



LUND UNIVERSITY
Faculty of Science

SYLLABUS

Date
11 May 2020

Reg. Nr.
U 2020/281

Syllabus for the course From CO₂ *in-situ* measurements to carbon balance maps as a tool to support national carbon accounting, NNG005F.

Swedish title: Från in-situ mätningar av CO₂ till kolbalanskartor som ett verktyg för att stödja nationell koldioxid bokföring

The course syllabus was confirmed by the Faculty board for graduate studies on 2020-05-11. Third cycle course, 4 credits.

This is a translation of the course syllabus approved in Swedish.

Learning outcomes

On completion of the course, the student shall be able to:

Knowledge and understanding

- Explain the basics of today methods used for in-situ measurements of atmospheric greenhouse gases concentrations and carbon balance
- Explain the basic principle of use of modelling in scaling of (regional) carbon balance and comparison with in-situ measurements.
- Describe how remote sensing and geographical information systems are important methodologies for scaling.
- Demonstrate awareness about uncertainties and limitations within data use and analysis.
- Be familiar with research data management best practices, including knowledge of the FAIR principles.

Competence and skills

- Use programming environments that facilitate data analysis and cooperation such as Jupyter Notebooks or Google Colab.

Judgement and approach

- Evaluate and assess uncertainties and limitations in data analysis and use of model simulations.

Course content

The course aims at introducing the concept of assessing the carbon balance of a geographical region from in situ measurements. The course will focus on the user perspective and different ways of upscaling the carbon dioxide exchange to assess the carbon budget of a larger region (e.g. Sweden or Northern Europe). This will include scientific motivation of the different types of analyses that are used in the different steps to assess the (terrestrial) carbon balance and knowledge about their uncertainties and limitations. Methods included are the IPCC standard national accounting, inverse modelling, vegetation modelling, remote sensing, and GIS. The take home message of

this PhD course will be how to handle uncertainty and the need for transparency in the data used. Besides introducing the different scaling methodologies, students will work with data handling, evaluation of uncertainties inherent of the applied methodologies. A reflection on the daily learning process is requested from the students.

Teaching

The course consists of lectures, reading material, exercises, excursion and meetings. The set-up is an intensive course with concentrated lectures, exercises and meetings, preceded with a preparing period of one week where the students works with reading material. After the intensive week, some time for final written report is needed.

Assessment

Assessment is based on participation in the in lectures and exercises, on oral presentations and on a written evaluation from learning diary.

Grading scale

Possible grades are Pass and Fail. For a grade of Pass the student must participate in all lectures and exercises and pass the oral presentations and the written evaluation of learning diary.

Language

The course is given in English.

Entry requirements

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Additional information

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