GHENT UNIVERSITY

Course Specifications

Valid as from the academic year 2025-2026

Climate Change (C003320)

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

Credits 4.0 **Study time 120 h**

Course offerings and teaching methods in academic year 2027-2028

A (semester 2)	English	Gent	group work seminar lecture
B (semester 2)	English	Gent	

Lecturers in academic year 2027-2028

Verschuren, Dirk	WE11	lecturer-in-charge
Boeckx, Pascal	LA24	co-lecturer
Bonte, Dries	WE11	co-lecturer
Miralles, Diego	LA20	co-lecturer
Neukermans, Griet	WE11	co-lecturer
Steppe, Kathy	LA21	co-lecturer
Verbeeck, Hans	LA20	co-lecturer
Verleyen, Elie	WE11	co-lecturer

Offered in the following programmes in 2027-2028	**crdts**	**offering**
Master of Science in Sustainable Land Management(main subject Land and Groundwater Management)	3	B
International Master of Science in Soils and Global Change (main subject Soil Ecosystem Services and Global Change)	4	A
Master of Science in Sustainable Land Management(main subject Urban Land Engineering)	3	B
Master of Science in Biology	4	A
Exchange Programme in Biology (master's level)	4	A

Teaching languages

English

Keywords

Climate change, greenhouse effect, CO2 emissions, biosphere impacts, carbon cycle,
climate prognosis, IPCC, adaptation, mitigation, sustainable development

Position of the course

This course provides a broad multi-disciplinary overview of the topic of anthropogenic climate change with emphasis on the processes of climate change itself and of its impacts on carbon cycling, the abiotic environment, the biosphere and the human
environment. Biosphere impacts are treated at all levels of plant/animal biology: physiology, populations and species, structure and functioning of ecosystems. Attention is given to the various methods of climate-change research and the associated
uncertainty in climate-change prognoses, and to strategies of adaptation and mitigation. By being presented with the complete picture in a single course, students learn to judge the relative importance of different processes at different spatial and temporal scales, develop appreciation for the different perspectives of different stakeholder groups, and become more comfortable with the uncertainties

linked to particular positions.

Contents

1 Aspects of general climatology relevant to climate change, atmospheric circulation and diverse feedbacks.
2 The greenhouse effect: physics and chemistry of natural and anthropogenic greenhouse gases, and their historical trends.
3 The carbon cycle: main carbon reservoirs and fluxes, fossil fuels and energy, human perturbation of the carbon cycle.
4 Air pollution and global dimming.
5 Predicting 21st-century climate: long-term historical perspective, forcing attribution,
IPCC prognoses and emission scenarios, sources of uncertainty in long-term climate
prediction.
6 Impacts of global warming on the cryosphere.
7 Hydrological processes relevant to climate change, and impacts of global warming on the hydrological cycle.
8 Impact of climate change on the marine realm (SULAMA students exempted)
9 Role of ecosystems/vegetation in the global carbon cycle.
10 Earth system models (IPCC-GCMs) and land-surface models (DGVMs), with application to climate change impacts on tropical rainforests.
11 Impacts of global warming on the biosphere: species distributions, phenology, habitat loss, exotic/invasive species and diseases, evolutionary aspects (SULAMA students exempted).
12 Sources, sinks, anthropogenic emissions and mitigation of non-CO2 greenhouse gases: N2O, CH4, O3.
13 Impacts on the human environment with emphasis on global food security, differentiating between western and developing countries.

Practical exercises: personal homework on cliate myths; PC exercises about earth energy balance and GHG emission scenarios; group assignment with presentations on topics of controversy or debate in climate change.

Initial competences

Having successfully completed an introductory course in ecology, e.g. Ba1 Ecologie in Biology or equivalent; or having acquired the relevant knowledge by personal study or other means.

Final competences

1 Demonstrate advanced knowledge of the causes of recent (natural and anthropogenic) climate change in relation to long-term climate history, of all relevant aspects of the carbon cycle, and of anthropopogenic climate change on the abiotic earth environment, the biosphere (fysiology, species distributions, ecosystems) and the human environment.
2 Demonstrate basic knowledge of the potential and limitations of diverse observational and paleoclimatological methods of climate study, and of the climate models used in prognoses over the 21st century.
3 Display a science-based critical attitude towards new data, interpretations, theories and models of anthropogenic climate change and the historical interaction between humans, climate and nature.
4 Demonstrate ability to process, combine, evaluate, and synthesize in a structured manner complex information from the primary scientific literature of multiple relevant sub-disciplines.

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

Group work, Seminar, Lecture, Independent work

Extra information on the teaching methods

Lectures: recorded PPT presentations with text and figures, made available

beforehand on Ufora
Guided practical exercises: one afternoon PC exercises on climate-change modeling, with report
Group work: literature study on topics of debate in the field of climate change, synthesized in a PPT presentation.
Independent work: homework around myths on climate change, with written report and on-line discussion

Study material

Type: Slides

Name: Powerpoint presentations and recordings for 16 lectures
Indicative price: Free or paid by faculty
Optional: no
Language : English
Number of Slides : 500
Available on Ufora : Yes
Online Available : No
Available in the Library : No
Available through Student Association : No

References

David Archer (2007). 'Global warming: understanding the forecast' (Blackwell)
IPCC (2021). 6th Assessment Report on Climate Change: summary for policymakers.

Course content-related study coaching

Interactive discussion on homework and group assignment. Personal contact with teaching staff by appointment.

Assessment moments

end-of-term and continuous assessment

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

Written assessment with open-ended questions

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

Written assessment with open-ended questions

Examination methods in case of permanent assessment

Oral assessment, Presentation, Assignment

Possibilities of retake in case of permanent assessment

examination during the second examination period is possible

Extra information on the examination methods

PE: On-campus exam with questions testing knowledge of and insight in the material presented in lectures and in the presentations of fellow students. Examination in the 2nd examination period is possible.
On-line PE exam is exceptionally possible with valid reason.
NPE: Evaluation of homework, report, and of the group presentation and discussion abilities of the student. Students who do not complete the exercises, and thus miss the non-periodical evaluation cannot pass for the course as a whole. A 2nd chance for NPE evaluation is offered in modified form between the 1st and 2nd examination period.

Calculation of the examination mark

End-of-term theory exam 60%. NPE evaluations on exercises (report and discussion homework, report climate-modelling exercises; presentation and discussion of group assignment) 40%

Facilities for Working Students

1. Possible exemption from educational activities requiring student attendance
2. Possible rescheduling of the exam to a different time in the same academic year