

Syllabus

UNDERSTANDING THE BASICS OF CLIMATE CHANGE SCIENCE

A. General Information

1. Academic Unit	OFFICE OF THE UNDERGRADUATE VICE-PRESIDENT					
2. Program	SCIENCE, TECHNOLOGY AND INNOVATION TRACK					
3. Code	TRC460					
4. Location in the curriculum	A.A. degree					
5. Credits	8					
6. Type of course	Mandatory		Elective	X	Optional	
7. Duration	Bimonthly		Semi-annual	X	Annual	
8. Modules per week	Theoretical	2	Practical		T.A.	
9. Class hours	Classes	68	Teaching Assistance			
10. Prerequisites	None					

B. Contribution to the Graduate's Profile

Bearing in mind the changes in the job market, mainly because of the global environment, diversity and interdisciplinary view, Universidad del Desarrollo has proposed to educate its students through an educational project that will develop new skills, competencies and knowledge in students. Students will receive a solid education in their branch of knowledge, consistent with the needs of the working world so that they can successfully enter their profession at the end of their undergraduate education. Track courses have thus been designed in the aim of helping students gain more enriching learning experiences through extra-disciplinary education that will prepare them for the changing working world.

Many of the changes that we see in civil society as well as in the economic system are impacted by the effects of Climate Change of our planet and it has brought up a sense of urgency to act now before it is too late. Despite this, there are still movements that deny the existence of this global problem and are trying to downplay the negative effect that various public policies and private investments could have on the environment.

The Understanding the Basics of Climate Change Science course, within the Science, Technology and innovation "Track" was created so that students can understand the scientific foundations of Climate Change, considering that these changes are permanent and will only intensify in the short and medium term.

During this course, the physical foundations of the terrestrial atmospheric system will be at the core of the classes, and we will supplement this by discussing the results of many scientific studies, that illustrate the need for interdisciplinary studies in order to understand Climate Change.

Thanks to the scientific basis that will be laid down in this course, students will gain the skills to critically evaluate the causes of Climate Change, using rigorous scientific reasoning. They will also be able to understand and interpret recent information generated by organizations working in Climate mitigation. Therefore the course will add to the following generic competencies of UDD Future: Communication and Critical Thinking.

C. General Competencies and Learning Outcomes from the Course

Generic Competencies	General Learning Outcomes
<p><i>Communication</i></p> <p><i>Critical Thinking</i></p>	<p>Understand the scientific evidence for Climate Change and Global warming, by means of a bibliographic review</p> <p>Analyze the evidence for Climate Change on a local or global, short, medium or long-term scale through analysis and discussion of scientific articles.</p> <p>Discuss the problem, its effects and possible solutions through a guided debate and discussion.</p> <p>Communicate the information about Climate Change in a technical and efficient way (in English).</p>

D. Units, Content and Learning Outcomes

Units and Content	Competency	Learning Outcomes
<p>Unit I: The Context of Climate Change</p> <ul style="list-style-type: none"> ● Introduction to Climate Change ● Greenhouse gases ● International agreements ● Intergovernmental panel on Climate Change 	<p><i>Communication</i></p> <p><i>Critical thinking</i></p>	<p>Identify the current state of Climate Change and the causes for this change, using relevant literature</p> <p>Analyze the plans and methods of the international organizations involved in mitigation measures, through guided discussions.</p>
<p>Unit II: Fundamentals of the Climate System Part I</p> <ul style="list-style-type: none"> ● Components of the terrestrial Climate System ● Ocean-Atmosphere interactions ● The Global Energy balance ● The Greenhouse effect ● Atmospheric Circulation 	<p><i>Critical thinking</i></p>	<p>Analyze the variables that make up the terrestrial Climate system, focusing on the physical basis and the interaction between them, using group discussions and writing essays justifying with the relevant literature.</p>

<p>Unit III: Fundamentals of the Climate System Part II</p> <ul style="list-style-type: none"> • The Carbon cycle • The role of Biological activity • The study of past Climates • Climate models • Climates on other planets 	<p><i>Critical thinking</i></p>	<p>Characterize the evolution of the terrestrial atmosphere, comparing the present state of the Climate with paleoclimatic findings and studies on other planets through case studies and laboratory/practical examples.</p> <p>Reflect on the role of the biosphere and the impact of human activity on the global climate system, through guided group discussions.</p>
<p>Unit IV: Future Climate Scenarios and Proposed Solutions</p> <ul style="list-style-type: none"> • The impact of Global warming • IPCC future Climate scenarios • Geo-engineering solutions 		<p>Communication</p>

E. Teaching Methods

-Theoretical classes with active participation, where the teachers will impart the information whilst encouraging student participation, stimulating discussions and debates on the topics covered.

-Active learning methods: Group discussions, critical analysis of relevant literature for Climate Change studies. Experiential learning through laboratory practicals or field work.

-Collaborative methods stimulating debate and reflection from the students, planting specific questions to the students during each class.

F. Evaluation

Peer review evaluation:

Students will submit a short essay on a theme of interest related to the respective unit. Each essay will be evaluated by their class-mates, allowing them to develop a critical analysis of the information within it, evaluating both the format used and the quality of the information.

Summative assessments of analysis and comprehension:

Evaluation of knowledge gained, with multiple selection tests using the CANVAS platform.

Exam:

This is obligatory and consists of a research Project that must be presented during the exam class in the form of a 3 minute video, as well as a scientific poster that will be presented in the University’s Science fair.

Attendance requirements:

"The course and/or activity include a mandatory attendance requirement, which implies that students who fail to meet this requirement will not be eligible to take the Final Exam for the subject, as stated in the Academic Regulations for Regular Students. The number of allowable absences will be specified in the respective calendars of each course and/or academic activity, and this information will be provided at the beginning of the school period for each of them."

G. Learning Resources

Essential Bibliography

- Climate Change 2013: The Physical Science Basis (<https://www.ipcc.ch/report/ar5/wg1/>)
- Takeaway Points from the State of the Climate 2019, [American Meteorological Society](#)

Complementary Bibliography

- Cook, John, et al. "Consensus on consensus: a synthesis of consensus estimates on human-caused global warming." *Environmental Research Letters* 11.4 (2016)
- GCRP, US. "Climate literacy: the essential principles of climate science." (2009).
- Dimitrov, Radoslav S. "The Paris agreement on climate change: Behind closed doors." *Global Environmental Politics* 16.3 (2016): 1-11.
- [Too hot to Handle, a Deep dive into Biodiversity in a warming world, WWF Living Planet Report 2020](#)
- [\(CR\)2 Megadrought, Report to the Nation, 2015](#)
- [\(CR\)2 Anthropocene in Chile, Report to the Nation, 2019](#)
- Palmer, T.: Resilience in the developing world benefits everyone, *Nature Climate Change*, volume 10, pages 794–795 (2020)
- Forster et al.: Current and future global climate impacts resulting from COVID-19, *Nature Climate Change*, volume 10, pages 913–919 (2020)

Websites

- <https://www.metoffice.gov.uk/weather/climate/science/the-science-behind-climate-change>
- <https://www.rmets.org/resource/what-climate-change>
- <https://climate.nasa.gov/>
- <https://earthobservatory.nasa.gov/>
- <https://scied.ucar.edu/learning-zone/climate>
- <https://www.noaa.gov/education/resource-collections/climate>
- <https://www.globalchange.gov/browse/educators>
- <https://unfccc.int/>
- <http://climateandhealthalliance.org/resources/impacts/climate-change-and-health-in-south-america/>