GÖTEBORGS UNIVERSITET

Greenhouse gases GHG - biogeochemistry and measurement techniques in ecosystems and landscapes 5 ects

Course period:	**Last day for application:**
Mid August to end September, one intensive week 4 – 8 Sept 2017.	August 1, 2017

Course leader / Address for applications:

Louise C. Andresen / louise.andresen@gu.se

Course description:

Methane and carbon dioxide emissions are caused by numerous biogeochemical processes with spatial and temporal variability. What methodologies can be used at what scale, and to answer what research question? GHG measurement techniques such as: chamber measurement in form of manual, automated (steady) and intelligent robot sampling, landscape eddy flux towering and various laser-instruments using $^{13}C/^{12}C$ will be studied. Lectures will elaborate on: the interaction between biosphere, atmosphere and climate change, the biogeochemistry behind N_2O, CH_4 and CO_2 emissions in various types of ecosystems, stable isotope techniques, the logic and equations behind eddy-covariance footprint data assimilation, GHG emission factors from different landscape types. Data analysis in groups and report writing of measurements from Skogaryd (Sites) will assess the year-round GHG emission at selected landscapes.

Responsible department and other participation departments/organisations:

Department of Earth Sciences

Teachers:

Louise C. Andresen (Course leader and main contact)
Åsa Kasimir
Leif Klemedtsson
Tobias Rütting
Mari Pihlate (Uni. Helsinki)
Janne Rinne (Lune Uni.)
Natascha Klujn (Lune Uni.)

Examiner: Prof. Leif Klemedtsson

GÖTEBORGS UNIVERSITET

Faculty of Science; Department of Earth Sciences

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Third cycle education

1. Confirmation

Disciplinary domain: Science
Department in charge: Department of Earth Sciences
Main field of study: Biogeochemistry

2. Position in the educational system

Elective course; third-cycle education.

3. Entry requirements

Admitted to third cycle education.

4. Course content

This 5 ects course for Ph.D. students is focussed during one week near Gothenburg, Sweden. Accommodation is made jointly at a local hostel 'Örtagaarden' in Lane-Ryr, *a participation fee is for food and any student not member of the ClimBecco school needs to pay for own accommodation*. Prior to that week a period of pre-study is expected with some small assignments. After the course week an individual report must be written up, submitted and approved. Week 36 September 3 to 9 is one intensive week with lectures, field visit & demonstrations (eddy covariance, GHG (CO_2 and CH_4) measurements, laser, robotics), calculations instructions, data analysis, report work, student seminar presentation of own topic and student presentation of report. Two weeks after course; finishing of report and submit; approval completed within a month.

5. Outcomes

After completion of the course the Ph.D. student has learned about:

5.1. Knowledge and understanding

- Advanced knowledge of the biogeochemistry of GHG emission (background self-study with interactive lessons two weeks up to the intensive week)
- Global and local research questions about GHG emissions - national reporting on GHG for UNFCCC and input into IPCC processes

- Applications of stable isotopes of elements in GHGs
- Understanding methane and N_2O emission from boreal upland and drained peat-land forests
- Understanding foot-print and micro-metrology theory

5.2. Skills and abilities

- Calculating soil respiration and stem respiration from chamber data
- Analysis and interpretation of foot-print data

5.3. Judgement and approach

- How the knowledge and data can be used for mitigation of GHG emissions from ecosystems and landscapes - What knowledge and data are of need?
- Strengths and weaknesses of various methods: chamber measurements and eddy-flux

6. Required reading

This will be announced after registration.

7. Assessment

To pass the course, the students are obliged to participate in all class-hours during the one intensive week as well as the small assignments given prior to that week. After the course-week, an individual written report is handed in and assessed a few weeks after the intensive week (approved / not-approved).

8. Grading scale

The grading scale comprises Fail, (U), Pass (G)

9. Course Evaluation

The course evaluation is performed at the last day as an open debate followed by an anonymous questionnaire.

10. Language of instruction

The language of instruction is English.