

## COURSE OUTLINE

### 1. GENERAL

<b>SCHOOL</b>	AGRICULTURAL SCIENCES		
<b>ACADEMIC UNIT</b>	DEPT. OF ANIMAL PRODUCTION, FISHERIES AND AQUACULTURE		
<b>LEVEL OF STUDIES</b>	UNDERGRADUATE		
<b>COURSE CODE</b>	AS-5002	<b>SEMESTER</b>	IX (elective of 5CU)
<b>COURSE TITLE</b>	FISH HATCHERIES		
<b>INDEPENDENT TEACHING ACTIVITIES</b> <i>if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits</i>	<b>WEEKLY TEACHING HOURS</b>	<b>CREDITS</b>	
	4	5	
<i>Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).</i>			
<b>COURSE TYPE</b> <i>general background, special background, specialised general knowledge, skills development</i>	Specialized general knowledge, Skills development		
<b>PREREQUISITE COURSES:</b>	Recommended: Ecology of Aquatic Systems, Aquaculture, Fish-farming		
<b>LANGUAGE OF INSTRUCTION and EXAMINATIONS:</b>	Greek, English		
<b>IS THE COURSE OFFERED TO ERASMUS STUDENTS</b>	YES		
<b>COURSE WEBSITE (URL)</b>	... to be constructed		

### 2. LEARNING OUTCOMES

#### Learning outcomes

*The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.*

#### Consult Appendix A

- Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area
- Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B
- Guidelines for writing Learning Outcomes

On successful completion of this unit, the students will be able to:

- ✓ **understand the issues related to the design, structure and the particular productive operations for the departments of an integrated fish hatchery (i.e., those pertaining to Broodstock, Egg incubation-hatching, Larval and fry stages, as well as to live food production); also, to appraise the installations and equipment of the various hatchery departments.**
- ✓ **realize the importance of water supply and the relevant technical arrangements; also, monitor the water quality and related environmental parameters concerning the living habitats of the various organisms reared in the hatchery.**
- ✓ **manage the broodstock of various fish species and utilize the adequate techniques for induced spawning and for the production of fry with special characteristics.**
- ✓ **plan for the production of egg batches, collect them and assess their quality; also, operate the incubation-hatching department and detect and deal with any possible problems therein.**
- ✓ **manage populations of broodstock, larvae and fry for various species of fish, in specific production systems, with respect to stocking densities and feeding levels; also, monitor the quality of fry, detect and deal correctly with any possible health problems.**
- ✓ **manage the transportation of fry or broodstock of various fish species; also, organize the collection of wild broodstock.**
- ✓ **co-ordinate the production of live feed for the young fish stages by means of preparing and managing the culture of various zooplankters and the corresponding phytoplanktic micro-organisms.**

#### General Competences

*Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?*

*Search for, analysis and synthesis of data and information, with the use of the necessary technology*

*Project planning and management*

*Adapting to new situations*

*Respect for difference and multiculturalism*

*Decision-making*

*Respect for the natural environment*

*Working independently*

*Showing social, professional and ethical responsibility and sensitivity to gender issues*

<i>Team work</i>	<i>Criticism and self-criticism</i>
<i>Working in an international environment</i>	<i>Production of free, creative and inductive thinking</i>
<i>Working in an interdisciplinary environment</i>	.....
<i>Production of new research ideas</i>	<i>Others...</i>
	.....

  

<ul style="list-style-type: none"> <li>➤ <b>Application of knowledge.</b></li> <li>➤ <b>Search for, analysis and synthesis of data and information, with the use of the necessary technologies.</b></li> <li>➤ <b>Adapting to new situations.</b></li> <li>➤ <b>Decision-making.</b></li> <li>➤ <b>Working independently.</b></li> <li>➤ <b>Team work.</b></li> <li>➤ <b>Working in an interdisciplinary environment.</b></li> <li>➤ <b>Project planning and management.</b></li> </ul>
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### 3. SYLLABUS

- Hatchery requirements and functions: location, design, main installations and equipment; departments and operations, organization, general technical and economic management.
- Water: supply and uses, quality and treatment, effluence; differences between fresh and sea water.
- Reproductive biology of fish and life-cycles; broodstock, reproduction cycles and spawning, egg incubation and handling.
- Egg hatching and post-larval development.
- Specializing applications of controlled reproduction per fish taxon (Salmonids, Cyprinids, catfish, tilapias, sturgeons, Perciformes, Pleuronectiformes, other reared and ornamental species).
- Special nutrition and feeding of broodstock and fry.
- Well-being and health; hygiene of fish, installations and equipment.
- Production of fry with special characteristics (monosex, sterile).
- Storage of semen.
- Transportation of broodstock and fry: methodology, equipment, water quality, handling and fish densities.
- Techniques for capturing wild broodstock in the natural environment. Techniques for capturing wild fry and wild zooplankton.
- Systems and protocols for mass production of phytoplankton; harvesting, testing and storage.
- Systems for zooplankton (Rotifers, Copepods) culturing as live feed of fish fry; management, enrichment and other preparation for use.

#### 4. TEACHING and LEARNING METHODS - EVALUATION

<p style="text-align: center;"><b>DELIVERY</b> <i>Face-to-face, Distance learning, etc.</i></p>	Face-to-face	
<p style="text-align: center;"><b>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY</b> <i>Use of ICT in teaching, laboratory education, communication with students</i></p>	Use of ICT in all teaching/learning activities.	
<p style="text-align: center;"><b>TEACHING METHODS</b></p> <p><i>The manner and methods of teaching are described in detail.</i></p> <p><i>Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.</i></p> <p><i>The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS</i></p>	<i>Activity</i>	<i>Semester workload</i>
	Lectures and Individual Essay writing (1)	26
	Laboratory practice, Seminars, Fieldwork and/or Educational visits	26
	Non-directed study	73
<b>Course total</b>	<b>125</b>	
<p style="text-align: center;"><b>STUDENT PERFORMANCE EVALUATION</b></p> <p><i>Description of the evaluation procedure</i></p> <p><i>Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other</i></p> <p><i>Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</i></p>	<p><b>Language, Greek and/or English</b></p> <ol style="list-style-type: none"> <li>1. Oral examination (summative-conclusive) (A)</li> <li>2. Written final examination – Short-answer questions, Open-ended questions and/or Problem solving (conclusive) (B)</li> <li>3. Written work (conclusive) (C)</li> </ol> <p><b>Each one to be graded in a 0-10 scale.</b></p> <p><b>Final grade (FG):</b></p> <p style="text-align: center;"><b>FG= 0,2A+0,6B+0,2C when B≥5, else: FG= B</b></p> <p><b>'A' and 'C' are done concurrently with the teaching process; 'B' takes place in the examinations period as regulated.</b></p> <p><b>In case of failure the student should repeat the procedure.</b></p>	

## 5. ATTACHED BIBLIOGRAPHY

### Suggested bibliography:

Βουλτσιάδου Ε., Αμπατζόπουλος Θ., Αντωνοπούλου Ε., Γκάνιας, Κ., Γκέλης Σ., Στάϊκου Α., Τριανταφυλλίδης Α. 2015. ΥΔΑΤΟΚΑΛΛΙΕΡΓΕΙΕΣ-Οργανισμοί, συστήματα παραγωγής, προοπτικές. ΣΕΑΒ, ISBN: 978-960-603-184-7.

Χώτος, Γ. 2016. ΚΑΛΛΙΕΡΓΕΙΕΣ ΠΛΑΓΚΤΟΥ-Βιολογικά στοιχεία και τεχνικές. Τ.Ε.Ι. Δυτικής Ελλάδας, Τμήμα Τεχν. Αλιείας-Υδατοκαλλιεργειών.  
<https://openeclasse.teimes.gr/modules/document/?course=YDAD181>

**Fish Reproduction: Maria J Rocha, Augustine Arukwe and B.G. Kapoor (2008). CRC Press, 632 Pages, ISBN 9781578083312**

**Hormones and Reproduction of Vertebrates, Volume 1: Fishes: David O. Norris and Kristin H. Lopez (2010). Academic Press, 288 pages, ISBN 978-0123750099**

**Induced Fish Breeding: A Practical Guide for Hatcheries: Nihar Ranjan Chattopadhyay (2016). Academic Press, 370 pages, ISBN 978-0128017746**

**Methods in Reproductive Aquaculture: Marine and Freshwater Species: Elsa Cabrita, Vanesa Robles and Paz Herraez (2008). CRC Press, 572 Pages, ISBN 9780849380532**

**Reproductive Biology of Teleost Fishes: Robert J. Wootton and Carl Smith (2015). John Wiley & Sons, ISBN 9780632054268**

### Related academic journals:

**Aquacultural Engineering: Elsevier, ISSN 0144-8609,  
(<https://www.journals.elsevier.com/aquacultural-engineering/>)**

**Aquaculture International - Journal of the European Aquaculture Society: Springer, ISSN 0967-6120 (Print) 1573-143X (Online), (<https://link.springer.com/journal/10499>)**

**Aquaculture Research: John Wiley & Sons, ISSN 1365-2109,  
([http://onlinelibrary.wiley.com/journal/10.1111/\(ISSN\)1365-2109](http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1365-2109))**

**Journal of Applied Ichthyology: John Wiley & Sons, ISSN 1439-0426,  
([http://onlinelibrary.wiley.com/journal/10.1111/\(ISSN\)1439-0426](http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1439-0426))**

**The Israeli Journal of Aquaculture-Bamidgeh (IJA): The official publication of the Society of Israeli Aquaculture and Marine Biotechnology (SIAMB), ISSN 0792-156X,  
(<http://www.siamb.org.il/articles-1180-The-Israeli-Journal-of-Aquacultur.aspx>)**