Climate macroeconomics and finance (98724)

Climate and transition risks:
Uncertainties, complexity, and implications for economic and financial dynamics

University of Bologna
2022/23 Academic Year

Logistics

Lecturer: Emanuele Campiglio (emanuele.campiglio@unibo.it)
Teaching assistant: Gabriele Cortini (gabriele.cortini3@unibo.it)
Classroom: Room V (ground floor), Via Zamboni 33, Bologna
Online presence: Virtuale (course material and submissions); Panopto (recordings)
Office hours: by appointment (please write email)

Course objective

The course will discuss the academic and policy research investigating the macro-financial implications of climate change and the low-carbon transition, as well as the appropriate societal responses to mitigate climate change. The course will consider qualitative, empirical, modelling and political economy methodological approaches. At the end of the course students will have developed a solid knowledge of the academic literature and policy debate on how climate change and the decarbonization process might affect economic activity, and vice versa.
The course is the first module of the integrated course 'Climate-related risks and commodity markets'. Information on the second module 'Commodities and energy markets: Interactions with climate policy' is available at this link.

Course structure

The course is composed of ten lectures of three hours each (for a total of 30 hours), plus five tutorial classes of two hours each (for a total of 10 hours).

1. Introduction and the big picture
2. Climate change: drivers, impacts, scenarios
3. Climate mitigation and adaptation
4. Climate-related policies and commitments
5. Modelling climate-economy interactions
6. Climate economics and Integrated Assessment Models
7. Macroeconomic modelling of climate and transitions
8. Climate, finance and money
9. Climate-related international implications
10. Student presentations and course wrap-up

Tutorial classes

Tutorial classes will be given by Gabriele Cortini. The standard class will consist of two parts: i) solution to problem sets and discussion; ii) discussion of advancements of groupworks. The last tutorial class will also focus on exam preparation.

Course readings

Most of the readings will be in the form of academic articles or policy reports. All readings will be available on Virtuale or through UniBo subscriptions. While there is no specific textbook for this course, interested students can we refer to:

- 'The economics of climate change' by G. Economides, A. Papandreou, E. Sartzetakis and A. Xepapadeas (available at this link)
- 'Climate Economics' by R. Tol (available at this link)

Assessment

Students will be graded using a scale from 0 to 30, where grades lower than 18 means a fail. Particularly excellent work will be awarded a 'laude' (30L). The overall grade for the integrated course will be a simple average of the grades for the two modules. The grade for Module I (this course) will be the combination of:

- *Problem sets* (25%). Each student will submit five (mainly) empirical problem sets during the course (each counting for 5% of the total grade). Problem sets will be corrected during tutorial classes, and the deadline for submission is 23.59 of the day before the tutorial. Submission is individual, and will take place through Virtuale. Late submissions will receive a 5-point penalty.
- *Group-work* (35%). Each student will self-allocate to a topic group (of between three and five members). Topics will be chosen among the ones provided by lecturer, but alternative topic proposals will be considered. Each group will: i) present the conclusions of their work during the last lecture (24 October 2022); ii) submit a related essay by 30 October via Virtuale.
- *Exam* (40%). A written exam for the module will take place on 2 November 2022, 10.00am. The exam will include open essay-style questions, exercises and/or multiple choice questions. Students can decide to reject the grade obtained and try their luck with a 'full' exam, combining Module I and II. In this case, grades for Module I problem sets and groupwork will remain valid.

Course outline

20 September 2022 (Tuesday) 15:00-18:00

Lecture 1. Introduction + The big picture

- Introduction to the course
- Basic concepts
- The big picture on climate macroeconomics

22 September 2022 (Thursday) 14:00-17:00

Lecture 2. Climate change: drivers, impacts, scenarios

- Climate change physical science
- Climate change drivers and impacts
- Climate futures: scenarios, RCPs, SSPs

27 September 2022 (Tuesday) 15:00-18:00

Lecture 3. Climate mitigation and adaptation

- GHG emissions and their drivers
- Mitigation technologies and strategies
- Climate adaptation strategies

28 September 2022 (Wednesday) 17:00-19:00

Tutorial 1

- Solutions to problem set 1
- Discussion of groupwork advancements

5 October 2022 (Wednesday) 09:00-12:00

Lecture 4. Climate-related policies and commitments

- Mitigation policies: tax, subsidies, markets, regulation
- Where will the money come from: sustainable finance policy-making
- Climate-related policy objectives: Paris agreement, NDCs, EU green deal

6 October 2022 (Thursday) 14:00-17:00

Lecture 5. Modelling climate-economy interactions

- Key economic modelling choices
- Key environment-economy modelling building blocks
- Damages, discounting, uncertainty, learning, beliefs

6 October 2022 (Thursday) 17:00-19:00

Tutorial 2.

- Solutions to problem set 2
- Discussion of groupwork advancements

11 October 2022 (Tuesday) 15:00-18:00

Lecture 6. Integrated assessment models

- The DICE model and its discontents
- Analytical IAMs
- Numerical IAMs and CGE models

13 October 2022 (Thursday) 14:00-17:00

Lecture 7. Macroeconomic modelling of climate and transitions

- Overview of macro modelling approaches
- Neoclassical modelling of climate and transition
- 'Heterodox' modelling of climate and transition

13 October 2022 (Thursday) 17:00-19:00

Tutorial 3.

- Solutions to problem set 3
- Discussion of groupwork advancements

17 October 2022 (Monday) 14:00-17:00

Lecture 8. Climate, finance and money

- Climate-related inflation and monetary policy
- Climate stress testing
- Climate-related financial regulation

18 October 2022 (Tuesday) 15:00-18:00

Lecture 9. Climate-related international implications

- Trade and the environment
- Climate-related cross-boundary risks
- International production and financial networks

19 October 2022 (Wednesday) 17:00-19:00

Tutorial 4.

- Solutions to problem set 4
- Discussion of groupwork advancements

24 October 2022 (Monday) 09:00-12:00

Lecture 10. Student presentations and course wrap-up

- Student presentations
- Wrapping up the course

25 October 2022 (Tuesday) 17:00-19:00

Tutorial 5.

- Solutions to problem set 5
- Exam preparation