



UNIVERSIDAD
esan

Course syllabus Climate Change

March – July 2019

Elective

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I. General course information

Course Name:	Climate Change		
Requirements:	100 créditos	Code:	12279
Precedent:	None	Semester:	2019-1
Credits:	3	Semester:	IX
Hours per week:	3 hours	Modality:	Presential
Major(s)	Elective course Engineering in environmental management	Course coordinator:	Mayra Arauco Livia marauco@esan.edu.pe

II. Course summary

Earth has a complex, interconnected system of processes that control the state of the climate. This course explores the science of climate change, perhaps the defining environmental issue of the 21st century. Students will learn how the climate system works; what factors cause climate to change across different time scales and how those factors interact; how climate has changed in the past; how scientists use models, observations and theory to make predictions about future climate; and the possible consequences of climate change for our planet. Finally, the course looks at the connection between human activity and the current warming trend and considers some of the potential social, economic and environmental consequences of climate change. We will examine these climate impacts and will also focus our attention on what can be done to help us successfully meet these challenges.

III. Course goals

The goal of this course is to provide students with adequate analytical tools to evaluate the complexity of climate change as a problem that includes scientific, social, cultural, economic, technological and political elements.

IV. Learning outcomes

Students who successfully complete this course would be able to:

- Understand fundamental physical processes underlying climate variability and climate change
- Critically read and discuss academic articles on climate change, recognizing the importance of different discourses and approaches;
- Explain and evaluate the evidence for human-caused climate change, in the context of historical climate change, as well as the relevant scientific uncertainties;

- Explain the impacts of climate change on human well-being and the natural world, and evaluate means by which these impacts can be reduced (adaptation).
- Understand the social dimensions of climate change from multiple perspectives.
- Critically evaluate and use visual media and other communication strategies to engage people on climate change.

V. Methods

Classes will include lectures, readings, in-class projects and evaluations, presentations, film screenings, and a group project. The textbook chapters, articles, reports, websites, and videos that students will read and watch during the quarter are key sources of information about climate science and policy. Students are required to come to class having completed the readings. Homework assignments and readings are designed to reinforce the course material and/or to introduce additional concepts and related issues.

The class will visit the Atarjea water plant in Lima to get a closer view of how a central facility for the city of Lima is being affected by climate change and how they are adapting to the future climate.

VI. Assessment

Your final grade will be the weighted average of 4 different elements:

a) Permanent evaluation (50%); b) Midterm exam (20%); and c) Final exam (30%).

Permanent evaluation grade is obtained as described in the following table:

PERMANENT EVALUATION 50%		
Type of evaluation	Description	Weighting factor %
Reading Quizzes	3 journal articles	15%
In class assignments (the lowest grade will not be considered)	Students will complete 3 in class assignments which will consist on discussing peer reviewed articles.	10%
Research work	Written works (40%) First draft (20%) Final draft (50%)	50%
	Exposition (60%) Group exposition (30%) Individual exposition (70%)	
Discussion facilitation (Oral presentation)	Presentación de un tema específico (PPT)	15%
In-class participation	Students' engagement in class discussions will be evaluated	10%

The continuous assessment average (CAA) is obtained from the weighted average of the assessments of the student's work. The weightings of each continuous assessment are shown in the following table:

The final grade (FG) is obtained using the following formula:

$$\mathbf{FG} = (0, 50 \times \mathbf{PE}) + (0, 20 \times \mathbf{ME}) + (0, 30 \times \mathbf{FE})$$

Where:

FG = Final Grade
MT = Mid Term Exam
PE = Permanent Evaluation
FE = FE

VII. Contents

WEEK	CONTENTS	ACTIVITIES / ASSESMENT
LEARNING UNIT I: THE SCIENCE OF CLIMATE CHANGE		
LEARNING OUTCOMES: <ul style="list-style-type: none"> • Critically read and discuss academic articles on climate change, recognizing the importance of different discourses and approaches • Explain and evaluate the evidence for human-caused climate change, in the context of historical climate change, as well as the relevant scientific uncertainties • Explain and evaluate the evidence for human-caused climate change, in the context of historical climate change, as well as the relevant scientific uncertainties 		
1° March 21th– 27th	1.1 What do you know and what do you want to know about climate change? 1.2 What makes climate change a new type of environmental problem? Maslin, Mark. <i>Climate Change: A Very Short Introduction</i> , Third Edition. Oxford: Oxford UP, 2014. (P. 1-11). Houghton, John (2015) <i>Global Warming: The complete briefing</i> . 5th Edition. Cambridge: Cambridge University Press. (P. 1-11)	Course presentation Course policies and class presentations distribution
2° March 28th -April 3rd	OVERVIEW OF CLIMATE SCIENCE 1.3 Earth's climate system today: Earth's energy budget 1.4 The concept of radiative forcing W.F. Ruddiman (2014), <i>Earth's Climate: Past and Future</i> . New York: W. H. Freeman. Chapter 1	Class introduction by a student Lecture In class assignment # 1 Climate Science Class discussion
3° April 4th – 10th	1.5 Greenhouse effect W.F. Ruddiman (2014), <i>Earth's Climate: Past and Future</i> . New York: W. H. Freeman. Chapter 2	Class introduction by a student Lecture Class discussion

<p>4° April 11th – 17th</p>	<p>1.6 Heat transformation</p> <p>W.F. Ruddiman (2014), <i>Earth's Climate: Past and Future</i>. New York: W. H. Freeman. Chapter 2</p> <p>D. Archer and S. Rahmstorf (2010), <i>The Climate Crisis: An Introductory Guide to Climate Change</i>. Cambridge University Press. Chapter 2</p>	<p>Class introduction by a student</p> <p>Lecture Class discussion</p>
<p>5° April 22th – 27th</p>	<p>1.7 The history of climate: What Can We Learn from the Past?</p> <p>W.F. Ruddiman (2014), <i>Earth's Climate: Past and Future</i>. New York: W. H. Freeman, Chapter 3</p>	<p>Reading quiz # 1 Past climate and the future of climate change</p> <p>Class introduction by a student Lecture Class discussion</p>
<p>6° April 29th – May 4th</p>	<p>1.8 Climate modelling: Global atmospheric circulation</p> <p>1.9 Future climate: Scenarios and projections</p> <p>Houghton, John (2015) <i>Global Warming: The complete briefing</i>. 5th Edition. Cambridge: Cambridge University Press. Chapter 5</p>	<p>Class introduction by a student Lecture Class discussion</p> <p>In class assignment # 2 Climate projections</p>
<p>7° May 6th -11th</p>	<p>CLASS MIDTERM EXAM</p>	
<p>8° May 13th – 18th</p>	<p>MIDTERM EXAMS</p>	
<p>LEARNING UNIT II: LOOKING AHEAD –POTENTIAL CONSEQUENCES, RISKS, UNCERTAINTIES, AND SOLUTIONS OF CLIMATE CHANGE</p> <p>LEARNING OUTCOMES:</p> <ul style="list-style-type: none"> • Explain the impacts of climate change on human well-being and the natural world, and evaluate means by which these impacts can be reduced (adaptation). • Understand the social dimensions of climate change from multiple perspectives; • Critically evaluate and use visual media and other communication strategies to engage people on climate change 		

<p>9° May 20th – 25th</p>	<p>2.1 Impacts of climate change: Who is being affected today and who could be affected in the future?</p>	<p>Class introduction by a student Lecture Class discusión</p> <p>Reading quiz # 2 Climate Change in Latin America</p>
	<p>D. Archer and S. Rahmstorf (2010), <i>The Climate Crisis: An Introductory Guide to Climate Change</i>. Cambridge University Press. Chapter 8.</p>	
<p>10° May 27th – June 1st</p>	<p>Impacts of climate change: Who is being affected today and who could be affected in the future? (Continuation)</p>	<p>Film Screening: <i>Before the Flood</i> film screening</p>
<p>11° June 3rd – 8th</p>	<p>2.2 Mitigation and Adaptation</p>	<p>Class introduction by a student Lecture Class discussion</p> <p>In class assignment #3 Communication and climate change</p>
	<p>A. Dessler and E.A. Parson (2010), <i>The Science and Politics of Global Climate Change: A Guide to the Debate</i>. Cambridge: Cambridge University Press, 2nd edition. Chapter 3</p> <p>D. Archer and S. Rahmstorf (2010), <i>The Climate Crisis: An Introductory Guide to Climate Change</i>. Cambridge University Press. Chapter 9</p>	
<p>12° June 10th – 15th</p>	<p>2.3 Climate policy options under uncertainty: 2.4 International Agreements: The future of adaptation and mitigation: Beyond the Paris Climate Agreement</p>	<p>Class introduction by a student Lecture</p> <p>Reading quiz #3 The history climate policy</p> <p>Class discussion</p>
	<p>Gupta, J. (2010). "A History of International Climate Policy." Wiley Interdisciplinary Reviews: Climate Change 1(5): 636-653.</p> <p>Clemencon, "The Two Sides of the Paris Climate Agreement: Dismal Failure or Historic Breakthrough?"</p> <p>A. Dessler and E.A. Parson (2010), <i>The Science and Politics of Global Climate Change: A Guide to the Debate</i>. Cambridge: Cambridge University Press, 2nd edition. Chapter 5</p>	
<p>13° June 17th – 22th</p>	<p>2.5 Measuring and Minimizing the Carbon Footprint</p>	

	WRI (2004). <i>The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard</i> .	
14° June 24 th – 29 th	Final projects presentation	Student presentations Class discussion
15° July 1 st – 6 th	CLASS FINAL EXAM	
16° July 8 th – 13 th	FINAL EXAMS	

VIII. Readings

Required readings:

- Houghton, John (2015) *Global Warming: The complete briefing*. 5th Edition. Cambridge: Cambridge University Press.
- D. Archer and S. Rahmstorf (2010), *The Climate Crisis: An Introductory Guide to Climate Change*. Cambridge University Press.
- Dessler and E.A. Parson (2010), *The Science and Politics of Global Climate Change: A Guide to the Debate*. Cambridge: Cambridge University Press, 2nd edition.
- W.F. Ruddiman (2014), *Earth's Climate: Past and Future*. New York: W. H. Freeman.
- Maslin, Mark. *Climate Change: A Very Short Introduction, Third Edition*. Oxford: Oxford UP, 2014. ISBN: 9780198719045
- IPCC (2014) *Climate Change 2014: Synthesis Report* Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Geneva, Switzerland: IPCC.
- IPCC (2014) *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press, Cambridge and New York.
- World Resources Institute and World Business Council for Sustainable Development. (2004). *The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (revised edition)*.

Complementary Bibliography

- N. Oreskes and E. Conway, *Merchants of Doubt: How a Handful of Scientists Obscured the Truth on Issues from Tobacco Smoke to Global Warming*. Bloomsbury Press, ISBN-13: 978-1608193943.
- Cléménçon, R. (2016). The two sides of the Paris climate agreement: Dismal failure or historic breakthrough?.
- Gupta, J. (2010). "A History of International Climate Policy." *Wiley Interdisciplinary Reviews: Climate Change* 1(5): 636-653.
- IPCC Report 2014: "Summary for Policy Makers" and "Central and South America.
- Pelling, M. 2011. *Adaptation to climate change: from resilience to transformation*, Routledge

IX. Lab support

Not required

X. Instructor

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