

Roskilde University

Master of Science

**Molecular
Health
Science**

Master's Programme



Molecular Health Science

Do you want to help control diseases through molecular analysis? Then join our Master's programme in Molecular Health Science, qualifying you to work with molecular biology in the health and biotech sector.

To battle diseases like covid-19, diabetes, cancer, or antimicrobial resistance, we need to understand the molecular mechanisms at play. In the Master's programme in Molecular Health Science, we lay the groundwork for new treatments and vaccines by investigating the molecular mechanisms of diseases.

Our profile

This interdisciplinary programme combines elements from molecular biology, cell biology and medicine, qualifying you to conduct molecular analyses in the health and biotech sectors. We will give you a thorough understanding of the molecular mechanisms behind human health, as well as the development of drugs and the treatment of diseases. Key subjects include pathophysiology, immunology, pharmacology, drug development and testing, infectious disease, biotechnology, genetic engineering, cell biology, data-analysis, and bioinformatics.

Experimental studies are a key element in this programme, so you will join us in the lab from day one and will spend a great deal of your time at hospitals and external labs, working closely with health professionals and analysts on real life projects. We have excellent facilities at campus and close research collaborations with hospitals in the Zealand and

Greater Copenhagen Regions, as well as with Statens Serum Institut (SSI), just to name a few. In your project work, you may join these collaborations or start new networks with other external partners, thus shaping your own academic profile.

You will also meet external partners during courses, when we invite guest lecturers from the health and biotech sectors to bring you the latest knowledge in areas like quality considerations, bioproduction, standards and deviation management. All in all, you will receive thorough hands-on-training, qualifying you for any job that entails analysing, developing, and conducting experimental work to solve health and biotechnology related challenges. We equip you to seamlessly join a workplace after you graduate.

Study environment

You will be studying in a relatively small research environment and work side by side with PhD-students and experienced researchers. We have an informal tone and an open-door policy, so academic, practical, and technical support is always close by. We are part of the department of Science and Environment, which also holds Master's programmes in Chemical Biology and Mathematical Bioscience, so you will have ample opportunities to mix it up both academically and socially. We often hold joint seminars, inviting external researchers or alumni, and you will also be invited to student run events like the Natcafé and boardgames nights.

Example of a study programme

4 th semester 3 rd semester	Master Thesis (60 ECTS) or Project-oriented internship (15 ECTS) and Master thesis (45 ECTS)					
	Advanced Eukaryotic Cell Biology I - Inside the Cell (5 ECTS)	Good Practices in Experimental Sciences (5 ECTS)	Applied Data Science and Visualisation (5 ECTS)	Bio-informatics (5 ECTS)	Elective course (5 ECTS)	Elective course (5 ECTS)
2 nd semester	Patophysiology and Immunology (10 ECTS)		Pharmacology (5 ECTS)	Experimental Biotechnology (5 ECTS)	Elective course (5 ECTS)	Track 1 General Molecular and Medical Biology (5 ECTS) Track 2 Elective course (5 ECTS)
1 st semester						

Please note: The table shows an example of a course of study. Courses, projects, internships and studies abroad with credit transfer may vary for each student.

Elective courses

1 st semester					
Proteomics and metabolomics (5 ECTS)		Genomics and metabolism (5 ECTS)		Seminar course in Molecular Health Science (5 ECTS)	
2 nd semester					
Host-Pathogen Interactions (5 ECTS)	Experimental Host-Pathogen Interactions (5 ECTS)	Experimental cell biology (5 ECTS)	Advanced eukaryotic cell biology II (5 ECTS)	Solid phase synthesis of peptides and peptidomimetics (5 ECTS)	Protein biochemistry (5 ECTS)

1st SEMESTER

The focus of the first semester is to provide knowledge and skills within key areas of medical biology. In collaboration with clinicians and researchers from regional hospitals, you will learn about the physiology of various human diseases, the function of the immune system and the mechanisms and metabolism of pharmaceutical products. You will also learn molecular methods for investigating complex biological systems through the course Experimental Biotechnology.

2nd SEMESTER

On the second semester you will obtain in-depth insight into one or more areas related to Molecular Health Sciences. For example, 'Molecular mechanisms of Health and Disease', 'Molecular mechanisms of infectious disease' and 'Protein properties and function'. In addition, you will be trained in Eukaryote Cell Biology, learn how to analyze complex biological data and how to conduct, plan and validate experimental studies.

3rd-4th SEMESTER

The 3rd and 4th semester are dedicated to project work. The student can choose between two options: a 15 ECTS Internship with an external partner + a 45 ECTS master's thesis OR a 60 ECTS master's thesis. Through your thesis-work you will be able to take a deep-dive into a specific problem of your own choice to investigate the molecular mechanisms of health and disease or develop and test novel drug-candidates or diagnostic tools. You will through this work obtain hands-on skills in planning, leading, conducting, documenting, analyzing and communicating an experimental project using state-of-the-art molecular methods and data analysis. The thesis can be done in collaboration with an external partner.

Form of Study

The master's programme has an explicit focus on experimental approaches. This is supported by several experimental courses within the elective and mandatory course portfolio combined with the possibility to carry out

a 60 ECTS experimental master's thesis project. Our courses have relatively small student-numbers ensuring a close and direct dialogue with the researcher and between students.

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One of the key skills I learned from studying a master's degree at RUC is the ability to systematically solve problems. In my current position, it is my systematic approach to solving problems that makes me stand out.”

Christian Gamsgaard, Quality Control Chemist, Novo Nordisk



Photo: Jiffe Weng

Examples of student projects include

- The combinatory effect of Resveratrol and its derivatives
- The Mechanism of the Auto-inducer, DPO, in Salmonella enterica Serovar Typhimurium
- Characterization of E coli and microbiota in Ulcerative colitis patients
- Insulins regulatory effect on YAP1 and CA3 expression in inflammatory bowel disease
- Expression, purification, characterization and detoxification of the toxin TcsL, from Clostridium sordellii, for vaccine development
- Evaluating the ability of a transient transfection MitoTimer method to measure mitochondrial biogenesis in C2C12 cells
- Reversal of mitoxantrone resistance in pancreatic cancer cells through inhibition of ABC transporters
- Effects of antimicrobial peptides in wound healing

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What I in particular find to be valuable skills for my current position is the capabilities of working interdisciplinary. I work with people with a wide variety of backgrounds and my interdisciplinarity enables me to collaborate with both my own and other departments.”

Kristian Jensen Pedersen, PhD Student
Helmholtz-Zentrum für Umweltforschung, UFZ, Deutschland

Career opportunities

Our candidates are highly sought after in pharmaceutical and biotechnological industries and consultancies, in the healthcare and hospital sector, in public and private research or control laboratories and in public health agencies on local, regional, and state level. Tasks include diagnostic analyses, development, validation and quality control of pharmaceutical and biotechnological products, and regulation and marketing of medication and healthcare products. The programme qualifies you to enter a PhD-programme.

Examples of employment include

- QC Professional at Novo Nordisk, working with quality control of pharmaceuticals
- Manufacturing Associate at FUJIFILM Diosynth Biotechnologies, working with contract development and manufacturing organization
- Scientist at AGC Biologics, working with development and manufacturing services for protein-based biologics
- Process Supporter at Novo Nordisk, working with production processes
- Scientist at Bavarian Nordic, working with vaccine downstream process development
- Production Supporter at SSI Diagnostica, working with diagnostic products
- Academic Employee at Bispebjerg Hospital

You should study Molecular Health Science, if:

**You want to work closely
with the relevant sectors
during your studies**

**You value our emphasis on
hands-on experimental
training**

**You want to study in a small
and interdisciplinary
research environment**

Further information



You can find admission requirements, application deadlines and other information about Molecular Health Science at Roskilde University here:

ruc.dk/kandidat/molecular-health-science

Contact us if you have questions about Environmental Science:

RUC Study & Career Guidance

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