Implementation Regulation for the MSc Programme Nanobiology

Part of the Course and Exam Regulation of the Master Programme
As referred to in Section 2 of the Course and Exam Regulation.

Faculty of Medicine (Erasmus MC) of
the Erasmus University Rotterdam

and

Faculty of Applied Sciences of
Technical University Delft

2016-2017

CONTENT **2**

Section 1 PROGRAMME COMPOSITION

The programme Nanobiology is a two-year master programme and comprises 120 EC.
Courses that form part of the students bachelor programme cannot be part of the master programme.

Article 1a: Composition of the fisrt year; 2015-2016

First year Master Nanobiology Academic year 2015-2016		
Course	Code	EC
Mathematics for Nanobiology	NB4010	6
High-Resolution Imaging	NB4020	4
Engineering Genetic Information	NB4030	3
Biology of Cancer	NB4040	4
Computational Modeling and Dynamic Systems	NB4050	3
Internship	NB4060	18

Article 1b: Composition of the first year 2016-2017

There are no changes in the composition of the mandatory part of the program compared to last academic year 2015-2016.

Article 2a: Composition of the second year; 2016-2017

Second year Master Nanobiology Academic year 2016-2017		
Course	Code	EC
Master End Project Nanobiology	NB5900	44
Seminars	NB5010	4
Literature Review Report	NB5020	4
Project proposal writing	NB5030	2
Research presentation	NB5040	2

Article 3: Elective courses

Elective courses
In addition to 20 credits worth of mandatory courses, students should earn at least 26 credits worth of elective courses. In practice this means that the students take five (sometimes six) elective courses from the list below.

Some of the electives are designed especially for Nanobiology students (and will be open to other (physics) students as well). Other electives are drawn from courses already offered at TU Delft or Erasmus MC.

One elective is entirely free and can also be taken at a different faculty or university. The elective should

be of the right (Masters) level, therefore the elective should be approved by the board of examiners..

Students may also propose their own combination of electives, but this is subject to approval by the Board of Examiners.

Course code	Name elective	ECTS	Location
NB4070	Soft condensed matter	6	TUD
NB4080	*Protein quality control mechanisms*	3	EMC
NB4090	*Stem cells*	?	EMC
NB4100	*Nuclear architecture*	3	EMC
NB.....	*Biological Networks; a data driven approach to discovery and understanding*	3	EMC
LM3741	Environmental biotechnology + Fermentation technniques	6	TUD
LM3691	iGem	18	TUD
LM3611	Microbial community engineering	6	TUD
LM3601	Molecular biotechnology and genomics	6	TUD
LM3512NB	Systems biology	6	TUD
LM3442	Metabolic reprogramming	6	TUD
LM3432	Analysis of metabolic networks	6	TUD
LM3311	Green chemistry and sustainable technology	3	TUD
CH3372a	Soft matter for Chemical products	3	TUD
AP3691D	Evolution and engineering of living systems	3	TUD
AP3461	The origins of life	6	TUD
AP3232D	Medical Imaging Signals and Systems	6	TUD
AP3161D	Cellular Dynamics: stochasticity, signalling and evolution	6	TUD
AP3121D	Imaging Systems	6	TUD
AP3032G	Continuum Physics	6	TUD
AP3021G	Advanced Statistical mechanics	6	TUD
4403THBPH	Theoretical Biophysics (Leiden University)		LeidenUni
WI4430	Martingales, Brownian Motion and Stochastic Processes	6	TUD
WI4205	Applied finite elements	6	TUD
WI4204	Advanced modeling	6	TUD
WI4201	Scientific computing	6	TUD
WI4141TU	Matlab for advanced users	3	TUD

Article 4: Intended learning outcomes MSc Nanobiology

Knowledge

1. The student has theoretical and practical knowledge of the physics of biological processes and the methods to observe them.
2. The student is able to build mathematical models of physical and biological systems, and can solve them numerically and/or analytically.
3. The student can apply his knowledge to quantify biological processes from experimental results.

Research skills

4. The student is able to formulate a relevant problem and translate this into a research question.
5. The student is able to conduct elaborate literature investigations, related to the research question.
6. The student is able to translate a research question into a research proposal.
7. In collaboration with other research group members, the student is able to set up and conduct a research project, collect data, analyze data, and come to conclusions.

Communication skills

8. The student is able to write down research findings in the form of a draft manuscript, which in collaboration with a research supervisor may be developed into a scientific article, suitable for publication in an international, peer-reviewed journal.
9. The student can communicate his or her results in oral and written form to audiences of specialists and non-specialists.

Section 3 ADMISSIONS

Article 5: Admission requirements

Article 5.1 Admission and application Dutch University Bsc degree

The master's degree program is accessible to students without further requirements after completion of their bachelor's degree in Nanobiology.
Students holding a BSc degree in biophysics or molecular biological sciences such a BSc degree in Medical Natural Science (VU), Life Science and Technology (UL/TUD), or Molecular Life Sciences (WUR / Radboud) can be admitted, but will be required to take additional courses (partially possible within the Master program) to compensate for deficiencies in mathematics, physics or biology related topics. This may be a standard program or it may be tailored to the students' specific situation in consultation with the Master coordinator and Admission Committee.

Article 5.2 Admission and application international applicants

Applicants from international institutions seeking admission to the MSc program in Nanobiology must in most cases possess a Bachelor of Science degree in either biophysics or biomolecular related sciences. Their application will require evaluation by the Admission Committee, based upon academic scores and an interview. Perceived deficiencies will need to be addressed by taking appropriate courses in mathematics, physics or biology related topics at TU Delft or Erasmus MC as part of the Master program.

Article 5.3 Admission and application Dutch University of Applied Sciences (HBO)

Since there is no Bachelor's degree from a university of applied sciences in the field of Nanobiology, a Bachelor's degree from a university of applied sciences does not automatically qualify you for direct admission to the Master's degree programme in Nanobiology.

The Bachelor's degree in applied sciences must have been completed within the nominal duration of the programme, with a grade-weighted average of 75% for all study components. In addition, a supplementary programme consisting of selected courses from the Bachelor's degree programme in Nanobiology is required.

Remediation of deficiencies
The Master's degree programme in Nanobiology is a multidisciplinary programme with mathematics, physics and biology as core subjects. In order to start the Master's degree programme in Nanobiology, you will first need to complete a supplementary programme in order to bring your knowledge to the required level for each of these subjects. Due to the multidisciplinarity of the programme we require a solid background in university mathematics (calculus, linear algebra and differential equations), physics and molecular biology.

The supplementary programme (or bridging programme) for the MSc programme is always customised, and can be completed after your studies at the university of applied sciences. Most customised bridging programmes for students with a Bachelor's degree in applied sciences will take approximately 2 years to complete. If you have any questions, please send an email to Info-MSc-NB@tudelft.nl./

Entrance examinations in Mathematics and English must be taken before the start of the programme (or the bridging programme). For additional details, see www.hbodoorstroom.tudelft.nl and www.tudelft.studielink.nl

Section 4 Examinations

Article 6 Order of the exams

6.1 Graduation Project, Master's thesis

You may start your Master Thesis Project if you:

- have been admitted to the master programme Nanobiology,
- have passed bridging/homologation modules or other obligations from the bachelor programme,
- have passed all obligatory courses 20EC
- have made a project plan with your thesis supervisor; this project plan should be handed in at enrollment.

At the start of the final project, the appropriate registration form must be filled in and handed in at the thesis project office.
The date and time of the master project presentation is determined by the thesis supervisor, after hearing the student. In exceptional cases, the programme director may be involved in setting this date and time.
Further rules governing the MSc graduation projects can be found in article 26 to 29 of the Rules and Guidelines of the Board of Examiners

Article 7 The form of the examinations and the methods of assessment

The form of the examinations and the methods of assessment are described in the (digital) study guide.

Section 5 Special programmes

Article 8 Bridging programmes

Bridging modules must be completed before a student can be admitted in the Master programme; homologation modules can be done as part of the Master. The bridging and/or homologation programmes are listed below. The final decision about a bridging or homologation programme, also in other cases, is made on an individual basis. Students can be admitted to the Master programme if the extent of their deficiencies is limited to a maximum of 9 credits. If deficiencies extend this size, students can only be admitted to the bridging programme. Students can then be admitted in the master programme if all remaining deficiencies can be incorporated in the master programme. The remaining modules become part of the master programme. Completion of the bridging programme by students formally admitted to it guarantees admission to the Master programme.

Required bridging/homologation courses for TU Delft BSc Life Science and Technology

Course	Code	credit
Analysis 3	WI1416NB	3
Linear Algebra	WI1142NB	3
Differential equations	NB2061	3
Electronic Instrumentation	NB2211-14	6
Physics 2	NB2141	3
Signals and Systems	TN2545	6
Optics & Microscopy	NB2041	3
Statistical Physics	TN2624NB	3
Computation / Matlab	TN2513	3
Image Analysis	NB2121	3
Nanotechnology	NB2081	2

Required bridging/homologation courses for TU Delft BSc Applied Physics

Course	Code	credit
Chemistry-1	NB1102	3
Chemistry-2	NB1110	3
Biomolecular Dynamics-1	NB1012	3
Molecular Biology	NB1016	3
Genetics	NB1022	4
Physical Biology of the Cell-1	NB1072	3
Biophysics	NB1132	3
Physical Biology of the Cell	NB2071	3
Evolutionary Developmental Biology Part 1&2	NB2032	6
Bioinformatics	NB2161	4.5
Image Analysis	NB2121	3

Article 9: Honours programme

The Honours Programme consists of at least 20 EC on top of the regular master programme of 120 EC. The full Nanobiology programme including the additional honours track should be finished according to schedule. It is an individual programme that contains a 5 EC specially developed course for all TU Delft honours track students plus a coherent package of at least 15 ec of challenging course modules or projects composed by the student.

Collective Part (5 EC) UD2010, Critical Reflection on Technology, 5EC, obligatory
Individual Part (15 EC) **Example:** AS1000HPM, Company Oriented Honours Programme of Applied Sciences, 15EC

Section 6 Additional Rules

Article 10: Transition rules

Per academic year 2016-2017, elective courses are not divided in different categories. Student can choose any elective from the proposed list in article 3. In retrospect this also counts for the students from cohort 2015.

Article 11: Degree supplement

An overview of the study modules taken is given on the certificate. The degree supplement is issued in English

Article 12 Date of commencement

These regulations will come into effect on 1 September 2016.