



# **Course Syllabus**

## **Climate Change**

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**January – July 2024**

**Elective**

**Lecturer**

**Carrión Puelles, Naldi Susan**

## II. General course details

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<b>Course Name:</b>	Climate Change		
<b>Pre-requisite:</b>	100 credits	<b>Code:</b>	12279
<b>Precedent:</b>	None	<b>Semester:</b>	2024-1
<b>Credits:</b>	3	<b>Term:</b>	IX
<b>Week Hours:</b>	3	<b>Course mode:</b>	On Campus
<b>Type Course and Faculty/University Department:</b>	Elective unit at Environmental Management Engineering	<b>Course Coordinator:</b>	Mayra Arauco Livia <a href="mailto:marauco@esan.edu.pe">marauco@esan.edu.pe</a>

## III. Summary

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The changes to global climate being brought about by human activity present one of the greatest challenges to confront humanity and are likely to have a profound effect over the working lives of today's students. Understanding them requires a comprehensive approach spanning multiple disciplines. The aim of this course is to equip students to begin to do this, by providing a grounding in the central scientific, economic and political issues surrounding climate change.

## IV. Course Objectives

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To provide students from a wide range of backgrounds with an up-to-date view of the scientific, social, cultural, economic, technological and political challenges that climate change poses.

## V. Learning Outcomes

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By the end of this course students should be able to:

- a) Understand the major issues that climate change raises across a range of disciplines (science, economics, politics, engineering etc).
- b) Explain the approaches to these challenges that are currently at play, or proposed, and the problems they create.
- c) Appreciate the role of uncertainty in climate change, how this may be folded into actions, and how it is implemented across different fields (where it often has slightly different meanings).
- d) Critically examine material relating to climate and climate change and assess its reliability.
- e) Be able to meaningfully discuss the nature of climate change with individuals from a wide range of backgrounds.
- f) Communicate effectively, by understanding and writing reports and design documentation, making presentations, and transmitting and receiving clear instructions.
- g) Understand and evaluate the impact of solutions to complex engineering problems in a global, economic, environmental and social context.

- h) Create, select and use modern engineering and information technology techniques, skills, resources and tools, including prediction and modelling, with an understanding of their limitations.
- i) demonstrate knowledge and understanding of the principles of engineering management and economic decision-making, and their respective application.

## VI. Methodology

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The course methodology emphasizes active student participation with the Lecturer assuming the role of learning facilitator. **Students are expected to come to class having completed the readings or watching in advance in order to actively participate in the weekly lectures, seminars, debates and related activities.**

Homework assignments and readings are designed to reinforce the specific course topic and/or to introduce new and additional issues.

Contact and communication between the student and lecturer will be via the virtual campus platform, where all the course resources will also be available.

## VII. Assessment

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The integrated evaluation system is continuous. The grade of the subject is obtained by averaging the continuous evaluation (50%), the partial exam (20%) and the final exam (30%).

The average grade for the continuous assessment results from the average of assessed research reports, integrative activities and creation and presentation of an individual map. The weighting within the continuous evaluation is described in the following table:

<b>CONTINUOUS ASSESSMENT AVERAGE 50%</b>		
<b>Type of evaluation</b>	<b>Description</b>	<b>Weighting</b>
Survey	Do people care about climate change	10%
Report	Climate Change IPCC Report	15%
ESG Report	Report on Personal Approaches to face Climate Change.	20%
Participation	Active participation and follow-up report's presentations	10%
Business Case	Final project on a selected business case/initiative addressing climate change	35%
NDCs Presentation	Climate Change debate about NDCs differences between developed and developing countries	10%

The final average grade (FA) is obtained as follows:

$$A = (0,20 \times MTE) + (0,50 \times CEA) + (0,30 \times FE)$$

Where:

- FA** = Final Average
- MTE** = Mid-Term Exam
- CEA** = Continuous Evaluation Average
- FE** = Final Exam

## Program Content

WEEK	CONTENIDOS	ACTIVITIES / ASSESSMENT
<b>UNIT OF LEARNING I:</b> The Science of Climate Change.		
To understand, evaluate and critically review the underlying physical processes that govern global climate, the evidence for human-induced warming, predictions for the future, and assessment of mitigation strategy.		
1°  March 21 <sup>th</sup> to 27 <sup>th</sup>	<b>Why study this elective course on Climate Change?</b>  1.1. Weather Vs. Climate 1.2. Why we talk about Climate Change?	<ul style="list-style-type: none"> <li>- Course methodology review.</li> <li>- Continuous assessment review, detailing each process.</li> <li>- APA Referencing Style Review (APA Manual)</li> <li>- Guidance for Mendeley use.</li> <li>- Lecture &amp; Class Seminar</li> </ul>
	<b>Read:</b> <b>Earth Day 2023 – Is concern and focus slipping on climate change?</b> <a href="https://www.ipsos.com/en/earth-day-2023-concern-and-focus-slipping-climate-change">https://www.ipsos.com/en/earth-day-2023-concern-and-focus-slipping-climate-change</a>  <b>Public concern about climate change</b>  <a href="https://www.ipsos.com/sites/default/files/ct/news/documents/2023-07/ipsos%20July%202023%20Political%20Monitor%20Charts_Climate_V1.pdf">https://www.ipsos.com/sites/default/files/ct/news/documents/2023-07/ipsos%20July%202023%20Political%20Monitor%20Charts_Climate_V1.pdf</a>  <b>More people care about climate change than you think</b> <a href="http://cristinacabal.com">http://cristinacabal.com</a>  <b>Additional Material</b>  Part 1 – Chapters 1 y 2: The Climate System, Mathez & Smerdon (2018). Climate Change: The Science of Global Warming and Our Energy Future.  WHO view on Climate Change <a href="https://www.who.int/news-room/fact-sheets/detail/climate-change-and-health#:~:text=Climate%20change%20is%20directly%20contributing,highly%20susceptible%20to%20climate%20change.">https://www.who.int/news-room/fact-sheets/detail/climate-change-and-health#:~:text=Climate%20change%20is%20directly%20contributing,highly%20susceptible%20to%20climate%20change.</a>	<b>Discussion 1</b> Does people bother about climate change?  <b>Video Activity:</b> Does TikTok have a climate change denial problem?  <a href="https://youtu.be/42xHuSmwYa4?si=75Y_H2pnaXBKRx4P">https://youtu.be/42xHuSmwYa4?si=75Y_H2pnaXBKRx4P</a>  <b>Discussion 2</b> Do you think that climate change needs individuals' behavior change? What we need to change?  <b>Video Activity:</b> Short-term variability <a href="http://www.youtube.com/watch?v=e0vj-0imOLw">http://www.youtube.com/watch?v=e0vj-0imOLw</a>  <b>1st Group Assignment</b> Run a survey regarding climate change topic.

<p style="text-align: center;"><b>2°</b></p> <p style="text-align: center;"><b>Apr.</b> <b>1<sup>st</sup> to 6<sup>th</sup></b></p>	<p><b>Scientific Debate and Denial</b></p> <p>1.3. Climate Change debate – who to believe?  1.4. Sustainability connection with climate change  1.5. Sustainable Development Goals</p>	<p>Lecture &amp; Class Seminar</p> <p><b>Discussion 3</b> Denial or misinformation</p>
	<p><b>Read:</b></p> <p>Understanding the differences between climate change deniers and believers' knowledge, media use, and trust in related information sources</p> <p><a href="https://www.sciencedirect.com/science/article/pii/S0363811120301132?casa_token=x903g59Kt60AAAAA:NOINhE6RmfEJ9zU0tdi4ShlIE5F927ilzC3hlq96ebGDr8_rB8jPDrUfxPijS88kl4ao15JkfaPt">https://www.sciencedirect.com/science/article/pii/S0363811120301132?casa_token=x903g59Kt60AAAAA:NOINhE6RmfEJ9zU0tdi4ShlIE5F927ilzC3hlq96ebGDr8_rB8jPDrUfxPijS88kl4ao15JkfaPt</a></p> <p>Copernicus: 2023 is the hottest year on record, with global temperatures close to the 1.5°C limit  <a href="https://climate.copernicus.eu/copernicus-2023-hottest-year-record">https://climate.copernicus.eu/copernicus-2023-hottest-year-record</a></p> <p><b>Additional Material</b></p> <p>Part 1 – Chapters 3: The Climate System, Mathez &amp; Smerdon (2018). Climate Change: The Science of Global Warming and Our Energy Future.</p>	<p><b>Discussion 4</b> Does social media influence our decision to take action?</p> <p><b>Discussion 5</b> Is emphasizing consensus in climate science helpful for policymaking?</p> <p><b>Video Activity:</b> Climate deniers don't deny climate change any more</p> <p><a href="https://youtu.be/3XSG2Dw2mL8?si=iQaBow2UfWbbW1Qk">https://youtu.be/3XSG2Dw2mL8?si=iQaBow2UfWbbW1Qk</a></p> <p>Ted Talk: Why should you believe scientists?  <a href="http://www.ted.com/talks/nami_oreskes_why_we_should_believe_in_science">http://www.ted.com/talks/nami_oreskes_why_we_should_believe_in_science</a></p> <p><b>Climate of Doubt</b>  <a href="https://www.pbs.org/wgbh/frontrange/film/climate-of-doubt/">https://www.pbs.org/wgbh/frontrange/film/climate-of-doubt/</a></p> <p>Debate I: Is it the data reliable? (what's the matter with climate sensibility, is there a conspiracy)</p>
<p style="text-align: center;"><b>3°</b></p> <p style="text-align: center;"><b>Apr.</b> <b>8<sup>th</sup> to 13<sup>th</sup></b></p>	<p><b>Evidence for climate change</b></p> <p>2.1 Climate change measurement (parameters)  2.2 Historical climate record  2.3 El Niño y La Niña precipitation effects  2.4 Vicious Cycles</p>	<p>Lecture &amp; Class Seminar</p> <p>Presentation Groups' survey results</p> <p>Debate II: Did climate change affect ancient civilizations? (examples)</p> <p><b>Video Activity:</b> UN: Without halving emissions by 2030 world faces warming of around 3°C  <a href="https://youtu.be/tx1eZ3JyzDY">https://youtu.be/tx1eZ3JyzDY</a></p>

		I wasn't worried about climate change. Now I am. <a href="https://youtu.be/4S9sDyooxf4?si=zUp25j959ARbvymD">https://youtu.be/4S9sDyooxf4?si=zUp25j959ARbvymD</a>
	<b>Read:</b> Chapter 3: The rise and fall of civilizations. Mathez & Smerdon (2018). Climate Change in Human History: Prehistory to the Present.	Quiz 1  <b>Discussion 1</b> Read <a href="https://www.conservationcouncil.ca/is-climate-change-something-we-really-need-to-worry-about/">https://www.conservationcouncil.ca/is-climate-change-something-we-really-need-to-worry-about/</a>  Watch Video Activity: What's the Big Deal With a Few Degrees?   Global Weirding <a href="https://youtu.be/6cRCbgTA_78">https://youtu.be/6cRCbgTA_78</a>
4°  Apr. 15 <sup>th</sup> to 20 <sup>th</sup>	<b>What is carbon?</b> 3.1 Fossil fuels 3.2 The carbon cycle 3.3. Are changes made by humans? - Carbon footprints 3.4. what's your budget? - Carbon budgets 3.5 The 3.6 limit 3.6 Steps to net zero	Lecture & Class Seminar
	<b>Read:</b> Part 1 – Chapter 4: The Climate System. Mathez & Smerdon (2018). Climate Change: The Science of Global Warming and Our Energy Future.	<b>Video Activity:</b> Real World: The Carbon Cycle -- Essential for Life on Earth <a href="https://youtu.be/hgFpvDNfXOk">https://youtu.be/hgFpvDNfXOk</a> Quiz 2
<b>UNIT OF LEARNING II:</b> To analyze and assess the ecological, economic and social progress and their relationship with climate change.		
5°  Apr. 22 <sup>nd</sup> to 27 <sup>th</sup>	<b>Population, Resources and Consumption Part I</b> 4.1 Wicked problems. 4.2 The Industrial Revolution and Population shifts 4.2 Rise of megacities 4.3 Longer life expectancies 4.4 Intensive farming techniques 4.5 Toxins in our food chain 4.6 Deforestation 4.7 Overfishing and Invasive species	Lecture & Class Seminar  <b>Presentation:</b> Report on Personal Approaches to face Climate Change.
	<b>Read:</b> Chapter 3, 4 & 5: Population, Food and Resources, Rising Consumption. Berkhout F. (2021) Simply Climate Change.  IPCC Summary for Policymakers:	Quiz 3  Debate II: Are demographic growth and technology development an

	<a href="https://www.ipcc.ch/report/ar6/wg2/downloads/report/IPCC_AR6_WGII_SummaryForPolicymakers.pdf">https://www.ipcc.ch/report/ar6/wg2/downloads/report/IPCC_AR6_WGII_SummaryForPolicymakers.pdf</a>  IPCC Technical Summary <a href="https://www.ipcc.ch/report/ar6/wg2/downloads/report/IPCC_AR6_WGII_TechnicalSummary.pdf">https://www.ipcc.ch/report/ar6/wg2/downloads/report/IPCC_AR6_WGII_TechnicalSummary.pdf</a>	antecedents and drivers of climate change?
6°  Apr. 29 <sup>th</sup> to May 4 <sup>t</sup>	<b>Population, Resources and Consumption Part II</b> 4.8 Wasted food 4.9 Water consumption 4.10 Cheap and dirty energy: Coal-burning energy 4.11 Transport: a high burden 4.12 Industrial emissions 4.13 Fast fashion 4.14 Mountains of waste  <b>Read:</b> Chapter 3, 4 & 5: Population, Food and Resources, Rising Consumption. Berkhout F. (2021). Simply Climate Change	Lecture & Class Seminar
		Quiz 4 Debate III: Is it our demographic future possible?
7° May. 6 <sup>rd</sup> to 11 <sup>th</sup>	<b>MID TERM EXAMS (ELECTIVES)</b>	
8° May. 13 <sup>rd</sup> to 18 <sup>t</sup>	<b>MID TERM EXAMS</b>	
<b>UNIT OF LEARNING II:</b> To analyze and assess the ecological, economic and social progress and their relationship with climate change. To examine and critically review the difficulties in the way of reaching a political consensus for action to mitigate climate change; political strategies and technological mechanisms to overcome them, and to adapt to future changes.		
9°  May. 20 <sup>th</sup> 25 <sup>th</sup>	<b>Effects on the atmosphere, Land and Oceans Part I</b> 5.1 A warmer world 5.2 Changing our climate 5.3 Season creep 5.4 Extreme weather 5.5 Acid rain 5.6 Light pollution 5.7 Air pollution 5.8 Depletion of the ozone layer	Lecture & Class Seminar
	<b>Read:</b> Chapter 6, 7 y 8: Effects on the atmosphere, Effects on Land, Effects on Oceans. Berkhout F (2021). Simply Climate Change  Part I – Chapter I: Changing the Biosphere. Lovejoy & Hannah (2019). Biodiversity and Climate Change	<b>Video Activity:</b> Engineering the Software for Understanding Climate Change <a href="https://youtu.be/vliW6ugLHL4">https://youtu.be/vliW6ugLHL4</a>  Debate IV: Can we value/calculate the ecosystem impact lost?

<b>10°</b>  <b>May.</b> <b>27<sup>th</sup> to</b> <b>Jun. 1<sup>st</sup></b>	<b>Effects on the atmosphere, Land and Oceans Part II</b> 5.9 Wildfires 5.10 Drought and desertification 5.11 A decrease in biodiversity 5.12 Habitat loss 5.13 Glaciers in retreat 5.14 Melting permafrost 5.15 Rising Sea Levels 5.16 Dying Oceans 5.17 Plastic Pollution	Lecture & Class Seminar  <b>Presentation:</b> Climate Change IPCC Report Assignment
	<b>Read:</b> Chapter 6, 7 y 8: Effects on the atmosphere, Effects on Land, Effects on Oceans. Berkhout F. (2021). Simply Climate Change	<b>Video Activity:</b> Inside an Antarctic time machine <a href="https://www.ted.com/talks/ee_hotz_inside_an_antarctic_time_machine">https://www.ted.com/talks/ee_hotz_inside_an_antarctic_time_machine</a>  Debate IV: What are we expose to that is related with climate change?
<b>11°</b>  <b>Jun.</b> <b>3<sup>rd</sup> to 8<sup>th</sup></b>	<b>Human Cost</b> 6.1 Climate inequalities 6.2 Displaced by disasters: Climate migrants 6.3 Infectious diseases 6.4 less food in our future: Malnutrition 6.5 The struggle for food: Food security 6.6 thirsty world: Freshwater scarcity	Lecture & Class Seminar
	<b>Read:</b> Chapter 9: Human Cost. Berkhout F. (2021). Simply Climate Change	Debate V: Have our countries being socially affected by climate change?
<b>12°</b>  <b>Jun.</b> <b>10<sup>th</sup> to</b> <b>15<sup>th</sup></b>	<b>Large Scale Solutions and Mitigation Scenarios</b> 7.1 Social and technology-based approaches 7.2 Conventional regulations 7.3 Market-based regulations 7.4 Information and voluntary methods Summary	Lecture & Class Seminar  <b>Presentation:</b> NDCs Reports
	<b>Read:</b> Chapter 10: Large Scale Solutions. Berkhout F. (2021). Simply Climate Chang  Chapter 12 Dessler (2015). Introduction to Modern Climate Change.  Case for a carbon Tax <a href="http://www.nytimes.com/2015/06/07/opinion/the-case-for-a-carbon-tax.html">http://www.nytimes.com/2015/06/07/opinion/the-case-for-a-carbon-tax.html</a>	<b>Video Activity:</b> <a href="http://youtu.be/ZYi78LaY8u4">http://youtu.be/ZYi78LaY8u4</a>  Debate VI: Does successful emissions reduction lie in the hands of non-state rather than state actors? / Is it technology enough?
<b>13°</b>  <b>Jun.</b> <b>17<sup>th</sup> to</b> <b>22<sup>rd</sup></b>	<b>The Politics of Climate Change</b> 8.1 The beginnings of climate science 8.2 The emergence of environmentalism 8.3 A long-term policy to address climate change Summary	Lecture & Class Seminar  Why do NDCs are different between developed and developing countries?
	Chapter 13 Dessler (2015). Introduction to Modern Climate Change.	



<b>14°</b>  <b>Jun.</b> <b>24<sup>th</sup> to</b> <b>28<sup>th</sup></b>	<b>Change on a personal scale</b> 9.5 Change from The ground up - Think globally, act locally 9.6 Making their voices heard - Climate activism 9.7 Collective change 9.8 Changing mindsets: Changing how we travel, eating 9.9 Green, Electric cars, Public transportation  <b>Course Summary: A Long-Term Policy to Address Climate Change</b>	Lecture & Class Seminar  <b>Presentation</b> Final project on a selected business case/initiative addressing climate change
	Chapter 11: Change on a Personal Scale. Berkhout F. (2021). Simply Climate Chang	Debate VI: Are social media making constructive climate policymaking harder?  <b>Evaluation</b> Final project presentations (Business stress-testing / future-proofing)
<b>15°</b> <b>Jul.</b> <b>1<sup>st</sup> to 6<sup>th</sup></b>	<b>FINAL EXAMS (ELECTIVES)</b>	
<b>16°</b> <b>Jul.</b> <b>8<sup>th</sup> to</b> <b>13<sup>th</sup></b>	<b>FINAL EXAMS</b>	

## 9 Bibliography

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- Andrew E. Dessler (2015). Introduction to Modern Climate Change - Cambridge University Press.
- Berkhout F. (2021). Simply Climate Change

Below are several sources of possible reading that complement the course. They are not intended to be exhaustive.

- Dryzek, Norgaard & Schlosberg (2013). Climate Challenged Society. OUP.
- Lovejoy & Hannah (2019). Biodiversity and Climate Change
- Mathez & Smerdon (2018). Climate Change: The Science of Global Warming and Our Energy Future.
- Mathez & Smerdon (2018). Climate Change in Human History: Prehistory to the Present.

## 10 Lecturer

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Naldi Susan Carrión Puelles PhD(c)

email: ncarrion@esan.edu.pe