GHENT UNIVERSITY

Course Specifications

Valid as from the academic year 2024-2025

Soil Evolution under Global Change (I002993)

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

Credits 6.0 **Study time 180 h**

Course offerings in academic year 2026-2027

A (semester 1) English Gent

Lecturers in academic year 2026-2027

Bauters, Marijn LA20 lecturer-in-charge

Offered in the following programmes in 2026-2027	**crdts**	**offering**
International Master of Science in Soils and Global Change (main subject Soil Ecosystem Services and Global Change)	6	A
International Master of Science in Soils and Global Change (main subject Soil-Plant System Processes and Global Change)	6	A

Teaching languages

English

Keywords

Soil formation, soil processes, soil evolution, formation of diagnostic horizons and materials

Position of the course

The aim of the course is to improve the knowledge and the understanding of the naturally occurring chemical reactions and physical changes, which are at the origin of the most important soil-forming processes, resulting in observable properties, specific diagnostic horizons and materials in different environmental conditions. Special attention is paid to the effects of global change on soil formation process rates.

Contents

Theory

1. (only course offering A) lectures and movies on soil threats.
2. Refresher Pedology

Introduction of the basic components of soils, understanding of analytical data and conversions from lab to common units

3. Some physico-chemical aspects of soil formation

In this chapter attention is paid to naturally-occurring chemical reactions (hydrolysis, influence of pH on dissociation and solubility of salts and hydroxides occurring in soils, influence of Eh and pH on the behaviour of some elements in soils); the physical behaviour of soil colloids with a surface charge and to the origin and distribution of acidity in mineral soils.

4. Processes of soil evolution

This chapter treats the most important soil-forming processes (weathering, oxido-reduction, biological activity, swelling and shrinking and, translocation and accumulation of organic compounds and of clay) and their observable features.

5. Formation of specific diagnostic horizons and materials

This chapter treats the formation of specific epipedons (mollic, umbric, ...), diagnostic subsurface horizons (cambic, argillic, oxic, spodic, placic), and plinthite.

6. Soil processes and soil evolution under specific conditions

Soil processes in forest ecosystems, in arid conditions, in marine deposits, in paddy rice fields and in arctic conditions.

Practical exercises

1. (only course offering A) field work to investigate the effects of some soil

threats on soils
2. Computer exercises aiming at formulating and simulating simple global change scenarios and their effects on soil development

Initial competences

Soil Genesis builds on certain learning outcomes of a course unit on basic Soil Science in the bachelor phase. Students also must have a thorough basis in chemistry (BSc-level or MSc-level), preferably soil chemistry.

Final competences

1 Students can identify and understand the different soil-forming processes that occur in soils,1 including the conditions which are responsible for these processes.
2 Students understand the properties and the formation of specific diagnostic horizons and1 materials, and can link these to analytical data and visual observations.

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

Seminar, Excursion, Lecture

Extra information on the teaching methods

Theory: oral lectures
Exercises: computer simulations (using your own Windows laptop)
This course will be taught on-site.

Study material

Type: Syllabus

Name: Soil Evolution under Global Change
Indicative price: € 10
Optional: no
Language : English

References

Soil Formation, N. Van Breemen & P. Buurman, 1998
Environmental Soil Chemistry, D. L. Sparks, 1995
Chemical Processes in Soils, W.A. Dick (ed.), Soil Science Society of America Book Series 8,
2005

Course content-related study coaching

Professor can be consulted.

Assessment moments

end-of-term assessment

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

Written assessment with multiple-choice questions, Written assessment with open-ended questions

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

Oral assessment, Written assessment with multiple-choice questions, Written assessment with open-ended questions

Examination methods in case of permanent assessment

Possibilities of retake in case of permanent assessment

not applicable

Extra information on the examination methods

Theory: written examination (closed book, 100%) Exercises: written examination (closed book).

Calculation of the examination mark

Students who eschew period aligned and/or non-period aligned evaluations for this course unit (or do not participate to the exercises) may be failed by the

examinator.