ΚΕΝΤΡΟ ΕΠΙΜΟΡΦΩΣΗΣ & Διά Βίου ΜΑΘΗΣΗΣ
ΓΕΩΠΟΝΙΚΟ ΠΑΝΕΠΙΣΤΗΜΙΟ ΑΘΗΝΩΝ

ΚΕ ΔΙ ΒΙΜ

Informative Study Guide

2024

Applications of Molecular Biology in Fisheries and Aquaculture

1. Introduction

The Center for Education and Lifelong Learning (KEDIVIM) of the Agricultural University of Athens (AUA) welcomes you to the educational program entitled **«Applications of Molecular Biology in Fisheries and Aquaculture»,** with a total occupational duration of **50 hours**. The program will be conducted in the Laboratory of Applied Hydrobiology of the Department of Animal Science at the Agricultural University of Athens and will be implemented using a **blended** learning approach, **distance learning** (Synchronous Education) through the CCELL /AUA E-class platform and **in-person** (participants' physical presence is required).

Scientific Manager of the program is Mr. **Emmanouil Malandrakis** Assistant Professor of the Department of Animal Science of the Agricultural University of Athens

2. Purpose

The current Training Program is implemented within the framework of the action: **"External services implementation"** of the EU-CONEXUS-RESEARCH FOR SOCIETY (EU-CONEXUS-RFS) program of the European Commission (HORIZON 2020), with the main objective of combining access in advanced research infrastructures and processes, training in how to use them, learning new skills and sharing best practices (job shadowing).

3. Program Necessity

Training in basic molecular biology techniques in fisheries and aquaculture is vital for researchers and industry professionals to improve understanding of fish genetics, breeding and breeding programs, study disease resistance and develop sustainable fishing and aquaculture practices. In addition, molecular biology tools are used to detect adulteration in the fish supply chain. Hands-on experience in these techniques enable researchers and practitioners to contribute to fisheries management, consumer fraud protection, selective breeding, disease control, and sustainable aquaculture practices.

4. Learning objectives

Upon completion of this cycle, participants will have gained a significant understanding of the fundamental concepts of molecular biology, including DNA structure, gene expression, genetic variation and other molecular techniques used in the fisheries and aquaculture fields.

Knowledge:

1. Solid understanding of fundamental molecular biology concepts, including DNA structure, extraction, gene expression, genetic variation, and molecular techniques used in fisheries and aquaculture research.
2. Hands-on experience in performing essential molecular in DNA extraction, PCR amplification, gel electrophoresis.
3. To visualize and analyze gel electrophoresis results, PCR and qPCR data.
4. Searching, analyzing and synthesizing data
5. Knowledge of production systems in aquaculture
6. Knowledge of basic elements of production in aquaculture
7. Ability to troubleshoot problems in the production process of aquaculture process

Skills:

1. Promotion of creative and inductive thinking
2. Adaptation to new situations
3. Decision making

Abilities:

1. Respect for the natural (aquatic) environment
2. Animal (fish) welfare awareness
3. Individual and group work

5. Target group

Graduates of Schools of Natural Sciences such as, for example: graduates holding a degree in Marine Science, Oceanography, Animal Sciences, Biosciences, Biotechnology, Biology, Biochemistry, and other Applied Sciences, Veterinary Sciences, high school teachers in Natural Sciences, as well as other individuals interested in the subject.

6. Certificates

Certificate Type:

- **Certificate of Education**

7. Educational program structure

Title of teaching unit	Subsection title	Duration in hours	ECVET/ ECTS
« Applications of Molecular Biology in Fisheries and Aquaculture»	Subsection 1.1: Introduction to fundamental molecular biology concepts, including DNA structure, extraction, gene expression, genetic variation, and molecular techniques used in fisheries and aquaculture research.	10,0	0,4
	Subsection 1.2: DNA extraction from fish samples.	10,0	0,4
	Subsection 1.3: Agarose gel electrophoresis	4,0	0,2
	Subsection 1.4: Polymerase chain reaction in fish samples	15,0	0,6
	Subsection 1.5: Real-time polymerase chain reaction in fish samples	11,0	0,4

8. Workshop

Practical training is NOT included

9. Scientific team

The Scientific Manager of the program is Mr. **Emmanouil Malandrakis**, Assistant Professor, Department of Animal Production Science, Agricultural University of Athens
https://zp.aua.gr/faculty/malandrakis_emmanuel/

In the program they teach AUA faculty members and external collaborators:
Emmanouil Malandrakis, Assistant Professor, Department of Animal Science, Agricultural University of Athens
https://zp.aua.gr/faculty/malandrakis_emmanuel/
Konstantina Bitchava, Associate Professor, Department of Animal Science, Agricultural University of Athens
https://zp.aua.gr/faculty/bitchava_konstantina/
Evanthia Chatzoglou, Biologist (PhD) University Research Associate, Agricultural University of Athens

10. Method of implementation

Mixed, **distance learning** (Synchronous Education) through the CCELL /AUA E-class platform and **in-person** (participants' physical presence is required).

11. Training techniques - Tools – Equipment

The training techniques in this program are designed taking into account the specificities and needs of adults. They have been designed and adapted according to the needs and interests of those employed in the fields of Marine Science, Biosciences, Veterinary Sciences, Food Safety, and Education. Training methods will be employed where participants actively engage in experimental procedures, create working groups for activities that promote critical thinking, and expand knowledge in the subject of study. Participants will be trained with the aim of perceiving the direct correlation between learning and practical application in their workplace. Training will be conducted using the scientific equipment of the **Applied Hydrobiology Laboratory of the Agricultural University of Athens, in laboratory rooms of the premises as well as in classrooms of the Department of Animal Science**. Additionally, for remote teaching methods, the capabilities of Microsoft Teams software or **the CCELL /AUA E-class platform** will be utilized.

In this program, basic Molecular Biology methods are applied to fish samples.
In detail:

- DNA extraction with spin columns from fish samples. Determination of the amount of DNA by spectrophotometry
- Electrophoresis of various fish DNA samples (total-fragments) in agarose gel.
- Polymerase chain reaction in fish DNA samples.
- Real time PCR in fish DNA samples.

Hardware equipment:

- Analytical balance
- Incubator
- Centrifuge
- Small volume photometer
- Electrophoresis device
- Thermal cycler
- Real Time PCR Thermal cycler

12. Educational Materials - Additional Resources

The educational material of the seminar consists of notes describing the theoretical background of the analyses, their purpose and significance, and their applications in the fields of Marine Sciences, Biosciences, Veterinary Sciences, and Food Safety. Additionally, analysis protocols with instructions for equipment use are provided. Supplementary sources of information such as literature, websites, and video presentations are also offered, aiming to expand knowledge on the subject, explore the possibilities of applying the provided knowledge and enhance relevant skills.

13. Evaluation Methodology

13.1 Evaluation of trainees

1. **Solving exercises during the seminar**
2. Final exam with **Multiple Choice Test** (minimum passing score (50% correct answers)

13.2 Evaluation of the training program (trainers, trainees, CELLL)

The evaluation of the training program will be done through a questionnaire completed by trainees. The findings will be used to continue and/or improve the training program.

14. Obligations of trainees/Certificate of Education

To successfully complete the program, participants must:

- have attended all the teaching modules. Absences cannot exceed 10% of the scheduled training hours.
- to have successfully completed the training program examination, the trainees must answer correctly at least 50% of the questions of the final examination, i.e. achieve a grade of at least 50, with an excellent score of 100. In this case, the trainees receive a Certificate of Education, which is published by the Center for Education and Lifelong Learning of the Agricultural University of Athens. The examination will take place through the **electronic CCELL/AUA E-class platform.**
- to have paid all the tuition fees by the start of the Program.
- to have submitted the completed evaluation questionnaire of the Educational Program.

After the successful completion of the program, the participants are awarded a Certificate of Education, which is issued by the Center of Continuing Education and Lifelong Learning (CCELL) of AUA.

Participants who attended but did not complete the entire program may be provided with a **Certificate of Attendance**.

15. Participation cost/Discount policy

The cost of participating in the program is **200 euros** and must be paid before the start of the program in order to secure participation in the program.

Discount Policy:

- to AUA graduates: 15%,
- for those who attended, or have simultaneously enrolled in one of the following Training programs 10% and for those who have enrolled or are currently attending both of the following Training programs 15%

- "Determination of fatty acids using gas chromatography in fish and fish feed"
- "Quality control of fish feed and fish"

The interested parties **deposit the above amount into the following account**, in which the beneficiary is the **Special Account for Research Funds of the AUA, necessarily stating their name** and the **ELKE code** of the project **(Code 80222)**

National Bank in the account with IBAN GR 2801100400000004001883448

The proof of deposit is attached to the submitted application electronically on the website of the Center of Continuing Education and Lifelong Learning (CCELL) of the Agricultural University of Athens (AUA)

16. Applications

Those interested submit an application online until **01/04/2024** on the website of the Center of Continuing Education and Lifelong Learning (CCELL/K.E.DI.VI.M.) of the AUA and fill in or attach all the prerequisites.

In the event that the minimum required number of trainees is not gathered, CELLL reserves the right to change the start date of the program or to cancel it.

17. Contact

For more information, interested parties can contact

- with the Secretarial Support of the e-mail program: echatzoglou@aua.gr Telephone number: 210 5294401 (10.00-15.30)
- with the Secretariat of the Center for Education & Lifelong Learning (K.E.DI.VI.M.) of the Agricultural University of Athens: email: kedivim@aua.gr Telephones: 210 5294400 (10.00-15.30)

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