

STUDY GUIDE

Climate change services provided by estuaries and estuarine ecosystems

Organised by

- University of Cantabria (UC)

Originally developed in the context of Creative Commons education materials created by the LIFE ADAPTA BLUES project (LIFE18 CCA/ES/001160, “Adaptation to climate change through management and restoration of European estuarine ecosystems”), coordinated by the Environmental Hydraulic Institute of the Universidad de Cantabria (IHCantabria-UC).



| 1. IDENTIFYING DATA | |
|------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Course Name. | Climate change services provided by estuaries and estuarine ecosystems |
| Coordinating University. | University of Cantabria (UC) |
| Course Field(s). | Climate change / Sustainability |
| Related Study Programme. | Course included in the University Microcredential in Adaptation Pathways through Management and Restoration of Estuarine Ecosystems (ADAPTABLES) |
| ISCED Code. | <ul style="list-style-type: none"> • 051101. Biology • 053201. Marine sciences • 071201. Environmental engineering • 073202. Civil engineering |
| Sustainable Development Goals | <ul style="list-style-type: none"> • SDG 04. Quality education • SDG 13. Climate action • SDG 14. Life below water |
| Study Level. | MECU 7 (Master or 240 ECTS Degree) |
| Number of ECTS credits allocated. | 2 ECTS |
| Mode of Delivery. | Online self-study |
| Language of Instruction. | English, with subtitles in Spanish, German and Portuguese |
| Course Dates. | 13.05. 2026 – 29.06.2026 |
| Schedule of the course. | <p>The course can be attended from may until the mid-june at any time. Course materials and assessment forms are fully online and can be checked at any point.</p> <p>Lectures are asynchronous and can be reviewed at any time.</p> |
| Key Words. | Estuarine ecosystems, Estuarine ecosystem services, Climate change, Adaptation, Mitigation, Nature-based Solutions |
| Prerequisites and co-requisites. | No previous requirements established |



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| Number of students that can attend the Course. | 50 |
| Course inscription procedure(s). | Requires registration on the ADAPTABLUES University Microcredential: https://web.unican.es/estudios/estudios-propios/informacion-estudios-propios-de-posgrado/detalle-estudios-propios?e=1117 |
| 2. CONTACT DETAILS | |
| Department. | Environmental Hydraulics Institute |
| Name of Lecturer. | <ul style="list-style-type: none"> • Prof. José A Juanes (Coordinator) • Dr. Cristina Galván (Director) |
| E-mail. | <ul style="list-style-type: none"> • juanesj@unican.es • galvanc@unican.es |
| Other Lecturers. | <p>Academic staff from UC-IHCantabria in charge of this course:</p> <ul style="list-style-type: none"> • Dr. Bárbara Ondiviela • Dr. Inés Mazarrasa • Dr. María Recio • Dr. Mirian Jiménez <p>International advisors from AdaptaBlues project:</p> <p>Dr. Joao Neto (University of Coimbra)</p> |
| 3. COURSE CONTENT | |
| <p>Teaching materials of this MOOC were co-created, under creative commons licence, in the ADAPTABLUES project “Adaptation to climate change through management and restoration of European estuarine ecosystems”, funded by the EU LIFE programme (LIFE18 CC/ES/001160) and developed through the collaboration of academics and researchers from the Institute of Environmental Hydraulics of the University of Cantabria, coordinator of the project, and the University of Coimbra.</p> <p>The course is an introduction to estuarine ecosystems that tries to explain how they relate to climate change adaptation and mitigation. Introduces the student to the basic concepts related to estuarine ecosystems: what is an estuary, what are its main components and their relationship with climate change; emphasizing the climate ecosystem services provided by estuarine plant communities: the mitigation service, due to their carbon sequestration capacity, and the adaptation service, associated with their capacity to protect against coastal flooding and erosion.</p> | |



4. LEARNING OUTCOMES

- Students will know the main biophysical characteristics of estuarine ecosystems and the goods and benefits they provide to society.
- Students will be introduced to the concepts of mitigation and adaptation, as well as the role of the estuarine ecosystems within these elements.

5. OBJECTIVES

This course aims to provide an integrated view of the climate ecosystem services provided by estuaries and estuarine ecosystems with particular emphasis on climate services.

6. COURSE ORGANISATION

UNITS

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|----|--------------------------------------------------|
| 1. | Introduction to estuarine ecosystems |
| 2. | Services and benefits of estuarine ecosystems |
| 3. | Mitigation Service |
| 4. | Adaptation services against flooding and erosion |

LEARNING RESOURCES AND TOOLS

The learning resources and assessment tools of the course are available at the UC Moodle Platform.

PLANNED LEARNING ACTIVITIES AND TEACHING METHODS

Students will have access to video materials, written course contents, and automatic online evaluation tests in UC Moodle online environment. Students can review the materials and do the assessments at their own pace during the period of course delivery since. The course is asynchronous and can be reviewed at any time. Students' activity in UC Moodle is expected to consist of the following:

- Watching the video materials available on the course site.
- Reading and familiarization with the text materials available on the course site.
- Taking the evaluation tests that measure students' knowledge and skills in content areas.

The course is completed by independently working and by taking the exams which consists of multiple-choice questions covering the course topics. The course is graded "passed" or "failed".



As an additional optional activity, each sub-topic will have a forum for students to share their questions, discussions or doubts. It will be moderated by the UC Office, with input from professors when necessary. All students are free to participate and post their queries.

7. ASSESSMENT METHODS, CRITERIA AND PERIOD

To complete the course, you must:

- View the materials in each Module, going through all Sub-Topics.
- Correctly answer at least 90% of each of the Automatic Online Assessments.
- Complete the post-survey of the course. This will take approximately 3 minutes.

OBSERVATIONS

8. BIBLIOGRAPHY AND TEACHING MATERIALS

Teaching materials are available on the course at the dedicated UC Moodle platform. Literature recommendations are also outlined in the course contents.

