

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 2025-2026

A (semester 1) English Gent

Lecturers in academic year 2025-2026

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

Offered in the following programmes in 2025-2026

	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 techniques 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

Theory

1. Fundamental knowledge on DNA structure
2. Molecular techniques for detecting genetic variation
3. Qualitative genetics
4. Polygenic inheritance and quantitative genetics
5. Genetic relationships, genetic parameters, breeding values
6. Inbreeding, selection and breeding programs
7. Use of androgenesis, gynogenesis and triploidisation
8. Manipulation of sexual phenotype
9. Genetic maps
10. Ethics in genetics

Practical exercises

1. Handling and analysing genetic data
2. Application of molecular tools in analysis of broodstock population (paper group exercise)
3. Exercise on quantitative genetics
4. Lab exercise RFLP analysis of a mitochondrial DNA fragment

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 (including sex reversal).
- 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

Theory lectures: lectures based on powerpoint presentations.

Practical classes: RFLP experiment in small groups.

Exercises: guided exercises and calculations and group work on cloning 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 (Becuement & 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

There will be a written closed book exam and a continuous evaluation for practical

classes and exercise assessment: participation and report.

Calculation of the examination mark

Out of 20:

13 points attributed to written exam

7 points to groupwork exercises in class and report of the practical classes

Students that do not attend the practical classes without a valid reason, should retake the course the next academic year.

Students who eschew period aligned and/or non-period aligned evaluations for this course unit may be failed by the examiner.