Course Specifications
Valid as from the academic year 2017-2018

Plant-Water Relations in the Soil-Plant-Atmosphere Continuum (I001466)

Course size (nominal values; actual values may depend on programme)
Credits 5.0 Study time 135 h Contact hrs 60.0 h

Course offerings and teaching methods in academic year 2018-2019
A (semester 2) English lecture 30.0 h
excursion 6.25 h
guided self-study 6.25 h
seminar: coached exercises 10.0 h
practicum 7.5 h

Lecturers in academic year 2018-2019
Steppe, Kathy LA21 lecturer-in-charge

Offered in the following programmes in 2018-2019
Master of Science in Physical Land Resources (main subject Soil Science) 5 A
Exchange Programme in Bioscience Engineering: Land and Forest management (master's level) 5 A

Teaching languages
English

Keywords
Plant-water status, water potential, water transport, water use, drought resistance

Position of the course
The course analyses the fundamental background of water transport, considering the soil, the plant and the atmosphere as a single continuum. Water flow within this system is described in terms of water potential for both stationary and non-stationary conditions. Special attention is paid to the physiological mechanisms of flow regulation and to the occurrence of drought resistance in plants. Determination and calculation of transpiration is also discussed for individual plants.
The practical training aims at the manipulation of instrumentation used in plant-water studies, such as the pressure bomb, the thermocouple psychrometer, the diffusion porometer, and sap flow equipment.

Contents
1. Plant-water relations
1.1. The role of water in plant functioning
1.2. Water content, water potential and components
1.3. Water relations of cells and osmotic adjustment
1.4. Water movement through plants and cavitation
1.5. Water in leaves, water loss from leaves and stomatal conductance
1.6. Water use efficiency
1.7. Adaptations to drought
1.8. Winter water relations and freezing tolerance
1.9. Salt tolerance
2. Instrumentation, sensors and practical training
2.1. Pressure bomb
2.2. Thermocouple psychrometer
2.3. Diffusion-porometer
2.4. Stomatal characteristics (replica method)
2.5. Sap flow sensors

(Approved)
Initial competences
   Basic knowledge of plant physiology and physics within the scope of the earth science curriculum.

Final competences
   1 Knowledge about the physiological and physical principles involved in water transport within the continuum soil-plant-atmosphere
   2 Insight about plant characteristics leading to drought resistance and economic water use (water use efficiency)
   3 Knowledge about water consumption by single plants and plant communities (crops and natural vegetation)
   4 Knowledge about instrumentation used to measure plant-water status and water consumption

Conditions for credit contract
   Access to this course unit via a credit contract is determined after successful competences assessment

Conditions for exam contract
   This course unit cannot be taken via an exam contract

Teaching methods
   Guided self-study, excursion, lecture, practicum, seminar: coached exercises

Learning materials and price
   Course book and hand-outs are available, including technical notes for equipment handling.
   Cost: 15.0 EUR

References

Course content-related study coaching

Evaluation methods
   end-of-term evaluation

Examination methods in case of periodic evaluation during the first examination period
   Oral examination

Examination methods in case of periodic evaluation during the second examination period
   Oral examination

Examination methods in case of permanent evaluation

Possibilities of retake in case of permanent evaluation
   not applicable

Calculation of the examination mark
   Theoretical exam: periodic evaluation (70%)
   Practical exam: periodic evaluation (30%)
   Students who eschew period aligned and/or non-period aligned evaluations for this course unit may be failed by the examinator.

(Approved)