

Soil Genesis (I002711)

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

Credits 5.0

Study time 150 h

Course offerings and teaching methods in academic year 2023-2024

A (semester 1)

English

Gent

lecture

seminar

Lecturers in academic year 2023-2024

Finke, Peter

LA20

lecturer-in-charge

Offered in the following programmes in 2023-2024

crdts

offering

International Master of Science in Soils and Global Change (main subject Physical Land Resources and Global Change)

5

A

International Master of Science in Soils and Global Change (main subject Soil Biogeochemistry and Global Change)

5

A

Master of Science in Bioscience Engineering: Land, Water and Climate

5

A

Exchange Programme in Bioscience Engineering: Agricultural Sciences (master's level)

5

A

Exchange Programme in Bioscience Engineering: Land and Forest management (master's level)

5

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. 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.

2. 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.

3. 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.

4. Soil processes and soil evolution under specific conditions

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

Practical exercises

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 course unit 'Soil Science'; or the learning outcomes have been achieved differently. 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, including the conditions which are responsible for these processes.
- 2 Students understand the properties and the formation of specific diagnostic horizons and 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, Lecture

Extra information on the teaching methods

Theory: oral lectures

Exercises: computer simulations (using your own Windows laptop)

This course will be taught on-line as well as on-site to enable late arrivals and students in quarantine to follow all classes.

Learning materials and price

A syllabus is available. Cost: 10.00 EUR

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 examiner.