COURSE OUTLINE

1. COURSE INFORMATION

SCHOOL	Chemical ad Environmental Engineering		
DEPARTMENT			
COURSE LEVEL	Postgraduate		
COURSE ID		**SEMESTER**	Spring
COURSE TITLE	Climate Change Impact Assessment		
COURSE MODULES *in the case of credits being awarded in distinct parts of the course eg. Lectures, Laboratory Exercises, etc. If credit units are awarded uniformly for the whole course, indicate the weekly hours of teaching and the total number of credits.*		**INSTRUCTION HOURS PER WEEK**	**CREDITS**
Lectures and Tutorials		3	9
Add rows if needed. The teaching organization and teaching methods used are described in detail in (4).			
COURSE TYPE *Background, General Knowledge, Scientific Area, Skills Development*	Special Background and Skills Development		
PREREQUISITES:	There are no prerequisite courses. The student is expected to have an adequate background on mathematics, physics/engineering, and basic skills on data processing (e.g. basic operations in excel). Some familiarity with programming (standard equivalent to a first-year science undergraduate programming module) and GIS would be advantageous but is not essential.		
INSTRUCTION/EXAM LANGUAGE:	English		
THE COURSE IS OFFERED TO ERASMUS STUDENTS:	Yes		
COURSE URL:	EURECA PRO LMS Moodle URL: https://moodle.eurecapro.tuc.gr/course/view.php?id=80		

2. LEARNING OUTCOMES

Learning Outcomes

The learning outcomes of the course describe the specific knowledge, skills and competences of an appropriate level that students will acquire after successfully completing the course.

Refer to Appendix A.

- *Description of the Level of Learning Outcomes for each course of study in line with the European Higher Education Area Qualifications Framework*
- *Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B*
- *Learning Outcomes Writing Guide*

After completing this course, the student will be able to:

Knowledge & Understanding:

- Comprehend the foundational concepts of climate science and the implications of a changing climate on both global and localized scales.
- Understanding key methodologies and principles of climate change impact assessment.
- Dissect and comprehend IPCC statements, reports, and findings.

Practical & Technical Skills:

- Source, extract, and interpret fit-for-purpose climate data for impact assessments, using a variety of tools and platforms.

- Apply hands-on techniques such as downscaling, adjustment, and processing of climate data to predict potential impacts.

Analytical & Problem-Solving Skills:

- Design and execute a CCIA project, from initial brainstorming to final presentation, integrating observational data, model outputs, and real-world applications.

Communication & Presentation Skills:

- Communicate scientific findings clearly and effectively.
- Present research projects coherently, integrating data, analyses, and implications into a structured presentation.

General Competencies/Skills

Considering the general competencies that the graduate must have acquired (as listed in the Diploma Supplement and below), which one(s) the course enhances?

Search, analysis and synthesis of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Teamwork
Working in an international environment
Working in an interdisciplinary environment
Production of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment
Demonstration of social, professional and moral responsibility and sensitivity to gender issues
Exercise criticism and self-criticism
Promoting free, creative and inductive thinking

- Search, analysis and synthesis of data and information, using the necessary technologies.
- Promoting free, creative and inductive thinking.
- Autonomous work.
- Working in an interdisciplinary environment.
- Awareness of the importance of the natural environment.

3. COURSE SYLLABUS

The CCIA course delves deep into the multifaceted effects of climate change on natural and human systems. Recognizing the gravity of current global climate challenges, the course equips students with the necessary tools and methodologies to evaluate the potential consequences of a changing climate on various sectors, such as agriculture, water resources, health, and urban planning. It combines scientific understanding with practical implications, focusing on both qualitative and quantitative assessment techniques. Students will learn the importance of local and global scale assessments, as well as the integration of socio-economic scenarios with climate change projections. Emphasis will be given to vulnerability and adaptation strategies, recognizing that climate change impact assessment is not only about understanding consequences but also preparing for them. Through a blend of theoretical knowledge, case studies, and hands-on exercises, learners will be well-prepared to contribute constructively to the climate change discourse and action plans in academic, governmental, or private sectors.

Syllabus:

1st Week:	Introduction to climate change and impact modelling.
2nd Week:	The IPCC organization and the 6th assessment report on impacts adaptation and vulnerability. AR6 Interactive session: Find your own meaning in a Headline Statement 1st Assignment: delve into an IPCC Headline Statement (group assignment)
3rd Week:	Key concepts for Assessing Climate Change Impact. Presentation of the 1st assignment
4th Week:	Climate Change Impacts: A Global and European Perspective The IPCC interactive Atlas. 2nd Assignment: IPCC WG1 AR6 Interactive ATLAS (individual assignment)
5th Week:	Climate Change Impacts: A local scale Perspective Presentation of the 2nd assignment

6th Week:	CCIA Projects Prospectus, roundtable discussion 3rd Assignment: Interpreting Climate Science: A Journal Paper Presentation (group assignment)
7th Week:	Climate model data: Sources, formats, software and repositories. The Copernicus Climate Data Store. Hands-on 1: Obtaining fit-for-purpose data for impact assessment.
8th Week:	Hands-on 2: The Climate Data Operator (CDO), installation
9th Week:	Hands-on 3: The Climate Data Operator (CDO), basic operations
10th Week:	Hands-on 4: Processing data for impact assessments (downscaling and impact modelling)
11th Week:	Presentation of the 3rd assignment
12th Week:	Detection and Attribution of Climate Change impacts
13th Week:	Project presentations and discussion

4. TEACHING and LEARNING METHODS – ASSESSMENT

LECTURE METHOD *Face to face, distance learning, etc.*	Hybrid (Face to face and Distance learning)
USE OF INFORMATION AND COMMUNICATION TECHNOLOGY *Use of ICT in Teaching, in Laboratory Exercises, in Communication with students*	• Moodle learning platform • Zoom communication platform
TEACHING ORGANISATION *Describe in detail the way and methods of teaching.* *Lectures, Seminars, Laboratory Exercise, Field Exercise, Literature review & analysis, Tutoring, Practice (Placement), Clinical Exercise, Artistic Lab, Interactive teaching, Educational visits, Project work, project, etc.* *The student's study hours for each learning activity and the hours of non-guided study according to the ECTS principles are mentioned.*	

ACTIVITY	***Workload per semester (in Hours)***
Lectures	30
Practical classes and workshops	9
Autonomous study	58
Assignments/tasks	62
Projects	66
Course Total (25 hours' workload/ECTS credit)	***225***

ASSESSMENT METHODS *Description of the evaluation process* *Assessment Language, Assessment Methods, Formative or Concluding, Multiple Choice Test, Short Answer Questions, Essay Development Questions, Problem Solving, Written Assignment, Essay / Report, Oral Exam, Public Presentation, Laboratory Assignment, Clinical Examination of Patients, Artistic Interpretation, Other* *Well defined student assessment criteria are mentioned. Mention whether and how the students can access them.*	Assignments (40%) Final project report (40%) Project presentation and discussion (20%)

5. DIGITIZATION (use of tools & software)

- Climate Data Operator (CDO)
- Data processing and analysis software

6. RECOMMENDED INTERNATIONAL LITERATURE

Zhongming, Z., Linong, L., Xiaona, Y., Wangqiang, Z., & Wei, L. (2021). AR6 climate change 2021: The physical science basis.

Pörtner, H. O., Roberts, D. C., Adams, H., Adler, C., Aldunce, P., Ali, E., ... & Fischlin, A. (2022). Climate change 2022: Impacts, adaptation and vulnerability. IPCC Sixth Assessment Report.

Feenstra, J. F., Burton, I., Smith, J. B., & Tol, R. S. (1998). Handbook on methods for climate change impact assessment and adaptation strategies.

Parry, M., Nishioka, S., Harasawa, H., & Carter, T. (1996). Technical guidelines for assessing climate change impacts and adaptations.

Further readings of selected material as indicated in the individual lecture presentations (reports and scientific publications).

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