UNIVERSITY OF GOTHENBURG

DEPARTMENT OF BIOLOGICAL AND ENVIRONMENTAL SCIENCES

NBEB303 Environmental Biophysics – states and processes in plant canopies , 3 credits

Miljöbiofysik - tillstånd och processer i växtbestånd, 3 högskolepoäng

Third-cycle level / Forskarnivå

Confirmation

This syllabus was confirmed by the Department of Biological and Environmental Sciences on 2020-08-19, and is valid from Autumn semester 2020.

Responsible Department
Department of Biological and Environmental Sciences, Faculty of Science

Participating Department/s
Department of Earth Sciences

Entry requirements

PhD student in relevant research field.

Learning outcomes

Research in plant ecophysiology and biogeochemistry has developed to be increasingly quantitative. This means that methods to asses fluxes of e.g. radiation, CO2, water vapour, heat, biogenic VOCs and air pollutants (including greenhouse gases) is becoming more important, as well as quantitative characterisation of the state of different (micro)environments with respect to temperature, humidity in air and soil, radiation, wind speed and concentrations of different compounds. There has developed an area of theory and methods called ”environmental biophysics”, which covers these research issues.

Knowledge and understanding

The paprticipants should after completed couse be able to account for those abiotic variables, as well a fluxes and ohter processes, which characterize plant canopies. This includes temperature, wind speed, humidity in soil and air, radiation as well as gases such as water vapour, crabon dioxide and air pollutants.

Further, the participants should after completed course have insights in how stataes and processes in plant canopies can be modelled, as well as measruement techniques for temperature, air humidity and verical flows of gases.

Competence and skills

After completed course the participants should be able to solve quantitative problems related to environmental biophysics in plant canopies, such as analysing gradients in wind speeds and concentrations of gases, diurnal variation in important environmental factors under different weather conditions and to convert between different units used fo express concentrations of compunds and of solar radiation.

Judgement and approach

The quantitative approach prodies the participans tools to assess the relative importance of various abiotic states and processes in different ecosystems.

Sustainability labelling

The course is sustainability-related, which means that at least one of the learning outcomes clearly shows that the course content meets at least one of University of Gothenburg's stipulated criteria for sustainability labelling.

Course content

The course is largely based on the book “An Introduction to Environmental Biophysics” by GS Campbell and JM Norman. In addition, a number of further relevant aspects of abiotic conditions in plant canopies not directly covered by book are included in the course, such as mechnistic ekosystem-modelling (COUP model), measurement techniques (e.g. eddy covariance for gas fluxes and and signficance of radiation protection in observations of termperature and air humidity), horizontal gradients of e.g. tempearture and humidity in the landscape and the response of plants to different qualities (wavelengths) of light. The participants will be provided with data files from real observations of meteorological variables and gas concentrations. Based on the data the participants are expected to solve a number of quantitative problems, solution of which required to be submitted to pass the course.

Types of instruction

The course is distributed using Zoom.

It covers lectures, demonstration of models and measruement methods, excercise, discussions and calculation tasks which shoul be submitted by the participants ofter the course.

Language of instruction

The course is given in English.

Grades

The grade Pass (G) or Fail (U) is given in this course.

Types of assessment

Active participation throughout the course is required.

Solutions of a number of calculation tasks should be submitted in order to pass the course.

Course evaluation

Oral course evaluation at the end of the course week as well as written anonymous using Forms will be performed.