GHENT UNIVERSITY

Course Specifications

Valid as from the academic year 2026-2027

Aquaculture Genetics (I003027)

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

Credits 5.0 **Study time 150 h**

Course offerings in academic year 2026-2027

A (semester 1)	English	Gent

Lecturers in academic year 2026-2027

Declercq, Annelies	LA22	lecturer-in-charge
De Smet, Stefaan	LA22	co-lecturer

Offered in the following programmes in 2026-2027	**crdts**	**offering**
International Master of Science in Health Management in Aquaculture	5	A
Master of Science in Aquaculture	5	A
Exchange Programme in Bioscience Engineering: Agricultural Sciences (master's level)	5	A
Exchange Programme in Bioscience Engineering: Cell and Gene Biotechnology (master's level)	5	A

Teaching languages

English

Keywords

Molecular genetic techniqus for detecting polymorphisms, qualitative and quantitative genetics, breeding programmes, chromosome manipulation, sex manipulation, polyploidisation, genetic maps.

Position of the course

This course starts with the study of the essential knowledge on genetic principles and molecular genetic techniques.
In the second part attention is paid to specific methods and applications of genetic research in aquaculture.

Contents

This course provides a comprehensive introduction to genetics in aquaculture, covering both fundamental principles and applied aspects relevant to breeding and population management.
The theoretical component addresses the molecular basis of heredity, including DNA structure and genetic variation, as well as molecular techniques used to detect and analyse genetic diversity. Core concepts in qualitative and quantitative genetics are introduced, including polygenic inheritance, genetic parameters, estimation of breeding values, and genetic relationships within populations. Building on these principles, the course explores the application of genetics in aquaculture, with a focus on inbreeding, selection strategies, and the design of breeding programmes. Additional topics include genetic mapping, manipulation of sexual phenotype, and ethical considerations related to genetic interventions.
The practical component focuses on the application of theoretical knowledge through data analysis and problem-solving. Students will handle and analyse genetic datasets, perform exercises in quantitative genetics, and apply molecular tools in the evaluation of broodstock populations (e.g. through literature-based group assignments). Where relevant, laboratory exercises (e.g. RFLP analysis of mitochondrial DNA fragments) are included to illustrate key techniques.

Initial competences

General biology, chemistry, biochemistry and basic knowledge on aquaculture.

Final competences

1 The student has insight into Mendelian genetics.
2 The student has knowledge on molecular markers and their application.
3 The student has basic knowledge on quantitative genetic models and parameters (heritability and genetic relations).
4 The student has insight into breeding value estimation in aquaculture.
5 The student understands the importance of selection, inbreeding and crossbreeding in breeding programs.
6 The student has insight into the construction and the use of genetic maps.
7 The student is able to amplify and analyse (RFLP) a DNA fragment.

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, Practical, Independent work

Extra information on the teaching methods

- **Interactive lectures:** key theoretical concepts are introduced through lectures supported by presentations, including guided discussions and problem-solving activities.
- **Practical sessions:** students perform laboratory work (e.g. RFLP analysis) in small groups, applying molecular techniques relevant to genetic analysis.
- **Exercises and group work:** guided exercises and calculations in quantitative genetics, as well as group assignments focusing on the design and evaluation of genetic and breeding strategies.

Study material

Type: Slides

Name: Notes partim Quantitative Genetics
Indicative price: Free or paid by faculty
Optional: no
Language : English
Available on Ufora : Yes
Additional information: The slides consist of theory and practical exercises. Supporting information for the slides is available in textbooks and documents that are also available on Ufora.

Type: Laptop

Name: Calculations on quantitative genetics
Indicative price: Free or paid by faculty
Optional: no
Additional information: Several calculations will be made in the exercises on quantitative genetics, using Excel.

References

An introduction to genetic analysis (Griffits et al.)
Biotechnology and genetics in fisheries and aquaculture (Becuemont & Hoare)
Practical genetics for aquaculture (Lutz G.)
Principles of population genetics (Hartl & Clark)

Course content-related study coaching

Study guidance upon request by email or on appointment.

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

Participation, Assignment

Possibilities of retake in case of permanent assessment

examination during the second examination period is possible

Extra information on the examination methods

The theoretical component is assessed by a **written closed-book examination**.
In addition, a **non-period-aligned (continuous) assessment** is organized for the practical component, including laboratory work and exercises. This evaluation is based on participation, engagement, and the quality of submitted assignments and reports.
The continuous assessment component is organized during the semester and cannot be retaken in the resit examination period.
All assessment components are mandatory. Students who do not participate in the required evaluation components may be recorded as absent and may not be evaluated for this course unit.

Calculation of the examination mark

Assessment (out of 20):

- **14 points** are attributed to the **written closed-book examination**, assessing the understanding of theoretical concepts in aquaculture genetics.
- **6 points** are attributed to the **continuous assessment**, including practical classes, group work exercises, and the quality of submitted reports. This component evaluates practical skills, data analysis, and the application of genetic concepts.

Participation in the practical component is **mandatory**. Students who do not attend the practical sessions without a valid reason may not be evaluated for this component and may be required to retake the course in the following academic year.
The continuous assessment component is organized during the semester and cannot be retaken in the resit examination period.
All assessment components are mandatory. Students who do not participate in the required evaluation components may be recorded as absent and may not be evaluated for this course unit.