GHENT UNIVERSITY

Course Specifications

Valid as from the academic year 2018-2019

Soil Erosion Processes and Control (I001494)

Due to Covid 19, the education and evaluation methods may vary from the information displayed in the schedules and course details. Any changes will be communicated on Ufora.

Course size (nominal values; actual values may depend on programme)

Credits 5.0 Study time 135 h Contact hrs 60.0 h

Course offerings in academic year 2020-2021

A (semester 1) English Gent

Lecturers in academic year 2020-2021

Verdoodt, Ann	LA20	lecturer-in-charge

Offered in the following programmes in 2020-2021	crdts	offering
Master of Science in Physical Land Resources (main subject Land Resources Engineering)	5	A
Master of Science in Physical Land Resources (main subject Soil Science)	5	A

Teaching languages

English

Keywords

Water erosion, wind erosion, processes, estimates and models, erosion control measures

Position of the course

Soil erosion is the removal of soil material by a transporting agent, being water, wind or tillage. Soil loss by erosion is taking place at high rates in many tropical and subtropical regions, but also affects temperate countries such as Belgium.
Building on general insights in soil science, soil physics and hydrology, this course aims to provide the students with advanced knowledge in water and wind erosion. We reveal underlying mechanics and processes, and assess the influencing factors of these phenomena. The students learn how to measure and interpret soil erosion losses at different scales, and how to apply and critically evaluate available soil erosion models, of which the USLE/RUSLE method is studied in detail. Several methods to control soil loss by water and wind erosion are discussed.

Contents

The course consists of two main parts: Water erosion and Wind erosion.

Theoretical insights in both erosion modes handle mechanics and processes, influencing factors, measuring techniques, modelling soil erosion losses and erosion control measures.
The practicals have a twofold aim: (1) to support the theory by promoting insights and critical reflections in the processes and models, respectively, and (2) to offer practical skills in measuring, assessing, modeling and reporting soil erosion at various scales. Simulations using the rainfall simulator and wind tunnel offer insights in the temporal behaviour of different processes at lab scale. The students also explore the use of a soil erosion model (e.g. RUSLE) and the identification of erosion risk zones in GIS.

During a field excursion, students observe different erosion control measures in place and are introduced to the development of erosion control plans.

Initial competences

The student
- has insight in the composition of soils, can explain the hydrophysical properties and behaviour of soils, and understands international soil classification nomenclature.
- has basic knowledge of meteorological phenomena related to rainfall and wind.
- can perform spatial analyses using GIS software on digital maps representing vector

and raster data structures

Final competences

1 Understand and correctly use specific terminology and principles in soil erosion assessments when communicating with experts
2 Understand mechanical, physical, aerodynamic processes that underlie occurrence of water and wind erosion
3 Explain the importance of the main factors influencing soil loss by water and wind erosion and know how they can be assessed
4 Provide an assessment of expected soil erosion losses using the USLE equation and be aware of its boundary conditions and limitations
5 Be able to select and design appropriate soil erosion measuring schemes at various spatial scales
6 Be able to apply the RUSLE model to evaluate the impact of various influencing factors as well as erosion control measures on soil erosion losses
7 Be able to identify water erosion risk zones within a GIS
8 Be aware of advanced soil erosion measurement techniques and models

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

Excursion, lecture, practicum, fieldwork, seminar: coached exercises, seminar: practical PC room classes

Learning materials and price

An English syllabus will be made available during the first lectures, downloadable from Minerva. During the course of the lectures, an electronic version of the slides will be deposited at the Minerva site. Relevant papers will be posted to Minerva.
An estimated contribution of 20.0 EUR will be asked to cover the expenses of the excursion (excursion guide, transport).

References

- R. Morgan: Soil Erosion and Conservation, Longman Ltd
- R.Bagnold: The Physics of Blown Sand. Chapman & Hall, London
- Y. Shao: Physics and modelling of wind erosion, Kluwer, Dordrecht
- J.M. Garcia-Ruiz et al. (2015). A meta-analysis of soil erosion rates across the world. Geomorphology 239.
- D. Nill et al. (1996). Soil erosion by water in Africa. GTZ.

Course content-related study coaching

Personal coaching before and after the lectures, and consultancy by assistant during the guided exercises.
Feedback about the corrected applications during the guided exercises.

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, report

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

The period-aligned written examination comprises theoretical questions that evaluate the knowledge and insight of the student in soil erosion processes and control, as well as relevant calculations (rainfall erosivity, USLE, ...).
During the course of the semester, students have to submit group reports on the excursion, lab- and computer work. Deadlines for submission need to be strictly respected. Each student is held responsible for the timely submission, report

and presentation of a part of the practicals. Each student is expected to contribute to all practicals and group reports.
In the second examination period, the practical exam will be in modified format: additional questions will be asked in the written examination evaluating insight that the student gained during the specific labwork and computer tasks completed during the semester.

Calculation of the examination mark

- Theory: 70% (written exam)
- Skills, Exercises: 30% (reports, participation)

If there is an obvious difference in input and commitment between the different group members, the marks for the group reports might differ among the students belonging to the same group.

Unfoundedly eschewing a practical for this course unit leads to a 0 on 10 for that report. In case of foundedly eschewing the practicals or excursion, (an) alternative task(s) can be provided.