

Master of Science Chemical Biology



Photo: Getty Images

”Can my blood tell me
how long I will live?”

Chemical Biol

**Do you want to work
with chemistry in
biological systems or
the chemistry of
biological systems?**

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That is exactly what you will do in our Chemical Biology program, where the focus is the application of chemistry in biology as well as biology understood from a chemical perspective.

The programme provides you with a strong foundation of knowledge and understanding of chemical biology. It also enables you to develop a practical skillset working at the interface of chemistry and biology. You will learn to apply chemical tools, methods, and analyses to study, evaluate and modify biological systems, and give a chemical perspective on biological problems and projects. You will also learn how to drive and manage such projects.

You can choose between three different specializations:

- Chemistry in biological systems, where you will learn how life works from a chemical perspective and how we can use chemistry to regulate biology.
- Protein properties & function, where you will learn how proteins behave, understand their function, how to regulate it and study the factors that govern their behavior.
- Omics, where you will learn to draw conclusions about the processes of life from collective characterization and quantification of different types of biological molecules.

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Chemical Biol

During your studies you will develop theoretical and practical skills for resolving research questions, using concepts, reasoning and methods characteristic of chemistry and biology, and learn to present such results at a scientific level.

Through problem-oriented project work, internship, or the master's thesis, you will acquire the competences to solve complex problems.

Your project work and master's thesis work present opportunities for applying and developing chemical and molecular biological models and methods to critically examine their validity.

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The programme gives you the foundation for a career as a chemist, with a unique skill set that will enable you to seamlessly work in and between the chemical and biological laboratory settings. This includes chemical synthesis and analysis, together with biological and biotech environments, such as working towards the development of medicines and medicinal technologies, conducting assays, biophysical characterization, etc.

These are coveted skills and competences within research and development or quality control in biological, biotech or pharmaceutical environments in the public or private sector. The interdisciplinary nature of this programme will prepare you for working in other types of interdisciplinary environments which is an integrated part of modern companies and research groups.

Example of a study programme

4. semester	Master Thesis (60 ECTS)					
	or Project-oriented Internship/Project (15 ECTS) and Master thesis (45 ECTS)					
3. semester						
2. semester	Advanced Eukaryotic Cell Biology I - Inside the Cell (5 ECTS)	Good Practices in Experimental Sciences (5 ECTS)	Applied Data Science and Visualisation (5 ECTS)	Elective course (5 ECTS)	Elective course (5 ECTS)	Elective course (5 ECTS)
1. semester	Essential Organic Chemistry (10 ECTS)		Applied Spectroscopy (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)

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. semester				
Proteomics and metabolomics (5 ECTS)		Genomics and metabolism (5 ECTS)		Advanced chemical methods (5 ECTS)
2. semester				
Biophysical chemistry (5 ECTS)	Protein biochemistry (5 ECTS)	Bioinformatics (5 ECTS)	Bioorganic chemistry (5 ECTS)	Solid phase synthesis of peptides and peptidomimetics (5 ECTS)

1.

SEMESTER

The main objective of this semester is to lift you to a higher level of mastery in selected areas of chemistry and molecular biology. There is also room to start your specialization.

2.

SEMESTER

The main objective of this semester is to let you finish your specialization and prepare you for more independent experimental work. The objective is also to provide you with necessary skills and competences in statistics and data science and how to conduct, plan and validate experimental studies which are competencies in demand by potential employers.

3.-4.

SEMESTER

The objective of these semesters is to let you work independently with projects of your own choice. You can participate in a project-oriented internship or write a project in the 3rd semester together with a 45 ECTS master's thesis that is also initiated in the 3rd semester.

Alternatively, you can choose a 60 ECTS master's thesis that covers the entire second year. If you wish, you can choose a project-oriented internship or a master's thesis with an external supervisor in another academic or industrial environment.

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

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In my job in a small pharmaceutical company, I frequently need to define the right solutions to challenges, as they occur; my ability to quickly gain new knowledge in such situations is a result of the project-oriented approach at RUC.”

Remy Kronbak, QC-chemist, pK Chemicals

Project Examples

- Molecular design for creating biodegradable plastic
- The chemistry of dye-sensitized solar cell
- Investigating the structure function relation of cellulase variants for production of 2nd generation bioethanol
- NMR characterization of amyloid formation related to neurodegenerative and other diseases.
- The Design, Synthesis and Evaluation of Cationic Lipids for Gene Delivery
- Cyclic peptides as micro antibodies
- Investigating the structure function relation of cellulase variants for production of 2nd generation bioethanol
- Synthesis and biological evaluation of functionalized Peptoid Nanosheets
- Activity and stability of hyperstable amylases
- Developing an electrochemical assay for real-time detection of oxidoreductase activity
- Analysis of adaptive responses of *Pseudomonas aeruginosa* through shot-gun proteomics
- Hyphenated mass spectroscopy analysis of organic and inorganic material.
- Divergent synthesis of natural projects
- Metabolomic measurements of the responses to disease or other perturbances in different organisms and tissues.

Competences

- Analyse and solve research problems in the interface between chemistry and biology
- Create your own solutions using a chemical perspective on biological projects
- Select, conduct, and evaluate experimental studies or simulations
- Prepare and present precepts, explanations and guides according to professional standards
- Work and interact efficiently in an interdisciplinary environment

Career examples

Principal Scientist | CPKelco

Chemist - Quality Control | pKChemicals

Technical supporter for two filling lines | Novo Nordisk

Head of Lipidomics Core Facility | Danish Cancer Society

Chemist - Quality Assurance | Novo Nordisk

Associate professor | Roskilde University

A large red speech bubble graphic with a white border, pointing upwards and to the right. Inside the bubble, there is a quote in white text and a name in smaller white text at the bottom left.

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My studies allowed me to transfer and apply the knowledge from one field to another and understand scientific phenomena on a deeper level. That reflected also on my master thesis work, PhD thesis and it continues to play a role in my current position and as an Associate professor in Chemical Biology.”

Biljana Mojsoska, Associate professor, Roskilde University

Further information



You can find admission requirements, application deadlines and other information about Chemical Biology at Roskilde University here:

ruc.dk/en/master/chemical-biology

Contact us if you have questions about Chemical Biology:

RUC Study & Career Guidance

E-mail: vejledning@ruc.dk

Telephone hours:

Monday - Friday 10.00 - 11.30

Telephone number: (+45) 4674 2424

Published by

Roskilde University
Department of Science and Environment

Layout

RUC Communication & Press

Print

LaserTryk

January 2022



Tryksag
5041 0826
LaserTryk.dk

