STUDY REGULATION for **Computer Science** and **Molecular Biology**

CAND.SCIENT.

Version: 6

Valid per 1 september 2020

ROSKILDE UNIVERSITY

This study regulation is determined pursuant to Ministerial Order No 1328 of 15 November 2016 on Bachelor and Master's (Candidatus) Programmes at Universities (the University Programme Order) with any subsequent amendments and Roskilde University's Common Rules of 5 July 2018 with any subsequent amendments.

The study regulation will become effective on 1 September 2020 and shall apply to all students. For students admitted before 1 September 2020, see section 5.2 of the transitional rules, if any.

The study regulation amendments apply for thesis contracts concluded in terms of initiating the thesis work 1 August 2020 or later.

1. About the programme

1.1 Title

The programme is an interdisciplinary programme consisting of two subjects:Computer Science and Molecular Biology.

Graduates of the programme are entitled to use the title: Master of Science (MSc) in Computer Science and Molecular Biology and the Danish translation of the title: cand.scient. i Datalogi og Molekylærbiologi.

1.2 The programme´s objective and competence profile - academic and professional skills

With reference to the University Programme Order section 3, the programme will provide the student with the knowledge and understanding, skills and competences within:

Software development and molecular biology. The programme focuses on providing the graduate with competences to organise, manage and plan a system development project, including the software element, where there is a particular focus on the development and application of molecular biology models and methods.

The programme has been designed with a particular view to qualifying for work within:

The IT industry as an IT developer, programmer or IT architect and project manager, particularly in the pharmaceutical and biotech sector or in IT companies working with biotechnology.

Knowledge and understanding:

- Research-based knowledge and understanding of techniques and theories for the analysis, design and construction of IT systems, including: software engineering methods and principles, computer and system architecture, algorithms and data representation, and design principles for human-machine interfaces
- About cellular biology and physiology, molecular genetics, biochemistry, gene and protein technologies, and bioinformatics.
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  About what constitutes computer science and molecular biology as a subject in terms of subject areas, forms of knowledge, focus points and developments
- Research-based knowledge and understanding of theories and methods for the analysis, design and implementation of IT applications, including: system development methods and principles, IT architecture, innovative use of IT as a product, service or process and the connection between IT solutions and their use
- Advanced knowledge and understanding of certain specialised computer science areas, based on the highest levels of international research.

Skills:

- Must be able to work with the selection and application of methods and techniques for the analysis, design and construction of software systems
- Must be able to program advanced software solutions using appropriate state-of-the-art programming languages, libraries, development tools and equipment
- Must be able to test, validate and evaluate software systems
- Must be able to contribute core molecular biology and computer science knowledge to collaborative and interdisciplinary projects

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  Must be able to communicate research-based knowledge and understanding of computer science and molecular biology and discuss professional research questions on a scientific basis with both colleagues and non-specialists.

Competences:

- To identify, formalise, analyse, assess and solve scientific research problems related to computer science and molecular biology, independently or in cooperation with others.
- Must be able to organise, plan and manage a software development project that is complex and requires new solution models.
- Must be able to independently initiate and complete computer science development work with interdisciplinary collaborations and assume professional responsibilities.
- To understand, refine, develop, complete and evaluate experimental studies, simulations, arguments or proofs.
- To understand, prepare, apply and evaluate qualitative and/or quantitative models in the subjects.
- To reflect upon and put into perspective ways in which the subjects can be applied.
- Must be able to systematically and critically become proficient in new subject areas and independently take responsibility for one's own professional development and specialisation.

1.3 Languages

The programme is offered in English.

The examination language is identical to the teaching language.

1.4 Admission requirements

The admission requierements can be found on the university website.

1.5 ECTS rating and duration

The programme is a full-time programme corresponding to 120 ECTS.

1.6 Main area affiliation

The programme belongs under the main subject area of Natural Sciences.

The programme elements of Molecular Biology belongs under the main subject area of Natural Sciences.

1.7 Board of Studies and Corps of External Examiners

The programme is administered by the Board of Studies for Computer Science and Informatics

The programme is affiliated with the Corps of External Examiners for Computer Science. The programme elements of Molecular Biology are covered by the Corps of Exernal Examiners for Biology.

2. The programme

2.1 First semester

Objective

The objective of the semester is for the student to acquire more in-depth knowledge of a number of core areas in Computer Science: machine architecture and operating systems, distributed systems, databases and human to machine interactions.

- Mandatory Core Topics - Computer Science (10 ECTS)
- Elective course (Computer Science) (5 ECTS)
- Project Portfolio - Computer Science (15 ECTS)

Title	Mandatory Core Topics -Computer Science
Amended	1.9.2019
Teaching language	English
Type of activity	Mandatory course
ECTS-rating	10 ECTS
Learning outcomes and assessment criteria	• Knowledge and understanding of key theories in the core subject areas. • Knowledge and understanding of the core subject area's techniques for the design and construction of software systems meeting specific requirements • A comprehensive overview of and understanding of the general principles behind the hardware and software systems that are part of modern computers and the users' interactions with these • Skills in selecting and applying appropriate methods and techniques from the subject area for the analysis, design and construction of software systems. • Competences in being able to work with IT issues, both independently and in teams. • Competences in being able to critically and systematically learn new approaches to the subject area and thereby independently take responsibility for one's own professional development
Overall content	The core areas of Computer Science are: machine architecture and operating systems, distributed systems, databases and human to machine interactions. The course includes a presentation and critical discussion as well as testing of knowledge and understanding of the core areas in each of these subjects. The specific contents will be listed on study.ruc.dk.
Teaching and working methods	

	Lectures with exercises or class teaching, etc.
Type of exam	**Type of exam** Individual oral exam without preparation time. The starting point for the exam is a question that will be drawn when the examination begins. The exam is conducted as a dialogue. There may be posed questions in any part of the curriculum. Time allowed for exam including time used for the draw and for assessment: 30 minutes. Permitted support and preparation materials: All. Assessment: 7-point grading scale. Moderation: Extern censor.

Title	Elective course(Computer Science)
Amended	1.9.2019
Teaching language	English
Type of activity	Elective course
ECTS-rating	5 ECTS
Learning outcomes and assessment criteria	• Knowledge and understanding of a specific subject area in computer science • Knowledge and understanding of the area's techniques for designing and constructing software systems that meet specific requirements • Knowledge and understanding of the general principles behind the subject area's theory, methods and technological solutions. • Skills in electing and applying appropriate methods and techniques from the subject area in order to analyse, design and construct reliable and user-friendly software systems • Competences in being able to work on computer science-related issues, both independently and in teams • Competences in being able to become proficient in new approaches to the subject area in a critical and systematic way and thereby independently take responsibility for one's own professional development.
Overall content	

	With an elective course, the student has the opportunity to specialise in a specific subject area where the student acquires knowledge, skills and competences in order to translate theories, methods and solutions ideas into their own practice in relation to software development. Examples of elective courses: Robotics, AI, internet technologies, programming language, parallel calculation, mobile computers, etc. The specific contents are listed on study.ruc.dk.
Teaching and working methods	Normal class instruction, i.e. a mix of lecturer presentations, student presentations and practical work on specific tasks. Lecture with exercises. Is stated in the description on study.ruc.dk.
Type of exam	**Type of exam 1** Individual oral exam based on an assignment. The exam is conducted as a dialogue. There may be posed questions in any part of the curriculum. The character limit of the written product is 4.800-48,000 characters, including spaces. The character limits include the cover, table of contents, bibliography, figures and other illustrations, but exclude any appendices. Time allowed for exam including time used for assessment: 20 minutes. The assessment is an overall assessment of the written product(s) and the subsequent oral examination. Permitted support and preparation materials for the oral exam: All. Assessment: 7-point grading scale. Moderation: Internal co-assessor. **Type of exam 2** Individual oral exam without preparation time. The starting point for the exam is a question that will be drawn when the examination begins. The exam is conducted as a dialogue. There may be posed questions in any part of the curriculum. Time allowed for exam including time used for the draw and for assessment: 20 minutes. Permitted support and preparation materials: All.

	Assessment: 7-point grading scale. Moderation: Internal co-assessor. **Type of exam 3** Individual written take-home assignment given by the lecturer. The character limit of the assignment is: 4.800-48,000 characters, including spaces. The character limit includes the cover, table of contents, bibliography, figures and other illustrations, but exclude any appendices. The duration of the take-home assignment is 21 days and may include weekends and public holidays. The estimated work effort is 3 days. Other exams may therefore be scheduled simultaneously. Assessment: 7-point grading scale.

Title	Project portfolio - Computer Science
Amended	1.9.2019
Teaching language	English
Type of activity	Project portfolio
ECTS-rating	15 ECTS
Learning outcomes and assessment criteria	• In-depth knowledge and understanding of the theoretical, methodological and practical opportunities and problems that are associated with software development, using specific models from the core areas or elective subject. • Skills in describing and reflecting upon independently completed work wherein a complex research question is processed using relevant solution models. • Skills in defining and justifying a selected solution model and independently planning and completing the solution using relevant high-level scientific literature • Skills in Mastering concepts, theories and methods based on literature and being able to use these in an insightful manner to solve concrete computer science problems. • Competences in mastering computer science development situations that are complex and require new solution models.
Overall content	

	The students will develop their own practices portfolio in groups. The subjects chosen for this must be within the core areas. The core areas of Computer Science are: machine architecture and operating systems, distributed systems, databases and human to machine interactions.
Teaching and working methods	A project portfolio is a collection of works (texts, program code, data models, architecture) at various levels of abstraction that are associated with practical workshop-oriented or exercise work.
Type of exam	**Type of exam** Oral group exam for the participants in the project. The starting point for the oral exam is the students' project portfolio, consisting of a main report including a reflection document and selected products (optional), and additional products as annexes. The exam includes individual presentations on a topic of the students' own choice. The topic must be relevant to the issues highlighted in the project portfolio. Each individual presentation including questions may last up to 5 minutes. The individual presentation(s) are followed by a dialogue between the student(s) and the assessors about the project. There may be posed questions related to the subject area relating to the project portfolio's subject area. The assessment is an assessment of both the project portfolio and the oral performance. Permitted group size: 2-6 students. The character limits of the project are:: For 2 students: 4,800-48,000 characters, including spaces. For 3 students: 4,800-48,000 characters, including spaces. For 4 students: 4,800-48,000 characters, including spaces. For 5 students: 4,800-48,000 characters, including spaces. For 6 students: 4,800-48,000 characters, including spaces. The character limits include the cover, table of contents, summary, bibliography, figures and other illustrations, but exclude any appendices. Time allowed for exam including time used for assessment is for: 2 students: 60 minutes. 3 students: 75 minutes. 4 students: 90 minutes. 5 students: 105 minutes. 6 students: 120 minutes. Spelling and communication skills in the project report are part

	of the assessment. Permitted support and preparation materials at the oral exam: All. Assessment: 7-point grading scale. Moderation: Internal co-assessor.

2.2 Second semester

Objective

The object of the second semester is to expand the student's knowledge, skills and competencies at Master's level in cell biology, cell physiology and experimental molecular biology.

Programme elements

Starting in the Autumn:

- 2 Optional courses 5 ECTS each (total of 10 ECTS). Choose from: Theoretical Theme Course in Molecular Biology (5 ECTS), Experimental Theme Course in Molecular Biology (5 ECTS), Seminar course in advanced Molecular Biology (5 ECTS), Methods course in advanced Molecular Biology (5 ECTS), Advanced Eukaryotic Cell Biology II - Cellular Mechanisms in Development and Cancer
- Advanced Eukaryotic Cell Biology I - Inside the Cell (5 ECTS)
- Project in Advanced Molecular Biology (15 ECTS)

Starting in the Spring:

- Course in Bioinformatics (5 ECTS)
- Course: Course in Experimental Biotechnology (5 ECTS)
- Optional course (5 ECTS): Theoretical Theme Course in Molecular Biology (5 ECTS), Experimental Theme Course in Molecular Biology (5 ECTS), Seminar course in advanced Molecular Biology (5 ECTS), Methods course in advanced Molecular Biology (5 ECTS)
- Project in Advanced Molecular Biology (15 ECTS)

Title	Project in Advanced Molecular Biology
Amended	01.09.20
Teaching language	English
Type of activity	Project
ECTS-rating	15 ECTS
Learning outcomes and assessment criteria	

	• Research-based knowledge within a selected cellular biology subject area and understanding of the placement of the subject area in the professional field • Identification of scientific research questions and critically relating to scientific knowledge in relation to models, theories and data from the scientific literature in the field • Proficiency in designing and carrying out relevant experiments and/or analysing original data to analyse a defined, professional and relevant research question • Proficiency in using scientific theories and methods when working with the research question • Proficiency in processing and interpreting own experimental data and/or analytical results in relation to models, theories and data from literature • Proficiency in communicating and discussing the results of the project in a clear and orderly manner in accordance with scientific requirements and norms • Competences in initiating, managing and conducting a scientific study and writing process
Overall content	An in-depth work addressing a cellular biology and/or molecular biology research question clarified with the inclusion of methods from biochemistry, genetics, cell physiology, bioinformatics or mathematical modelling.
Teaching and working methods	Project work in groups.
Type of exam	**Type of exam** Group exam for the participants in the project work. The exam is based on the students' project report and additional material. The exam includes individual presentations on a topic of the students' own choice. The topic must be relevant to the issues highlighted in the project report. Each individual presentation lasts up to 15 minutes. The individual presentations are followed by a dialogue between the students and the assessors based on the project. There may be posed questions related to the subject area of the project report. The assessment is individual and is based on the project report and the student´s oral performance. Permitted group size: 2-4 students. The character limits of the project report are: For 2 students: 24,000-180,000 characters, including spaces. For 3 students: 24,000-192,000 characters, including spaces.

	For 4 students: 24,000-192,000 characters, including spaces. The character limits include the cover, table of contents, summary, bibliography, figures and other illustrations, but exclude any appendices. Time allowed for exam including time used for assessment is for: 2 students: 60 minutes. 3 students: 75 minutes. 4 students: 90 minutes. Spelling and communication skills in the project report are part of the assessment. Permitted support and preparation materials during the exam: Personal notes, own reports and assignments. Assessment: 7-point grading scale. Moderation: Internal co-assessor.

Title	**Experimental Biotechnology**
Amended	01.09.20
Teaching language	English
Type of activity	Mandatory course: Molecular Biology in combination Environmental Biology, Medical Biology, Physics, Communication and Computer Science Elective course: Chemistry in combination with Environmental Biology
ECTS-rating	5 ECTS
Learning outcomes and assessment criteria	• Knowledge and understanding of the opportunities for isolating, characterising and modifying genes and gene products • Insight into scientific studies of the properties of genes and proteins and their application in biotechnological processes • Proficiency in independently planning and completing experimental work based on standard protocols • Proficiency in good practices related to keeping laboratory journals • Proficiency in using digital programs to analyse the data that has been acquired • Ability to plan, complete and analyse assigned experiments using methods in gene and protein technology

Overall content	A practical course in DNA and protein technology that gives students insight into the function and regulation of genes and gene products. Introduction to various methods that are used in contemporary molecular biology research
Teaching and working methods	An intensive laboratory course with introductory lectures and student presentations related to the day's work. The students will work in groups of two or three and prepare a laboratory journal and a laboratory report during the course
Prerequisites for participation in the exam	Attendance of 80%, approved oral presentation and approved laboratory journal. Alternate prerequisites for taking the examination: Attendance of 60%, approval of oral presentation, approval of laboratory journal and a 48-hour take-home assignment (set by the lecturer).
Type of exam	**Type of exam** Individual oral exam based on a laboratory report. The exam is conducted as a dialogue. There may be posed questions in any part of the curriculum. The character limit of the written product is 24,000-204,000 characters, including spaces. The character limits include the cover, table of contents, bibliography, figures and other illustrations, but exclude any appendices. Time allowed for exam including time used for assessment: 15 minutes. The assessment is an overall assessment of the written product(s) and the subsequent oral examination. Permitted support and preparation materials for the oral exam: Personal notes, own reports and assignments. Assessment: 7-point grading scale. Moderation: Internal co-assessor.

Title	Advanced Eukaryotic Cell Biology II - Cellular Mechanisms in Development and Cancer
Amended	01.09.20
Teaching language	English
Type of activity	Elective course

ECTS-rating	5 ECTS
Learning outcomes and assessment criteria	• Knowledge and understanding of the organisation and regulation of multi-cellular systems, including embryo development, stem cells and cancer and homeostasis in adult tissues • Knowledge and understanding of the organisation and regulation of processes in and between eukaryotic cells, cell adhesion, cell signaling, cell cycle, migration, growth and apoptosis • Insight into how experiments have contributed to the current knowledge about specialised cellular mechanisms. • Proficiency in describing the structure and function of molecules in the eukaryotic cell that are important to the regulation of cellular growth and inter-cellular interactions • Proficiency in providing a detailed description of the function of proteins in eukaryotic cells, such as receptors, signaling molecules and morphogens • Ability to complete a theoretical review of the latest scientific literature in advanced eukaryotic cellular mechanisms, with an emphasis on development and cancer • Ability to formulate new scientific hypotheses as the starting point for a thesis project in eukaryotic cell biology
Overall content	Theoretical course in advanced eukaryotic cell biology aimed at making the students familiar with the regulation. Intercellular interactions, with an emphasis on development and cancer.
Teaching and working methods	Lectures, interactive quizzes and a group review of assignments that have been handed out.
Type of exam	**Type of exam** Individual written invigilated exam in a topic(s) given by the lecturer. The duration of the exam is 3 hours. Permitted support and preparation materials for the exam: Dictionaries and non-programmable pocket calculator. Assessment: 7-point grading scale. Moderation: Internal co-assessor.

Title	**Seminar Course in Advanced Molecular Biology**

Amended	01.09.20
Teaching language	English
Type of activity	Elective course
ECTS-rating	5 ECTS
Learning outcomes and assessment criteria	• Knowledge and understanding of core biochemical, cellular biological or physiological processes in various organisms • Insight into the different physiological and regulatory responses of various organisms to changes in the internal or external environment • Proficiency in gathering relevant knowledge and understanding from scientific review articles • Proficiency in critically analysing new and original scientific literature and interpreting and evaluating experimental data and hypotheses in biochemistry, physiology or cellular biology • Proficiency in making oral presentations of scientific hypotheses, results and interpretations to fellow students • Ability to reflect upon the latest scientific hypotheses and experiments in the course's subject area. • Ability to formulate a relevant research question and a testable hypothesis as a basis for an experimental thesis project related to biochemistry, physiology or cellular biology.
Overall content	The course cover biochemical, physiological and cellular biological responses, mechanisms and adaptations. The main emphasis is on knowledge and understanding, theory and scientific methods and oral presentation. The content of the individual courses appears in the course description on study.ruc.dk.
Teaching and working methods	A theoretical course with a combination of overview lectures, student presentations and class discussions of original articles and peer feedback on the presentations.
Type of exam	**Type of exam** The course is passed through active, regular attendance and satisfactory participation. Active participation is defined as: The student must participate in course related activities (e.g. workshops, seminars, field excursions, process study groups, working conferences, supervision groups, feedback sessions). Regular attendance is defined as: - The student must be present for minimum 80 percent of the

	lessons. Satisfactory active participation is defined as: - The student must during the course participate in four presentation (oral). Assessment: Pass/Fail. **Reexam** Individual written take-home assignment given by the lecturer. The character limit of the assignment is: 7,200-12,000 characters, including spaces. The character limit includes the cover, table of contents, bibliography, figures and other illustrations, but exclude any appendices. The duration of the take-home assignment is 48 hours and may include weekends and public holidays. Assessment: Pass/Fail.

Title	Methods Course in Advanced Molecular Biology
Amended	01.09.20
Teaching language	English
Type of activity	Elective course
ECTS-rating	5 ECTS
Learning outcomes and assessment criteria	• Knowledge and understanding of selected experimental or bioinformatic methods in specific areas of molecular biology • Proficiency in planning and completing experimental or bioinformatic work based on standard protocols • Proficiency in working with good practices for keeping work journals • Proficiency in the application of software tools for the analysis of experimental data • Competences in reading and understanding the scientific literature within a specialisation in molecular biology • Competences in selecting and applying methods as part of an experimental project in the course's specific subject area

	• Competences in formulating a relevant research question and a testable hypothesis as a basis for an experimental thesis project related to the course's subject area
Overall content	Scientific methods for the investigation of selected molecular biological research questions. The content of the individual course can be found in the course description on study.ruc.dk.
Teaching and working methods	Lectures, student presentations and laboratory work. The teaching and working methods for the individual course are stated in the course description on study.ruc.dk.
Type of exam	**Type of exam 1** The course is passed through active, regular attendance and satisfactory participation. Active participation is defined as: The student must participate in course related activities (e.g. workshops, seminars, field excursions, process study groups, working conferences, supervision groups, feedback sessions). Regular attendance is defined as: - The student must be present for minimum 80 percent of the experimental/practical parts of the course with the developed analysis and interpretation of data in reports.. Satisfactory active participation is defined as: - The student must during the course hand in four reports. - The student must during the course participate in two presentation (oral). Assessment: Pass/Fail. **Type of exam 2** The course is passed through active, regular attendance and satisfactory participation. Active participation is defined as: The student must participate in course related activities (e.g. workshops, seminars, field excursions, process study groups, working conferences, supervision groups, feedback sessions). Regular attendance is defined as: - The student must be present for minimum 80 percent of the experimental/practical parts of the course with the developed analysis and interpretation of data in reports.. Satisfactory active participation is defined as: - The student must during the course hand in two reports.

	- The student must during the course participate in two presentation (oral). Assessment: Pass/Fail.

Title	Bioinformatics
Amended	01.09.20
Teaching language	English
Type of activity	Mandatory course: Molecular Biology in combination Environmental Biology Elective course: Molecular Biology in combination with Chemistry, Medical Biology, Physics, Communication and Computer Science
ECTS-rating	5 ECTS
Learning outcomes and assessment criteria	• Ability to formulate a biological research problem so that it can be analysed from a bioinformatic perspective • Knowledge of the opportunities and limitations in certain databases and programs • Proficiency in searching databases • Proficiency in searching programs to solve bioinformatic problems • Proficiency in using online programs and downloading, installing and using local programs • Ability to analyse a bioinformatic problem and select a solution • Ability to solve simple bioinformatic problems • Ability to communicate competently with bioinformaticians about more complex problems
Overall content	The course will introduce the students to describing bioinformatic problems, selecting bioinformatic methods and solving simple bioinformatic problems using existing tools.
Teaching and working methods	The course will focus on practical solutions to selected problems via written and oral reporting. Students are supported by a theory review and practical instructions. The course is composed of 4-5 modules. Each module is concluded with a written module report. The module reports can be written individually or in groups of 2-3 students. The module reports form the basis for the written final report.

Prerequisites for participation in the exam	80% attendance and approval of 4-5 module reports. If the student only meets the prerequsite of attendance with 60% or above, the student must submit an additional report on a topic selected by the lecturer.
Type of exam	**Type of exam** Oral group exam based on a report made by the group. The exam starts with a presentation from each of the students of maximum 5 min. After the presentations the exam is conducted as a dialogue There may be posed questions in any part of the curriculum. Permitted group size: 2-4 students. The character limits of the written product: For 2 students: 19,200-72,000 characters, including spaces. For 3 students: 19,200-72,000 characters, including spaces. For 4 students: 19,200-72,000 characters, including spaces. The character limits include the cover, table of contents, bibliography, figures and other illustrations, but exclude any appendices. Time allowed for exam including time used for assessment is for: 2 students: 20 minutes. 3 students: 25 minutes. 4 students: 30 minutes. The assessment is individual and based on the student's individual performance. The assessment s based on the product(s) and the oral exam. Permitted support and preparation materials for the oral exam: PowerPoint presentation or equivalent and notes to presentation. Assessment: Pass/Fail. Moderation: Internal co-assessor.

Title	Advanced Eukaryotic Cell Biology I - Inside the Cell
Amended	01.09.20
Teaching language	English
Type of activity	Mandatory course: Molecular Biology in combination Chemistry, Environmental Biology, Medical Biology, Physics, Communication and Computer Science

	Elective course: Medical Biology in combination with Environmental Biology
ECTS-rating	5 ECTS
Learning outcomes and assessment criteria	• Knowledge and understanding of the organisation and function of chromosomes, membranes and organelles, intra-cellular protein sorting and vesicular traffic in the eukaryotic cell • Knowledge and understanding of the organisation and regulation of processes in and between eukaryotic cells, including gene expression, membrane function and cell signaling • Insight into how experiments have contributed to the current knowledge of cellular mechanisms • Proficiency in describing the role of proteins and nucleic acids in eukaryotic cells • Proficiency in providing a detailed description of the function of proteins in eukaryotic cells such as receptors, transport proteins, ion channels and structural proteins • Ability to complete a theoretical review of the latest scientific literature in eukaryotic cell biology • Ability to formulate new scientific hypotheses as the starting point for a thesis project in eukaryotic cell biology
Overall content	Theoretical course in eukaryotic cell biology aiming to give the students a broad knowledge of the formation of cellular compartments and organelles as well as intracellular functions and regulation mechanisms
Teaching and working methods	Lectures, interactive quizzes and a group review of assignments that have been handed out.
Type of exam	**Type of exam** Individual written invigilated exam in a topic(s) given by the lecturer. The duration of the exam is 3 hours. Permitted support and preparation materials for the exam: Dictionaries and non-programmable pocket calculator. Assessment: 7-point grading scale. Moderation: External examiner.

Title	**Theoretical Theme Course in Molecular Biology**

Amended	01.09.20
Teaching language	English
Type of activity	Elective course
ECTS-rating	5 ECTS
Learning outcomes and assessment criteria	• Insight into the latest scientific research in a specific molecular biology subject • Ability to complete an exhaustive search of databases for the scientific literature in the specific academic subject • Proficiency in summarising and discussing the latest research-based knowledge, theories and results in clear and understandable manner in accordance with scientific requirements and norms • Ability to search the scientific literature for the relevant theory and experimental methods in order to formulate a research question for the master's thesis project
Overall content	A literature review of a defined molecular-biological topic in physiology, cellular biology, biochemistry, genetics or molecular biology methods.
Teaching and working methods	Independent study: individually or in groups of 2 students. Four hours of supervision for one student, six hours for two students. The project outline and supervisor must be approved by the Head of Studies before the student can begin working on it.
Type of exam	**Type of exam** Take-home assignment - individual or in a group in a research question of own choice approved by the lecturer. Assignments written by a group must be individualised. Permitted group size: 2-2 students. The character limits of the assignment: For 1 student: 24,000-40.800 characters, including spaces. For 2 students: 24,000-52.800 characters, including spaces. The character limits include the cover, table of contents, bibliography, figures and other illustrations, but exclude any appendices. The students start writing the take-home assignment during the course. The duration is 10 weeks and may include public holidays. The submission deadline will be announced on study.ruc.dk.

	Assessment: Pass/Fail.

Title	Experimental Theme Course in Molecular Biology
Amended	01.09.20
Teaching language	English
Type of activity	Elective course
ECTS-rating	5 ECTS
Learning outcomes and assessment criteria	• Insight into experimental methods for investigating a specific biological problem • Proficiency in carrying out one or more experimental methods or procedures for studying a specific academic research question • Proficiency in analysing data gained with these methods • Proficiency in presenting the experimental method(s) and the gained results in a clear and understandable manner in accordance with scientific requirements and norms • Ability to assess whether the method is appropriate to investigating the relevant research question in connection with a master's thesis project
Overall content	An experimental study assessing one or more experimental methods in physiology, cellular biology, biochemistry, biotechnology or bioinformatics
Teaching and working methods	Independent laboratory work: individually or in groups of two students. Six hours of supervision for one student, nine hours for two students. Students must prepare a report on the experimental work. The report must include a brief introduction to possible experimental methods that can be used to study the problem in question, a clear description of the procedures for the tested method(s), a section on results and a brief discussion of the suitability of the method(s). The project outline and supervisor must be approved by the Head of Studies before the student can begin working on it.
Type of exam	**Type of exam** Take-home assignment - individual or in a group in a research question of own choice approved by the lecturer.

	Assignments written by a group must be individualised. Permitted group size: 2-2 students. The character limits of the assignment: For 1 student: 24,000-40,800 characters, including spaces. For 2 students: 24,000-52,800 characters, including spaces. The character limits include the cover, table of contents, bibliography, figures and other illustrations, but exclude any appendices. The students start writing the take-home assignment during the course. The duration is 10 weeks and may include public holidays. The submission deadline will be announced on study.ruc.dk. Assessment: Pass/Fail.

Title	Project-oriented Internship (Molecular Biology)
Amended	01.09.2019
Teaching language	English
Type of activity	Project-oriented Internship
ECTS-rating	15 ECTS
Learning outcomes and assessment criteria	• Knowledge of the parts of Molecular Biology relevant to the selected research question at the internship organisation • Identification of scientific research questions and critical adherence to scientific knowledge in relation to models, theories and data both from the scientific literature in the field and the experience acquired during the internship • Knowledge of the occupational sector in which work is carried out on the subject of Molecular Biology • Skills in designing and carrying out relevant experiments and/or analysing original data to analyse concrete practical research questions • Skills in using scientific theories and methods when working with the research question • Skills in processing and interpreting own experimental data and/or analytical results in relation to models, theories and data from literature

	• Skills in communicating and discussing the results of the project in a clear and orderly manner in accordance with scientific requirements and norms • Skills to be able to critically reflect on the practice of a specific workplace based on the theories and methods employed in Molecular Biology • The competence in setting up, managing and implementing an application-oriented scientific study and writing process • After the internship, the competence to be able to participate actively and independently in carrying out tasks in organisations/companies where the professionalism and competences from molecular biology contribute to creating value for the organisation/company • The competence to be able to enter into dialogue with other professional groups on how their own knowledge and skills can contribute to a qualified execution of tasks
Overall content	The internship must allow the students to test their professional profile and to qualify their job opportunities. The internship should allow the student to gain practical experience of working professionally with research questions in the field of molecular biology. The student must prepare an internship project with a Molecular Biological research question relevant to the internship and the tasks the student has had.
Teaching and working methods	As a general rule, the students must arrange their own internship. The student is assigned an internship project supervisor from Molecular Biology. A pre-meeting is held with the supervisor. The supervisor assists in concluding the necessary agreements with the internship organisation, including a written mutual traineeship agreement between the supervisor, student and internship organisation. The supervisor must assess that the internship organisation and the functions that the student must carry out during the internship are of such a nature that the student's learning and competence development are ensured. The supervisor assists the student in establishing an academic foundation, completing knowledge production in the context of the internship, and summarising the practical experience and knowledge in an internship project. The internship project has the nature of a standard project report, in which the case-based knowledge is included, where the case in this context is the internship organisation and/or the tasks solved by the intern. The internship organisation can also contribute to the supervision of the student.
Type of exam	**Type of exam** Oral exam based on the internship project report and additional material, if any. The exam begins with a presentation based on the report. The presentation may last up to 15 minutes The presentation is followed by a dialogue between the student and the assessors on the basis of the internship project report.

	There may be posed questions within the main area(s) of the internship report. The character limit of the internship report is: 24,000-204,000 characters, including spaces. The character limits include the cover, table of contents, bibliography, figures and other illustrations, but exclude any appendices. Time allowed for exam including time used for assessment: 30 minutes. The assessment is an assessment of the report and the oral performance. Spelling and communication skills in the report are part of the assessment. Permitted support and preparation materials for the oral exam: All. Assessment: 7-point grading scale. Moderation: Internal co-assessor.

2.3 Third semester

Objective

The third semester aims to expand upon the students' knowledge and understanding of computer science and molecular biology. The course work in computer science will promote the students' specialisation.

Programme elements
Computer Science

- 2 x Elective Courses in Computer Science (5 ECTS)
- Research Seminar in Computer Science (Datalogi) (5 ECTS)

Molecular Biology

Starting in the Autumn:

- Course: Bioinformatics (5 ECTS)
- Course: Experimental Biotechnology (5 ECTS)
- Optional course (5 ECTS): Theoretical Theme Course in Molecular Biology (5 ECTS), Experimental Theme Course in Molecular Biology (5 ECTS), Seminar course in advanced Molecular Biology (5 ECTS), Methods course in advanced Molecular Biology (5 ECTS)

Starting in the Spring:

- Advanced Eukaryotic Cell Biology I - Inside the Cell (5 ECTS)

- 2 Optional course 5 ECTS each (10 ECTS): Theoretical Theme Course in Molecular Biology (5 ECTS), Experimental Theme Course in Molecular Biology (5 ECTS), Seminar course in advanced Molecular Biology (5 ECTS), Methods course in advanced Molecular Biology (5 ECTS) or Advanced Eukaryotic Cell Biology II - Cellular Mechanisms in Development and Cancer

Title	Elective course(Computer Science)
Amended	1.9.2019
Teaching language	English
Type of activity	Elective course
ECTS-rating	5 ECTS
Learning outcomes and assessment criteria	• Knowledge and understanding of a specific subject area in computer science • Knowledge and understanding of the area's techniques for designing and constructing software systems that meet specific requirements • Knowledge and understanding of the general principles behind the subject area's theory, methods and technological solutions. • Skills in electing and applying appropriate methods and techniques from the subject area in order to analyse, design and construct reliable and user-friendly software systems • Competences in being able to work on computer science-related issues, both independently and in teams • Competences in being able to become proficient in new approaches to the subject area in a critical and systematic way and thereby independently take responsibility for one's own professional development.
Overall content	With an elective course, the student has the opportunity to specialise in a specific subject area where the student acquires knowledge, skills and competences in order to translate theories, methods and solutions ideas into their own practice in relation to software development. Examples of elective courses: Robotics, AI, internet technologies, programming language, parallel calculation, mobile computers, etc. The specific contents are listed on study.ruc.dk.
Teaching and working methods	Normal class instruction, i.e. a mix of lecturer presentations, student presentations and practical work on specific tasks. Lecture with exercises. Is stated in the description on study.ruc.dk.
Type of exam	**Type of exam 1** Individual oral exam based on an assignment.

The exam is conducted as a dialogue.
There may be posed questions in any part of the curriculum.

The character limit of the written product is 4.800-48,000 characters, including spaces.
The character limits include the cover, table of contents, bibliography, figures and other illustrations, but exclude any appendices.

Time allowed for exam including time used for assessment: 20 minutes.
The assessment is an overall assessment of the written product(s) and the subsequent oral examination.

Permitted support and preparation materials for the oral exam: All.

Assessment: 7-point grading scale.
Moderation: Internal co-assessor.

Type of exam 2
Individual oral exam without preparation time.

The starting point for the exam is a question that will be drawn when the examination begins.

The exam is conducted as a dialogue.
There may be posed questions in any part of the curriculum.

Time allowed for exam including time used for the draw and for assessment: 20 minutes.

Permitted support and preparation materials: All.

Assessment: 7-point grading scale.
Moderation: Internal co-assessor.

Type of exam 3
Individual written take-home assignment given by the lecturer.

The character limit of the assignment is: 4.800-48,000 characters, including spaces.
The character limit includes the cover, table of contents, bibliography, figures and other illustrations, but exclude any appendices.

The duration of the take-home assignment is 21 days and may include weekends and public holidays.
The estimated work effort is 3 days. Other exams may therefore be scheduled simultaneously.

	Assessment: 7-point grading scale.

Title	Research Seminar in Computer Science (Datalogi)
Amended	01.09.2019
Teaching language	English
Type of activity	Mandatory course
ECTS-rating	5 ECTS
Learning outcomes and assessment criteria	• Knowledge • Advanced knowledge and understanding of a selected specialised computer science area, based on the highest levels of international research • Skills • Must be able to work independently on research-based questions in the field of computer science. • Must be able to take responsibility for one's own professional development and specialisation in the field of computer science. • Must be able to communicate research-based knowledge and understanding of computer science and discuss professional computer science-related research questions on a scientific basis with both colleagues and non-specialists • Competences: • Must be able to work with IT issues both independently and in teams • Must be able to become proficient in new computer science subject areas in a systematic and critical way and independently take responsibility for one's own professional development and specialisation.
Overall content	The course is designed to prepare the students for their subsequent master's thesis in Computer Science. The course enables the students to describe a specific area of specialisation and prepare a draft of the research question within the subject area. During the course, the students will find and select key, relevant peer-reviewed research publications within the subject area.
Teaching and working methods	Seminar.
Type of exam	

	Type of exam Individual oral exam with a starting point in an assignment designed as a presentation (maximum 10 slides) in one mini report. The student must chose five publications and write a presentation based on the literature. The exam is conducted as a dialogue There may be posed questions in any part of the curriculum. Time allowed for exam including time used for assessment: 20 minutes. The assessment is an overall assessment of the written product(s) and the subsequent oral examination.. The assessment is individual and based on the student's individual performance. Permitted support and preparation materials for the oral exam: All. Assessment: 7-point grading scale. Moderation: Internal co-assessor.

Title	Advanced Eukaryotic Cell Biology II - Cellular Mechanisms in Development and Cancer
Amended	01.09.20
Teaching language	English
Type of activity	Elective course
ECTS-rating	5 ECTS
Learning outcomes and assessment criteria	• Knowledge and understanding of the organisation and regulation of multi-cellular systems, including embryo development, stem cells and cancer and homeostasis in adult tissues • Knowledge and understanding of the organisation and regulation of processes in and between eukaryotic cells, cell adhesion, cell signaling, cell cycle, migration, growth and apoptosis • Insight into how experiments have contributed to the current knowledge about specialised cellular mechanisms. • Proficiency in describing the structure and function of molecules in the eukaryotic cell that are important to the regulation of cellular growth and inter-cellular interactions

	• Proficiency in providing a detailed description of the function of proteins in eukaryotic cells, such as receptors, signaling molecules and morphogens • Ability to complete a theoretical review of the latest scientific literature in advanced eukaryotic cellular mechanisms, with an emphasis on development and cancer • Ability to formulate new scientific hypotheses as the starting point for a thesis project in eukaryotic cell biology
Overall content	Theoretical course in advanced eukaryotic cell biology aimed at making the students familiar with the regulation. Intercellular interactions, with an emphasis on development and cancer.
Teaching and working methods	Lectures, interactive quizzes and a group review of assignments that have been handed out.
Type of exam	**Type of exam** Individual written invigilated exam in a topic(s) given by the lecturer. The duration of the exam is 3 hours. Permitted support and preparation materials for the exam: Dictionaries and non-programmable pocket calculator. Assessment: 7-point grading scale. Moderation: Internal co-assessor.

Title	**Experimental Biotechnology**
Amended	01.09.20
Teaching language	English
Type of activity	Mandatory course: Molecular Biology in combination Environmental Biology, Medical Biology, Physics, Communication and Computer Science Elective course: Chemistry in combination with Environmental Biology
ECTS-rating	5 ECTS
Learning outcomes and assessment criteria	• Knowledge and understanding of the opportunities for isolating, characterising and modifying genes and gene products • Insight into scientific studies of the properties of genes and proteins and their application in biotechnological processes

	• Proficiency in independently planning and completing experimental work based on standard protocols • Proficiency in good practices related to keeping laboratory journals • Proficiency in using digital programs to analyse the data that has been acquired • Ability to plan, complete and analyse assigned experiments using methods in gene and protein technology
Overall content	A practical course in DNA and protein technology that gives students insight into the function and regulation of genes and gene products. Introduction to various methods that are used in contemporary molecular biology research
Teaching and working methods	An intensive laboratory course with introductory lectures and student presentations related to the day's work. The students will work in groups of two or three and prepare a laboratory journal and a laboratory report during the course
Prerequisites for participation in the exam	Attendance of 80%, approved oral presentation and approved laboratory journal. Alternate prerequisites for taking the examination: Attendance of 60%, approval of oral presentation, approval of laboratory journal and a 48-hour take-home assignment (set by the lecturer).
Type of exam	**Type of exam** Individual oral exam based on a laboratory report. The exam is conducted as a dialogue. There may be posed questions in any part of the curriculum. The character limit of the written product is 24,000-204,000 characters, including spaces. The character limits include the cover, table of contents, bibliography, figures and other illustrations, but exclude any appendices. Time allowed for exam including time used for assessment: 15 minutes. The assessment is an overall assessment of the written product(s) and the subsequent oral examination. Permitted support and preparation materials for the oral exam: Personal notes, own reports and assignments. Assessment: 7-point grading scale. Moderation: Internal co-assessor.

Title	Seminar Course in Advanced Molecular Biology
Amended	01.09.20
Teaching language	English
Type of activity	Elective course
ECTS-rating	5 ECTS
Learning outcomes and assessment criteria	• Knowledge and understanding of core biochemical, cellular biological or physiological processes in various organisms • Insight into the different physiological and regulatory responses of various organisms to changes in the internal or external environment • Proficiency in gathering relevant knowledge and understanding from scientific review articles • Proficiency in critically analysing new and original scientific literature and interpreting and evaluating experimental data and hypotheses in biochemistry, physiology or cellular biology • Proficiency in making oral presentations of scientific hypotheses, results and interpretations to fellow students • Ability to reflect upon the latest scientific hypotheses and experiments in the course's subject area. • Ability to formulate a relevant research question and a testable hypothesis as a basis for an experimental thesis project related to biochemistry, physiology or cellular biology.
Overall content	The course cover biochemical, physiological and cellular biological responses, mechanisms and adaptations. The main emphasis is on knowledge and understanding, theory and scientific methods and oral presentation. The content of the individual courses appears in the course description on study.ruc.dk.
Teaching and working methods	A theoretical course with a combination of overview lectures, student presentations and class discussions of original articles and peer feedback on the presentations.
Type of exam	**Type of exam** The course is passed through active, regular attendance and satisfactory participation. Active participation is defined as: The student must participate in course related activities (e.g. workshops, seminars, field excursions, process study groups, working conferences, supervision groups, feedback sessions).

	Regular attendance is defined as: - The student must be present for minimum 80 percent of the lessons. Satisfactory active participation is defined as: - The student must during the course participate in four presentation (oral). Assessment: Pass/Fail. **Reexam** Individual written take-home assignment given by the lecturer. The character limit of the assignment is: 7,200-12,000 characters, including spaces. The character limit includes the cover, table of contents, bibliography, figures and other illustrations, but exclude any appendices. The duration of the take-home assignment is 48 hours and may include weekends and public holidays. Assessment: Pass/Fail.

Title	Methods Course in Advanced Molecular Biology
Amended	01.09.20
Teaching language	English
Type of activity	Elective course
ECTS-rating	5 ECTS
Learning outcomes and assessment criteria	• Knowledge and understanding of selected experimental or bioinformatic methods in specific areas of molecular biology • Proficiency in planning and completing experimental or bioinformatic work based on standard protocols • Proficiency in working with good practices for keeping work journals • Proficiency in the application of software tools for the analysis of experimental data • Competences in reading and understanding the scientific literature within a specialisation in molecular biology

	• Competences in selecting and applying methods as part of an experimental project in the course's specific subject area • Competences in formulating a relevant research question and a testable hypothesis as a basis for an experimental thesis project related to the course's subject area
Overall content	Scientific methods for the investigation of selected molecular biological research questions. The content of the individual course can be found in the course description on study.ruc.dk.
Teaching and working methods	Lectures, student presentations and laboratory work. The teaching and working methods for the individual course are stated in the course description on study.ruc.dk.
Type of exam	**Type of exam 1** The course is passed through active, regular attendance and satisfactory participation. Active participation is defined as: The student must participate in course related activities (e.g. workshops, seminars, field excursions, process study groups, working conferences, supervision groups, feedback sessions). Regular attendance is defined as: - The student must be present for minimum 80 percent of the experimental/practical parts of the course with the developed analysis and interpretation of data in reports.. Satisfactory active participation is defined as: - The student must during the course hand in four reports. - The student must during the course participate in two presentation (oral). Assessment: Pass/Fail. **Type of exam 2** The course is passed through active, regular attendance and satisfactory participation. Active participation is defined as: The student must participate in course related activities (e.g. workshops, seminars, field excursions, process study groups, working conferences, supervision groups, feedback sessions). Regular attendance is defined as: - The student must be present for minimum 80 percent of the experimental/practical parts of the course with the developed analysis and interpretation of data in reports..

	Satisfactory active participation is defined as: - The student must during the course hand in two reports. - The student must during the course participate in two presentation (oral). Assessment: Pass/Fail.

Title	Bioinformatics
Amended	01.09.20
Teaching language	English
Type of activity	Mandatory course: Molecular Biology in combination Environmental Biology Elective course: Molecular Biology in combination with Chemistry, Medical Biology, Physics, Communication and Computer Science
ECTS-rating	5 ECTS
Learning outcomes and assessment criteria	• Ability to formulate a biological research problem so that it can be analysed from a bioinformatic perspective • Knowledge of the opportunities and limitations in certain databases and programs • Proficiency in searching databases • Proficiency in searching programs to solve bioinformatic problems • Proficiency in using online programs and downloading, installing and using local programs • Ability to analyse a bioinformatic problem and select a solution • Ability to solve simple bioinformatic problems • Ability to communicate competently with bioinformaticians about more complex problems
Overall content	The course will introduce the students to describing bioinformatic problems, selecting bioinformatic methods and solving simple bioinformatic problems using existing tools.
Teaching and working methods	The course will focus on practical solutions to selected problems via written and oral reporting. Students are supported by a theory review and practical instructions. The course is composed of 4-5 modules. Each module is concluded with a written module report. The module reports can be written individually or

	in groups of 2-3 students. The module reports form the basis for the written final report.
Prerequisites for participation in the exam	80% attendance and approval of 4-5 module reports. If the student only meets the prerequsite of attendance with 60% or above, the student must submit an additional report on a topic selected by the lecturer.
Type of exam	**Type of exam** Oral group exam based on a report made by the group. The exam starts with a presentation from each of the students of maximum 5 min. After the presentations the exam is conducted as a dialogue There may be posed questions in any part of the curriculum. Permitted group size: 2-4 students. The character limits of the written product: For 2 students: 19,200-72,000 characters, including spaces. For 3 students: 19,200-72,000 characters, including spaces. For 4 students: 19,200-72,000 characters, including spaces. The character limits include the cover, table of contents, bibliography, figures and other illustrations, but exclude any appendices. Time allowed for exam including time used for assessment is for: 2 students: 20 minutes. 3 students: 25 minutes. 4 students: 30 minutes. The assessment is individual and based on the student's individual performance. The assessment s based on the product(s) and the oral exam. Permitted support and preparation materials for the oral exam: PowerPoint presentation or equivalent and notes to presentation. Assessment: Pass/Fail. Moderation: Internal co-assessor.

Title	Advanced Eukaryotic Cell Biology I - Inside the Cell
Amended	01.09.20
Teaching language	English
Type of activity	

	Mandatory course: Molecular Biology in combination Chemistry, Environmental Biology, Medical Biology, Physics, Communication and Computer Science Elective course: Medical Biology in combination with Environmental Biology
ECTS-rating	5 ECTS
Learning outcomes and assessment criteria	• Knowledge and understanding of the organisation and function of chromosomes, membranes and organelles, intra-cellular protein sorting and vesicular traffic in the eukaryotic cell • Knowledge and understanding of the organisation and regulation of processes in and between eukaryotic cells, including gene expression, membrane function and cell signaling • Insight into how experiments have contributed to the current knowledge of cellular mechanisms • Proficiency in describing the role of proteins and nucleic acids in eukaryotic cells • Proficiency in providing a detailed description of the function of proteins in eukaryotic cells such as receptors, transport proteins, ion channels and structural proteins • Ability to complete a theoretical review of the latest scientific literature in eukaryotic cell biology • Ability to formulate new scientific hypotheses as the starting point for a thesis project in eukaryotic cell biology
Overall content	Theoretical course in eukaryotic cell biology aiming to give the students a broad knowledge of the formation of cellular compartments and organelles as well as intracellular functions and regulation mechanisms
Teaching and working methods	Lectures, interactive quizzes and a group review of assignments that have been handed out.
Type of exam	**Type of exam** Individual written invigilated exam in a topic(s) given by the lecturer. The duration of the exam is 3 hours. Permitted support and preparation materials for the exam: Dictionaries and non-programmable pocket calculator. Assessment: 7-point grading scale. Moderation: External examiner.

Title	Theoretical Theme Course in Molecular Biology
Amended	01.09.20
Teaching language	English
Type of activity	Elective course
ECTS-rating	5 ECTS
Learning outcomes and assessment criteria	• Insight into the latest scientific research in a specific molecular biology subject • Ability to complete an exhaustive search of databases for the scientific literature in the specific academic subject • Proficiency in summarising and discussing the latest research-based knowledge, theories and results in clear and understandable manner in accordance with scientific requirements and norms • Ability to search the scientific literature for the relevant theory and experimental methods in order to formulate a research question for the master's thesis project
Overall content	A literature review of a defined molecular-biological topic in physiology, cellular biology, biochemistry, genetics or molecular biology methods.
Teaching and working methods	Independent study: individually or in groups of 2 students. Four hours of supervision for one student, six hours for two students. The project outline and supervisor must be approved by the Head of Studies before the student can begin working on it.
Type of exam	**Type of exam** Take-home assignment - individual or in a group in a research question of own choice approved by the lecturer. Assignments written by a group must be individualised. Permitted group size: 2-2 students. The character limits of the assignment: For 1 student: 24,000-40.800 characters, including spaces. For 2 students: 24,000-52.800 characters, including spaces. The character limits include the cover, table of contents, bibliography, figures and other illustrations, but exclude any appendices. The students start writing the take-home assignment during the course. The duration is 10 weeks and may include public holidays. The submission deadline will be announced on study.ruc.dk.

	Assessment: Pass/Fail.

Title	Experimental Theme Course in Molecular Biology
Amended	01.09.20
Teaching language	English
Type of activity	Elective course
ECTS-rating	5 ECTS
Learning outcomes and assessment criteria	• Insight into experimental methods for investigating a specific biological problem • Proficiency in carrying out one or more experimental methods or procedures for studying a specific academic research question • Proficiency in analysing data gained with these methods • Proficiency in presenting the experimental method(s) and the gained results in a clear and understandable manner in accordance with scientific requirements and norms • Ability to assess whether the method is appropriate to investigating the relevant research question in connection with a master's thesis project
Overall content	An experimental study assessing one or more experimental methods in physiology, cellular biology, biochemistry, biotechnology or bioinformatics
Teaching and working methods	Independent laboratory work: individually or in groups of two students. Six hours of supervision for one student, nine hours for two students. Students must prepare a report on the experimental work. The report must include a brief introduction to possible experimental methods that can be used to study the problem in question, a clear description of the procedures for the tested method(s), a section on results and a brief discussion of the suitability of the method(s). The project outline and supervisor must be approved by the Head of Studies before the student can begin working on it.
Type of exam	

	Type of exam Take-home assignment - individual or in a group in a research question of own choice approved by the lecturer. Assignments written by a group must be individualised. Permitted group size: 2-2 students. The character limits of the assignment: For 1 student: 24,000-40,800 characters, including spaces. For 2 students: 24,000-52,800 characters, including spaces. The character limits include the cover, table of contents, bibliography, figures and other illustrations, but exclude any appendices. The students start writing the take-home assignment during the course. The duration is 10 weeks and may include public holidays. The submission deadline will be announced on study.ruc.dk. Assessment: Pass/Fail.

2.4 Fourth semester - thesis

Objective

The Master Thesis must be written in the first subject, ie Computer Science.

Programme elements

- Master Thesis (30 ECTS)

Title	Master Thesis in Computer Science
Amended	1 September 2019
Teaching language	English
Type of activity	Master thesis
ECTS-rating	30 ECTS
Learning outcomes and assessment criteria	• Knowledge and understanding:

	• Research-based knowledge of selected subject areas and understanding of and reflection on how one's own thesis research fits into its academic context • Knowledge and understanding of the academic genre and the academic target group to which the master's thesis is addressed • Skills: • Proficiency in using and mastering scientific theories and methods while working with a defined, professional and relevant research question • Proficiency in identifying scientific research questions • Proficiency in analysing, categorising, discussing, arguing, reflecting and evaluating on a scientific basi • Proficiency in critically addressing and choosing scientific sources, literature, theory and methods • Proficiency in discussing and participating in academic argumentation • Proficiency in writing in accordance with academic text norms and for an academic target group • Competences • Competences in independently being capable of initiating, managing and completing a long-term academic research and writing process • Competences in identifying and taking responsibility for one's own professional and written language development and specialisation
Overall content	Master Thesis in Computer Science
Type of exam	**Type of exam** The master thesis can be written individually or in a group. Permitted group size: 2-4 students. The student(s) can choose whether the assessment should be based on solely the written product or on both the written product and the oral exam. The character limits of the master thesis are: for 1 student: 40,800-192,000 characters, including spaces. For 2 students: 40,800-192,000 characters, including spaces. For 3 students: 40,800-204,000 characters, including spaces. For 4 students: 40,800-204,000 characters, including spaces. The character limits include the cover, table of contents, summary, bibliography, figures and other illustrations, but exclude any appendices. The master thesis must include a summary. The summary can

either be written in English or Danish.
The summary is included in the overall assessment with a weighting of 5 percent.

Before submitting a master thesis written by a group, that have chosen an assessment solely based on the written product, each member of the group must clearly indicate which part(s) of the thesis they are responsible for.
All group members are responsible for the introduction, conclusion and summary.

The oral exam is individual for students that have written the thesis alone, or students that have requested an individual exam. All other oral master thesis exams are conducted as group exams.

The oral exam, if relevant, will be based on the master thesis. The students begin the exam with a short presentation followed by a dialogue between the student, examiner and external examiner.
There may be posed questions related to the subject area(s) that the master thesis covers.

Time allowed for exam including time used for assessment for:
1 student: 30 minutes.
2 students: 60 minutes.
3 students: 75 minutes.
4 students: 90 minutes.

There will be an individual assessment of each student's performance.
The assessment is an overall assessment of the master thesis and, where relevant, the oral performance.

Spelling and communication skills in the thesis are part of the assessment.

Permitted support and preparation materials at the oral exam: All.

Assessment: 7-point grading scale.
Moderation: External examiner.

3. General provisions

3.1 Credit

On the basis of an application for credit transfer or pre-approval of credit transfer from the student, the Board of Studies will make an academic assessment of whether the programme elements that are included in another programme in Denmark or abroad, can replace the programme elements in the programme at Roskilde University, see the University Programme Order.

A decision of the Board of Studies regarding rejections or partial rejections of applications for credit transfer for completed Danish programme elements and pre-approved credit transfer for Danish or foreign programme elements, can be appealed to a credit transfer appeals board if the appeal concerns the academic assessment, cf. the rules set out in the Ministerial Order on Boards of Appeals for Decisions on Credit Transfer on University Programmes (the Credit Transfer Appeals Board Order). The deadline for submission of an appeal is two weeks from the day the decision is announced to the students.

A decision of the Board of Studies regarding rejections or partial rejections of applications for credit transfer for completed foreign programme elements may be appealed to the Qualifications Board) if the appeal concerns the academic assessment, (cf. the rules set out in the Danish Assessment of Foreign Qualifications etc.). The deadline for submission of an appeal is four weeks from the day the decision is announced to the student.

3.2 Mobility - studying abroad and project-oriented internship

Study abroad

A student can apply to the Board of Studies for pre-approval of credit transfer to complete a stay abroad, which instead replaces individual specified parts of the ordinary education. The detailed rules are available on the university's website.

The Board of Studies recommends that the stay abroad is placed in the second semester.

Project-oriented internship

A student can apply to the Board of Studies for approval of a project-based internship. The period must be approved before the student commences the internship. With approval, the Board of Studies must ensure that the internship does not prevent the student from completing the programme in the prescribed time. The detailed rules are available on the university's website.

The Board of Studies recommends that the internship is placed in the third semester.

Only one internship may be taken during the study programme.

3.3 Special examination conditions

The university can offer special examination conditions for students with physical or mental functional impairments, if the University assesses that this is necessary in order to secure equal opportunities for these students in the examination situation. The provision of such facilities must not result in an alteration of the examination standard.

3.4 Selection criteria

If there are more students who wish to take a given course, etc., than there are places for, the following selection criteria will be applied:

Drawing lots.

3.5 Other provisions

General provisions regarding registration, the examination, tests and other assessment can be found in the university's Common rules, the Examination Order and the Grading Scale Order, etc.

4. Exemption and right of complaint

4.1 Exemption

The Board of Studies can, when justified in unusual circumstances, allow exemption from the rules in the study regulation, which are solely determined by the Board of Studies.

4.2 Right of complaint

A decision made by the Board of Studies pursuant to this study regulation can be appealed to Rector, if the appeal concerns legal issues. The deadline for submission of an appeal is two weeks from the day the decision is announced to the student.

The rector's decision on legal questions can be appealed to the Ministry of Higher Education and Science.

5. Approval

5.1 Approved by the Board of Studies

Approved by the Board of Studies for Computer Science and Informatics on 31 January 2020.

The chairperson for external examiners is informed about amendments before the study regulation comes into force.

5.2 Transitional rules

5.3 Approved by Rector

Approved by Rector Hanne Leth Andersen on 24 March 2020.