# Environmental Regulation and Management with Geographical Information Systems

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| Title | Environmental Regulation and Management with Geographical Information Systems |
| Semester | E2023 |
| Master programme in | Bæredygtig Omstilling (TekSam) / Environmental Science |
| Type of activity | Course |
| Teaching language | English |
| Study regulation | Read about the Master Programme and find the Study Regulations at ruc.dk |

**REGISTRATION AND STUDY ADMINISTRATIVE**

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| Registration | Sign up for study activities at STADS Online Student Service within the announced registration period, as you can see on the Study administration homepage.<br><br>When signing up for study activities, please be aware of potential conflicts between study activities or exam dates.<br><br>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. |
| Number of participants | |
| ECTS | 5 |
| Responsible for the activity | Andreas Aagaard Christensen (anaach@ruc.dk) |
| Head of study | Bente Kjærgård (bkj@ruc.dk) |
| Teachers | • Andreas Aagaard Christensen (course responsible) |

- Esbern Holmes
- Henrik Hauggaard
- Gry Lyngsie

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| Study administration | IMT Tilmelding & Eksamen (imt-eksamen@ruc.dk) |
| Exam code(s) | U60552 |

**ACADEMIC CONTENT**

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|---|---|
| Overall objective | The course focuses on current issues associated with natural resources in rural landscapes and associated coastal marine environments, and on environmental assessments prior to decisions that may significantly affect the environment. Emphasis is on the knowledge base for environmental regulation and management, and the use of Geographic Information Systems (GIS) as a key method for building policies and regulations on a quantitative basis. The course has three dimensions:<br><br>1. Geographical data and tools for environmental regulation<br>2. Climate- and transition-oriented regulation<br>3. The interplay between the knowledge base and politics |
| | The course focuses on current issues associated with natural resources in rural landscapes and associated coastal marine environments, and on environmental assessments prior to decisions that may significantly affect the environment. |
| Detailed description of content | Emphasis is on the knowledge base for environmental regulation and management, and the use of Geographical Information Systems (GIS) as a key method for building policies and regulations on a quantitative basis. The course has three dimensions:<br><br>1. Geographical data and tools for environmental regulation<br>2. Climate- and transition-oriented regulation<br>3. The interplay between the knowledge base and politics |
| Course material and Reading list | The course literature is linked to each individual course and planned according to the stated expected work effort. Reading instructions and access to the written material will be made available on moodle. |

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| | The course is 5 ECTS, corresponding to 135 hours of work for each student. An approximate distribution is:<br><br>• preparation of lectures: 3 hours per lecture<br><br>• participation in lectures: 2 hours per lecture.<br><br>• preparation for lab activities: 2 hours<br><br>• participation in lab activities: 2 hours<br><br>• Exercises and feedback to fellow students 24 hours.<br><br>• Final exam paper: 21 hours |
| Overall plan and expected work effort | The course depends on a high degree of participant involvement, which requires extensive preparation in order to meet the desired learning goals. From the above it appears approx. 64 hours of independent work, 50 hours of written exercises, presentations, and feedback to fellow students. 21 hours for exams.<br><br>Learning activities:<br><br>• In the lectures, we will focus on the knowledge base of environmental assessments prior to policymaker decisions and interventions to mitigate the course of specific environmental problems.<br><br>• Each lecture is supplemented with a lab activity where the students work directly with Geographical Information Systems (GIS) in order to understand how existing geodata can be used to represent relevant spatial knowledge potentially qualifying the decisions taken. |
| Format | |
| Evaluation and feedback | During the course different forms of evaluation and feedback is used in combination with home assignments. The students are expected to: i) contribute to a living learning environment during lectures and labs; ii) participate in feedback on each other's assignments to support cooperative learning, and iii) present in plenum primary results from assignments and plenary discussions<br><br>A final oral evaluation of the entire course is held, and all students are expected to complete an electronic individual evaluation. |

Programme

Each lecture (Level 1) is supported by a GIS lab (level 2)

1. Introduction to how geodata represents spatial knowledge
    - 1.1. Introduction to geodata and how it is handled in GIS
2. Knowledge base and data base
    - 2.1. Description of an area basis on the existing environmental data
3. Dissemination of the digital representation of the physical space
    - 3.1. Use of basic layout and symbols to design a synoptic presentation
4. Socio-economic assessment of environmental projects
    - 4.1. Performing key calculations around spatial data represented.
5. Pollution and effects on the socio-ecological system
    - 5.1. Evaluate existing data availability for effects descriptions in relation to the wishes and needs of different actors
6. Land use and biodiversity relationships
    - 6.1. Picturing changed land use and re-establishment of historic and new habitats
7. Land use, land use change and forestry
    - 7.1. Obtain and analyse data from satellite-based observation platforms
8. Climate footprint and land use in connection with mega-trends in human food consumption
    - 8.1. Changed crop selection and environmental effects
9. Public authorities' work with environmental assessments, why and how
    - 9.1. Different methods of collecting spatial data from citizens

10. Workshop with selected topics, primary conclusions, visualization (part of exam assessment)

11. Final debate on knowledge base and political processes for decision making

**ASSESSMENT**

Overall learning outcomes

Knowledge, skills and competences

- can establish an overview of and assess the relevance of central spatial data collections within selected environmental areas: climate, energy, industry and waste, transport, agriculture and food, nature, and biodiversity
- can identify, select, and present data for supporting decisions on selected environmental challenges
- can select, apply, and reflect on the scope of GIS methods, models and data as well as assess the knowledge base for regulation
- can collect and navigate spatial data collections and extract and present new knowledge
- can assess interactions between spatial knowledge, political institutions and opportunities to steer towards policy objectives
- can select, organize and analyze spatial data as decision support for regulatory efforts

Form of examination

Oral group exam based on a product written by a group

Permitted group size: 2-4 students.

The character limit of the written product is:
For 2 students: 9,600-19,200 characters, including spaces.
For 3 students: 16,800-21,600 characters, including spaces.
For 4 students: 24,000-28,800 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: 30 minutes.

3 students: 40 minutes.
4 students: 50 minutes.

The assessment is individual and based on the student's individual performance.
The assessment is an overall assessment of the written product(s) and the subsequent oral examination..

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

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

Form of Re-examination

Samme som ordinær eksamen / same form as ordinary exam

Type of examination in special cases

Examination and assessment criteria

The oral exam is based on written assignments, which are devided into two parts:

- One part is a compilation of Peergrade assignments prepared as part of the GIS lab exercises. Before the delivery deadline for the oral exam, the student will receive an instruction which explains the criteria for choosing 3 of 4 Peergrade assignments as examination basis.
- The other part of the examination basis consists of a logbook. Students fill in an individual logbook for each course session and GIS lab exercise. The logbook consists of approximately half a page with reflections related to key concepts, and aspects related to data, and visualization. The logbook reflections must relate to the course literature and the completed lab exercise.

**The assessment criteria:**

• The competence to conduct coherent spatial analysis tasks using geographical information systems as a knowledge base informing environmental regulation within selected domains.

• The ability to critically reflect on lab experience with navigating and transforming spatial data, including assessment of data relevance, quality and bias.

• Knowledge about roles and opportunities for action for relevant knowledge institutions, involved parties and societal actors for specific selected regulatory areas.

• The ability to recommend relevant knowledge bases for selected regulation domains.

• The ability to assess interactions between knowledge, political institutions and opportunities to steer towards political objectives.

Exam code(s) Exam code(s) : U60552

# Course days:

**Hold: 1**

## Environmental Regulation and Management with Geographical Information Systems (BO)

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|---|---|
| time | 08-09-2023 08:15 til<br>08-09-2023 12:00 |
| forberedelsesnorm | ikke valgt |
| forberedelsesnorm D-VIP | ikke valgt |
| location | 02.1-203 - gis 1 (27) / 02.1-141 - lille-geo (20) |
| Teacher | Henrik Hauggaard-Nielsen ( hnie@ruc.dk )<br>Andreas Aagaard Christensen ( anaach@ruc.dk ) |

## Environmental Regulation and Management with Geographical Information Systems (BO)

| | |
|---|---|
| time | 14-09-2023 12:15 til<br>14-09-2023 16:00 |
| forberedelsesnorm | ikke valgt |
| forberedelsesnorm D-VIP | ikke valgt |
| location | 11.1-047 - studiesal (40) |

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|---|---|
| Teacher | Andreas Aagaard Christensen ( anaach@ruc.dk )<br>Esbern Holmes ( holmes@ruc.dk ) |

## Environmental Regulation and Management with Geographical Information Systems (BO)

| | |
|---|---|
| time | 09-10-2023 12:15 til<br>09-10-2023 16:00 |
| forberedelsesnorm | ikke valgt |
| forberedelsesnorm D-VIP | ikke valgt |
| location | 02.1-095 - kort og sten-salen (60) |
| Teacher | Esbern Holmes ( holmes@ruc.dk )<br>Andreas Aagaard Christensen ( anaach@ruc.dk ) |

## Environmental Regulation and Management with Geographical Information Systems (BO)

| | |
|---|---|
| time | 11-10-2023 12:15 til<br>11-10-2023 16:00 |
| forberedelsesnorm | ikke valgt |
| forberedelsesnorm D-VIP | ikke valgt |
| location | 02.1-203 - gis 1 (27) / 02.1-005 - lille teorirum (30) |
| Teacher | Esbern Holmes ( holmes@ruc.dk )<br>Andreas Aagaard Christensen ( anaach@ruc.dk ) |

## Environmental Regulation and Management with Geographical Information Systems (BO)

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|---|---|
| time | 23-10-2023 12:15 til<br>23-10-2023 16:00 |
| forberedelsesnorm | ikke valgt |
| forberedelsesnorm D-VIP | ikke valgt |
| location | 02.1-203 - gis 1 (27) / 02.1-005 - lille teorirum (30) |
| Teacher | Gry Lyngsie ( lyngsie@ruc.dk )<br>Esbern Holmes ( holmes@ruc.dk ) |

## Environmental Regulation and Management with Geographical Information Systems (BO)

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|---|---|
| time | 26-10-2023 08:15 til<br>26-10-2023 12:00 |

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|---|---|
| forberedelsesnorm | ikke valgt |
| forberedelsesnorm D-VIP | ikke valgt |
| location | 02.1-203 - gis 1 (27) / 02.1-141 - lille-geo (20) |
| Teacher | Andreas Aagaard Christensen ( anaach@ruc.dk )<br>Esbern Holmes ( holmes@ruc.dk ) |

## Environmental Regulation and Management with Geographical Information Systems (BO)

| | |
|---|---|
| time | 30-10-2023 08:15 til<br>30-10-2023 12:00 |
| forberedelsesnorm | ikke valgt |
| forberedelsesnorm D-VIP | ikke valgt |
| location | 02.1-203 - gis 1 (27) / 02.1-141 - lille-geo (20) |
| Teacher | Henrik Hauggaard-Nielsen ( hnie@ruc.dk )<br>Esbern Holmes ( holmes@ruc.dk ) |

## Environmental Regulation and Management with Geographical Information Systems (BO)

| | |
|---|---|
| time | 02-11-2023 08:15 til<br>02-11-2023 12:00 |
| forberedelsesnorm | ikke valgt |
| forberedelsesnorm D-VIP | ikke valgt |
| location | 02.1-203 - gis 1 (27) / 02.1-141 - lille-geo (20) |
| Teacher | Andreas Aagaard Christensen ( anaach@ruc.dk )<br>Esbern Holmes ( holmes@ruc.dk ) |

## Environmental Regulation and Management with Geographical Information Systems (BO)

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|---|---|
| time | 06-11-2023 08:15 til<br>06-11-2023 12:00 |
| forberedelsesnorm | ikke valgt |
| forberedelsesnorm D-VIP | ikke valgt |
| location | 02.1-203 - gis 1 (27) / 02.1-141 - lille-geo (20) |
| Teacher | Henrik Hauggaard-Nielsen ( hnie@ruc.dk )<br>Esbern Holmes ( holmes@ruc.dk ) |

## Environmental Regulation and Management with Geographical Information Systems (BO)

| | |
|---|---|
| time | 09-11-2023 08:15 til<br>09-11-2023 12:00 |
| forberedelsesnorm | ikke valgt |
| forberedelsesnorm D-VIP | ikke valgt |
| location | 02.1-203 - gis 1 (27) / 02.1-141 - lille-geo (20) |
| Teacher | Henrik Hauggaard-Nielsen ( hnie@ruc.dk )<br>Andreas Aagaard Christensen ( anaach@ruc.dk )<br>Esbern Holmes ( holmes@ruc.dk ) |

## Environmental Regulation and Management with Geographical Information Systems - Aflevering af skriftligt produkt (BO)

| | |
|---|---|
| time | 16-11-2023 10:00 til<br>16-11-2023 10:00 |
| forberedelsesnorm | ikke valgt |
| forberedelsesnorm D-VIP | ikke valgt |

## Environmental Regulation and Management with Geographical Information Systems - Mundtlig prøve (BO)

| | |
|---|---|
| time | 23-11-2023 08:15 til<br>23-11-2023 18:00 |
| forberedelsesnorm | ikke valgt |
| forberedelsesnorm D-VIP | ikke valgt |
| Teacher | Esbern Holmes ( holmes@ruc.dk )<br>Andreas Aagaard Christensen ( anaach@ruc.dk ) |

## Environmental Regulation and Management with Geographical Information Systems - Mundtlig prøve (BO)

| | |
|---|---|
| time | 24-11-2023 08:15 til<br>24-11-2023 18:00 |
| forberedelsesnorm | ikke valgt |
| forberedelsesnorm D-VIP | ikke valgt |
| Teacher | Esbern Holmes ( holmes@ruc.dk )<br>Andreas Aagaard Christensen ( anaach@ruc.dk ) |

# Environmental Regulation and Management with Geographical Information Systems - Mundtlig omprøve (BO)

| | |
|---|---|
| time | 07-02-2024 08:15 til 07-02-2024 18:00 |
| forberedelsesnorm | ikke valgt |
| forberedelsesnorm D-VIP | ikke valgt |