COURSE LAYOUT

1. GENERAL

SCHOOL	Animal Biosciences		
DEPARTMENT	Animal Science		
STUDY LEVEL	Undergraduate - Selection Course		
COURSE CODE	**268**	**SEMESTER**	9ο
COURSE TITLE	Principles of Animal Embryology		

INDEPENDENT TEACHING ACTIVITIES	**WEEKLY TEACHING HOURS**	**ECTS**
Theory: Lectures	1	1
Laboratory training	1	1
		2

COURSE TYPE	Scientific area
PREREQUISITES	Animal Anatomy-Histology, Physiology of Farm Animals
LANGUAGE	Greek
IS THE COURSE OFFERED forERASMUS STUDENTS?	No
COURSE WEB PAGE (URL)	https://oeclass.aua.gr/eclass/courses/765/

2. LEARNING RESULTS

Learning Outcomes

The course Principles of Animal Embryology describes the physiological mechanisms involved in fertilization and embryonic development, as well as the methods used to replicate these physiological procedures in laboratory conditions.
It aims to present a review of the science of embryology and its terminology, using literature sources inclusive of acclaimed course books and original groundbreaking papers.
It aims to present fertilization and embryonic development *in vivo*, and the basic methods used in gametes collection and preservation, embryo transfer, *in vitro* embryo production, sex determination and selection in embryos, embryo cloning and division, production of transgenic animals and chimaeras.
It aims to train students to identify microscopy embryo samples in various stages of development.

Upon completion of the course the student should be able to:

- Understand international and Greek terminology of embryology.
- Comprehend animal embryonic development and the techniques available for the study of embryonic development stages *in vitro*, as well as their potential and limitations.
- Identify embryo samples using microscopy.
- Use safely and efficiently the necessary laboratory equipment and consumables (microscopes, image analysis), combining literature sources and World Wide Web.

According to Bloom a student should be able to:

1. Describe gametes, fertilization, and embryonic development of animals. [KNOWLEDGE]

2. Describe the techniques used by modern embryology in animal production. [KNOWLEDGE]
3. Distinguish between the potential and the limitations of the techniques used in embryology. [UNDERSTANDING & EVALUATION]
4. Examine embryo samples and practice *in vitro* applications. [APPLICATION]
5. Combine microscopy observations, techniques and literature and thus comprehend embryonic development both *in vivo* and *in vitro*. [ANALYSIS & SYNTHESIS]

General Competence

- *Search, analysis and synthesis of data, using the required technologies*
- *Desicion making*
- *Autonomus 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. Metaplasis 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

TEACHING METHOD	In class, face to face.
USE OF INFORMATICS and COMMUNICATION TECHNOLOGIES	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.
TEACHING ORGANISATION	

Activities	***Workload per semester (hrs)***
Lectures	13
Laboratory practice	13

	Literature search and analysis	10
	Self study	14
	Total Course (25 hours workload per credit unit)	50
STUDENTS EVALUATION	Evaluation language: Greek Evaluation method: Written final examination. I. Theory (T): 60% of the final exam with short-answer questions. II. Laboratory (L): 40% of the final exam with multiple choice questions (50%) and microscopy histology slide description (50%). Final score: (T)+(L) = 60+40=100% of the total final score.	

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