COURSE OUTLINE

1. GENERAL INFORMATION

FACULTY/SCHOOL	SCHOOL OF PLANT SCIENCES		
DEPARTMENT	DEPARTMENT OF CROP SCIENCE		
LEVEL OF STUDY	*Undergraduate*		
COURSE UNIT CODE	151	**Semester:**	4th
COURSE TITLE	EXTREME WEATHER EVENTS AND CLIMATE CHANGE (Elective)		
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	3	3
	Laboratory Exercises	2	2
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:			
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 familiarization with topics referred to extreme weather events in relation to climate change in natural, rural and urban areas. Climate variability, climate change and the Southern Oscillation (El Niño, La Niña) and North Atlantic Oscillation (NAO) cycles are analyzed, affecting the climatic conditions of many regions and contributing to terrestrial ecosystems alterations. The creation and evolution of extreme weather events (heat and drought episodes, frost, hail, cyclones (tropical and extratropical ones included), wind gusts and tornadoes, floods, storms, blizzards and fires, etc.) are clearly analyzed and their spatiotemporal distribution and impact on agriculture are examined. In addition, the vertical zones of vegetation and their geographical distribution are examined in relation to climatic conditions. The results of applications of agroclimatic models combined with atmospheric circulation models to estimate the potential impact of climate change on agriculture are analyzed and both the climatology of air pollution and

environmental pollution are examined in rural areas.

The aim of the course is the understanding of extreme weather events in relation to climate variability and climate change in order that the agriculture graduates of the Department have the knowledge of the creation, evolution and effects of these events on agricultural ecosystems so that they can take the appropriate measures to protect vegetation and cultivations. The above-mentioned objective is achieved by both theoretical teaching and laboratory exercises.

Regarding the laboratory exercises, the goal is the familiarization with new technologies in the monitoring, recording and transmission systems of climate parameters related to extreme weather events (extreme air temperature values, wind gusts, drought indicators/indices, meteorological fire risk, etc.) as well as the new methods of processing of the corresponding climate data.

Upon successful completion of the course, the student will be in a position to:
• understand the methods of processing of the corresponding data as well as the new technologies concerning the operation of data receiving networks based on automatic stations.
• use the data processing methodologies to write studies relevant to the installation of greenhouses and management of rural lands in order to cultivate new plants of high economic value (e.g. aromatic crops, energy crops, etc.).
• collaborate with their fellow students to create and present a plan - study framework which, in the future, in the course of their work as an agriculturist, will be part of a bigger study-plan for the installation of greenhouses and the management of rural lands.

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 for, analysis and synthesis of data and information by the use of appropriate technologies*
• *Environmental awareness*
• *Working in an interdisciplinary environment*
• *Individual/Independent work*
• *Group/Team work*

3. COURSE CONTENT

The content of the course is as follows:
• Climate variability, climate modification and change. Climate history.
• Climate modification and variability in the Mediterranean region.
• Climate models of atmospheric circulation. Basic equations and assumptions.
• Agroclimatic models and atmospheric circulation models. Applications based on their combined use for assessing the potential impacts of climate modification-change in agriculture.
• Desertification and agriculture.
• Extreme weather and climate events, types and effects on agricultural production, socio-economic effects, and protection measures. El-Ninõ-LaNinã cycles, etc., effects on vegetation and agricultural ecosystems.
• Episodes of high temperatures (heat waves). Effects and ways to cope with them. Fires.
• Cyclones (tropical and extratropical ones included), tornadoes, etc. Effects and forecasting methods.
• Drought. Assessment and prognosis.
• Storms. Hail. Hail fall and anti-hail protection.
• Changes of the atmospheric environment (air pollution climatology) and environmental burdens in rural areas.

• Extreme temperature values in rural and urban environments and spatiotemporal distributions.
• Extreme and heavy rainfall. Effects and assessment methods. Flood events. Effects - ways to cope with them. Estimation and forecasting methods.

4. TEACHING METHODS--ASSESSMENT

MODES OF DELIVERY *Face-to-face, in-class lecturing, distance teaching and distance learning etc.*	• In-class lecturing. • In the Laboratory. • Field teaching (areas where classic and automatic weather stations are located and selected outdoor areas covered with plants and not).
USE OF INFORMATION AND COMMUNICATION TECHNOLOGY *Use of ICT in teaching, Laboratory Education, Communication with students*	• Use of slide presentation. • Communication with students via academic email. • Meetings with the students in small groups to prepare the assignments.
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 assignment	12
Visits	8
Personal study	40
Total of Course (25 hours of workload per ECTS)	***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.* *Specifically defined evaluation criteria are stated, as well as if and where they are accessible by the students.*	I. Final written exam in the theory of the course. II. The examination in the laboratory part of the course consisted of: • Elaboration of individual assignments. • Laboratory exercise that includes calculations of extreme values of characteristic climate parameters. • Final written examination (multiple choice).

5. SUGGESTED BIBLIOGRAPHY:

Texts in Greek Language

- Barry G.R. and Hall-McKim E.A. 2022. Κλιματολογία και Κλιματική Αλλαγή (Επιστημονική Επιμέλεια: Π. Νάστος). Εκδόσεις Τζιόλα, Θεσσαλονίκη.
- Μαχαίρας, Π., Μπαλαφούτης, Χ. 1997. Γενική Κλιματολογία με στοιχεία Μετεωρολογίας. University Studio Press, Θεσσαλονίκη.
- Πασχαλίδου Α. 2021. Κλιματική Αλλαγή. Εκδόσεις Τζιόλα, Θεσσαλονίκη.
- Τσίρος, Ι.Ξ. 2019. ΠΑΓΚΟΣΜΙΕΣ ΠΕΡΙΒΑΛΛΟΝΤΙΚΕΣ ΜΕΤΑΒΟΛΕΣ: Ακραία Καιρικά Φαινόμενα - Κλιματική Αλλαγή – Ρύπανση. Σημειώσεις Πανεπιστημιακών Παραδόσεων.

- Χρονοπούλου-Σερέλη Α. και Φλόκας Α., 2010. Μαθήματα Γεωργικής Μετεωρολογίας και Κλιματολογίας. Εκδόσεις Ζήτη, Θεσσαλονίκη.

Texts in Foreign Language

- Das H.P., Adamenko T.I., Anaman K.A., Gommes R.G. and Johnson G. 2003. Agrometeorology related to extreme events. Technical Note No. 201, World Meteorological Organization (WMO) – No. 943, Geveva, Switzerland.
- World Meteorological Organization (WMO), 2006. Preventing and mitigating disasters. Working together for a safer world. WMO – No.993. Geneva, Switzerland.
- Reddy K.R. and Hodges H.F., 2000. Climate Change and Global Crop Productivity. CABI Publishing, NY, USA.

6. TEACHERS:

-Theory:

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

-Laboratory:

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