



A Multidisciplinary Approach to Climate Change



SYLLABUS 2021

1. COURSE TITLE

A Multidisciplinary Approach to Climate Change

1.1. Course number

SSMACC-6ECTS

1.2. Content area

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

1.3. Course level

Undergraduate or Bachelor's degree

1.4. Language

English

1.5. Prerequisites

None

1.6. Minimum attendance requirement

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

1.7. Faculty data

Director: Prof. Dr. Miguel Buñuel
Facultad de Ciencias Económicas y Empresariales
Departamento de Economía y Hacienda Pública
Despacho 205, Módulo E-6
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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. Director of the course, classes 1, 12-13, 18-19, 23-24 and 30.
- 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 of the Youtube channel 'Dr. What?' and scientific advisor of the Youtube channel 'Quantum Fracture'. Classes 2 to 6.
- 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 7 to 9.
- 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). Classes 10 and 11.
- 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



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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 14 and 15.

- Mercedes Pardo: Professor, Faculty of Social Sciences and Law, UC3M. Doctor in Sociology. Other relevant facts: She is the main researcher of the 'Sociology of Climate Change and Sustainable Development' Research Group and member of the Scientific and Technical Committee of Sustainability and Climate Change of the Autonomous Region of Madrid. Classes 16 and 17.
- 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 20 and 21.
- 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 information of interest: 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. Class 22.
- Pablo Renieblas (TBC): Partner in charge of the area of Customs, Excise and Environmental Law, Deloitte Legal Spain. Bachelor's degree in Economic and Business Sciences (UAM), Master's degree in International Taxation (School of Public Finance), Master's degree in Customs Taxation (School of Public Finance). Other relevant facts: he was the deputy director general of Special Taxes and Taxes on Foreign Trade (Spain's Ministry of Finance and Public Administration) and deputy director general of Special Taxes and Traffic on Foreign Trade (Spain's Ministry of Economy and Finance). As deputy director general, he was



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the 'father' of the only Spain-wide environmental tax on greenhouse gases, the Tax on Fluorinated Greenhouse Gases. Classes 25 and 26.

- Estela Díaz: Associate Professor, Faculty of Economic and Business Sciences, U Pontificia Comillas. Doctor in Economics and Business Studies (U Pontificia Comillas), Master's degree in Sustainability and Corporate Social Responsibility (UNED), Master's degree in Research in Economics and Business Studies (U Pontificia Comillas), Bachelor's degree in Law (U Granada). Other relevant facts: her main area of research focuses on ethical and transformative consumption, human-animal relations, gender, sustainable transitions, theories of power, transformative education, and institutional work. Classes 27 to 29.

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



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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.

Students will also gain further knowledge of a field (usually the field of study of their bachelor's degree, but not necessarily) by taking a directed study under the direction of one of the professors of the program. Students can complete the directed study during their stay in Madrid or, more likely, remotely after they return to their country, under the timing agreed with their supervisor.

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, 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.

1.9. Course contents

The course contents and the areas of knowledge or disciplines that each subject deals with are listed in the following table:

CLASS	TITLE	FIELD 1	FIELD 2	FIELD 3
1	Introduction to Climate Change	Interdisciplinary		
2	Earth's Energy Balance	Physics	Earth Sciences	
3	Earth's Energy Balance	Physics	Earth Sciences	
4	Greenhouse Gases and Energy Balance	Earth Sciences	Chemistry	
5	Greenhouse Gases and Energy Balance	Earth Sciences	Chemistry	
6	Future Global Climate	Physics	Earth Sciences	
7	Impacts on Physical Systems	Earth Sciences	Geography	
8	Impacts on Physical Systems	Earth Sciences	Geography	



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9	Consequences of Climate Change on Cities, Settlements and Key Infrastructure & Adaptation	Geography	Economics	
10	Consequences of Climate Change on Biological Systems & Adaptation	Biology	Earth Sciences	
11	Consequences of Climate Change on Biological Systems & Adaptation	Biology	Earth Sciences	
12	Science Consensus and the Climate Change Debate	Interdisciplinary		
13	Science Consensus and the Climate Change Debate	Interdisciplinary		
14	Art and Climate Change	Art	Humanities	
15	Art and Climate Change	Art	Humanities	
16	Sociology of Climate Change	Sociology	Psychology	
17	Sociology of Climate Change	Sociology	Psychology	
18	Mitigation Strategies	Engineering	Economics	Business
19	Mitigation Strategies	Engineering	Economics	Business
20	Mitigation Strategies	Engineering	Economics	Business
21	Mitigation Strategies	Engineering	Economics	Business
22	International Response to Climate Change	Political Science	Law	Economics
23	Policy Instruments against Climate Change	Economics	Political Science	
24	Policy Instruments against Climate Change	Economics	Political Science	
25	What does climate change mean for business?	Business		
26	What does climate change mean for business?	Business		
27	Producers and Consumers: Corporate Social Responsibility	Business		
28	Producers and Consumers: Green Consumption	Business	Marketing	
29	Producers and Consumers: Green Consumption	Business	Marketing	
30	Conclusions: The Transition to a Sustainable Energy Model	Interdisciplinary		



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1.10. Course bibliography

All the materials will be provided through Moodle (UAM'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. Visits to institutions and field trips.
3. Sessions of guidance for the directed study, as agreed with the supervisor.
4. 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 the exam.
2. A multiple-choice take-home exam, which will be delivered electronically through Moodle.
3. Writing a short paper as a result of the directed study.



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3. Student workload

ACTIVITIES	HOURS	ECTS	%
With attendance	38	1.52	25.33
Lectures, experimental sessions, and visits to institutions and field trips	30	1.20	20.00
Additional visits to institutions and field trips	4	0.16	2.66
Meetings with the advisor for the directed study (in person or remote)	4	0.16	2.66
With no attendance	112	4.48	74.66
Personal study	43	1.72	28.66
Multiple choice take-home exam	2	0.08	1.33
Short paper	67	2.68	44.66
TOTAL	150	6.00	100.00

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

PROCEDURE 3-ECTS COURSE	% GRADE
Attendance and participation	70.00
Multiple choice take-home exam	30.00
TOTAL	100.00

PROCEDURE 3-ECTS DIRECTED STUDY	% GRADE
Short paper	100.00
TOTAL	100.00



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5. Guidelines for short papers

5.1. Structure

The short paper must have a logical structure that in most cases would include:

1. Index
2. Introduction
3. Objectives and Justification
4. Methodology (even if the short paper consists just of a literature review, you can describe in the methodology how you have searched for and selected the literature that you have reviewed)
5. Development section or sections (as required by your paper)
6. Conclusions
7. Bibliography
8. Annexes (if appropriate)

5.2. Paging, length and format

The paper should be page numbered. On the cover, write the name of the course (UAM-SpaCIE's "A Multidisciplinary Approach to Climate Change": Directed Study), the title of your paper, your name and surname, your supervisor's name and surname, the academic year for which it is presented, and the month and year of delivery to your supervisor.

The paper should have a length between 8 and 15 pages, excluding the cover page and annexes (which are unlimited), and be written in English (except if you agree another common language with your supervisor), using a font Arial Narrow, 12 points, margins 2.5 cm, 1.5 spacing.

The section titles will be in size 14 and bold, and the subsections of each section (if any) in size 12 and bold. The sections shall be numbered in increasing order (1, 2, 3...), as well as the subsections (1.1, 1.2, 1.3...).



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Tables or charts (those containing numerical data) and figures or graphs (those containing some kind of representation) will be numbered with double digits. The first digit will indicate the section to which it belongs, and the second digit the order it occupies in that section. After the general index, the lists of tables, figures and graphs will be presented, indicating their number, title and page.

5.3. Bibliographic references

Depending on the subject of study chosen, the bibliographic references will consist of the existing bibliography related to the subject, secondary statistical sources that collect quantitative information previously prepared by public or private institutions, reports published by companies, etc.

This information may be obtained from libraries, documentation centers and the Internet, and may be supplemented by information obtained directly by the students if applicable. Supervisors will guide students about the main sources of information available for their chosen subject.

All the books, articles and works used to prepare the paper must be appropriately cited and included in the Bibliography. Likewise, the graphs and tables must be accompanied by reference to the sources from which they have been obtained (example 1: *Source: Smith (2018, p. 28)*; example 2: *Source: own calculations based on Smith (2018, p. 28) and López (2019, p. 22)*). If any text is reproduced literally, it will appear between quotation marks and cited (for instance: In this paper I will study how we can value the damages caused by climate change, something of utmost importance, since, as Wilde (1890, p. 30) said, “Nowadays people know the price of everything, but the value of nothing”).

Citing a single author may be made in two ways (in the case of quoting literally it would be the same, but the quote would be between quotation marks and the citation would also include the number of the page where the quote was found):

1. According to González (2008), the weight of KIBs in the Spanish economy is still small.
2. The weight of KIBs in the Spanish economy is still small (González, 2008).



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In the case of citing two authors (if quoting literally it would be the same, but the quote would be between quotation marks and the citation would also include the number of the page where the quote was found):

1. According to Camacho and Rodríguez (2005), knowledge-intensive professional services companies are among the most innovative in the service sector.
2. Knowledge-intensive professional services companies are among the most innovative in the services sector (Camacho and Rodríguez, 2005).

If there are more than two authors (in the case of quoting literally it would be the same, but the quote would be between quotation marks and the citation would also include the number of the page where the quote was found):

1. Río et al. (2009) have found that users in the mobile phone sector invariably want recovery to focus on restoring service as soon as possible.
2. In the mobile phone sector, users invariably want recovery to focus on restoring service as soon as possible (Río et al., 2009).

The Bibliography will cite the references as follows:

1. If it is an article: JOHNSTON, R. (2005): "Service operations management: from the roots up", *International Journal of Operations & Production Management*, Vol. 25, No. 12, pp. 1298-1308.
2. If it is a book: JOHNSTON, R. and CLARK, G. (2008): *Service operations management*, 3rd ed., Editorial Pearson, Essex.
3. If it is a chapter in a book: SMITH, A. (2008): "Service operations management in Ruritania", in JOHNSTON, R. and CLARK, G., *Service operations management*, 3rd ed., Editorial Pearson, Essex, pp. 98-130.

If there are several authors, they should all appear starting with their surnames and ending with the initials of their first names.

In case of doubt or cases not mentioned above, you can adhere to any well-known code of citation rules and let know your advisor that you are following those rules. For instance, you can follow APA citation rules, contained in "The Publication Manual of the American Psychological Association".