

## COURSE OUTLINE

### 1. GENERAL INFORMATION

<b>FACULTY/SCHOOL</b>	School of Plant Sciences		
<b>DEPARTMENT</b>	Department of Crop Science		
<b>LEVEL OF STUDY</b>	Postgraduate		
<b>COURSE UNIT CODE</b>	120113	<b>Semester:</b>	W-2
<b>COURSE TITLE</b>	Bioclimatology and Bioclimatic Design of Urban Open Space		
<b>INDEPENDENT TEACHING ACTIVITIES</b> <i>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</i>	<b>WEEKLY TEACHING HOURS</b>	<b>ECTS</b>	
Lectures and Exercises	3	3	
<i>Add rows if necessary. The organization of teaching and the teaching methods used are described in detail under section 4</i>			
<b>COURSE TYPE</b> <i>Background knowledge, Scientific expertise, General Knowledge, Skills Development</i>	Scientific expertise		
<b>PREREQUISITE COURSES:</b>			
<b>LANGUAGE OF INSTRUCTION:</b>	Greek		
<b>THE COURSE IS OFFERED TO ERASMUS STUDENTS</b>	No		
<b>COURSE WEBSITE (URL)</b>			

### 2. LEARNING OUTCOMES

<p><b>Learning Outcomes</b> 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:</p> <p><b>APPENDIX A</b></p> <ul style="list-style-type: none"> <li>• Description of the level of learning outcomes for each level of study, in accordance with the European Higher Education Qualifications' Framework.</li> <li>• Descriptive indicators for Levels 6, 7 &amp; 8 of the European Qualifications Framework for Lifelong Learning and</li> </ul> <p><b>APPENDIX B</b></p> <ul style="list-style-type: none"> <li>• Guidelines for writing Learning Outcomes</li> </ul>
<p>The subject of the course is the analysis of the special characteristics of the city that influence and shape microclimatic and bioclimatic conditions. Emphasis is placed on outdoor and semi-outdoor spaces and the principles of bioclimatic design in these spaces under the conditions of the Mediterranean climate considering the increased climate variability. Bioclimatic indicators adapted to the Mediterranean environment are presented. Techniques aimed at improving microclimatic and bioclimatic conditions are presented and analyzed with an emphasis on modeling techniques of atmospheric conditions in the urban environment and on state-of-the-art mathematical models. Field measurements in areas of Athens aim to gain experience in the analysis of quantitative characteristics of the urban microclimate in bioclimatic planning.</p>

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

- design and conduct research on microclimatic and bioclimatic conditions of outdoor and semi-outdoor spaces,
- apply techniques and simulation models to estimate and predict bioclimatic-microclimatic parameters under various scenarios (e.g., redevelopment proposals) to improve conditions in the urban environment.

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

### 3. COURSE CONTENT

Deepening in the bioclimatic concepts of urban outdoor spaces. Urban microclimate and bioclimate. Climate of the urban canopy layer. Energy balance in urban areas. Urban heat island and urban cool island. Thermal sensation and comfort. Basic principles and philosophy of bioclimatic design. Bioclimatic design as a function of macro-, meso-, and micro-climate, with applications in arid-warm climates, focusing on the Mediterranean region. Microclimatic and bioclimatic conditions of urban outdoor spaces. Field measurements and assessments using modern methods and techniques. Case studies. Strategies for microclimatic and bioclimatic design in urban areas and strategies for mitigating the urban heat island. Vegetation, shading techniques, water use techniques, natural ventilation techniques, materials, and colors, etc. Modeling of urban microclimate and bioclimate. Principles of environmental modeling - Environmental models. Analytical, semi-analytical, numerical models, codes for environmental fluid mechanics. Software and their applications in bioclimatic design and evaluation of bioclimatic solutions. Analysis, evaluation, and use of bioclimatic parameters in urban outdoor space studies in urban planning and redevelopment studies of urban areas (urban complexes).

### 4. TEACHING METHODS--ASSESSMENT

<b>MODES OF DELIVERY</b> <i>Face-to-face, in-class lecturing, distance teaching and distance learning etc.</i>	The teaching of the course takes place in-person, in a classroom well-equipped with the necessary audio-visual equipment for the realization of lectures and presentations, as well as computers installed with simulation software (models) for teaching the course. Additionally, teaching can also be conducted remotely through video conferencing when required.
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<p><b>USE OF INFORMATION AND COMMUNICATION TECHNOLOGY</b></p> <p><i>Use of ICT in teaching, Laboratory Education, Communication with students</i></p>	<p>Slide Presentations in PowerPoint format are used for teaching purposes. Video projection. Use and applications of 3 state-of-the-art simulation and bioclimatic design software (Envi-Met, UMEP, Rayman models) Communication with students is facilitated through email. The learning process is supported through the digital platform Webex ή/και Microsoft Teams. Access to online databases is provided.</p>													
<p><b>COURSE DESIGN</b></p> <p><i>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.</i></p> <p><i>The study hours for each learning activity as well as the hours of self-directed study are given following the principles of the ECTS.</i></p>	<table border="1"> <thead> <tr> <th data-bbox="719 490 1074 533">Activity/ Method</th> <th data-bbox="1078 490 1433 533">Semester workload</th> </tr> </thead> <tbody> <tr> <td data-bbox="719 539 1074 582">Lectures</td> <td data-bbox="1078 539 1433 582">26 hours</td> </tr> <tr> <td data-bbox="719 589 1074 687">Laboratory exercises</td> <td data-bbox="1078 589 1433 687">13 hours</td> </tr> <tr> <td data-bbox="719 694 1074 792">Individual field work or simulation</td> <td data-bbox="1078 694 1433 792">20 hours</td> </tr> <tr> <td data-bbox="719 799 1074 891">Individual study</td> <td data-bbox="1078 799 1433 891">16 hours</td> </tr> <tr> <td data-bbox="719 898 1074 992"><b>Total of Course (25 hours of workload per ECTS)</b></td> <td data-bbox="1078 898 1433 992"><b>75 hours</b></td> </tr> </tbody> </table>		Activity/ Method	Semester workload	Lectures	26 hours	Laboratory exercises	13 hours	Individual field work or simulation	20 hours	Individual study	16 hours	<b>Total of Course (25 hours of workload per ECTS)</b>	<b>75 hours</b>
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<p><b>STUDENT PERFORMANCE EVALUATION/ASSESSMENT METHODS</b></p> <p><i>Detailed description of the evaluation procedures:</i></p> <p><i>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.</i></p> <p><i>Specifically defined evaluation criteria are stated, as well as if and where they are accessible by the students.</i></p>	<p>The evaluation language is Greek (and English if required). Assessment of the material learned is generally done through assignments that combine field data, simulation results, and state-of-the-art literature references. If necessary, there is the possibility of a final examination. The grade generally results from the delivery of the assignments, while the evaluation criteria are based on the approach to the subject, the correctness of the results, the clarity of the technical description and also the general image of the aesthetic presentation of the assignments.</p>													

## 5. SUGGESTED BIBLIOGRAPHY:

<p>- <i>Suggested Bibliography:</i></p> <ul style="list-style-type: none"> <li>• Ανδρεαδάκη, Ε. 2006. Βιοκλιματικός σχεδιασμός. Εκδόσεις University Studio Press. Θεσσαλονίκη. (Εύδοξος)</li> <li>• Errell, E., Pearlmutter D., Williamson, T. 2011. Urban Microclimate. Designing the spaces between buildings. Earthscan, London and Washington.</li> <li>• Τσίρος, Ι. , 2019. ΒΙΟΚΛΙΜΑΤΟΛΟΓΙΑ ΑΣΤΙΚΟΥ ΠΕΡΙΒΑΛΛΟΝΤΟΣ ΚΑΙ ΕΙΣΑΓΩΓΗ ΣΤΟ ΒΙΟΚΛΙΜΑΤΙΚΟ ΣΧΕΔΙΑΣΜΟ. (Πανεπιστημιακές Σημειώσεις, 4η έκδοση)</li> </ul> <p>- <i>Related Scientific Journals:</i></p> <ul style="list-style-type: none"> <li>• Urban Climate, Building and Environment, International Journal of Biometeorology,</li> <li>• Architectural Science Review, Journal of Environmental Science and Health</li> </ul>
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