SYLLABUS 2026

1. COURSE TITLE

A Multidisciplinary Approach to Climate Change

1.1. Course number

CCSS-6ECTS

1.2. Content area

Art, Biology, Business, Chemistry, Earth Sciences, Economics, Engineering, Geography, Humanities, Law, Marketing, Medicine, 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%.

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1.7. Faculty data

Director: Pedro García, EngD
Director of SpaCIE – Spain Center for International Education

Complete list of professors and relevant biography (in alphabetical order of last name):

- **Prof. Dr. 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. **Classes taught: Science Consensus and the Climate Change Debate; International Response to Climate Change: Introduction; From Mitigation Strategies to Policy; Art and Climate Change: An Introduction from a Social Science perspective; Conclusions: The Transition to Net Zero by 2050.**

- **Ms. 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. **Classes taught: CSR: The Role of Banking in Sustainable Mobility.**

- **Prof. Dr. Rosa Fernández**: Associate Professor, Faculty of Law, UAM. Doctor in Law (UAM), Master's degree in European Community Law (UAM), Bachelor's degree in Law (UAM). Other relevant facts: she is specialized in International Environmental Law, International Economic Law and EU Law. She is responsible for the chronicle of International Environmental Law published in the Electronic Journal of International

Studies and the chronicle of International Environmental Jurisprudence. **Classes taught: International Response to Climate Change: The Paris Agreement; Climate Change Litigation.**

- **Prof. Dr. 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. **Classes taught: Sociology of Climate Change.**

- **Prof. Dr. Nagore García:** Assistant Professor, Faculty of Science, UAM. PhD in Evolutionary Biology and Biodiversity (UAM), Bachelor's degree in Environmental Sciences (UAM). Other relevant facts: She specializes in species responses to environmental gradients and climate change. She led the citizen science project SoilSkin, focused on ecosystem vulnerability to global change. **Classes taught: Consequences of Climate Change on Biological Systems & Adaptation; Human Health Consequences of Climate Change & Adaptation.**

- **Dr. Clara I. González:** Senior Economist and Actuary, Operations Department, Bank of Spain. Ph.D. in Economics (UCM), Bachelor's degree in Actuarial and Financial Sciences (UPC-ICADE), Bachelor's degree in Economics and Business Administration (UPC-ICADE). Other relevant facts: Since 2018, she is involved in the internal work of the Banco de España regarding the challenges posed by climate change for the financial system. She works on incorporation of sustainable and responsible investment principles in investment portfolios and in the monitoring of the development of sustainable finance markets. She is also a member of several international committees on this topic, for example the Network for Greening the Financial System. She also coordinates the organization of the Green Fridays workshops at Banco de España. **Classes taught: Climate Change and Sustainable Finance.**

- **Prof. Dr. Noemí de Haro:** Associate Professor, 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'. **Classes taught: Art and Climate Change.**

- **Mr. Emilio de las Heras:** Independent Researcher. He is a Naval Architect and Marine Engineer by the Universidad Politécnica de Madrid, PDG by IESE University of Navarra, and Master's in Business Administration by the University of Chicago, Booth School of Business. Other relevant facts: He writes in his Blog of the financial newspaper EXPANSION, with more than 700 articles on climate change, clean technologies, fiscal policies, and energy transition. He also writes in Fundación Renovables, Fundación Alternativas and Agenda Pública-El País. He has given more than 70 lectures and courses about the climate emergency and how to prevent it. He started his career in Empresarios Agrupados in nuclear power plants. Soon, he moved to Banco de Crédito Industrial, Banco de Negocios Argentaria, Banco Exterior de España, and BBVA, where he was Head of the BBVA New York Office. **Classes taught: Mitigation Strategies.**

- **Prof. Dr. 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. **Classes taught: Impacts on Physical Systems; Consequences of Climate Change on Cities, Settlements and Key Infrastructure & Adaptation.**

- **Dr. 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 with the aim to accelerate the different stakeholders' awareness on Climate action inside and outside the company. **Classes taught: Mitigation Strategies.**

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- **Prof. Dr. Mónica Pérez-Bedmar:** Professor of Earth Science, Marine Ecology, Oceanography and Environmental Ethics at several USA University programs in Spain. B.SC. and M.Sc. in Oceanography and Coastal Zone Management (Florida Institute of Technology), PhD in Environmental Education. Other relevant facts: She has received several awards and prizes for experiential learning and excellence, the last one being the Peter Wollitzer Award granted by The Forum on Education Abroad, for advocating international education. In the past year, Monica has held the post of European Secretary for the Climate Action Network for International Educators (CANIE), a volunteer-run organization whose mission is to mitigate the effect that the international education sector has in the climate crisis. **Classes taught: What is Climate Change? Experimental evidence; Earth's Energy Balance and Greenhouse Gases; Science Consensus: Why we know that we are to blame; Feedbacks and tipping points; Future Global Climate.**

- **Mr. Peter Sweatman:** CEO of Climate Strategy & Partners, a strategic consulting group in Clean Energy, Clean Technology Innovation and Energy Efficiency that works with leading companies and policymakers in the global energy transition. He is also Chairman of Energy Efficiency Capital Advisors, an expert solution provider and structuring agent for over Euro 30 million of finance for energy savings and on-site power in Spanish cities. MA Cantab degree in Engineering and Management Studies (Cambridge U). Other relevant facts: He has spent 26 years in finance of which 16 are climate finance and energy efficiency. He is a founder advisor to the Climate Bond Initiative, an active member of the Ashoka Support Network, a member of the Network for Sustainable Financial Markets, advisor to the Climate Lab, Braemar Energy Ventures, rapporteur for EU Commission and UNEP FI's EEFIG and G20's EEFTG, member of the steering committee of the Global Alliance for Energy Productivity, Build-Upon and the Investor Confidence Project Europe and visiting lecturer at IIT-Comillas university, IE University IMBA programme and European University Institute. **Classes taught: Being a Climate Leader in 2030.**

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1.8. Course objectives, competencies and learning outcomes

A) Introduction

Climate change is the main global environmental problem and one of the main economic and social problems facing humanity. And citizens increasingly perceive it as such. For example, the latest Eurobarometer survey, published in June 2025 by the European Commission, shows that 85% of EU citizens believe that climate change is a serious problem for the world. Moreover, climate change is seen as the most pressing issue in several Member States and ranks among the top three concerns in most others.

On the other hand, climate change is a multidimensional problem that must be studied from all disciplines of knowledge. However, our curricula do not usually offer a multi- or interdisciplinary understanding of the problem. Furthermore, 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

The main objective of this course is to alleviate the shortcomings of our curricula and the lack of knowledge of a large part of the population mentioned in the introduction. To this end, the course offers a multidisciplinary and rigorous vision of the problem of climate change. Experts in each subject offer this comprehensive, university-level vision. Although academically rigorous, their classes are adapted to the necessary introductory level. This is necessary given the heterogeneous profile that students will have.

In addition to the main objective described in the previous paragraph, 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, but with the advantage that by intensifying the course in only two weeks it can encourage those who cannot live a longer experience due to its greater economic cost or do not dare to do so due to other factors.

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C) Competencies

This course aims to develop the following key competencies:

A. Generic Competencies:

a. **Analytical and Synthesis Skills:** The ability to break down complex information, identify key components, and integrate them into a coherent understanding.

b. **Information Management Skills:** Effectively locating, evaluating, and utilizing diverse sources of information.

c. **Problem-Solving Skills:** Applying knowledge and reasoning to identify and resolve challenges.

d. **Critical Reasoning:** Analyzing information objectively, identifying biases, and forming well-founded judgments.

e. **Ethical Commitment:** Recognizing and upholding ethical responsibilities in addressing complex problems.

f. **Autonomous Learning:** Taking initiative and responsibility for one's own learning process.

g. **Environmental Sensitivity:** Demonstrating awareness and concern for environmental issues and their implications.

h. **Practical Application of Knowledge:** Applying theoretical understanding to real-world scenarios and challenges.

i. **Interdisciplinary Communication:** Understanding and effectively communicating with specialists from various fields.

B. Specific Competencies

a. **Multidisciplinary Problem Framing:** Approaching environmental, economic, and social problems from integrated multidisciplinary perspectives.

b. **Temporal and Spatial Awareness:** Understanding the historical, current, and future dimensions of environmental processes and their geographical variations.

c. **Data Interpretation (Qualitative & Quantitative):** The ability to accurately interpret and draw conclusions from both qualitative and quantitative data relevant to climate change.

D) Expected Learning Outcomes:

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

Knowledge and Understanding:

1. Explain the fundamental scientific principles of climate change, including Earth's energy balance, the greenhouse effect, and the role of greenhouse gases, drawing on concepts from Physics, Earth Sciences, and Chemistry.
2. Describe the scientific consensus on anthropogenic climate change, articulating the evidence and reasoning behind it.
3. Identify and differentiate between key climate feedback mechanisms and potential tipping points, and their implications for future global climate scenarios.
4. Summarize the observed and projected impacts of climate change on various physical systems, such as glaciers, sea levels, and extreme weather events (Earth Sciences, Geography).
5. Analyze the consequences of climate change on human settlements, cities, and critical infrastructure, as well as the economic and geographical challenges and opportunities for adaptation.
6. Articulate the impacts of climate change on biological systems, including biodiversity, ecosystems, and species distribution, and discuss biological adaptation strategies.
7. Evaluate the direct and indirect human health consequences of climate change, including infectious diseases, heat stress, and mental health impacts, and discuss adaptation strategies in healthcare and public health (Medicine, Biology).

Application and Analysis:

8. Apply a multidisciplinary lens to critically evaluate information and arguments related to climate change, integrating perspectives from natural sciences, social sciences, humanities, and engineering.
9. Evaluate the socio-cultural and psychological dimensions of climate change, including public perception, communication challenges, and behavioral responses.
10. Discuss the role of art and humanities in communicating climate change issues and fostering public engagement.
11. Analyze the complexities of the international response to climate change, including key agreements, political challenges, and legal frameworks.
12. Examine the emergence and implications of climate change litigation, including the types of cases, legal strategies, and the role of international and domestic law in addressing climate-related damages and responsibilities (Political Science, Law).
13. Identify and explain various climate change mitigation strategies, distinguishing between technological, economic, and policy-based approaches.
14. Assess the role of business and finance in addressing climate change, including concepts of green finance, sustainable business practices, and carbon markets.

Synthesis and Critical Thinking:

13. Synthesize information from diverse disciplines to construct a holistic understanding of climate change as a complex, interconnected global challenge.
14. Formulate informed perspectives on the transition to net-zero emissions by 2050, considering the scientific, technological, economic, social, and political implications.
15. Engage in reasoned discussions about climate change by integrating scientific evidence with societal, economic, and ethical considerations.

1.9. Course contents

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

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1. What is Climate Change? Earth's Energy Balance and Greenhouse Gases (Physics, Earth Sciences, Chemistry)

2. Science Consensus: Why we know that we are to blame (Physics, Earth Sciences)

3. Feedbacks, tipping points, and future global climate (Physics, Earth Sciences)

4. Impacts on Physical Systems (Earth Sciences, Geography)

5. Consequences of Climate Change on Cities, Settlements and Key Infrastructure & Adaptation (Geography, Economics)

6. Consequences of Climate Change on Biological Systems & Adaptation (Biology, Earth Sciences)

7. Human Health Consequences of Climate Change & Adaptation (Medicine, Biology)

8. Sociology of Climate Change (Sociology, Psychology)

9. Art and Climate Change (Art, Humanities)

10. Science Consensus and the Climate Change Debate (Interdisciplinary)

11. International Response to Climate Change (Political Science, Law, Economics)

12. Climate Change Litigation (Political Science, Law)

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

All materials are available through the Program's web platform.

2. Teaching methodology

Teaching activities requiring students' attendance will be the following:

1. Lectures and experimental sessions: Lectures will be based upon the materials provided to students, and PowerPoint presentations. Lectures will be combined with experimental 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 exams (one per week), which will be delivered electronically through the Program's web platform.

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3. Student workload

ACTIVITIES	HOURS	ECTS	%
With attendance	**60**	**2.40**	**40.00**
Lectures, experimental sessions, guest lectures, visits to institutions and field trips	60	2.40	40.00
With no attendance	**90**	**3.60**	**60.00**
Personal study	80	3.20	53.33
Multiple-choice take-home exams	10	0.40	6.67
TOTAL	**150**	**6.00**	**100.00**

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

PROCEDURE	% GRADE
Attendance and participation	40.00
Exam week 1	30.00
Exam week 2	30.00
TOTAL	**100.00**