

Environmental Economics: Climate Change

2022-2023 Academic Year

Master of Research in Economics, Finance and Management

1. Description of the subject

- Environmental Economics: Climate Change
- Code: 32589
- Total credits: 3 ECTS Workload: 75 hours
- Term: 3rd
- Type of subject: Optative
- Department of Economics and Business
- Teaching team: Humberto Llavador. humberto.llavador@upf.edu
Office: 20.204

2. Teaching guide

Introduction

Climate change is arguably the most complex and pressing environmental problem the world has ever faced. This course attacks the problem of climate change from the perspective of economics. The aim is to provide you with an understanding of some of the relevant economic issues on climate change and the existing debates. Hopefully it will expand your view of economics and stimulate your own research ideas.

Enrollment

This is a course for the Master of Research students. It is also open to a few Master students in the Economics Program who aim at a Ph.D.

Enrollment is limited to 16 students. Selection of Master students will be made by the end of December based on available grades and research interests. Enrolment after that date will only open if there are still available places.¹

Teaching methodology

The course starts with an introduction to the science of climate change for economists, followed by the presentation of specific topics on positive and normative analysis, and policy issues of climate change economics. It is structured around 8 lectures and student presentations during the last sessions.

¹ Master students may also consider the course The Energy Transition and Climate Change that I offer in the second term as part of the Economics of Energy, Climate Change, and Sustainability program. This course is offered in some other BSE master's programs as an Out of Program and it might be eligible for certain students (subject to specific course requirements and schedules permitting).

 Contents²

1. Introduction. Climate Change for Economists

- Dietz, S. & Venmans, F. (2019) “Cumulative carbon emissions and economic policy: In search of general principles.” *J. Environ. Econ. Manage.* 96, 108–129.
- Hsiang, S., & Kopp, R. E. (2018). An economist’s guide to climate change Science. *Journal of Economic Perspectives*, 32(4), 3–32.
- IPCC, AR6 Climate Change 2021: The Physical Science Basis.
<https://www.ipcc.ch/report/ar6/wg1/>

2. Integrated Assessment Modeling

- Cai, Yongyang, and Thomas S. Lontzek (2019): "The Social Cost of Carbon with Economic and Climate Risks", *Journal of Political Economy*, 127(6): 2684-2734.
- Golosov, Mikhail, John Hassler, Per Krusell, and Aleh Tsyvinski. 2014. “Optimal Taxes on Fossil Fuel in General Equilibrium.” *Econometrica* 82 (1): 41–88.
- Nordhaus, W. (2019) “Climate Change: The Ultimate Challenge for Economics,” *Am. Econ. Rev.* 109, 1991–2014 (2019).
- Nordhaus, W. D. Revisiting the social cost of carbon. *Proc. Natl. Acad. Sci.* 114, 1518–1523 (2017).
- Nordhaus, W. Evolution of modeling of the economics of global warming: changes in the DICE model, 1992–2017. *Clim. Change* 148, 623–640 (2018).

3. Normative economics of climate change

- Dennig, Francis, Mark B Budolfson, Marc Fleurbaey, Asher Siebert, and Robert H Socolow. 2015. “Inequality, Climate Impacts on the Future Poor, and Carbon Prices.” *Proceedings of the National Academy of Sciences* 112 (52): 15827–32.
- Llavador, H., Roemer, J. E. & Silvestre, J. North–south convergence and the allocation of CO2 emissions. *Climatic Change* 130, 383–395 (2015).
- Llavador, H., Roemer, J. E. & Silvestre, J. Sustainability for a Warming Planet, Harvard University Press (2015).

4. Tipping Points in the Economics of Climate Change (offered by Thomas Stoerk)

- Dietz, S., Rising, J., Stoerk, T., & Wagner, G. (2021). Economic impacts of tipping points in the climate system. *Proceedings of the National Academy of Sciences*, 118(34), e2103081118.
- Lenton, Timothy M., Hemann Held, Elmar Kriegler, Jim W. Hall, Wolfgang Lucht, Stefan Rahmstorf, and Hans Joachim Schellnhuber (2008): "Tipping elements in the Earth's climate system", *Proceedings of the National Academy of Sciences*, 105(6): 1786-1793.
- Nordhaus, William (2019): "Economics of the disintegration of the Greenland ice sheet", *Proceedings of the National Academy of Sciences*, 116(25): 12261-12269.

5. Carbon Markets and the EU Emissions Trading System (offered by Thomas Stoerk)

- Martin, Ralf, Mirabelle Muûls, and Ulrich J. Wagner (2016): "The Impact of the European Union Emissions Trading Scheme on Regulated Firms: What Is the Evidence after Ten Years?", *Review of Environmental Economics and Policy*, 10(1): 129-148.
- PMR (Partnership for Market Readiness) - ICAP (International Carbon Action Partnership) (2016): *Emissions Trading in Practice: A Handbook on Design and Implementation*, Washington, DC: International Bank for Reconstruction and Development / The World Bank.

6. Climate Change Policy, Innovation and Trade

- Acemoglu, D., Aghion, P., Burszty, L., & Hemous, D. (2012). “The Environment and Directed Technical Change.” *American Economic Review*, 102(1), 131–166.
- Hassler, J., Krusell, P., & Olovsson, C. (2021). “Directed Technical Change as a Response to Natural Resource Scarcity.” *Journal of Political Economy*, 129(11), 3039–3072.

² Order, content, and references subject to change.

7. International agreements, cooperation and carbon markets (either 7 or 8)

Caparrós, A. (2020). “Pledge and implement bargaining in the Paris Agreement on climate change.” Working Paper. 2020-05 IPP (CSIC)

Keohane, R. O. & Victor, D. G. Cooperation and discord in global climate policy. *Nat. Clim. Chang.* **6**, 570–575 (2016).

Llavador, H., Roemer, J. and Stoerk T., (2022) “Global Unanimity Equilibrium on the Carbon Budget.” Working paper.

Nordhaus, B. W. (2015) Climate Clubs: Overcoming Free-riding in International Climate Policy. *Am. Econ. Rev.* 105, 1339–1370.

8. Energy Transition (offered by Mar Reguant³)

Fabra, Natalia (2021) “The Energy Transition: An Industrial Economics Perspective,” *International Journal of Industrial Organization* 79:102734.

Kellogg, Ryan and Mar Reguant (forthcoming) “Energy and Environmental Markets, Industrial Organization, and Regulation,” chapter for the Handbook of Industrial Organization.

 **Assessment and Grading System**

The course will be graded on a 0-10 scale:

0-4.5	Fail
5-6	C
6.5-7.5	B
8-9	A
9.5-10	A+

Evaluation will be based on in-class participation (20%) and a presentation (80%).

³ Pending confirmation.