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

2015-2016

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 1: Fisrt year

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 2: Elective courses

Elective courses
In addition to 20 credits worth of obligatory 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. The electives have been divided in three categories:

1. electives of direct interest to the nanobiology program;
2. electives of related interest;
3. all other electives.

Some of the electives in the first category 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.

The choice of electives is not entirely free. Students should select at least three electives from the first category, one (or two in the case of six electives) can be selected from the second category. In consultation it is also possible to choose a relevant elective from a different faculty or university. The choice of the final elective is entirely free and can also be taken at a different faculty or university.

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

Electives with direct interest to the Nanobiology program

Course code	**Name elective**	**ECTS**
AP3161D	Cellular Dynamics: stochasticity, signalling and evolution	6
AP3691D	Evolution and engineering of living systems	3
AP3461	The origins of life	6

AP3231TUD	Medical Imaging	6
AP3361TU	Clinical Physics of Medical Imaging	6
new course	Soft condensed matter	6
new course	Systems biology	?

Electives with related interest to the Nanobiology program

Course code	**Name elective**	**ECTS**
WI4201	Scientific computing	6
WI4202	Stochastic processes	6
WI4204	Advanced modeling	6
WI4205	Applied finite elements	6
AP3021G	Advanced Statistical mechanics	6
AP3032G	Continuum Physics	6
AP3011D	Chaotic processes	6
LM3432	Analysis of metabolic networks	6
LM3741	Environmental biotechnology	3
LM3311	Green chemistry and sustainable technology	3
LM3442	Metabolic reprogramming	6
LM3601	Molecular biotechnology and genomics	6
LM3611	Microbial community engineering	6
LM3711	Proteomics 1	3
LM3721	Proteomics 2	3
	iGem	18

Section 2: Intended learning outcomes

Article 3: 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 4: Admission requirements

Article 4.1 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 4.2 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 4.3 Admission and application Dutch University of Applied Sciences (HBO)

Since there is no Bachelor of Engineering degree that covers the multidisciplinary breadth of the BSc Nanobiology, students with a Bachelor of Engineering in biophysics or biomolecular related sciences may apply. Their application will require evaluation by the Admission Committee, based upon grades, an interview and a reference letter from a mentor. Perceived deficiencies will need to be addressed by taking a bridging program consisting of BSc courses from the BSc Nanobiology program.

Article 5 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	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
Biomolecular Dynamics-2	NB1016	3
Genetics	NB1022	4
Physical Biology of the Cell-1	NB1072	3
Biophysics	NB1131	3
Physical Biology of the Cell	NB2071	3
Evolutionary Developmental Biology Part 1&2	NB2031	6
Bioinformatics	NB2161	4.5
Image Analysis	NB2121	3

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 Additional Rules

Article 8: Transition rules
n.a.

Article 9: Degree supplement
An overview of the study modules taken is given on the certificate. The degree supplement is issued in English

Article 9 Date of commencement
These regulations will come into effect on 1 September 2015.