Topics in Environmental Macroeconomics

Instructor: Marcelo Aarestrup Arbex **Period:** October 21 - 25, 2024
Lecture Time: 9:00am - 12:00pm **Lecture Location:** TBA

Course Description

This course explores the intersection of economic growth, innovation, and environmental policy in the context of climate change and resource constraints. We will examine models of endogenous and directed technical change, focusing on the role of carbon taxes, research subsidies, and clean energy incentives in transitioning from "dirty" to "clean" inputs. Topics include the substitutability of inputs, the dynamics of energy-saving innovations, and the macroeconomic implications of energy shocks. Through quantitative models, the course will assess the effectiveness of climate policies in reducing emissions, fostering innovation, and balancing economic growth with sustainability.

List of Papers

- The Environment and Directed Technical Change (Acemoglu et al., 2012)
- Climate Policy and Innovation: A Quantitative Macroeconomic Analysis (Fried, 2018)
- Directed Technical Change as a Response to Natural Resource Scarcity (Hassler et al., 2021, 2012)
- Energy Efficiency and Directed Technical Change: Implications for Climate Change Mitigation (Casey, 2023)
- The Macroeconomics of Clean Energy Subsidies (Casey et al., 2023)
- Materials, Technology and Growth: Quantifying the Costs of Circularity (Arbex and Mahone, 2024)

References

Acemoglu, D., P. Aghion, L. Bursztyn, and D. Hemous (2012): "The Environment and Directed Technical Change," *American Economic Review*, 102, 131–66.

Arbex, M. and Z. Mahone (2024): "Materials, Technology and Growth: Quantifying the Costs of Circularity," Working Papers 2402, University of Windsor, Department of Economics.

Casey, G. (2023): "Energy Efficiency and Directed Technical Change: Implications for Climate Change Mitigation," *The Review of Economic Studies*, rdad001.

Casey, G., W. Jeon, and C. Traeger (2023): "The Macroeconomics of Clean Energy Subsidies," CER-ETH Economics working paper series 23/387, CER-ETH - Center of Economic Research (CER-ETH) at ETH Zurich.

Fried, S. (2018): "Climate Policy and Innovation: A Quantitative Macroeconomic Analysis," *American Economic Journal: Macroeconomics*, 10, 90–118.

Hassler, J., P. Krusell, and C. Olovsson (2012): "Energy-Saving Technical Change," NBER Working Papers 18456, National Bureau of Economic Research, Inc.

——— (2021): "Directed Technical Change as a Response to Natural Resource Scarcity," *Journal of Political Economy*, 129, 3039–3072.