UNIVERSITEIT GENT

Studiefiche

Academiejaar 2020-2021

Soil Physics (I002657)

Wegens Covid19 kan mogelijk afgeweken worden van de onderwijs- en evaluatievormen. Dergelijke afwijkingen zullen via Ufora worden gecommuniceerd.

Cursusomvang *(nominale waarden; effectieve waarden kunnen verschillen per opleiding)*

Studiepunten 5.0 **Studietijd** 150 u **Contacturen** 50.0 u

Aanbodsessies en werkvormen in academiejaar 2021-2022

A (semester 1)	Engels	Gent	hoorcollege: response college	8.75 u
			online hoorcollege	0.0 u
			werkcollege: geleide oefeningen	8.75 u
			veldwerk	6.25 u
			werkcollege: PC-klasoefeningen	5.0 u
			practicum	3.75 u
			microteaching	2.5 u

Lesgevers in academiejaar 2021-2022

Cornelis, Wim	LA20	Verantwoordelijk lesgever

Aangeboden in onderstaande opleidingen in 2021-2022	**stptn**	**aanbodsessie**
Master of Science in Sustainable Land Management (afstudeerrichting Land and Groundwater Management)	5	A
International Master of Science in Soils and Global Change (afstudeerrichting Physical Land Resources and Global Change)	5	A
International Master of Science in Soils and Global Change (afstudeerrichting Soil Biogeochemistry and Global Change)	5	A
Master of Science in Sustainable Land Management (afstudeerrichting Urban Land Engineering)	5	A
Master of Science in de bio-ingenieurswetenschappen: land, water en klimaat	5	A
Uitwisselingsprogramma bio-ingenieurswetenschappen: land- en bosbeheer (niveau master-na-bachelor)	5	A
Uitwisselingsprogramma bio-ingenieurswetenschappen: landbouwkunde (niveau master-na-bachelor)	5	A
Uitwisselingsprogramma bio-ingenieurswetenschappen: milieutechnologie (niveau master-na-bachelor)	5	A

Onderwijstalen

Engels

Trefwoorden

soil-water content, soil-water potential, soil-water retention, flow of water and chemicals in soils, soil structure

Situering

Soils constitute a central link between air, ground and surface water, and living organisms and are thus crucial to ecosystem functioning. This basic course aims at providing profound knowledge on and insights in physical properties and processes of and in soil, and how to measure and model them, applying physical and mathematical laws. Soil-water relationships are central to the course. A profound understanding of soil physical properties and processes is

essential in studies on water and chemical transport in soils, irrigation and drainage, biomass production, trafficability, gas emission from soils, soil erosion, soil compaction, salinization and ecosystem functioning, among others.

Inhoud

Concepts and principles

1. Introduction to soil physics

Part 1. Soil solid phase

2. Composite soil properties
3. Soil structure

Part 2. Water retention in soils

4. Properties of water related to porous media
5. Soil-water content
6. Energy status of water in soil
7. Water retention curve

Part 3. Water movement in soil

8. Water flow in capillary tubes
9. Water flow in saturated soil
10. Water flow in unsaturated soil

Part 4. Chemical transport in soil

11. Conservation and flux equations
12. Convection-dispersion equation

Measuring and modeling in practice

Lab and field work to sample soil and measure soil physical and hydraulic properties from fields with different land use. At the field, water content and matric potential is measured. Data are used to assess the effect of land use on 1) soil health using soil physical quality indicators and 2) on the water regime with the Hydrus model.

Begincompetenties

The student should have good knowledge of mathematics and physics, and some basic understanding of earth sciences and soil science or pedology.

Eindcompetenties

1 Apply standard lab and field methods to determine hydrophysical properties of soil.
2 Use soil-moisture sensors and tensiometers to measure soil-moisture status.
3 Explain the principles behind lab and field methods, and instrumentation for monitoring soil-moisture status.
4 Analyse simple to more complex water transport processes in soil.
5 Evaluate physical quality of soils.
6 Apply parameter estimation methods to determine soil hydraulic properties.
7 Apply numerical models to predict changes in water content and matric potential with time.
8 Explain hydrophysical and soil mechanical properties of soil.
9 Explain the principles behind water and chemical transport in soil.
10 Present and discuss research results to peers.

Creditcontractvoorwaarde

Toelating tot dit opleidingsonderdeel via creditcontract is mogelijk mits gunstige beoordeling van de competenties

Examencontractvoorwaarde

Dit opleidingsonderdeel kan niet via examencontract gevolgd worden

Didactische werkvormen

Groepswerk, microteaching, practicum, veldwerk, zelfstandig werk, werkcollege: geleide oefeningen, werkcollege: PC-klasoefeningen, online demonstratie, online hoorcollege, online hoorcollege: plenaire oefeningen, online hoorcollege: response college

Toelichtingen bij de didactische werkvormen

Self-reliant study activities: simple calculations + simulations with Hydrus model can be solved at home
Online lecture: short video's in preparation of on campus seminars
Online lecture: plenary exercises: examples are solved and recorded on video
Online lecture: response lecture: Q&A chat session with students
Fieldwork: soil sampling, measuring hydraulic conductivity, and soil-moisture status with sensors and tensiometers
Practicum: laboratory measurements of bulk density and porosity, water content (gravimetrically), water retention curve, hydraulic conductivity curve

Seminar: coached exercises: simple calculations are solved classically (pocket calculator/spreadsheet); model simulations with Hydrus model (laptop)
Seminar: practical PC-class room: estimation of parameters of water retention model, simulation of water flow with Hydrus model
Microteaching: two group presentations about fieldwork, practicum and practical PC-class room exercises (reporting and discussion of results)
Group work: preparation of presentations in group
Online demonstration: short videos in preparation of practicum

Leermateriaal

A syllabus is available. Additional documentation (slide shows, background information, exercises, video) can be found on Ufora platform.
Cost: 5.0 EUR

Referenties

Jury, W.A. & Horton, R. 2004. Soil Physics. John Wiley & Sons.
Hillel, D. 1998. Environmental Soil Physics : Fundamentals, Applications, and Environmental Considerations. Academic Press.
Radcliffe, D.E. & Simunek, J. 2010. Soil Physics with HYDRUS: Modeling and Applications. CRC Press, Taylor & Francis Group

Vakinhoudelijke studiebegeleiding

Instructors (professor/assistants) are available for questions and further explanations on appointment.

Evaluatiemomenten

periodegebonden en niet-periodegebonden evaluatie

Evaluatievormen bij periodegebonden evaluatie in de eerste examenperiode

Schriftelijk examen met open vragen

Evaluatievormen bij periodegebonden evaluatie in de tweede examenperiode

Schriftelijk examen met open vragen

Evaluatievormen bij niet-periodegebonden evaluatie

Participatie, verslag

Tweede examenkans in geval van niet-periodegebonden evaluatie

Examen in de tweede examenperiode is enkel mogelijk in gewijzigde vorm

Toelichtingen bij de evaluatievormen

Written examination with open questions (no multiple choice, closed book) on theory + exercises. This evaluates the teaching methods lecture, self-reliant study activity, seminar coached exercises: periodic evaluation.
Participation: assessment of participation in groupwork and group presentations, and of timely submission of small assignments. This evaluates the teaching methods fieldwork, practicum, microteaching, group work, seminar coached exercises.
Report: assessment of the group presentations. This evaluates the teaching method fieldwork, practicum, microteaching, group work.

Eindscoreberekening

Written examination with open questions: 70%
Participation + Report: 30%
De examinator kan de student die zich onttrekt aan periodegebonden en/of niet-periodegebonden evaluaties voor dit opleidingsonderdeel niet-geslaagd verklaren.