



UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

SYLLABUS DEL CORSO

Economics of The Environment and Climate Change

2627-2-E3304M010

Learning objectives

The course introduces students to the main tools of environmental economics and the economics of climate change. By the end of the course, students will be able to identify the market failures underlying environmental problems; explain the role of externalities, public goods and common-pool resources; compare carbon taxes, tradable permits, standards, bans and subsidies; interpret empirical evidence on environmental and climate policies; discuss trade-offs among efficiency, equity, innovation and political feasibility; and develop a short policy analysis of a concrete environmental problem.

Contents

The course studies the environment and climate change as economic problems. The first part introduces externalities, public goods, common-pool resources and policy instruments. The second part discusses carbon pricing, regulation, standards, subsidies and behavioural tools. The third part presents empirical evidence on environmental policies, with attention to causality, difference-in-differences, natural experiments and environmental data. The final part addresses pollution and health, environmental inequality, the impacts of climate change, mitigation, adaptation, green innovation, green growth, degrowth and climate justice.

Detailed program

The wrong price of the environment: The environment as an economic resource; growth, consumption, scarcity and sustainability; local pollution and global climate change; stocks and flows in emissions.

2. Negative externalities: Private and social costs; private and social benefits; inefficient competitive equilibria; deadweight loss from pollution; the logic of Pigouvian taxation.

3. Public goods and free riding: Non-rivalry and non-excludability; local, national and global public goods; free

riding; climate as a global public good; the role of the state and international cooperation.

4. Common-pool resources and the tragedy of the commons: Common-pool resources; individual exploitation and collective inefficiency; fisheries, forests, water and the atmosphere; private property, public regulation and community governance.

5. Carbon tax: Pigouvian taxation; efficient tax levels; public revenue; double dividend; distributional effects; political acceptability of carbon pricing.

6. Cap-and-trade and permit markets: Tradable permits; emissions caps; auctions and free allocation; price volatility; comparison between carbon taxes and cap-and-trade; the EU ETS.

7. Standards, bans and direct regulation: Technology and performance standards; emissions limits; bans; price-based instruments versus command-and-control regulation; applications to cars, buildings and industry.

8. Subsidies, incentives and green industrial policy: Subsidies for renewables; incentives for energy efficiency; support for clean technologies; green public procurement; risks of capture and green industrial policy.

9. Information, nudges and environmental behaviour: Imperfect information; bounded rationality; energy labels; green defaults; social norms; consumption feedback; behavioural environmental economics.

10. How to evaluate an environmental policy: Correlation and causality; treatment and control groups; counterfactual reasoning; selection bias; environmental, economic and social outcomes.

11. Difference-in-differences for environmental policies: Intuition of difference-in-differences; before-after and treated-control comparisons; the parallel trends assumption; applications to taxes, regulations and local policies.

12. Experiments, quasi-experiments and environmental data: Randomised controlled trials; regression discontinuity; synthetic control; natural experiments; satellite, administrative, climate and georeferenced data.

13. Pollution and health: Particulate matter and other pollutants; mortality and morbidity; effects on children; productivity; health costs; the value of statistical life.

14. Environment and inequality: Environmental justice; unequal exposure to pollution; income, education and vulnerability; North-South and intergenerational inequalities.

15. Cities, transport and quality of life: Urban congestion; public transport; low-emission zones and congestion pricing; electric mobility; low-emission cities; urban green areas and heat islands.

16. Economics of climate change: Cumulative emissions; uncertainty; irreversibility; long time horizons; discounting; climate damages; the social cost of carbon.

17. Climate, agriculture, labour and migration: Temperature and agricultural productivity; droughts and extreme events; labour productivity; climate migration; vulnerability and adaptation.

18. Mitigation and adaptation: Emissions reduction; adaptation to climate damages; resilient infrastructure; climate insurance; coastal protection; resilient agriculture; risk management.

19. Green innovation and technological change: Induced innovation; green patents; path dependence and technological lock-in; learning by doing; the role of taxes, standards and subsidies; renewables, batteries, electric vehicles and carbon capture.

20. Green growth, degrowth and climate justice: Green growth; relative and absolute decoupling; limits of GDP; sufficiency and consumption; historical responsibility; climate justice and just transition.

21. Global climate policy and international negotiation: International agreements; carbon border adjustment; climate finance; technology transfer; adaptation; loss and damage; the role of governments, firms and citizens.

Prerequisites

Students are expected to have basic knowledge of microeconomics, especially demand, supply, market equilibrium, efficiency and welfare. Introductory knowledge of statistics is useful, but the empirical methods needed for the course will be reviewed at an intuitive and applied level.

Teaching methods

Lectures with guided discussion of examples and real-world cases; reading and discussion of empirical articles;

use of graphs, data and short policy applications; group presentations by students on empirical papers or environmental policy cases; structured debates on controversial issues such as carbon taxes, green subsidies, climate justice, green growth and adaptation. (see detailed program)

Assessment methods

Option A — Active participation during the course

This option is designed for students who regularly attend classes and actively participate in discussions and course activities.

The final grade will be based on:

50% group work, including an oral presentation and the preparation of a policy brief on a topic related to environmental economics or climate change economics;

50% final written exam, consisting of one open-ended question chosen by the student from a set of four questions.

Group work will assess students' ability to apply the theoretical concepts discussed in the course to concrete policy problems, to use empirical evidence critically, and to communicate their arguments clearly and effectively.

The written exam will assess students' understanding of the main theoretical concepts, environmental and climate policy instruments, and empirical evidence discussed during the course.

Option B — Final written exam only

Students who do not take part in course activities, or who prefer not to be assessed through group work, may choose a final written exam accounting for 100% of the final grade.

In this case, the exam will consist of four compulsory open-ended questions out of four.

The questions will assess knowledge of the entire course programme, including the theoretical foundations of environmental economics, policy instruments, the economics of climate change, empirical evidence, and topics related to innovation, green growth and climate justice.

Textbooks and Reading Materials

reading list TBA

Semester

Second semester

Teaching language

English

Sustainable Development Goals

NO POVERTY | QUALITY EDUCATION | CLEAN WATER AND SANITATION | AFFORDABLE AND CLEAN ENERGY | INDUSTRY, INNOVATION AND INFRASTRUCTURE | SUSTAINABLE CITIES AND COMMUNITIES | RESPONSIBLE CONSUMPTION AND PRODUCTION | CLIMATE ACTION | PEACE, JUSTICE AND STRONG INSTITUTIONS
