COURSE OUTLINE

1. GENERAL INFORMATION

FACULTY/SCHOOL	**SCHOOL OF PLANT SCIENCES**		
DEPARTMENT	Faculty of Crop Science		
LEVEL OF STUDY	Undergraduate		
COURSE UNIT CODE	**1185**	**Semester:**	**9º**
COURSE TITLE	**ECOLOGY AND BIOCLIMATOLOGY OF URBAN ENVIRONMENT** (Compulsory course for the direction of Floriculture and Landscape Architecture)		
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 Theory + 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)			

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:

The objective of the course is to understand the functioning of urban ecosystems, how major urban environmental issues are addressed, and how human activities impact natural and semi-natural ecosystems. Emphasis is placed on methods for assessing the impacts of these activities, as well as the practical applications of ecological knowledge in the organization and maintenance of urban and suburban parks through the implementation of Green Paths in cities. Additionally, the course presents the main methods of natural resource management in the urban ecosystem and describes the basic principles governing Urban Agriculture as an example of Urban Ecology.

Furthermore, the course aims to analyze the specific characteristics of the urban climate and the elements of the city that influence and shape it. Special attention is given to the phenomena of urban heat islands and cold islands. The basic concepts and principles of bioclimatic design in the urban environment are introduced. The concepts of human thermal sensation (comfort) are analyzed, and the bioclimatic and biometeorological indicators that quantify it are presented. Emphasis is placed on the analysis of microclimatic and bioclimatic conditions in the urban fabric and how they are distributed in outdoor spaces with different coverage. The course also aims to present and analyze techniques that aim to improve microclimatic conditions in urban centers after analyzing the interactions between urban greenery and the built environment. Finally, techniques for modeling atmospheric conditions in the urban environment are presented and developed with the purpose of diagnosing and predicting bioclimatic/microclimatic conditions. These processes analyze the methods of identifying points of interest and techniques for mitigating and curbing the urban heat island and other adverse atmospheric conditions.

The laboratory exercises aim to understand the methodology of Ecological Risk Assessment and the importance of using bioindicators in measuring urban pollution. Furthermore, the laboratory exercises aim to solidify the basic concepts of urban bioclimatology and gain experience in their analysis. In addition, the exercises familiarize students with the basic principles of bioclimatic design and their application to improve conditions in the urban environment.

Upon successful completion of the course, students will be able to:

Analyze spatial distributions of atmospheric parameters in the urban environment.

Design and conduct research on microclimatic and bioclimatic conditions within the built environment.

Apply bioclimatic principles and techniques in the design of outdoor spaces.

Work with simulation applications to assess and predict bioclimatic/microclimatic parameters in order to improve conditions in the urban environment.

Use bioindicators to measure urban pollution.

Assess the Ecological Risk of various human activities

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

The course aims to develop the following general skills:

- Search, analysis, and synthesis of data and information using the necessary technologies.
- Work in an interdisciplinary environment.
- Generate new research ideas.
- Design and manage projects.
- Respect for the natural environment..

3. COURSE CONTENT

1. The subject matter of the course, both in theory and in the laboratory, includes the following topics:
2. • Ecology - Urban Ecology - Urban Ecosystems - Study Methods.
3. • Definition of the city - Historical evolution of cities - Historical evolution of Athens.
4. • Urbanization - Urbanization processes - Urbanism - Modern cities - Urban Demography - Ecological footprints (Water footprint - Carbon footprint - Ecological footprint).
5. • Models of cities - Types of cities - Megacities, Slums, Garden Cities - Soft cities, Smart cities, Future cities.
6. • Urban pollution - Atmospheric pollution - The "smog" of Athens. Visual pollution - Aesthetic pollution - Light pollution - Noise pollution. Indoor pollution - Pollution and historical monuments.
7. • Limits of pollutant effects on human health - Environmental indicators. Urban life and diseases. Bioindicators-Biomonitoring of urban environmental quality. Phytoremediation - Urban rain gardens.
8. • Biodiversity of Urban ecosystems. Urban greenery - Urban pockets - "Pocket Parks". Ecological corridors - Green routes in the urban environment.
9. • Management of urban waste. Urban Agriculture.
10. • Urban microclimate. The phenomena of urban heat islands and urban cold islands. Urban bioclimatology and principles of bioclimatic design in the urban environment.
11. • Thermal comfort and thermal sensation. Bioclimatic-biometeorological indicators.
12. • Estimation of microclimatic and bioclimatic parameters and study of spatio-temporal distributions in the urban environment with emphasis on vegetated surfaces and public open spaces.
13. • Investigation of the relationship between urban greenery and built space and principles of urban microclimatic and bioclimatic simulation models.
14. • Techniques for improving microclimate and bioclimate in the urban fabric with an emphasis on mitigation and alleviation techniques for urban heat islands.

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

In the classroom, in the laboratory, in the field (areas of the classical and automatic meteorological station of the University) and in selected outdoor spaces in the urban fabric of the city of Athens.

- ✓ Use of PowerPoint slides, communication with students via email, and meetings with students in small groups for the completion of assignments.
- ✓ 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
Lectures	39
Laboratory exercises	26
Individual fieldwork or simulation	15
Personal study	*45*
Personal study	*45*
Total Course Load (25 hours of workload per credit unit)	125

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 examination in the theory part of the course is based on the completion of assignments and/or a written final examination. II. The examination in the laboratory part of the course is based on the completion of fieldwork assignments in characteristic configurations of the Urban Environment.

5. SUGGESTED BIBLIOGRAPHY:

Greek-language bibliography:

• Andreadaki, E. 2006. Bioclimatic Design. University Studio Press. Thessaloniki. (Eudoxus) • Riga-Karandinou, A. 2002. Urban Ecology Issues (University Notes) • Kosmopoulos, P., Michalopoulou, K. 2017. Environmental Design - Comfort conditions in urban outdoor spaces. University Studio Press. Thessaloniki. (Eudoxus) • Tsiros, I. 2010. Bioclimatology of the Urban Environment and Introduction to Bioclimatic Design (University Notes)

Foreign-language bibliography:

• Gaston, K. J., Davies, Z. G., Edmondson, J. L., Evans, K. L., et al. 2010. Urban Ecology. Editor: Kevin J. Gaston, Cambridge University Press, ISBN: 9780521743495 • Erell, E., Pearlmutter, D., Williamson, T. 2011. Urban Microclimate: Designing the spaces between buildings. Earthscan, London and Washington.

6. TEACHERS:

Professor Costas SAITANIS
Prof. John TSIROS