



A Multidisciplinary Approach to Climate Change



SYLLABUS 2022

1. COURSE TITLE

A Multidisciplinary Approach to Climate Change (with emphasis on Environmental Economics and Policy Analysis)

1.1. Course number

SSMACC-6ECTS

1.2. Content area

Art, Biology, Business, Chemistry, Earth Sciences, Economics, Engineering, Environmental Policy, Environmental Management, Geography, Humanities, Law, Marketing, Physics, Political Science, Psychology, Sociology

1.3. Course level

Undergraduate

1.4. Language

English

1.5. Prerequisites

None

1.6. Minimum attendance requirement

Attendance is mandatory. Minimum attendance to pass the course is 80%.



Spain Center for International Education

A Multidisciplinary Approach to Climate Change



SYLLABUS 2022

1.7. Faculty data

Director: Prof. Dr. Miguel Buñuel

Facultad de Ciencias Económicas y Empresariales

Departamento de Economía y Hacienda Pública

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Office hours: By appointment.

Complete list of faculty members and relevant bio:

- Miguel Buñuel: Associate Professor and Director of the Summer School of Economics and Business, Faculty of Economics and Business Studies, UAM. Doctor in Energy and Environmental Studies (Boston U), Doctor in Economic and Business Sciences (UAM), Master's degree in Economics (Boston U), Bachelor's degree in Law (UAM), Bachelor's degree in Economic and Business Sciences (UAM). Other relevant facts: He was advisor of Spain's Minister for the Environment, 'father' of the Spanish Office for Climate Change, which was created at his proposal. He represented the Kingdom of Spain at the negotiation table of the 6th Conference of the Parties of the United Nations Framework Convention on Climate Change.
- Eduardo Gonzalo: Doctoral Fellow, Faculty of Science, UAM. Doctoral student in Phenomenology of String Theory (Institute of Theoretical Physics and Faculty of Sciences, UAM). Other relevant facts: Scientific advisor in the Youtube channel 'Dr. What?' and scientific advisor in the Youtube channel 'Quantum Fracture'.
- Raúl Martín: Associate Professor, Faculty of Teacher Training and Education, UAM. Doctor in Geography (UAM). Other relevant facts: He is a member of PANGEA Research Group, a multidisciplinary group that studies natural aspects (geomorphology, hydrology, natural landscapes, geodiversity) and social aspects (demography, tourism, sustainable development, valuation of elements and management of the natural heritage), as well as the control of geomorphological processes or elements and the application of geomatic and geophysical techniques.



Spain Center for International Education

A Multidisciplinary Approach to Climate Change



SYLLABUS 2022

- Nagore García: Assistant Professor, Faculty of Science, UAM. Doctor in Evolutionary Biology and Biodiversity (UAM), Bachelor's degree in Environmental Sciences (UAM). Other relevant facts: She was the main researcher of the project SoilSkin (The Living Skin of the Soil: A citizen science programme to evaluate the vulnerability of ecosystems and their functions in front of global change).
- Noemí de Haro: Researcher of the Ramón y Cajal Program, Faculty of Philosophy and Humanities, UAM. Doctor in Art History (UCM), Master's degree in Museology (U Granada), Bachelor's degree in Art History (U de Córdoba), Higher Professor of Viola (Conservatorio Superior de Música de Córdoba). Other relevant facts: She is a member of the research group 'Discourses, genealogies and practices in contemporary visual creation'.
- Cristina Carrillo: Director for Responsible Banking in Santander Consumer Finance Europe. Bachelor's degree in Business Administration (Universidad Carlos III), Master's degree in International Finance (CUNEF), Executive Master's degree in Human Resources (Garrigues). Other relevant facts: she has been working in Santander Consumer for 8 years, coordinating since 2018 the implementation of the Responsible Banking strategy (Sustainability and Culture strategy) in 14 European countries.
- Jesús Marcos Gamero: Associate Professor in "Global Environmental Challenges", Faculty of Social Sciences and Law, and researcher at the 'Sociology of Climate Change and Sustainable Development' Research Group, UC3M. Doctor in Social Analysis (UC3M), Master of Law at the Irish Centre for Human Rights (NUI), and Bachelor's degree in Political Science (UCM). Other information of interest: His main area of research focuses on socioeconomic impacts of climate change, like inequality, health, or migration among others.
- Lucía Muñoz: Head of Climate Action Project and Analysis, Direction of Energy Policies & Climate Change, Iberdrola. Industrial Engineer (UPM), Doctor in Environmental Models (U Pontificia Comillas). Other relevant facts: specialized in Electricity Generation Technologies, Energy Management and Environment, she has been working in the energy sector for more than 25 years; she has recently moved inside Iberdrola, a global energy company based in Spain, to the Climate Change area



Spain Center for International Education

A Multidisciplinary Approach to Climate Change



SYLLABUS 2022

with the aim to accelerate the different stakeholders' awareness on Climate action inside and outside the company.

1.8. Course objectives

A) Introduction

Climate change is the main global environmental problem and one of the main economic and social problems of Humanity. At least in the European Union, citizens' perception is also in line with scientific conclusions on the seriousness of the problem. According to the latest Eurobarometer survey published in 2019 by the European Commission, 93% of EU citizens believe that climate change is a serious problem and 79% that it is a very serious problem. Compared to the previous Eurobarometer, published in 2017, climate change has overtaken international terrorism as the second most serious problem facing mankind, after poverty, hunger, and lack of drinking water.

On the other hand, climate change is a multidimensional problem, which must be studied from all disciplines of knowledge. However, our curricula do not usually provide a multi- or interdisciplinary understanding of the problem and, although the population perceives it as a very serious problem, there is a notable lack of knowledge about its nature, effects, possible scenarios, policies, and responses to the challenge it poses for Humanity.

B) Objectives

In view of the shortcomings of our curricula and the lack of knowledge of a large part of the population mentioned in the introduction, the main objective of this course is to provide a multidisciplinary and rigorous view of the problem of climate change. The aim is for students to have a complete university-level vision, rigorously provided by experts in each subject, although adapted to the necessary introductory level given the heterogeneous profile that students will have, as it is generally the case throughout society.

The complete university-level vision of climate change is provided in the second half of the course, which is the whole program for the students taking 3 ECTS credits. The students taking 6 ECTS credits will also gain further knowledge of the main issues related to public environmental policies and management in the first half of the course. This part deals with the role of the Public Sector for internalizing environmental externalities through public



Spain Center for International Education

A Multidisciplinary Approach to Climate Change



SYLLABUS 2022

policies, which is the base of the economic analysis of environmental policies that it is applied in the Economics of Climate Change, covered in the second part of the course. As a result, students will be able to understand the economic justification and effects of environmental public policies, as well as to formulate them, and analyze them.

In addition to the main objectives described in the previous paragraphs, the course has a secondary objective: Providing an enriching “study abroad” experience, with all the benefits of academic, cultural, and personal enrichment that this type of experience provides. This experience is intensified for the students taking 6 ECTS credits because they will have a larger and more diverse set of classmates, since they will share the first part of the course with the students at the Summer School of Economics and Business, and the second part with the students taking only 3 ECTS credits of A Multidisciplinary Approach to Climate Change.

1.9. Course contents

The course contents (and the areas of knowledge or disciplines that each subject deals with) are the following:

1. Introduction to Environmental Economics and Policy Analysis (Economics)
2. The Theory of Externalities: Economics of Pollution Control (Economics, Environmental Policy, Environmental Management)
3. What is Climate Change? Earth's Energy Balance and Greenhouse Gases (Physics, Earth Sciences, Chemistry)
4. Science Consensus: Why we know that we are to blame (Physics, Earth Sciences)
5. Feedbacks, tipping points, and future global climate (Physics, Earth Sciences)
6. Impacts on Physical Systems (Earth Sciences, Geography)
7. Consequences of Climate Change on Cities, Settlements and Key Infrastructure & Adaptation (Geography, Economics)



Spain Center for International Education

A Multidisciplinary Approach to Climate Change



SYLLABUS 2022

8. Consequences of Climate Change on Biological Systems & Adaptation (Biology, Earth Sciences)
9. Sociology of Climate Change (Sociology, Psychology)
10. Art and Climate Change (Art, Humanities)
11. Science Consensus and the Climate Change Debate (Interdisciplinary)
12. International Response to Climate Change (Political Science, Law, Economics)
13. Introduction to Climate Change Policy (Economics, Political Science, Law)
14. Mitigation Strategies (Engineering, Economics, Business)
15. From Mitigation Strategies to Policy (Economics, Political Science)
16. Climate Change and Business (Business, Finance)
17. Conclusions: The Transition to Net Zero by 2050 (Interdisciplinary)

1.10. Course bibliography

First half of the course:

Buñuel, Miguel (forthcoming): *The Use of Economic Instruments in Environmental Policy*, Madrid: EnvEco Publishing.

Lewis, Lynne, and Thomas H. Tietenberg (2020): *Environmental Economics and Policy*, 7th edition, Abingdon, Oxon, and New York, NY: Routledge.

Complementary material will be provided through Moodle (UAM's web platform).

Second half of the course:

All the materials will be provided through Moodle (UAM's web platform).



Spain Center for International Education

A Multidisciplinary Approach to Climate Change



SYLLABUS 2022

2. Teaching methodology

Teaching activities requiring students' attendance will be the following:

1. Lectures and experimental or problem-solving sessions: Lectures will be based upon the materials provided to students, and PowerPoint presentations. Lectures will be combined with experimental or problem-solving sessions, which will apply some of the concepts presented in the former. Participation will be strongly encouraged.
2. Guest lectures, visits to institutions and field trips.
3. Optional: Non-compulsory sessions with one or several students during office hours.

Students' activities not requiring attendance will be the following:

1. Personal study for preparing lectures and exams.
2. Two take-home exams will be delivered electronically through Moodle.

3. Student workload

ACTIVITIES	HOURS	ECTS	%
With attendance	60	2.40	40.00
Lectures, experimental or problem-solving sessions, guest lectures, visits to institutions and field trips	60	2.40	40.00
With no attendance	90	3.60	60.00
Personal study	86	3.44	57.33
Take-home exams	4	0.16	2.66
TOTAL	150	6.00	100.00



Spain Center for International Education

A Multidisciplinary Approach to Climate Change



SYLLABUS 2022

4. Evaluation procedures and weight of components in the final grade

PROCEDURE	% GRADE
Attendance and participation	50.00
Take-home exam 1	25.00
Take-home exam 2	25.00
TOTAL	100.00