GHENT UNIVERSITY

Course Specifications

Valid as from the academic year 2016-2017

Environmental Modelling (C003809)

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

Credits 3.0	Study time 90 h	Contact hrs	30.0 h

Course offerings and teaching methods in academic year 2018-2019

A (semester 2)	English	lecture	15.0 h
		seminar: coached exercises	15.0 h

Lecturers in academic year 2018-2019

Soetaert, Karline	WE11	lecturer-in-charge
Bonte, Dries	WE11	co-lecturer

Offered in the following programmes in 2018-2019	crdts	offering
Master of Science in Marine and Lacustrine Science and Management	3	A

Teaching languages

English

Keywords

Position of the course

Contents

Present day environmental problems (e.g. eutrophication, contaminant dispersal, climate change, ocean acidification) require a quantitative approach. To better understand how natural systems respond to such changing inputs and boundary conditions, biogeochemical models of varying complexity are being called upon. The central aim of this course is to learn how to develop and apply such models. In this course we will focus particularly on elemental cycling (Carbon, Nitrogen etc) and transport of contaminants within aquatic ecosystems (e.g. rivers, estuaries, lakes, oceans). Models are implemented in the open-source programming language R.

Models in the environmental sciences.
- What is a model?
- Types of models
- Model examples (e.g. North Sea, Scheldt estuary, ocean acidification)

Construction of models
- Balance equations, boundary conditions, transport formulation, kinetic rate laws
- Reactive transport models (box models, 1D, 2D and 3D)
- pH models, acid-base chemistry and CO2 uptake

Model solution
- steady-state solutions versus transient solutions
- analytical versus numerical solution
- numerical integration procedures

Model applications
- Causes of uncertainty in model predictions
- Sensitivity analysis
- Fitting models to data: parameter estimation, cost functions, estimators (least squares, maximum likelihood)
- Parameter uncertainty
- Model selection

Initial competences

Final competences

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, seminar: coached exercises

Learning materials and price

References

Course content-related study coaching

Evaluation methods

end-of-term evaluation

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

Oral examination

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

Oral examination

Examination methods in case of permanent evaluation

Possibilities of retake in case of permanent evaluation

not applicable

Calculation of the examination mark

oral exam: 100%