



Course guide

480072 - CC - Climatic Change: Policies to Mitigate

Last modified: 22/05/2024

Unit in charge: Barcelona School of Civil Engineering
Teaching unit: 748 - FIS - Department of Physics.
717 - DEGD - Department of Engineering Graphics and Design.

Degree: MASTER'S DEGREE IN SUSTAINABILITY SCIENCE AND TECHNOLOGY (Syllabus 2013). (Optional subject).

Academic year: 2024 **ECTS Credits:** 5.0 **Languages:** Catalan, Spanish, English

LECTURER

Coordinating lecturer: OLGA ALCARAZ SENDRA

Others: Alcaraz Sendra, Olga
Sureda Carbonell, Bàrbara

TEACHING METHODOLOGY

During the development of the subject, the following teaching methodologies will be used:

- Master class (EXP): exposure of knowledge by teachers through master classes.
- Practical Works (TP): resolution of practical exercises and case studies individually or in small groups.
- Assessment activities (AV).

During the development of the subject the following training activities will be used:

-Face-to-face

Theoretical classes (CTC): know, understand and synthesize the knowledge exposed by the teaching staff through master classes.

Practical work classes (CTP): participate in solving exercises and different case studies. Discussion of the conclusions with the teacher and other students in the classroom.

-No face-to-face

Autonomous study (EA): study or extend the contents of the subject individually or in a group, understanding, assimilating, analyzing and synthesizing knowledge.

LEARNING OBJECTIVES OF THE SUBJECT

At the end of the subject, the student knows and understands the problem of climate change, both from the point of view of its causes and scientific manifestations, as well as its anthropogenic driving factors: the global energy problem, the economic dynamics of the last 200 years, the inability of political decision-makers to deal with it and the prospects for the future.

The student acquires the following Specific Competencies:

CE03: Critically analyze and evaluate the theories and approaches on the characteristics and properties of the geosphere and the biosphere that facilitate and frame the development of socio-ecological systems, as well as the main challenges of climate change.

CE07: Design, develop and apply in an integrated and coordinated manner concepts, theories and analysis techniques of the social, economic, earth sciences and of management and research - action techniques, and of approaches based on science and sustainability technologies, in the areas of biodiversity and natural resources, the built environment and services, and the production and information system.

and the following Transversal Competence:

CT2: SUSTAINABILITY AND SOCIAL COMMITMENT - Level 3: Take into account the social, economic and environmental dimensions when applying solutions and carrying out projects consistent with human development and sustainability.



STUDY LOAD

| Type | Hours | Percentage |
|--------------------|-------|------------|
| Hours large group | 24,0 | 19.20 |
| Hours small group | 9,0 | 7.20 |
| Hours medium group | 12,0 | 9.60 |
| Self study | 80,0 | 64.00 |

Total learning time: 125 h

CONTENTS

1. The science of global warming and climate change

Description:

Earth's atmosphere and the greenhouse effect. The carbon cycle.
The intensification of the greenhouse effect of anthropogenic origin and its interference with the carbon cycle.
radiative forcing; greenhouse gases, GHG, and its global warming potential, GWP. The CO₂eq.
The evidence of climate change according to the latest IPCC reports: a) in the perspective of the analysis of historical correlations of relevant data; b) in the perspective of its effects.

Related activities:

Content English

Full-or-part-time: 6h

Theory classes: 6h

title english

Description:

The great acceleration, an anthropogenic phenomenon as a consequence of a certain economic-energy model.
The exponentiality of the phenomenon.
Variation of GHG emissions and concentrations, orders of magnitude.
The differentiated historical responsibilities of developing countries vs. developed countries and the different capacity of these countries to undertake mitigation and/or adaptation policies.
Drivers of anthropogenic climate change, Kaya's identity. Methodology for carrying out future scenarios of CO₂ emissions.
The contribution of the different sectors to climate change at the global and regional levels.

Related activities:

TP1: Determination and analysis of the primary energy vector of different countries, and calculation of the associated emissions of CO₂.
TP2: Elaboration of future scenarios of the energy vector of different countries, and calculation of the associated emissions of CO₂.
TP3: Kaya's identity. Analysis of the evolution of historical CO₂ emissions based on changes in carbon intensity, energy intensity, GDP per capita and population.
TP4: Construction of scenarios for the evolution of future emissions acting on the driving factors of Kaya's identity.

Full-or-part-time: 6h

Theory classes: 6h



title english

Description:

International summits to combat climate change; some history: from Rio 92 to Paris 2015 and Glasgow 2021.
The UNFCCC: structure and functioning; contents, principles and commitments; the annexes of the UNFCCC.
The Kyoto protocol.
The failure of the Copenhagen summit and the promises of the Cancún summit.
The Durban Platform and the road to Paris 2015. Intentions on Nationally Determined Mitigation Commitments (INDCs).

Related activities:

Content English

Full-or-part-time: 6h

Theory classes: 6h

4. The Paris Agreement and the future.

Description:

The Paris Agreement (PA): structure, analysis of the mitigation component of the PA, the NDCs, the global stocktake, the LTLEDS, the new reinforced transparency framework, ...
The Decisions that accompany the PA.
The PA rule book.
The Glasgow Climate Pact.

Full-or-part-time: 6h

Theory classes: 6h

5. The latest IPCC reports

Description:

The future scenarios of the AR6 of the IPCC, the Shared Socio-economic Pathways (SSPs).
The concept of Global Carbon Budget. The IPCC and the global mitigation goals.
Analysis of the Paris Agreement and Decisions from the perspective of climate change mitigation.
The Nationally Determined Contributions (NDCs) and their aggregate analysis.

Related activities:

TP5: the SSP scenarios and the NDCs
TP6: Mitigation Policy Simulator

Full-or-part-time: 6h

Theory classes: 6h

GRADING SYSTEM

AV1 Knowledge control test. 30%

AV2 Active participation in class work. 10%

AV3 Practical work carried out throughout the course. 60%



BIBLIOGRAPHY

Basic:

- UNFCCC [on line]. [Consultation: 28/10/2019]. Available on: <https://unfccc.int/>.
- UN and climate change [on line]. [Consultation: 10/10/2022]. Available on: <https://www.un.org/climatechange/>.
- IPCC : intergovernmental panel on climate change [on line]. Geneva, Switzerland, 2001 [Consultation: 17/03/2021]. Available on: <https://www.ipcc.ch/>.
- IEA : International energy agency [on line]. [Consultation: 10/10/2022]. Available on: <https://www.iea.org/>.
- CAN: climate action network [on line]. [Consultation: 02/02/2021]. Available on: <http://www.climateactionnetwork.org/>.
- IISD: International Institute for Sustainable Development [on line]. [Consultation: 08/03/2021]. Available on: <https://www.iisd.org/>.
- CarbonBrief - Clear on Climate [on line]. [Consultation: 21/07/2023]. Available on: <https://www.carbonbrief.org/>.
- IPCC. AR6 Synthesis Report: Climate Change 2023 [on line]. Geneva, Switzerland, 2023 [Consultation: 27/06/2023]. Available on: <https://www.ipcc.ch/report/ar6/syr/>.