GHENT UNIVERSITY

Course Specifications

Valid as from the academic year 2018-2019

Soil Water Management (I001513)

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 1)	English	seminar: practical PC room classes	28.75 h
		lecture	27.5 h
		lecture: plenary exercises	2.5 h
		self-reliant study activities	0.0 h
		seminar: coached exercises	1.25 h

Lecturers in academic year 2018-2019

Cornelis, Wim	LA20	lecturer-in-charge

Offered in the following programmes in 2018-2019	crdts	offering
Master of Science in Physical Land Resources (main subject Soil Science)	5	A
Master of Science in Bioscience Engineering: Land and Water Management	5	A
Exchange Programme in Bioscience Engineering: Agricultural Sciences (master's level)	5	A
Exchange Programme in Bioscience Engineering: Environmental Technology (master's level)	5	A

Teaching languages

English

Keywords

Soil-hydrological processes, soil hydraulic properties, water conservation, water harvesting, water balance, sustainability, water productivity, rainfed

Position of the course

This is an applied course aiming at providing an overall knowledge about the need for proper soil-water management and how it can result in sustainable use of rainwater for biomass production, while minimising environmental risks.

Contents

PARTIM A. Concepts and principles of rainwater partitioning and soil-water management practices
1. Building resilience against drought: the soil-water management perspective
Part 1. Rainwater partitioning
2. Infiltration - entry of water into soil
3. Redistribution of water in soil
4. Evaporation from bare soil
5. Surface runoff
Part 2. Soil-water management practices to increase crop productivity
6. Improving restricted rainfall infiltration
7. Physical structures across slope or along contour
8. Reducing water losses from evaporation and excessive transpiration
9. Reducing rainwater drainage beyond the rooting zone
10. Improving soils with restricted rooting
11. Maximizing usefulness of low and erratic rainfall

PARTIM B. Methods to evaluate and model rootzone water balance
12. Assessing components of rootzone water balance
13. Crop response to water using the crop-water model AquaCrop

Practical exercises
The practical exercises comprise a variety of excercises in Excel and with the computer simulation models Hydrus and AquaCrop.

Initial competences

'Soil-water Management' primarily builts on the learning outcomes of the course 'Soil Physics'. The learning outcomes may also have been achieved in a different way.

Final competences

1 Explain how to use water sustainably and advice policy makers accordingly.
2 Explain the components of the field water cycle.
3 Select and evaluate techniques to conserve and harvest rainwater, in order to increase water productivity while minimising the environmental risks.
4 Use the Hydrus computer model to simulate changes in water content and matric potential during infiltration, redistribution and evaporation processes.
5 Use the AquaCrop model to predict crop-response to water under various conditions.
6 Calculate the components of the rootzone water balance
7 Conduct a hydrometeorological frequency analysis.
8 Predict soil-hydraulic properties from basis soil properties (with pedotransfer functions).

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

Lecture, self-reliant study activities, lecture: plenary exercises, seminar: coached exercises, seminar: practical PC room classes

Extra information on the teaching methods

Lecture: interactive ex cathedra lectures (slides can be downloaded from Minerva); all lectures are given in PC rooms which enables an optimal mix between theory and practical work
Seminars: coached exercises, practical PC room classes, self-reliant study activities: assignments start during the contact hours; if not finished they need to be completed at home and Hydrus screen shots and excel sheets need to be uploaded in Minerva prior to the next lecture.

Learning materials and price

A syllabus is available. Additional documentation (slide shows, background information) can be freely downloaded.
Cost: 5.0 EUR

References

Hillel, D. (1998). Environmental soil physics. Academic Press, San Diego Hudson, N.W. (1987). Soil and water conservation in semi-arid areas FAO Soils Bulletins 57, Rome Shaxson, F. and Barber, R. (2003). Optimizing soil moisture for plant production. The significance of soil porosity. FAO Soils Bulletin 79, Rome

Course content-related study coaching

The lectures enable intensive interaction between instructors and students, during which ample opportunity is provided for questioning and discussion. Instructors (professor/assistants) are available for questions and further explanations on a

Evaluation methods

end-of-term evaluation and continuous assessment

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

Written examination with open questions

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

Written examination with open questions

Examination methods in case of permanent evaluation

Participation, assignment

Possibilities of retake in case of permanent evaluation

examination during the second examination period is possible in modified form

Extra information on the examination methods

Lecture and seminars: periodic evaluation: 3 to 4 short answer and essay questions; 3 exercises.
Seminars, self-reliant study activities: permanent evaluation: assignments need to be uploaded in Minerva; penalties for not submitting assignments in due time.

Calculation of the examination mark

Lecture: 50%
Seminars, self-reliant study activities: 50% (with 30% of total score based on AquaCrop assignment)
Students who eschew period aligned and/or non-period aligned evaluations for this course unit may be failed by the examiner.