COURSE OUTLINE

1. GENERAL

SCHOOL	APPLIED BIOLOGY AND BIOTECHNOLOGY		
DEPARTMENT	BIOTECHNOLOGY		
STUDY LEVEL	*Undergraduate*		
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**	**ECTS**
Lectures	3	1,56
Practical Lab Courses	2	1,04
Group class presentation (selected topics/ scientific articles)		1,20
Autonomous study (personal assignment)		1,20
TOTAL		**5,00**

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Special Background
PREREQUISITES	-
LANGUAGE	Greek (Teaching & Exams)
IS THE COURSE OFFERED for ERASMUS STUDENTS?	English (Teaching & Exams)
COURSE WEB PAGE	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 successful completion of this course, the students will be able to:

- Understand fundamental concepts related to adaptation mechanisms and molecular regulation
- Appreciate the significance of environmental factors and human activities in exerting pressure on organisms and influencing their adaptive response
- Recognize the interaction between organisms and their environment.
- Comprehend the interactions between individuals of the same or different species
- Understand organismal responses to environmental or external stimuli
- Become familiar with examples of biodiversity and evolutionary divergence that shape adaptive variability
- Grasp the molecular mechanisms underlying each organism's adaptive capacity
- Collaborate with fellow students to jointly analyze and present a project or experimental study aimed at elucidating molecular mechanisms associated with molecular ecology and adaptation
- Develop and enhance their ability to access online scientific libraries and journals

- Strengthen their skills in analyzing and presenting research and literature-based data
- Improve their skills in scientific writing and the preparation of scientific publications

General Competencies

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
Adapting to new situations
Decision-making
Working independently
Team work
Working in an international environment
Working in an interdisciplinary environment Production of new research ideas
Project planning and management
Respect for differences and multiculturalism
Respect for the natural environment
Showing social, professional and ethical responsibility and sensitivity to gender issues
Criticism and self-criticism
Production of free, creative and inductive thinking

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. COURSE CONTENT

- Introductory concepts (molecular ecology in the context of climate change – mechanisms of organismal adaptation – variability – molecular regulation)
- Mutations, polymorphisms and biodiversity – The contribution of the environment to mutation rates and gene expression
- Speciation and the environment
- Molecular chaperones – Their contribution, role and evolution within the framework of molecular ecology
- Understanding the relationship between natural variation among individuals of the same genus or species and the molecular mechanisms regulating adaptability under extreme environmental conditions
- Interpretation of molecular mechanisms that determine organismal adaptation under competitive conditions
- Decoding the role of the microbiome in plant adaptation
- Molecular interpretation of the phenomenon of industrial (or other) melanism at the population level among conspecific individuals
- Examples of molecular mechanisms of ecological adaptability due to mimicry or crypsis
- Acceleration of evolutionary adaptability through morphological changes triggered by molecular regulatory catalysts – The regulatory role of the HSP90 molecular chaperone
- Explanation of the development and molecular evolution of pesticide resistance mechanisms in crop pests and public health-related insects

4. TEACHING and LEARNING METHODS - EVALUATION

TEACHING METHOD *Face-to-face, Distance learning, etc*	Direct (face to face).

<table>
<tr><td>USE OF INFORMATICS and COMMUNICATION TECHNOLOGIES
Use of ICT in teaching, laboratory education, communication with students</td><td>Power point presentations, student contact electronically.</td></tr>
<tr><td>TEACHING ORGANISATION

Lectures, Seminars, Laboratory Exercises, Field Exercise, Literature Study & Analysis, Tutorial, Internship, Clinical Exercise, Interactive Teaching, Educational Visits, Study Preparation (Project), Written assignments, Independent study

The student's study hours for each learning activity are listed, so that the total workload at the semester level corresponds to ECTS standards.</td><td><table><tr><th>Activity</th><th>Semester Work Load</th></tr><tr><td>Lectures</td><td>39 h</td></tr><tr><td>Practical Lab Courses</td><td>26 h</td></tr><tr><td>Group class presentations</td><td>30 h</td></tr><tr><td>Autonomous study</td><td>30 h</td></tr><tr><td>Course total
(25 hours of student work load per ECTS)</td><td>125 h</td></tr></table></td></tr>
<tr><td>STUDENT EVALUATION

Evaluation Methods, Formative or Inferential, Multiple Choice Test, Short Answer Questions, Essay Development Questions, Problem Solving, Written Assignment, Report / Report, Oral Examination, Public Presentation, Laboratory Work, Other / Others

Expressly specified assessment criteria are stated and whether and where they are accessible to students.</td><td>I) Written final examination (50%) with ranking difficulty on the basis of 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%).</td></tr>
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5. BIBLIOGRAPHY

Text book [12464847]: "**An Introduction to Molecular Ecology**"; Graham Rowe, Michael Sweet, Trevor Beebee; 3rd Edition; ISBN-13: 978-0198716990

Relevant Scientific Journals:

Molecular Ecology, Molecular Ecology Resources, Global Change Biology, Methods in Ecology and Evolution, Trends in Ecology and Evolution, Plant Physiology, Plant Cell, Plant Journal, New Phytologist, Science, Nature, Proceedings of the National Academy of Sciences of the USA, Scientific American, Current Biology, New Scientist