COURSE OUTLINE

1. GENERAL INFORMATION

FACULTY/SCHOOL	**SCHOOL OF PLANT SCIENCES**		
DEPARTMENT	Faculty of Crop Science		
LEVEL OF STUDY	Undergraduate		
COURSE UNIT CODE	**895**	**Semester:**	**9ο**
COURSE TITLE	**AGROECOTOXICOLOGY**		
INDEPENDENT TEACHING ACTIVITIES *in case credits are awarded for separate components/parts of the course, e.g. in lectures, laboratory exercises, etc. If credits are awarded for the entire course, give the weekly teaching hours and the total credits*		**WEEKLY TEACHNG HOURS**	**ECTS**
		3h The + 2h Lab	5
Add rows if necessary. The organization of teaching and the teaching methods used are described in detail under section 4			
COURSE TYPE *Background knowledge, Scientific expertise, General Knowledge, Skills Development*	*Scientific expertise*		
PREREQUISITE COURSES:	None		
LANGUAGE OF INSTRUCTION:	Greek		
LANGUAGE OF EXAMINATION/ASSESSMENT:	Greek		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	N/A		

2. LEARNING OUTCOMES

Learning Outcomes
The course learning outcomes, specific knowledge, skills and competences of an appropriate (certain) level, which students will acquire upon successful completion of the course, are described in detail. It is necessary to consult:
Among the objectives of the course is for students who successfully complete it to understand the importance of environmental protection in productive activities, with emphasis on primary production. Additionally, the practical application of basic principles from the sciences of Ecology, Environment, and Toxicology significantly contributes to the understanding of the problems society faces today regarding environmental quality and its impacts on the functioning of natural, semi-natural, and human-made ecosystems. Another objective is the thorough comprehension of fundamental concepts in the science of Ecotoxicology and the mechanisms of transfer of toxic substances in the environment and the food chain.

APPENDIX A

- *Description of the level of learning outcomes for each level of study, in accordance with the European Higher Education Qualifications' Framework.*
- *Descriptive indicators for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and*

APPENDIX B

- *Guidelines for writing Learning Outcomes*

General Competences

Taking into consideration the general competences that students/graduates must acquire (as those are described in the Diploma Supplement and are mentioned below), at which of the following does the course attendance aim?

Search for, analysis and synthesis of data and information by the use of appropriate technologies,
Adapting to new situations
Decision-making
Individual/Independent work
Group/Team work
Working in an international environment
Working in an interdisciplinary environment
Introduction of innovative research
Project planning and management
Respect for diversity and multiculturalism
Environmental awareness
Social, professional and ethical responsibility and sensitivity to gender issues
Critical thinking
Development of free, creative and inductive thinking
……
(Other……citizenship, spiritual freedom, social awareness, altruism etc.)
…….

The course aims to:

- Foster respect for the natural environment.
- Enable the design and management of projects based on the assessment of environmental impacts, with a focus on ecosystem functioning.
- Support the decision-making process concerning environmental quality management.
- Promote the generation of new research ideas. Furthermore, as the problems of Ecotoxicology and Environmental Toxicology are quite complex, the course promotes interdisciplinary work.

3. COURSE CONTENT

1. Basic Principles of Environmental Toxicology - Ecotoxicology. The concept of toxicity.
2. Modes of action of toxic substances, with emphasis on Agricultural Ecosystems.
3. Routes of entry of pollutants/toxic substances into organisms and (agro)ecosystems. Mechanisms of pollutant transport. Runoff - Drainage - Spray drift.
4. Movement of pollutants through food chains. Bioaccumulation - Biomagnification.
5. Ecotoxicological consequences of agricultural chemicals and other substances - Characteristic Examples - DDT and other chlorinated pesticides - Polychlorinated biphenyls - Polycyclic hydrocarbons - Nitrate and phosphate fertilizers - Dioxins and dibenzofurans - Toxicity of Hg Pb, Cd, and other metals and metalloids. Toxicological consequences of radioactive materials. Toxicity from persistent organic pollutants (POPs) - Stockholm Convention - Ecotoxicology of nanomaterials.
6. Atmospheric pollution - O3, NOx, SO2, Acid rain, Particulate pollution, Heavy metals, etc. Monitoring and biomonitoring of atmospheric pollutants - health impact thresholds.
7. Qualitative characteristics of terrestrial waters - Aquatic toxicity - Reuse of treated liquid waste for irrigation - conditions and procedures.
8. Exposure of bees to pesticides - Colony Collapse Disorder (CCD) phenomenon.
9. Biochemical action of pollutants and toxic substances. Molecular mechanisms of toxicity - examples. Action of pollutants on physiology, at organ and whole organism level. Toxicokinetics and Toxicodynamics of Xenobiotics.
10. Interaction of toxic factors: Synergistic and Competitive interaction between toxic factors - Iso-bolographic analysis.
11. Tolerance and response of organisms to toxic agents. The phenomenon of hormesis in Toxicology.
12. Tests, Standards, and Methodology of Ecotoxicological Research. Calculation of toxicity. "Dose-Response" curve. Categories of toxicity.
13. Bioassays - Bioindicators - Biomarkers and their significance in environmental pollution assessment. Toxicity tests with soil organisms and plants. Tests with freshwater organisms. Daphnia Magna - algae - fish - duckweed, etc. Field toxicological tests.
14. Assessment of Environmental and Ecological Risk from Toxic and Hazardous Substances. Analysis of pollution mechanisms. QSAR method.
15. Toxicological Data of Chemical Substances and Classification of Toxicity and Hazard. Greek and European Legislation for Environmental Protection. International Conventions.

4. TEACHING METHODS--ASSESSMENT

MODES OF DELIVERY *Face-to-face, in-class lecturing, distance teaching and distance learning etc.*	In the amphitheater.
USE OF INFORMATION AND COMMUNICATION TECHNOLOGY *Use of ICT in teaching, Laboratory Education, Communication with students*	Use of PowerPoint and video Communication with students through: ✓ email, ✓ the e-class website, ✓ the Open class platform, and ✓ the announcements website of the Agricultural University of Athens: http://tdd.aua.gr/announcements/main
COURSE DESIGN *Description of teaching techniques, practices and methods:* *Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, Internship, Art Workshop, Interactive teaching, Educational visits, projects, Essay writing, Artistic creativity, etc.* *The study hours for each learning activity as well as the hours of self-directed study are given following the principles of the ECTS.*	

Activity/ Method	Semester workload
Theory Lectures: 13*3	39 hours
*Laboratory practice: 13*2*	26 hours
Personalized exercises (comprehension exercises) and tutorials:	30 hours
Individual Essay writing:	30 hours
Total Course Workload (25 hours of work per credit unit):	125 hours
Total (5h/w * 25h per ECTS):	**125 hours**

STUDENT PERFORMANCE EVALUATION/ASSESSMENT METHODS *Detailed description of the evaluation procedures:* *Language of evaluation, assessment methods, formative or summative (conclusive), multiple choice tests, short- answer questions, open-ended questions, problem solving, written work, essay/report, oral exam, presentation, laboratory work,* *other……etc.* *Specifically defined evaluation criteria are stated, as well as if and where they are accessible by the students.*	I. The evaluation language is Greek. II. The grade for the course is determined by the final written exam, which is subsidized by the performance grade of students attending the course in the lecture hall, as well as by intermediate tests or progress evaluations. III. The written exam will vary periodically and may include Multiple-Choice Questions, Short-Answer Questions, or Essay Questions. Typically, among the topics covered, there is also a problem-solving exercise. Oral examinations are also provided for those who are entitled to them (e.g., for health reasons). IV. The course consists of theory and tutorial exercises, with concurrent completion of personalized assignments.

5. SUGGESTED BIBLIOGRAPHY:

Recommended Bibliography:

- Valavanidis Ath. 2008. "Ecotoxicology and Environmental Toxicology". Contemporary Issues Publications. Non-profit publishing company. Available free of charge from the author, in electronic form, through the EYDOXOS platform, at the link: https://service.eudoxus.gr/search/file/93/full-13243693.pdf
- Valavanidis Ath., Vlachogianni Thom. 2008. "Environmental Chemistry & Ecotoxicology". Contemporary Issues Publications. Non-profit publishing company. Available free of charge from the author, in electronic form, through the EYDOXOS platform, at the link: https://service.eudoxus.gr/search/file/06/full-13317906.pdf

• Landis, W.G., Yu Ming-Ho. 1995. **Introduction to Environmental Toxicology**. Lewis Publishers. ISBN 0-87371-515-2.

• Walker, C. et al. 1996. **Principles of Ecotoxicology**. Taylor & Francis Publishers. ISBN 0-7484-0221-7.

Relevant Scientific Journals:

Environmental Toxicology (Wiley - Edited By: PAUL B. TCHOUNWOU, Impact Factor: 2.708).

6. TEACHERS:

Professor Costas SAITANIS, PAPADIMITRIOU Chrysi