

## COURSE LAYOUT

### 1. GENERAL

<b>SCHOOL</b>	ANIMAL BIOSCIENCES		
<b>DEPARTMENT</b>	ANIMAL SCIENCE		
<b>STUDY LEVEL</b>	B.Sc. - SELECTION CURRICULUM COURSE		
<b>COURSE CODE</b>	<b>268</b>	<b>SEMESTER</b>	9 <sup>o</sup>
<b>COURSE TITLE</b>	PRINCIPLES OF ANIMAL EMBRYOLOGY		
<b>INDEPENDENT TEACHING ACTIVITIES</b>		<b>WEEKLY TEACHING HOURS</b>	<b>ECTS</b>
<b>Theory: Lectures</b>		1	
<b>Laboratory</b>		1	
			2
<b>COURSE TYPE</b>	Field of Science - Scientific region		
<b>PREREQUISITES</b>	ANIMAL ANATOMY AND HISTOLOGY, PHYSIOLOGY OF FARM ANIMALS		
<b>LANGUAGE</b>	GREEK		
<b>IS THE COURSE OFFERED for ERASMUS STUDENTS?</b>	NO		
<b>COURSE WEB PAGE (URL)</b>	<a href="https://mediasrv.aua.gr/eclass/courses">https://mediasrv.aua.gr/eclass/courses</a> under construction		

### 2. LEARNING RESULTS

Learning Outcomes
<p>The course Principles of Animal Embryology describes the physiological mechanisms involved in fertilization and embryonic development, as well as the techniques used in order to replicate these physiological procedures in laboratory conditions.</p> <p>It aims to present a review of the science of embryology and its terminology, using literature sources inclusive of acclaimed course books and original ground breaking papers.</p> <p>It aims to present fertilization and embryonic development <i>in vivo</i>, and the basic techniques used in gametes collection and preservation, embryo transfer, <i>in vitro</i> embryo production, sex determination and selection in embryos, embryo cloning and division, production of transgenic animals and chimaeras.</p> <p>It aims to train students to identify microscopy embryo samples in various stages of development.</p> <p>Upon completion of the course the student should be in a position to:</p> <ul style="list-style-type: none"> <li>• Understand international and Greek terminology of embryology.</li> <li>• Comprehend animal embryonic development and the techniques available for the study of embryonic development stages <i>in vitro</i>, as well as their potential and limitations.</li> <li>• Identify embryo samples using microscopy.</li> <li>• Use safely and efficiently the necessary laboratory equipment and consumables (microscopes, image analysis), combining literature sources and World Wide Web.</li> </ul> <p>According to Bloom a student should be in a position to:</p> <ol style="list-style-type: none"> <li>1. Describe gametes, fertilization and embryonic development of animals. [KNOWLEDGE]</li> <li>2. Describe the techniques used by modern embryology in animal production. [KNOWLEDGE]</li> <li>3. Distinguish between the potential and the limitations of the techniques used in embryology. [UNDERSTANDING &amp; EVALUATION]</li> <li>4. Examine embryo samples and practice <i>in vitro</i> applications. [APPLICATION]</li> <li>5. Combine microscopy observations, techniques and literature and thus comprehend</li> </ol>

embryonic development both *in vivo* and *in vitro*. [ANALYSIS & SYNTHESIS]

### General Competence

- *Search, analysis and synthesis of data, using the required technologies*
- *Decision making*
- *Autonomous work*
- *Teamwork*
- *Work in multidisciplinary environment*
- *Production of new research ideas*
- *Respect of natural environment*
- *Promotion of free, constructive and inductive thinking*

### 3. COURSE CONTENT

- i. Epigenesis and embryonic development.
- ii. Gametogenesis. Collection and preservation of genetic material.
- iii. Fertilization.
- iv. *In vitro* embryo production.
- v. Morula. Blastula. Embryo transfer techniques.
- vi. Formation of embryonic body. Metaplasia of blastoderms.
- vii. Embryonic appendages.
- viii. Determination of embryo age and sex. Selection of sex in embryos.
- ix. Embryo cloning and embryo division.
- x. Transgenic animals and chimaeras. Production techniques.
- xi. Principles of experimental and comparative embryology.
- xii. Malformations.
- xiii. Latest developments in embryology.

### 4. TEACHING AND LEARNING METHODS - Evaluation

<b>TEACHING METHOD</b>	In class, face to face.	
<b>USE OF INFORMATICS and COMMUNICATION TECHNOLOGIES</b>	PowerPoint presentations, multimedia and imaging systems, and the World Wide Web. Use of light and fluorescence microscopes and stereoscopes fitted with digital cameras and connected with computerised image analysis software. Use of inverted microscopes fitted with micromanipulation equipment. Embryo cultures. Student learning support by e-class. Communication with students via e-mail.	
<b>TEACHING ORGANISATION</b>	<b>Activities</b>	<b>Work load per semester (hrs)</b>
	Lectures	13
	Laboratory practice	13
	Literature search and analysis	10
	Self study	14
	<b>Total Course (25 hours workload per credit unit)</b>	50
<b>STUDENTS EVALUATION</b>	Evaluation language: Greek	
	Evaluation method: Written final examination I. Theory (T): 60% of the final exam with short-answer	

	<p>questions.</p> <p>II. Laboratory (L): 40% of the final exam with multiple choice questions (50%) and microscopy histology slide description (50%).</p> <p>Final score: (T)+(L) = 60+40=100% of the total final score.</p>

## 5. BIBLIOGRAPHY

### ***-Proposed Literature:***

- Μάγρας Ι.Ν. Εμβρυολογία των κατοικίδιων θηλαστικών. Εκδ. Οικ. Αφοι Κυριακίδη. Θεσσαλονίκη, 2004.
- Θεοδωρόπουλος Γ., Χαδιώ-Μάντζαρη Στ., Μπαλάσκας Χρ., Οικονομόπουλος Ι. Λειτουργική Ανατομική και Φυσιολογία των Ζώων. ISBN-13: 978-618-80647-8-2 Εκδόσεις Utopia. Αθήνα, 2014.  
Επιμέλεια- Μετάφραση του Functional Anatomy and Physiology of Domestic Animals, 4th edition, W.O. Reece, Wiley-Blackwell.
- Gordon I. Controlled Reproduction in Farm Animals. CABI, 1996.
- Field T.G. & Taylor R.E. Scientific Farm Animal Production. Pearson, 2016.

### ***-Related Scientific journals (non-exhaustive list):***

Anatomy and Embryology  
 Animal Biotechnology  
 Animal Reproduction Science  
 Cell  
 Cell and Tissue Research  
 Development  
 Developmental Dynamics  
 Journal of Anatomy  
 Journal of Cytology and Histology  
 Journal of Histochemistry and Cytochemistry  
 Journal of Morphology  
 Nature  
 Nature Biotechnology  
 Nature Cell Biology  
 Nature Structural Biology