

Land Evaluation (I002699)

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 150 h Contact hrs 50.0 h

Course offerings and teaching methods in academic year 2020-2021

A (semester 2)	English	Gent	lecture	25.0 h
			microteaching	3.75 h
			seminar: practical PC room classes	21.25 h

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
International Master of Science in Soils and Global Change (main subject Physical Land Resources and Global Change)	5	A
Master of Science in Physical Land Resources (main subject Soil Science)	5	A
Master of Science in Bioscience Engineering: Forest and Nature Management	5	A
Master of Science in Bioscience Engineering: Land and Water Management	5	A
Exchange Programme in Bioscience Engineering: Land and Forest management (master's level)	5	A

Teaching languages

English

Keywords

land capability, land suitability, ecosystem services, crop growth modelling, soil quality

Position of the course

Land evaluation is about the integrated assessment of climate, topography, soil and land cover. As such, it aims at evaluating (1) the sustainable performance of specific land use types and/or (2) the delivery of productive and regulatory ecosystem services. Land evaluation therefore supports strategic and tactical decision making.

It builds on general knowledge of ecology, plant physiology, climate and soil science, and deepens the insights in applied soil science. Understanding how soils co-determine the potential of the land for ecosystem service delivery and the requirements for land management is key to this application field.

Many land use and management decisions, taken at spatial scales ranging from the global to the enterprise level, rely on land evaluation approaches. Either the client has a particular land use in mind for expansion or optimisation, or land use/management changes are needed to solve problems with land degradation. In order to respect the multifunctional character of land and soils in particular, some tools assess the inherent capacity of land to deliver various kinds of ecosystem services, before taking land use decisions.

Land evaluation entails many different land uses and is applied in various natural and man-made ecosystems.

Contents

Students learn how to use the land evaluation terminology and concepts and how to judge and apply a number of existing tools. Interpretation of results is oriented towards land use planning, land consolidation, yield forecasts and soil protection policies at local and regional scales.

The following aspects will be addressed:

- Origin, terminology, principles of land evaluation
- Land capability classifications
- Land suitability classifications
- Ecosystem services assessments (existing tools + application in an urban context)
- Crop growth modelling
- Soil quality assessment
- Dealing with uncertainty in land evaluation
- Land evaluation and climate change

Initial competences

The student

- has insight in the composition of soils, can explain the behaviour of soils on the basis of their physico-chemical properties, and understands classification of soils on a basic level.
- has basic knowledge of meteorological processes.
- knows the plant physiological processes photosynthesis, respiration, transpiration, water and nutrient uptake.
- can perform spatial analyses using GIS software on digital maps representing vector and raster data structures

Final competences

- 1 Correctly use the specific terminology and principles in land evaluation techniques when communicating with experts.
- 2 Explain the selection and evaluation of different land characteristics or soil quality indicators as they are used in existing land evaluation techniques.
- 3 Critically evaluate the basic concepts, advantages/disadvantages, and output quality of existing land evaluation techniques, and use this to decide upon their applicability
- 4 Apply existing land evaluation techniques to evaluate land suitability, ecosystem service delivery or soil quality
- 5 Judge the environmental and socio-economical uniqueness of each land evaluation study, and translate it into adapted land evaluation techniques.
- 6 Integrate soil degradation and climate change scenarios with land suitability assessment in a GIS environment
- 7 Display interest, insights and a critical attitude in/towards recent evolutions in land evaluation technologies and applications
- 8 Report and communicate (own) land evaluation research methods and results clearly, unambiguously, soundly, and critically
- 9 Collaborate with fellow students in a (interdisciplinary) team to solve land evaluation assignments

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, microteaching, seminar: practical PC room classes

Extra information on the teaching methods

One microteaching session will be organised during which the groups present a scientific paper of their own interest (related to land evaluation) to the class.

Learning materials and price

An English syllabus will be made available during the first lectures, downloadable from Minerva. There are no obligatory handbooks. During the course of the lectures, an electronic version of the slides will be deposited at the Minerva site.

References

- UNEP (2016). Unlocking the sustainable potential of land resources: evaluation systems, strategies and tools. A report of the working group on land and soils of the international resource panel.
- Hewitt A., Dominati E., Webb T., Cuthill T. (2015). Soil natural capital quantification by the stock adequacy method. *Geoderma* 241-242 (2015) 107-114
- Nguyen, T.T., Verdoodt, A., Tran, V.Y., Delbecque, N., Tran, T.C., and Van Ranst, E. (2015). Design of a GIS and Multi-criteria Based Land Evaluation Procedure for Sustainable Land-use Planning at the Regional Level. *Agriculture Ecosystems &*

Environment 200: 1-11.

- Constantini, E.A.C. (2009). Manual of Methods for Soil and Land Evaluation. Science Publishers.
- FAO (2007). Land evaluation. Towards a revised framework. FAO Land and Water Discussion paper n°6. FAO, Rome. (http://www.fao.org/NR/Iman/abst/Iman_070601_en.htm)
- Lehmann, A., David, S., Stahr, K. (2006). TUSEC – Technique of urban soil evaluation in city regions – a method for the assessment of natural and anthropogenic soils. Hohenheim.
- FAO (2003). Global agro-ecological assessment for agriculture in the twenty-first century (CD-ROM). FAO Land and Water Digital Media Series n° 21, FAO, Rome. (<http://www.fao.org/ag/agl/agll/gaez/index.htm>)
- Verdoodt, A. and Van Ranst, E. (2003). A Two-Level Crop Growth Model for Annual Crops. Ghent University, Laboratory of Soil Science, Ghent (available in library)
- Sys, C., Van Ranst, E., Debaveye, J. and Beernaert, F. (1991, 1993). Land Evaluation. Part I, II and III, Agricultural Publ. N° 7, ABOS, Brussels (being revised)

Course content-related study coaching

Personal coaching before and after the lectures and 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

Oral examination, assignment, skills test, peer assessment, report

Possibilities of retake in case of permanent evaluation

examination during the second examination period is not possible

Extra information on the examination methods

The **period aligned written examination** (closed book) comprises theoretical questions with more emphasis on general comprehension of the basic principles, boundary conditions, and scope of application of the different land evaluation tools than on encyclopaedic knowledge, as well as questions that check the students individual understanding of the practicals.

During the course of the semester, students have to submit **group reports**. Deadlines for submission need to be strictly respected. Four aspects will be evaluated:

- the acquired skills, evaluating to what extent calculations, software were correctly done/used,
- the ability to critically and thoroughly analyse specific cases, come to integrated conclusions (assignment),
- the group dynamics (planning, tasks, individual contributions summarised in a report), and
- an assessment on your performance and growth as team member in different roles by your peers.

Each student is held responsible for the timely submission and reporting of a part of the practicals. Each student is expected to contribute to all practicals and group reports. The group members can organise themselves and agree upon a fair task distribution (reflected in the reports). Through peer assessment they help each other in understanding and exploiting/correcting their strengths and weaknesses when working in a team.

At the end of the semester, students will present the scientific paper of their interest to the fellow students. Each student contributes by presenting part of the paper, and participating in question and answer sessions (oral examination, participation) during a **microteaching activity**.

Calculation of the examination mark

- Written exam: 55%
- Group reports: 25%
- Microteaching: 20%

The lecturer can decide to deviate from or not consider the peer assessment scores at all when determining individual scores per student for the group tasks.

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.