GHENT UNIVERSITY

Course Specifications

Valid as from the academic year 2024-2025

Aquatic Genomics (C004490)

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

Credits 6.0 **Study time 180 h**

Course offerings and teaching methods in academic year 2024-2025

A (semester 1)	Dutch, English	Gent	seminar
			lecture

Lecturers in academic year 2024-2025

De Clerck, Olivier	WE11	lecturer-in-charge
Derycke, Sofie	WE11	co-lecturer

Offered in the following programmes in 2024-2025	**crdts**	**offering**
Master of Science in Marine and Lacustrine Science and Management	6	A

Teaching languages

English, Dutch

Keywords

Position of the course

The course deals with genome-enabled insights into the broader framework of environmental marine science. Topics within the course include evolutionary as well as functional aspects of genes, genomes and metagenomes of marine organisms from the individual to the ecosystem-level.
pre-requisites.
The course aims to provide students an introduction to the field of molecular ecology, specifically directed toward the marine environment on its organisms. The course is concerned with applying molecular population genetics, phylogenetics, as well as (meta-)genomics and (meta-)transcriptomics to traditional ecological and evolutionary
questions (e.g., species diagnosis, conservation and assessment of biodiversity, quantitative genetics, heritability of traits and breeding studies, and questions of behavioral ecology).

Contents

The course is divided in modules which outline the use of genomic approaches, from the ecosystem-level, gradually narrowing to species-, population and individual -levels.
Theoretical aspects and commonly used techniques will be demonstrated using examples and practical exercises from the marine environment.
a) Community-level addresses the use of genome data in assessing community structure of marine ecosystems. Techniques discussed include amplicon sequencing, qPCR, metagenomics (+ metatranscriptomics, metaproteomics, metabolomics).
b) Species-level offers an introduction to sequence alignment techniques, phylogenetics, species-delimitation, and phylogeography.
c) Population-level addresses the factors influencing population structure such as genetic drift, dispersal, mutation and selection. These aspects will be addressed using traditional organelle (mtDNA) and co-dominant markers (e.g. microsatellites) as well as NGS-based genome reduction techniques (Radseq, GBS). Aspects of speciation in the
marine realm will be addressed also.
d) Individual-level: Heritability of physiological and morphological traits will be

addressed using quantitative genetics, in combination with genome scans, QTL analyses and RNA-seq.

Initial competences

Bachelor in sciences. Basic knowledge in ecology, evolution and genetics is highly recommended.

Final competences

1 The graduated student understands the ecological and evolutionary processes acting at the genomic level in populations of marine organisms.
2 The graduated student has a good knowledge of the terminology used in the field of molecular ecology.
3 The graduated students understands the underlying principles of the commonly used molecular techniques, including preservation of tissues and specimens.
4 The graduated student is able to make a considerate choice of molecular techniques to address specific ecologically or evolutionary questions.
5 The graduated student has acquired the knowledge to correctly analyse and interpret molecular datasets from the individual to the community level.

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

Study material

Type: Slides

Name: slides distributed as pdf through UFORA
Indicative price: Free or paid by faculty
Optional: no
Language : English
Number of Slides : 400
Oldest Usable Edition : not applicable
Available on Ufora : Yes
Online Available : No
Available in the Library : No
Available through Student Association : No

References

Bourlat S.J. [ed.]. Marine Genomics, Methods and protocols. Methods in Molecular Biology Series. Springer Protocols.

Course content-related study coaching

Opportunity for questioning the lecturers during the orals, and outside these via email, personal contact and in an electronic teaching environment.

Assessment moments

end-of-term and continuous assessment

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

Written assessment

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

Written assessment

Examination methods in case of permanent assessment

Assignment

Possibilities of retake in case of permanent assessment

examination during the second examination period is possible in modified form

Calculation of the examination mark

UGent:
- Exam 80%;
- Evaluation of presentation 20%