COURSE OUTLINE

(1) GENERAL

SCHOOL	ANIMAL BIOSCIENCES		
ACADEMIC UNIT	DEPARTMENT OF ANIMAL SCIENCE		
LEVEL OF STUDIES	Undergraduate [Free Elective]		
COURSE CODE	3625	**SEMESTER**	5th
COURSE TITLE	MOLECULAR ECOLOGY AND ADAPTATION		

INDEPENDENT TEACHING ACTIVITIES *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*	**WEEKLY TEACHING HOURS**	**CREDITS (ECTS)**
Lectures	3	1.56
Practical Lab Courses	2	0.56
Group class presentation (selected topics/ scientific articles)		0.82
Autonomous study (personal assignment)		2.07
Total	**5**	**5**
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Scientific Area
PREREQUISITE COURSES:	-
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek (Teaching & Exams)
IS THE COURSE OFFERED TO ERASMUS STUDENTS:	English (Teaching & Exams)
COURSE WEBSITE (URL):	www.aua.gr/plantdevelopment

(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*

Upon completion of the course the student should:
• Gain in-depth understanding of the biological rhythms on our planet and in organisms.
• Become familiar with the molecular analysis of these mechanisms and their ecological significance for any organism.
• Understand how circadian rhythms work and are achieved through molecular mechanisms in plants, animals, and humans, and will be able to use theoretical knowledge to address issues arising from environmental parameter disruptions.
• Understand the mechanisms that lead to seasonal ecological changes in animals (e.g., insect diapause, hibernation) and the significant impact of climate change on these adaptations.
• Understand what happens when organisms are forced to function under stressful conditions. They will realize that the organism's immediate stress response may lead to problems if prolonged over time.
• Comprehend the concept of behavioral genetics in animals and humans, allowing them to comprehend how and why an animal or a person functions as they do.
• Understand the importance of environmental factors (family, education, society) in shaping human personality and behavior.

• Gain in-depth understanding of the consequences of environmental pollution caused by human activity on our planet and the risks associated with the creation and use of industrial products (e.g., plastics, insecticides, herbicides) that act as xenobiotics.
• Develop critical and creative thinking regarding their contribution to maintaining stable conditions in the planet's environment (pollution, etc.).
• Able to apply their knowledge to solving ecological problems, contributing to the protection of the planet from pollution and climate change while promoting social progress.
• Ability to design simple ecological solutions and interventions.
• Capability to transfer their knowledge to students (primary, middle, and high school) and/or a non-academic audience.
• Implement the knowledge they have gained and make decisions relevant to society.
• Autonomous and/or team-based work.
• Promotion of free, creative, and inductive thinking.

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

1) Retrieve, analyze and synthesize data and information relying on use of necessary technologies.
2) Adjust to new situations.
3) Decision making.
4) Work autonomously.
5) Work in groups.
6) Create novel scientific projects.
7) Design and develop research projects/experiments.
8) Be critical and self-critical.
9) Apply knowledge to practice.

(3) SYLLABUS

1. Biological Clocks: Rhythmic phenomena and types of rhythms, the mechanism of circadian rhythms.
2. Molecular Study of Circadian Systems: Focused on cyanobacteria (Synechococcus), fungi (Neurospora), insects (Drosophila), mammals (mouse), and plants.
3. Photoperiodic Clocks: Structure and function.
4. Insect Diapause: Genetic and molecular approaches to diapause, mechanisms of diapause.
5. Heat-Induced Proteins (Heat Shock Proteins - HSPs): The transcription factor of thermal stress (Heat Shock Factor - HSF), stress proteins as molecular chaperones, families of heat shock proteins.
6. Stress Proteins and Their Role in Insect Diapause: The role of HSPs in the insect Sesamia nonagrioides and the study of their expression under stress conditions. The role of HSPs in the control of pathology and treatment of diseases.
7. Behavioral Genetics in Animals: Genetic analysis of behavior, behavioral genetics in humans. The polymorphism of 5-HTT and its use in diagnosis and therapy.
8. Epigenetic Mechanisms in Mammals: Establishment and maintenance of epigenetic patterns in mammalian cells, personality disorders, epigenetics, and human diseases.
9. Social Importance of Research in Behavioral Genetics.
10. Environmental Factors and Organism Responses: DNA damage caused by environmental factors.
11. Biological Effects of Dioxin.
12. Xenobiotics, Xenoestrogens, and Endocrine Disruptors.
13. Bisphenol A (BPA) and Its Effects on Humans: Impact of BPA on insect physiology.
14. Molecular and physiological effects of BPA on Sesamia nonagrioides

(4) TEACHING and LEARNING METHODS - EVALUATION

TEACHING METHOD *Face-to-face, Distance learning, etc.*	Direct (face to face).
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	Power point presentations, student contact electronically.
TEACHING METHODS *The manner and methods of teaching are described in detail.* *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.* *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*	
STUDENT PERFORMANCE EVALUATION *Description of the evaluation procedure* *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* *Specifically-defined evaluation criteria are given, and if and where they are accessible to students.*	I) Written final examination (50%) with ranking difficulty based on the issues and subjects presented during theoretical courses. The exams will include: - Questions of multiple choice. - Questions of theoretical knowledge. - Theoretical problems to be resolved. II) Laboratory exercises/ practical courses (30%). Students individually or in groups will provide a written report before the beginning of the next exercise. The grade of lab courses will be based on the writing reports, attendance and class participation. III) Group and small autonomous assignments (20%).

Activity	***Semester workload***
Lectures	39
Practical Lab Courses	14
Group class presentations	20.5
Autonomous study	51.5
Course total (25 h of workload per ECTS)	***125***

(5) ATTACHED BIBLIOGRAPHY

Molecular Ecology (2011)
Joanna R. Freeland and Stephen D. Petersen (ISBN-13 9780470748336)

Molecular Ecology, Molecular Ecology Resources, Global Change Biology, Methods in Ecology and Evolution, Trends in Ecology and Evolution, Science, Nature, Proceedings of the National Academy of Sciences of the USA