

Economic Geography and Climate Change

3 ECTS

TERM 3

ELECTIVE/MANDATORY

Professor

Prof. Andre Gröger

Prerequisites to enroll

Econometrics

Overview and objectives

This course introduces a range of tools and approaches to collect, manipulate and analyze geospatial data for conducting empirical research in economic geography and environmental economics including climate change. In the first part, we introduce different types of geospatial data and learn how to visualize it. We explore various prominent examples of empirical economic research that use geospatial data to understand its significance and role in economics. We then introduce a range of tools to manipulate geospatial data and construct different measures that can be used for economic analysis. Building on the first part, the second part of the course focuses on selected quasi-experimental approaches to make inference about questions related to economic geography and environmental economics, and climate change. The course provides a hands-on approach to learning the tools for manipulating spatial data, constructing spatial measures, and conducting empirical analysis.

The objectives of this course are threefold: First, we will review selected pieces of empirical research in economic geography and environmental economics that use

geospatial data for causal inference. Second, through continuous hands-on exercises using GIS software we will learn the necessary skills to replicate these approaches and harness the benefits of geospatial data. Third, by the end of the course, students are expected to identify an interesting research question in economic geography and environmental economics using geospatial data to conduct an empirical investigation in the form of a term paper. The option of developing the term paper into a Master thesis is offered.

Course outline

PART I

1. Introduction
 - a. Types of geospatial data
 - b. Spatial objects
 - c. Spatial reference and projection
2. GIS for Economists
 - a. Program choice and language
 - b. Visualization of geospatial data
 - c. Data manipulation
3. GIS: Basic tools
 - a. Overlay/collapse
 - b. Buffer/distance
 - c. Elevation/least cost paths

PART II

4. Statistical inference I: Spatial regression discontinuity design
 - a. Approach and assumptions
 - b. Examples
 - c. Replication exercise
5. Statistical inference II: Spatial propagation
 - a. Approach and assumptions
 - b. Examples
 - c. Replication exercise

6. Statistical inference III: Climate Change
 - a. Approaches and assumptions
 - b. Examples
 - c. Replication exercise
7. Additional Topics

Required activities

Attendance, submission of homework (3 assignments in total, 1 presentation), term paper.

Evaluation

- Term paper (60%)
- Homework (40%)

Selected references

- Auffhammer, Maximilian (2018). "Quantifying Economic Damages from Climate Change." *Journal of Economic Perspectives* 32(4), 33-52.
- Burke, Marshall, Anne Driscoll, David Lobell, and Stefano Ermon (2020). "Using Satellite Imagery to Understand and Promote Sustainable Development", NBER Working Paper No. 27879.
- Dell, Melissa, Benjamin F. Jones, and Benjamin A. Olken (2014). "What Do We Learn from the Weather? The New Climate-Economy Literature." *Journal of Economic Literature* 52(3), 740–98.
- Olivier Deschenes and Kyle C. Meng (2018). "Quasi-experimental methods in environmental economics: Opportunities and challenges", in: *Handbook of Environmental Economics*, eds. Partha Dasgupta, Subhrendu K. Pattanayak, V. Kerry Smith, Volume 4, 285-332.

- Donaldson, Dave and Adam Storeygard (2016). "The view from above: Applications of satellite data in economics". *Journal of Economic Perspectives*, 30 (4), 171–198.
- Proost, Stef and Jacques-François Thisse (2019). "What can be learned from spatial economics?", *Journal of Economic Literature*, 57 (3), 575–643.

Competencies

To (be able to) communicate with determination and in the English Language, the results and implications of the required analytical study using a language that the receiver can relate to.

To work within a heterogeneous team of researchers as economic analyst using specific group techniques.

To fit in diverse professional environments and varied types of collaborations in different professional projects.

To possess and understand the knowledge that provides a basis or opportunity to be original in the development and / or application of ideas, often in a research context.

That students know how to apply the acquired knowledge and their ability to solve problems in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their field of study

That the students be able to integrate knowledge and face the complexity of making judgments based on information that, being incomplete or limited, include reflections on the social and ethical responsibilities linked to the application of their knowledge and judgments.

That the students be able to communicate their conclusions and the knowledge and the ultimate reasons that sustain them to both, specialized and non-specialized publics in a clear and unambiguous way.

- That students possess the learning skills that allow them to continue studying in a way that will be largely self-directed or autonomous.
- To identify and apply the insights of the theory, the models, and the analytical tools of modern economy to its global dimension
- To understand and apply the quantitative methods used to solve complex problems of the economy.
- To evaluate, with theoretical and quantitative instruments, the complex realities of the economy to understand the way it works.
- To design the appropriate strategy to solve complex problems related to the economy.

Learning outcomes

- Uses and rigorously applies the economic theory of the design and evaluation of public policies.
- Uses and applies the empirical tools of economic analysis to evaluate public policies.
- Identifies the institutional frameworks in which public policies are designed and implemented.
- Uses and applies econometric techniques for an applied analysis of financial market policies.
- Uses and applies the methods of numerical calculation and simulation techniques for macroeconomic problems and financial policy evaluation design.
- Empirically describes relevant phenomena from the macroeconomic point of view.
- Uses and rigorously applies economic theory, economic concepts and models to understand decision-making and the consequences of the energy transition in the short and long term and the analysis and monitoring of sustainability objectives.

- Applies empirical statistical and analytical tools to evaluate the costs and benefits of alternative energies and environmental regulation.
- Identify the institutional frameworks in which decisions for the energy transition are designed and implemented and learn how energy markets work and how they are organized and what are the opportunities and challenges of the energy transition.
- Identify the different specific fields of economics.
- Uses the theory, practice, fundamentals and applications of economic policies.