

Ecological Modelling (C004528)

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

Credits 4.0

Study time 120 h

Course offerings in academic year 2025-2026

A (semester 1)

English

Gent

Lecturers in academic year 2025-2026

Bonte, Dries

WE11

lecturer-in-charge

Soetaert, Karline

WE11

co-lecturer

Offered in the following programmes in 2025-2026

[Master of Science in Bioinformatics \(main subject Systems Biology\)](#)

crdts

offering

4

A

[Master of Science in Biology](#)

4

A

[Exchange Programme in Biology \(master's level\)](#)

4

A

Teaching languages

English

Keywords

Modelling philosophy, Model formulation, parameterization and solution, sensitivity analyses, Analytical and Numerical methods, ecological and evolutionary dynamics

Position of the course

Modelling in ecology and evolution becomes increasingly important to understand and predict complex dynamics of populations. Yet, students are often unfamiliar with the different modeling approaches. This course aims at providing an overview of the most-used modeling techniques in ecology and evolution and to give skills for constructing and using simple ecological models. Students learn modelling in R and Python.

Contents

Introduction to Scientific Computing in R

Model construction: model development, solution, application and analysis

Modelling approaches in ecology and evolution: Coupled Ordinary Differential Equations, Reaction-Diffusion models, equilibria and stability in discrete and continuous time models; Optimisation methods, stage-structured models

Exercises and projects in R/Python

Initial competences

Principles of population ecology and evolution, mathematical methods, computational techniques

Final competences

1 Developing awareness of the uses and limitations of different modelling approaches for studying ecological and evolutionary processes.

2 Obtaining skills required to construct simple ecological models.

3 Developing and using models to study ecological and evolutionary dynamics.

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

Learning material: Course material delivered by teachers via Ufora

Study material

None

References

Roff, D. A. 2010. Modeling Evolution: An Introduction to Numerical Methods. Oxford Univ. Press, Oxford
Soetaert K. & Herman P.M.J. 2009. A Practical Guide to Ecological Modelling. Springer
Kokko, H. 2007. Modelling for field biologists and other interesting people. Cambridge University press

Course content-related study coaching**Assessment moments**

end-of-term assessment

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

Participation, Written assessment

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

Participation, Written assessment

Examination methods in case of permanent assessment**Possibilities of retake in case of permanent assessment**

not applicable

Extra information on the examination methods

report: modelling project

Calculation of the examination mark

80% examination, 20% modelling project and homework