# Course guide
# 820094 - CCCEEPF - Climate Change: Science, Energy, Economics, Politics and the Future

**Last modified:** 02/10/2025

**Unit in charge:** Barcelona East School of Engineering
**Teaching unit:** 717 - DEGD - Department of Engineering Graphics and Design.
749 - MAT - Department of Mathematics.
748 - FIS - Department of Physics.

**Degree:** BACHELOR'S DEGREE IN CHEMICAL ENGINEERING (Syllabus 2009). (Optional subject).
BACHELOR'S DEGREE IN ELECTRICAL ENGINEERING (Syllabus 2009). (Optional subject).
BACHELOR'S DEGREE IN ENERGY ENGINEERING (Syllabus 2009). (Optional subject).
BACHELOR'S DEGREE IN INDUSTRIAL ELECTRONICS AND AUTOMATIC CONTROL ENGINEERING (Syllabus 2009). (Optional subject).
BACHELOR'S DEGREE IN MECHANICAL ENGINEERING (Syllabus 2009). (Optional subject).
BACHELOR'S DEGREE IN MATERIALS ENGINEERING (Syllabus 2010). (Optional subject).

**Academic year:** 2025 **ECTS Credits:** 3.0 **Languages:** Catalan, Spanish

## LECTURER

**Coordinating lecturer:** OLGA ALCARAZ SENDRA - BARBARA SUREDA CARBONELL

**Others:**

## PRIOR SKILLS

Not called in; is advisable to have studied the course 820019 - TMS

## DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

**Transversal:**
02 SCS N3. SUSTAINABILITY AND SOCIAL COMMITMENT - Level 3. Taking social, economic and environmental factors into account in the application of solutions. Undertaking projects that tie in with human development and sustainability.

## TEACHING METHODOLOGY

It will be used expository methodology, analysis and development of case studies (mainly with characteristics of self-learning), realization of practices, open debates in class and realization of assessments.

## LEARNING OBJECTIVES OF THE SUBJECT

The student should acquire essential knowledge about the climate change problematique, from the point of view of: its causes and scientific manifestations, anthropocentric drivers factors, the world's energy problems, the economic dynamics during the last 200 years, the inability of the political decision to deal with it, and future prospects of everything.

## STUDY LOAD

| Type | Hours | Percentage |
|---|---|---|
| Self study | 45,0 | 60.00 |
| Hours large group | 30,0 | 40.00 |

**Total learning time:** 75 h

## CONTENTS

### 1.Prsentations amd introductions

**Description:**
- Several but important presentations and introductions for the good development of the course in all its aspects

**Specific objectives:**
- Presenting the objectives, program, biblyography, methodology, etc. of course
- Introduction to the work activities and assessment methods.
- Give the key dates of the course during the academic year.

**Full-or-part-time:** 5h
Theory classes: 2h
Self study : 3h

### 2.Science of climate change

**Description:**
- On scientific knowledge it has of the causes and effects of anthropogenic global warming and climate change

**Specific objectives:**
- Understand the scientific principles governing the average temperature at the Earth's surface
- Know the anthropogenic reasons that explain the variation of the temperature and therefore the foundations of global warming and climate change
- Get intensifying the greenhouse effect and its anthropogenic interference with the carbon cycle
- The GHG and CO2 equivalent units
- Know the evidence of climate change from a historical point of view. The main manifestations and effects of global warming

**Full-or-part-time:** 10h
Theory classes: 4h
Self study : 6h

### 3. Energy, economy and climate change

**Description:**
- Factors driving anthropogenic climate change; primary energy vector; and identity I = PAT

**Specific objectives:**
- Understand historical trends and present recent exponential phenomenology of the drivers factors of climate change
- Know the numbers and orders of magnitude of the phenomena. Emissions and concentrations
- Know the Kaya's identity

**Related activities:**
- Calculation of CO2 emissions associated with the energy vector of different countries
- Kaya's identity and the driving factors of climate change

**Full-or-part-time:** 15h
Theory classes: 6h
Self study : 9h

### 4.The multilateral policy and the agendes fighting against climate change

**Description:**
- From the environmental summits and the creation of the IPCC ... towards Paris 2015 ... trough the UNFCCC, the Kyoto Protocol and the failure of Copenhaguen

**Specific objectives:**
- Saber de les NNUU, els tractats internacionals i la seva aplicació i evolució en el tema subjecte de l?assignatura
- Descriure la cronologia política i institucional fonamental de la ?lluita? contra el canvi climàtic
- Conèixer la UNFCCC
- Conèixer el Protocol de Kyoto
- Saber del fracàs de Copenhaguen
- Sobre les diferents responsabilitats històriques

**Full-or-part-time:** 10h
Theory classes: 4h
Self study : 6h

### 5.The Paris Agreement and the future

**Description:**
- The Paris Agreement 2015

**Specific objectives:**
- Understand and analyze the reasons, characteristics and key elements of the 2015 Paris Agreement
- Future NDCs and its future aggregate analysis
- Know the climate strategies and policies that must be implemented to achieve the mitigation objective of the Paris agreement

**Related activities:**
Practice on a climate policy simulator

**Full-or-part-time:** 5h
Theory classes: 2h
Self study : 3h

**6. The IPCC, the assessment reports.**

**Description:**
- Creation and fundamental role of the IPCC
- The SR15 and the AR6
- Climate scenarios compatible with the objectives of the Paris Agreement

**Specific objectives:**
- Know the future scenarios of the IPCC and the possible climate change mitigation objectives in the perspective of the first decade of the century
- The concept of Global Carbon Budget and specific objectives of stabilizing the Earth's temperature

**Related activities:**
Practice on SSP scenarios and analysis of a country's NDC

**Full-or-part-time:** 5h
Theory classes: 3h
Self study : 2h

## GRADING SYSTEM

Attendance and active participation in debates and exercises in theoretical sessions: 15%
Evaluation of the excel of each of the four practical sessions: 6% (up to a total of 24%)
Final control of the course contents: 37%
Final control of the contents of the practical sessions: 24%

## EXAMINATION RULES.

The final control of the course contents will be through a multiple-choice test.
The final control of the practical contents will be through an oral test.

## BIBLIOGRAPHY

**Basic:**
- United Nations. Climate Change. United Nations Framework Convention on Climate Change [on line]. Bonn: UNFCCC, 2020 [Consultation: 23/04/2020]. Available on: http://unfccc.int/2860.
- United Nations. Intergovernmental Panel on Climate Change [on line]. IPCC, 2020 [Consultation: 23/04/2020]. Available on: http://www.ipcc.ch.
- United Nations. United Nations Environmental Program and CC [on line]. Nairobi: UNEP, 2020 [Consultation: 23/04/2020]. Available on: http://www.unep.org/climatechange/.
- International Energy Agency. International Energy Agency [on line]. Paris: IEA, [Consultation: 23/04/2020]. Available on: http://www.iea.org.
- United Nations. United Nations and Climate Change [on line]. New York: United Nations, 2020 [Consultation: 23/04/2020]. Available on: http://www.un.org/climatechange/.

**Complementary:**
- World Resources Institute. CAIT Climate Data Explorer [on line]. Washington: World Resources Institute, 2020 [Consultation: 23/04/2020]. Available on: http://cait.wri.org/.
- IISD. International Institute on Sustainable Development [on line]. IISD, 2020 [Consultation: 23/04/2020]. Available on: http://enb.iisd.org/process/climate_atm.htm.
- CAN. Climate Action Network International [on line]. Bonn: CAN, 2020 [Consultation: 23/04/2020]. Available on: http://www.climatenetwork.org.