

## Environmental Chemistry and Element Cycling

Title	Environmental Chemistry and Element Cycling
Semester	E2024
Master programme in	Environmental Science
Type of activity	Course
Teaching language	English
Study regulation	Read about the Master Programme and find the Study Regulations at <a href="http://ruc.dk">ruc.dk</a> Læs mere om uddannelsen og find din studieordning på <a href="http://ruc.dk">ruc.dk</a>

### REGISTRATION AND STUDY ADMINISTRATIVE

Registration	<p>Sign up for study activities at <a href="#">STADS Online Student Service</a> within the announced registration period, as you can see on the <a href="#">Study administration homepage</a>.</p> <p>When signing up for study activities, please be aware of potential conflicts between study activities or exam dates.</p> <p>The planning of activities at Roskilde University is based on the recommended study programs which do not overlap. However, if you choose optional courses and/or study plans that goes beyond the recommended study programs, an overlap of lectures or exam dates may occur depending on which courses you choose.</p>
Number of participants	
ECTS	10
Responsible for the activity	Simon David Herzog ( <a href="mailto:sherzog@ruc.dk">sherzog@ruc.dk</a> )
Head of study	Per Meyer Jepsen ( <a href="mailto:pmjepsen@ruc.dk">pmjepsen@ruc.dk</a> )
Teachers	
Study administration	INM Registration & Exams ( <a href="mailto:inm-exams@ruc.dk">inm-exams@ruc.dk</a> )
Exam code(s)	U60092

### ACADEMIC CONTENT

Overall objective	This course will provide students with knowledge about chemical processes that occur in water, air, terrestrial and living environments, and
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	<p>the effects of human activity on these processes. The course will further provide an introduction to the principles of energy and element cycling across trophic levels in ecosystems, focusing on biogeochemical processes and their underlying physical, chemical, biochemical and biological drivers.</p>
Detailed description of content	<p>This course will provide students with knowledge about chemical processes that occur in water, air, terrestrial and living environments, and the effects of human activity on these processes.</p> <p>The course will further provide an introduction to the principles of energy and element cycling across trophic levels in ecosystems, focusing on biogeochemical processes and their underlying physical, chemical, biochemical and biological drivers.</p>
Course material and Reading list	<p>A combination of a textbook and scientific literature. More details will be announced on Moodle</p>
Overall plan and expected work effort	<p>The course is a 10 ETCS credit course, corresponding to an expected student work load of ca 270 hrs.</p> <ul style="list-style-type: none"> <li>• Lectures, exercises, student oral presentation: 64-70 hrs</li> <li>• Preparation: ca 200 hrs</li> <li>• Portfolio: 2 hrs (see below)</li> <li>• Exam: 1 hrs</li> </ul>
Format	
Evaluation and feedback	<p>The course includes formative evaluation based on dialogue between the students and the teacher(s).</p> <p>Students are expected to provide constructive critique, feedback and viewpoints during the course if it is needed for the course to have better quality. Every other year at the end of the course, there will also be an evaluation through a questionnaire in SurveyXact. The Study Board will handle all evaluations along with any comments from the course responsible teacher.</p> <p>Furthermore, students can, in accordance with RUCs 'feel free to state your views' strategy through their representatives at the study board, send evaluations, comments or insights from the course to the study board during or after the course.</p>
Programme	<p>This course is divided into three parts.</p> <ul style="list-style-type: none"> <li>• In part I we will study the fundamental principles of environmental chemistry with a focus on student driven exercises.</li> <li>• In part II we will study element and energy cycling processes, based on teacher driven lectures and class exercises.</li> <li>• In part III we will study energy and element cycling in ecosystems, based on student presentations and class discussions on relevant papers</li> </ul>

## ASSESSMENT

Overall learning outcomes

After completing the course, students will be able to:

- demonstrate knowledge of the major pathways and cycles of energy and matter in ecosystems
- demonstrate knowledge of the chemical composition, processes, mechanisms and reactions that take place in environmental spheres
- demonstrate knowledge on the turnover and bioavailability of major pollutants
- demonstrate knowledge on how chemists and biologists approach and solve environmental problems
- identify and analyze the main processes that drive biogeochemical cycles in various ecosystem types
- apply basic principles of chemistry to analyse current environmental issues
- evaluate and construct principal flows of matter and energy and their relative importance in various ecosystems
- evaluate regulatory factors for energy and material cycles in ecosystems
- advice and co-operate to solve ecological problems in which biogeochemical cycles are of central importance
- think analytically and assess information in such ways to make informed conclusions and decisions about controversial environmental issues.

Form of examination

Individual oral exam based on a portfolio.

The character limit of the portfolio is 2,400-24,000 characters, including spaces. Examples of written products are exercise responses, talking points for presentations, written feedback, reflections, written assignments. The preparation of the products may be subject to time limits.

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 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: External examiner

Form of Re-examination

Samme som ordinær eksamen / same form as ordinary exam

Type of examination in special cases

Examination and assessment criteria

The portfolio consists of two written exercises in class.

At least 10 days prior to the oral exam the students receive a catalogue of preparatory questions for the oral exam. At the oral exam the student draws one of the questions and starts the oral exam with a presentation followed by a dialog about the course content.

Students will be assessed by their ability to:

- demonstrate knowledge of the major pathways and cycles of energy and matter in ecosystems
- demonstrate knowledge of the chemical composition, processes, mechanisms and reactions that take place in environmental spheres
- demonstrate knowledge on the turnover and bioavailability of major pollutants
- demonstrate knowledge on how chemists and biologists approach and solve environmental problems
- identify and analyze the main processes that drive biogeochemical cycles in various ecosystem types
- apply basic principles of chemistry to analyse current environmental issues
- evaluate and construct principal flows of matter and energy and their relative importance in various ecosystems
- evaluate regulatory factors for energy and material cycles in ecosystems

The assessment of the oral exam is based on the student's ability to meet the criteria mentioned above and their ability to

- clearly present and communicate the scientific content of the course
- engage in a scientific dialogue and discussion with the assessors

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