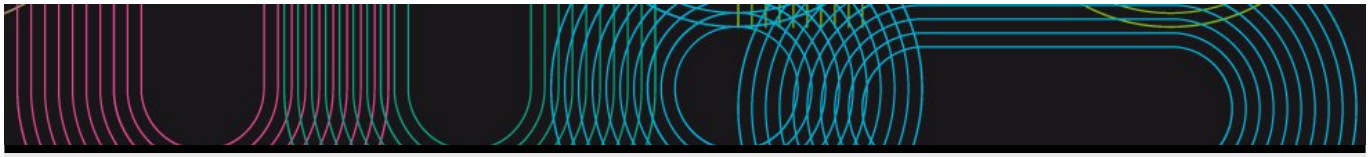

IDENTIFYING DATA				
Climate change				
Subject	Climate change			
Code	O01G261V01702			
Study programme	Grado en Ciencias Ambientales			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Mandatory	4th	1st
Teaching language	Spanish			
Department				
Coordinator	Castro Rodríguez, María Teresa de			
Lecturers	Castro Rodríguez, María Teresa de			
E-mail	mdecastro@uvigo.es			
Web				
General description	The climate change suffered by the Earth from the moment of its formation to the present is studied. In the present climate, the change that takes place in the atmosphere, on the surface and in the ocean is analyzed separately. Subsequently, the effect of climate change on biodiversity is analyzed. Finally, resources and management of mitigation and adaptation to climate change are described.			

Skills	
Code	
A3	Students will be able to gather and interpret relevant data (normally within their field of study) that will allow them to have a reflection-based considered opinion on important issues of social, scientific and ethical nature.
A4	Students will be able to present information, ideas, problems and solutions both to specialist and non-specialist audiences.
B1	Students will acquire analysis, synthesis and information-management skills to be applied in the food and agriculture and environmental sectors
B2	Students will acquire and apply teamwork abilities and skills.
C3	To be familiar with the temporal and spatial dimensions of environmental processes.
C10	To be familiar with concepts linked with climate and global change.
C22	To be familiar with the fundamentals of weather forecasting and the analysis of climate phenomena.
D1	Capacity of analysis, organization and planning.
D3	COral and written communication in the native language and foreign
D4	Ability of autonomous learning and information management.
D5	Ability of problem solving and decision making
D9	Team of interdisciplinary nature

Learning outcomes				
Expected results from this subject	Training and Learning Results			
RA1. Learning of the concepts and basic processes related to climatic change.		B1	C3 C10 C22	D1 D4
RA2. Students, in addition to knowing and understanding the basic competencies of the subject and the general competencies of the degree, must develop a series of necessary transversal competencies such as acquiring skills and abilities in team work and in autonomous work, in the synthesis and transmission of information as well as problem solving and decision making.	A3 A4	B1 B2	C3 C10 C22	D1 D3 D4 D5 D9
RA2. Students, in addition to knowing and understanding the basic competencies of the subject and the general competencies of the degree, must develop a series of necessary transversal competencies such as acquiring skills and abilities in team work and in autonomous work, in the synthesis and transmission of information as well as problem solving and decision making.				

Contents

Topic	
Part I. Climate Change Subject 1. Climate Change from the origin of the Earth.	1.1 Definition of climate. 1.2 Climatic system. 1.3 Reconstruction of the climate. 1.4 Climatic variability. 1.5 Characterization of the climate in the different periods of the Earth.
Part I. Climate Change Subject 2. Present Climate change in the atmosphere.	2.1 Global temperature evolution from the 190th to the 21st Century. Trends. 2.2 Evolution of the ice cover in the different regions of the planet. 2.2.1 Ice cover trends. 2.3 Variability of the atmospheric humidity. 2.3.1 Humidity trends. 2.4 Evolution of global clouds coverege. 2.5 Variations in the atmospheric circulation.
Part 1. Climate Change Subject 3. Present climate change in the ocean.	3.1 Global temperature and salinity changes. 3.1.1 Temperature trends. 3.1.2 Salinity trends. 3.2 Changes in the sea level rise. 3.2.1 Sea level rise trends. 3.3 Biochemical changes in the ocean. 3.3.1 Trends in biochemical variables.
Part II: Climate Change and biodiversity Subject 4. Effect of the climate change on the vegetal biodiversity	4.1 Evidences of the climate change and its characteristics. 4.2 Main climatic elements which determines the plant development and growth. 4.3 Influence of meteorological parameters on the plants periodic phenomenons. 4.3 Effects on the agriculture.
Part II. Climate Change and biodiversity Subject 5. Mitigation and adaptation	5.1 Resources to improve the present energetic system. 5.2 Management of forest resources and of crops.

Planning			
	Class hours	Hours outside the classroom	Total hours
Lecturing	26	56	82
Seminars	14	28	42
Problem and/or exercise solving	0	24	24
Essay questions exam	2	0	2
*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.			

Methodologies	
	Description
Lecturing	The own concepts of each subject will be explained in masterclasses. Like material of support will use the available technology: projection, blackboard, etc. The subjects will dump in the platform of Teledocencia of the University of Vigo (https://moovi.uvigo.gal/).
Seminars	Analysis of temporal series (perpetual years, interannual variability, anomalies, tendencies□) of different variables both atmospheric and oceanic (tidal elevation, air temperature, ocean temperature, salinity and atmospheric indices like NAO, EA□) Resolution of exercises and practical cases. Analysis of documentation on the subject and of audiovisual.

Personalized assistance	
Methodologies	**Description**
Lecturing	Through the platform MOOVI the student can access to the content of each subject and to the different activities proposed. Personal attendance will take place during tutorials and seminars. Tutorials: Monday from 16:00 to 18:00 and Wednesday from 9:00 to 11:00
Seminars	Through the platform MOOVI the student can access to the content of each subject and to the different activities proposed. Personal attendance will take place during tutorials and seminars. Tutorials: Monday from 16:00 to 18:00 and Wednesday from 9:00 to 11:00

Assessment

	Description	Qualification	Training and Learning Results		
Problem and/or exercise solving	Resolution of practical cases and exercises proposed in seminars. RESULTS FROM LEARNING EVALUATED: RA1.	40	A3	B1 B2	D4 D5 D9
Essay questions exam	Evaluation of the main aspects of the subject	60	A3 A4	C3 C10 C22	D1 D3

Other comments on the Evaluation

In case of face- to- face teaching, it is mandatory the attendance to lessons and especially to seminars.

In case of online/face-to-face teaching, it is mandatory the attendance to lessons and especially to seminars for those students who can attend in person. .

The course is divided into two parts. Both parts will be averaged if and only if a minimum mark of 4.5 out of 10 is obtained in each part. In addition, to pass each part the students must have a mark of 5 out of 10 both in the of short answer tests and in the resolution of practical cases and exercices.
The students that cannot attend the course must justify it properly at the beginning. The evaluation will be carried out by means of alternative activities proposed by the teacher.
Examinations:End of degree: 09/23/2021 16:00 h**End of course:** 01/21/2022 10:00 h**July:** 07/08/2022 16:00 h
In case of error in the transcription of the dates of examinations, the valid dates will be the ones officially approved and published in the board of announcements and in the web of the Centre.
Announcement July: The student will be evaluated with an exam (60% of the final mark) and the practical cases solved in seminars (40% of the final mark). **Announcement end of degree:** The student will only be evaluated with this examn that will be the 100% of the final mark.

Sources of information

Basic Bibliography

Complementary Bibliography

Antón Uriarte Centolla, **Historia del Clima de la Tierra**, EuskoJaurlaritzarenArgitalpenZerbituNagusia,

Intergovernmental Panel on Climate Change, **AR5 Climate Change 2013: The physical science basis**, Contribution of Working Group 1 to the Fourth Assessment Report of the Intergovernmental Panel on C, 2013

Elias F. & Castellví F., **Agrometeorología**, Mundi Prensa,

Mavi H.S. & Tupper G.J., **Agrometeorology.**, Food Products Press.,

Cambio climático y biodiversidad, IPCC,

IPCC, **AR5 Syntesis report: Climate change 2014**, 2014

IPCC, **The ocean and cryosphere in a changing climate**, 2019

Recommendations

Subjects that continue the syllabus

Terrestrial ecosystems pollution/O01G261V01923
Physical climatology/O01G261V01916
Air pollution/O01G261V01918

Subjects that are recommended to be taken simultaneously

Aerobiology/O01G261V01917

Subjects that it is recommended to have taken before

Meteorology/O01G261V01912

Contingency plan

Description

=== EXCEPTIONAL MEASURES SCHEDULED ===
In front of the uncertain and unpredictable evolution of the sanitary alert caused by the *COVID-19, the University of Vigo establishes extraordinary planning that will activate at the moment in that the administrations and the own institution determine it attending to criteria of security, health, and responsibility, and guaranteeing the teaching in a no face-to-face stage or partially face-to-face. These already scheduled measures guarantee, at the moment that was prescriptive, the development of the teaching of a more agile and effective way when being known in advance (or with a wide *antelación) by the students and the professorate through the tool normalized and institutionalized of the educational guides.

=== ADAPTATION OF THE METHODOLOGIES ===
* Educational Methodologies that keep
Both in case of online and partially face-to-face teaching:

We will keep the use of MOOVI platform to upload all information necessary to reach the main objectives of the subject

Solving practical cases in seminars

* Educational Methodologies that modify

In the case of partially face-to-face teaching:

Some of the face-to-face methodologies, lecturing classes, and solving practical cases, will be on-line through platforms like remote Campus, Zoom, Teams...

In the case of online teaching:

All face-to-face methodologies, lecturing classes, and solving practical cases, will be on-line through platforms like remote Campus, Zoom, Teams...

* Mechanism no face-to-face of attention to the students (*tutorías)
Tutorial classes will be virtual through the Remote Campus requesting an appointment to the teacher´s email.

* Modifications (if they proceed) of the contents to give
Both in the case of online and partially face-to-face teaching, there will not be modifications to the contents.

* Additional Bibliography to facilitate the car-learning
Both in the case of online and partially face-to-face teaching, additional bibliography will not be necessary.
* Other modifications

=== ADAPTATION OF THE EVALUATION ===
Both in the case of online and partially face-to-face teaching:

Tests done will keep their weight
Pending tests also will keep their weight.

* Proofs that modify
In the case of partially face-to-face teaching.
There will not be changes in the evaluation proofs.
In the case of online teaching:
[Face-to-Face tests] => [Online tests through Faitic, Campus Remoto, Teams, Zoom.]
* New proofs
New tests will not be necessary
* Additional Information
Both in the case of online and partially face-to-face teaching, the assessments will be the same described in step 7 of the present teaching guide.