

Master Nanobiology

MSc Programme



Are you intrigued by the physical forces at work inside cells? Does the nanoscale complexity of health and disease captivate you? Do you want to work in a cutting edge field that could revolutionize medicine? Then the Master's programme in Nanobiology might be the perfect fit for you. We are a small, highly innovative and interdisciplinary programme applying high level math and physics to answer biological questions.

Degree	Master of Science
Starts	September/February*
Type	Full-time
Credits	120 ECTS, 24 months
Language	English
Application deadline	Int. diploma: 1 April 2021 Dutch diploma: check admission.tudelft.nl
Kosten	€ 18.750 (non EU) € 2.168(EU)
Scholarships	scholarships.tudelft.nl

* only for Dutch students

In Nanobiology, we integrate methods and theories from physics, and molecular biology, using tools from math and computer modelling to further understanding of the molecular basis of life.

What you'll learn in the Nanobiology master has direct applications in research. Developments in biomedicine, such as studies on human genome variation and the control of stem cells, increasingly require analysis and quantitative description at the fundamental level. Moreover, it is becoming possible to develop artificial biomolecules and nanoparticles with wide applications in research and medicine. The incorporation of new biological building blocks is highly promising in for instance industrial biotechnology and medical science.

These advances will reshape many aspects of medical diagnosis and treatment. The rapid advancement of modern biomedical, biophysical and computational technologies promises to provide new tools to gain in depth knowledge of the fundamental molecular and cellular mechanisms controlling health or involved in disease.

Programme

The Nanobiology programme of TU Delft and Erasmus MC builds on the extensive existing research collaborations between the two institutes. The focus of the programme is on the molecular building blocks of living organisms and the tools to study them. The programme is a mixture of theoretical and practical courses, which deepen and broaden the knowledge the

Master Nanobiology

FIRST YEAR			
FIRST SEMESTER		SECOND SEMESTER	
HIGH RESOLUTION IMAGING (4 EC)	BIOLOGY OF CANCER (4 EC)	INTERNSHIP OR ACADEMIC RESEARCH PROJECT (18 EC)	
ANALYTICAL MECHANICS (3 EC)	STOCHASTIC PROCESSES WITH APPLICATIONS (3 EC)		
COMPUTATIONAL MODELING AND DYNAMIC SYSTEMS (3 EC)	ENGINEERING GENETIC INFORMATION (3 EC)	ELECTIVES (12 EC)	
ELECTIVES (4 EC)			
SOFT MATTER (6 EC)*		PHYSICS OF BIOLOGICAL SYSTEMS: MATHEMATICAL MODELLING IN SYSTEMS BIOLOGY (6 EC)*	
SECOND YEAR			
FIRST SEMESTER		SECOND SEMESTER	
RESEARCH PROJECT (44 EC)			
SEMINARS (2 EC)			
LITERATURE REVIEW REPORT (4 EC)			
PROJECT PROPOSAL WRITING (2 EC)	RESEARCH PRESENTATION (2 EC)	PROJECT PROPOSAL WRITING (2 EC)	ELECTIVES (6 EC)

* Students may choose either Soft Matter (1st semester) or Physics of Biological systems (2nd semester)

students have acquired previously, and original research in an academic or industrial internship and a large independent research project. The courses integrate physics, math and biology. Mandatory courses cover topics such as the study of cancer from a biological and physical perspective, modern high-resolution microscopy techniques and modelling of complex systems. Apart from the compulsory courses, there is a large selection of elective courses from both institutions.

Student profile

Because of the multidisciplinary nature of the programme, we require a solid background in all three underlying disciplines: mathematics (calculus, linear algebra, and differential equations), physics, and molecular biology. For further information about admission and application, please see: www.admissions.tudelft.nl

Career prospects

The career prospects of Nanobiology graduates are excellent. The programme prepares for a career in industry, research organizations, or public institutions. Graduates can find jobs in fundamental as well as applied research. Examples include life sciences or pharmaceutical companies, chemical

companies, and jobs in the development of nano measuring methods and manufacturing technologies.

Graduation projects

Graduation projects can be done at both TU Delft and Erasmus MC, creating a very broad spectrum of possibilities, from theoretical physics to biomedicine. Some examples of recent graduation projects are:

- Spacer Integration into CRISPR Locus by Cas1-Cas2 Complex in type II-A
- Exploring the 3D landscape of cellular membranes
- Pattern formation of surface bound proteins
- Coupling of elastic sheets to curvature inducing fields in cylindrical geometry
- Identification of trans-acting factors that regulate alternative cleavage by DROSHA
- Assembly of Mycobacterium tuberculosis clinical strains and comparative analysis of PE and PPE proteins using long-read sequencing data
- Synchronicity and patterning in the olivo-cerebellar and cerebello-cortical loops
- Development of a new batch correction method for scRNA-seq analysis
- Computer-assisted diagnosis of early stage lung adenocarcinoma

 **40**
students

 **50%**
male

 **50%**
female

 **10%**
international students

 **52th**
QS World University Ranking

RECENT INTERNSHIPS

CANTRIP: CAS12A ACTIVATED NUCLEASE POLY-T REPORTER ILLUMINATING PARTICLES
 COMPUTATIONAL PLATFORM DEVELOPMENT FOR BOX H/ACASORNNA-BASED RNA EDITING SYSTEM
 FASTER, CHEAPER, BETTER - A PLATE READER-BASED BARRIER INTEGRITY ASSAY FOR THE ORGANOPLATE
 GREENHOUSE CLIMATE MODEL WITH THERMAL SCREENS
 PREVENTIVE INFLAMMATORY BOWEL DISEASE PROPOSAL
 OPTIMISING THE BARRIER INTEGRITY ASSAY IN THE ORGANOPLATE
 THE USE OF SERS AS RAPID DIAGNOSTIC TECHNIQUE FOR SARS-COV-2

tudelft.nl/msc/nb