COURSE OUTLINE

1. GENERAL INFORMATION

FACULTY/SCHOOL	School of Plant Sciences		
DEPARTMENT	Crop Science		
LEVEL OF STUDY	Undergraduate (Elective)		
COURSE UNIT CODE	152	**Semester:**	3rd
COURSE TITLE	Meteorology – Climatology		
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**
Lectures		2	2
Laboratory Exercises		2	2
Add rows if necessary. The organisation 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:			
LANGUAGE OF INSTRUCTION:	Greek		
LANGUAGE OF EXAMINATION/ASSESSMENT:			
THE COURSE IS OFFERED TO ERASMUS STUDENTS	Yes (in English)		
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:

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*

The subject of the course is the analysis of the spatio-temporal distribution of meteorological and climatic parameters on the earth's surface and especially in the Greek territory, their study at various spatial scales and

their effects on the biological factor. The instruments for the measurement of meteorological parameters are briefly presented, the techniques of their proper operation are broadly analysed, and the networks of meteorological and climatic stations are described. Modern techniques and methods of recording and utilisation of their data in meteorology are also presented. The climatic characteristics of regions of the earth concerning vegetation are clearly presented, and the conditions formed in the Greek territory are analysed. The micro- and topoclimatic conditions in mountainous, agricultural and urban areas are described, specific cases of Greek regions are presented, and the methods of meteorological and climatic data management and processing are analysed. Emphasis is placed on the phenology of biota concerning micro-meteorological conditions and the relationship between vegetation and climate, on basic climatic classifications (Köppen, Thornthwaite and Papadakis etc.) and on climatic indicators (Gaussen, Emberger, desert-weather, continental-oceanic, etc.).
The laboratory exercises, which are carried out both in the laboratory and in the field, aim to acquire fluency and experience in the acquisition, processing and management of meteorological data, mainly in agricultural and natural areas as well as in urban areas. Also, during the laboratory exercises, the deepening of the mechanisms of the atmosphere as well as a better understanding of climatic variables, is achieved. After completing the exercises, the student will be able to manage, using modern techniques, time series of climate data for research or professional work.

Upon successful completion of the course, the student will be able to:
- Understand the basic systems of general atmospheric circulation and, in particular, the systems formed in Greece as well as the spatio-temporal variability of key climate parameters for crop production.
- Understand the specificities of the climatic framework of the Greek area. Thus, the student will be able to use the knowledge provided in his professional life in studies-framework proposals for the protection of the agricultural and natural environment and the development of the agricultural sector in the agricultural areas of Greece.
- Process the necessary knowledge to be able to delve further into specialised issues concerning the interactions of mete/climatic conditions of the atmospheric environment with living organisms and the built environment.

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.)*
	…….

Search, analysis and synthesis of data and information using the necessary technologies.
Adaptation to the scientific topic advances.
Decision-making.
Teamwork.
Project planning and management.
Respect for the natural environment.
Promotion of free, creative and deductive thinking.

3. COURSE CONTENT

The syllabus per week of the course is as follows:

- Evolution and scope of Meteorology and Climatology. The history and evolution of the subject and history of meteorology and climatology. Development and evolution of meteorological-climatic parameters/ indices/ indicators and their biological effects.
- Weather stations. Instruments, observations of classical and automatic weather stations, control of their proper functioning.
- Layers and composition of the atmosphere. Estimation of the vertical structure of the atmosphere using radiosondes.
- Network of meteorological and climatic stations. Data processing and their use in meteorology and climatology. Elementary statistical controls of data. Data sample homogenisation and extension.
- Combined use of meteorological satellite, radar and ground station data in the evolution of meteorological phenomena and other applications.
- Spatio-temporal variations of air, soil and water temperature, air humidity of water bodies and water vapour.
- Geographical and temporal distribution of solar radiation and illumination, duration of sunshine and cloud cover, atmospheric pressure and winds on the surface of the earth and in Greece.
- Phenological observations, their processing and exploitation. Phenology and climate.
- Classification and description of the earth's climates. Climate diagrams. Climate of Greece.
- Basic climate classifications according to Köppen, Thornthwaite and Papadakis.
- Bioclimatic classification according to Unesco-Fao, climatic indicators (Emberger, continental-oceanic, desert euphoria, etc.)
- Climate and vegetation. Typical climax vegetation as a climatic indicator.
- Microclimatology: Microclimatic conditions in outdoor and indoor spaces.

4. TEACHING METHODS--ASSESSMENT

<table>
<tr><td>MODES OF DELIVERY
Face-to-face, in-class lecturing, distance teaching and distance learning etc.</td><td>Lectures in the classroom for the theoretical part and in the laboratory classroom for exercises along with field exercises.</td></tr>
<tr><td>USE OF INFORMATION AND COMMUNICATION TECHNOLOGY
Use of ICT in teaching, Laboratory Education, Communication with students</td><td>Presentation of Powerpoint-type slides. Familiarisation with modern techniques and the instruments for measuring meteorological parameters in the field. Communication with students via e-mail, support of the educational process with printed and electronic materials and using national and international databases from the university library and other educational, research and operational institutions. Use of eclass and Microsoft Teams platforms.</td></tr>
<tr><td>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.</td><td>
<table>
<tr><th>Activity/ Method</th><th>Semester workload</th></tr>
<tr><td>Lectures</td><td>26</td></tr>
<tr><td>Laboratory exercises</td><td>26</td></tr>
<tr><td>Task per student</td><td>3</td></tr>
<tr><td>Bibliographic research and analysis</td><td>4</td></tr>
<tr><td>Fieldtrip</td><td>3</td></tr>
<tr><td>Homework – project</td><td>8</td></tr>
<tr><td>Study</td><td>30</td></tr>
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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.* *Specifically defined evaluation criteria are stated, as well as if and where they are accessible by the students.*	A written final examination including: 1. Short questions 3. Problem solving 4. Oral examination (where applicable) 5. Compilation of a climate report for the evaluation of vegetated and non-vegetated areas/Written assignment 6. Tasks and exercises in the laboratoty

5. SUGGESTED BIBLIOGRAPHY:

English language

- Ahrens D. Essentials of Meteorology: An invitation to the Atmosphere, 2012. Cengage learning, Stamford, USA
- Adams J., 2010. Vegetation-Climate Interaction. Springer Science + Business Media B.V., USA.
- Hidore J, Oliver J, Snow M and Snow R. 2009. Climatology: An atmospheric science. Prentice Hall, USA
- Ebi Kristie L., 2009. Biometeorology for adaptation to climate variability and change. Springer Science + Business Media B.V., USA.
- Geiger R., Aron R.H. and Todhunder P., 2003. The climate near the ground. Rowman and Littlefield Publishers, Lanham, MD, USA.
- Mavi, H. S., 2004. Agrometeorology. Principles and applications of climate studies in agriculture. Haworth Press Inc. NY, USA.
- Breckle S.W. 2002. Walter's Vegetation of the Earth. The ecological systems of Geo-Biosphere. Springer Verlag Heildeberg. Germany.
- Wieringa J. and Lomas J., 2001. Lecture Notes for Training Agricultural Meteorological Personnel. WMO – 551, WMO, Geveva, Switzerland.
- Barry R. 1992. Mountain weather and climate. Routledge, London, UK.

Greek language

- Χρονοπούλου-Σερέλη Α. και Φλόκας Α., 2010. Μαθήματα Γεωργικής Μετεωρολογίας και Κλιματολογίας. Εκδόσεις Ζήτη, Θεσσαλονίκη (Κωδικός Βιβλίου στον Εύδοξο: 11437).
- Χρονοπούλου - Σερέλη Α. και Χρονόπουλος Ι., 2011. Βιομετεωρολογία – Βιοκλιματολογία. Εφαρμογές στη διαμόρφωση υπαίθριων χώρων. Εκδόσεις Ζήτη, Θεσσαλονίκη (Κωδικός Βιβλίου στον Εύδοξο: 12583580).
- Χρονοπούλου - Σερέλη Α., Τσίρος Ι. , Καμούτσης Α., Ματσούκης Α., Δρούλια Φ., Χαραλαμπόπουλος Ι. και Χρονόπουλος Κ., 2012. Γενικά και Ειδικά Θέματα Βιοκλιματολογίας. Εφαρμογές – Ασκήσεις. Εκδόσεις Ζήτη, Θεσσαλονίκη (Κωδικός Βιβλίου στον Εύδοξο: 32997875).
- Χρονοπούλου-Σερέλη Α., Καμούτσης Α. και Χρονόπουλος Κ., 2022. Μαθήματα Εφαρμοσμένης Μετεωρολογίας. Εκδόσεις Ζήτη, Θεσσαλονίκη (Κωδικός βιβλίου στον Εύδοξο: 112701490).

6. TEACHERS:

Theory
Athanasios Kamoutsis, Assistant Professor

Laboratory Tutoring/ Teaching
Ioannis Tsiros, Professor
Athanasios Kamoutsis, Assistant Professor
Fotoula Droulia, Laboratory Teaching Staff
Aristidis Matsoukis, Laboratory Teaching Staff
Ioannis Charalampopoulos, Laboratory Teaching Staff