GHENT UNIVERSITY

# Course Specifications

Valid in the academic year 2024-2025

## Conservation Genetics (C003326)

**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 2024-2025**

| | | | |
|---|---|---|---|
| A (semester 2) | English | Gent | lecture |
| | | | independent work |
| | | | seminar |

**Lecturers in academic year 2024-2025**

| | | |
|---|---|---|
| Helsen, Philippe | WE11 | lecturer-in-charge |
| Lens, Luc | WE11 | co-lecturer |

| **Offered in the following programmes in 2024-2025** | **crdts** | **offering** |
|---|---|---|
| Master of Science in Teaching in Science and Technology(main subject Biology) | 5 | A |
| Master of Science in Bioinformatics(main subject Systems Biology) | 5 | A |
| Master of Science in Biology | 5 | A |
| Exchange Programme in Biology (master's level) | 5 | A |

**Teaching languages**

English

**Keywords**

Genetic markers, genetic drift, geneflow, genetic equilibria, inbreeding, relatedness, coalescence, population viability

**Position of the course**

Students obtain theoretical knowledge on population-genetic concepts within an ecological (fragmented populations, management of endangered populations, sustainable hunting, ...) and evolutionairy (adaptive) framework. In addition, students will be intensively trained in commonly-used software programs for population-genetic analysis. Finally, students will be trained in applying genetic concepts and tools to real-world conservation issues.

**Contents**

Theoretical concepts

Introduction to conservation genetics
Overview of genetic markers
Genetically viable populations
Genetically fragmentated populations
Inbreeding and inbreeding depression
Evolution in small populations
Evolution in harvested populations
The basic of coalescence theory
Extensions of CT: selection, migration, population growth
Taxonomic uncertainties and management units
Genetic management of captive and natural populations
Case studies on population fragmentation, individual-based estimates, selection and evolution;

Analytical concepts and methods

Allelic richness, allelic diversity, HW, linkage disequilibrium, Null alleles (Genalex)
Genetic differentiation, effective population size (Genepop, LDNe)
Genetic clustering, PCoA (Structure, Genalex)
Genetic autocorrelation, geneflow, private alleles (Genalex, Bayesass, ADZE)
Inbreeding, relatedness (MLRelate, Coancestry)
Coalescence (Migrate, DNA sp)
Applied conservation genetics (Zoo Antwerp)

**Initial competences**

This course builds on basic concepts gained from population-ecology (population growth, demography, spatially-structured populations), genetics (heritability, genemapping, genetic interactions, functional genome analysis, epigenetics) and evolution (sources of genetic variation, random evolutionary processes, natural selection, adaptation, life-history evolution).

**Final competences**

1 Obtain theoretical knowledge on population-genetic concepts within an ecological (fragmented populations, management of endangered populations, sustainable hunting, ...) and evolutionairy (adaptive) framework.
2 Intensively trained in commonly-used software programs for population-genetic analysis.
3 Apply genetic concepts and tools to real-world conservation issues.

**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, Independent work

**Study material**

Type: Handbook

Name: Frankham et al. 2010. Introduction to Conservation Genetics. Cambridge University Press. 642 pp'
Indicative price: € 50
Optional: no

Type: Syllabus

Name: Syllabus'
Indicative price: Free or paid by faculty
Optional: no
Additional information: Powerpoint slides (syllabus)

**References**

Höglund 2009. Evolutionary Conservation Genetics. Oxford University Press. 189 pp.
Amato et al. 2009. Conservation Genetics in the Age of Genomics. Columbia University Press. 248 pp.
Bertorelle et al. 2009. Population Genetics for Animal Conservation. Cambridge University Press. 395 pp.
Allendorf et al. 2012. Conservation and the Genetics of Populations. Wiley John and Sons. 608 pp.

**Course content-related study coaching**

During the practicals, concepts taught during the theoretical classes will be applied to real-world questions, models and analyses. During these practicals, students can pose questions that cover all course topics.

**Assessment moments**

end-of-term assessment

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

Oral assessment, Written assessment with open-ended questions

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

Oral assessment, Written assessment with open-ended questions

**Examination methods in case of permanent assessment**

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

not applicable

**Calculation of the examination mark**

Theory: 50%
Practicals: 50%