

**AEA Continuing Education Course:
Climate Change Economics**

ASSA Meetings 2020
Westin San Diego Gaslamp Quarter, San Diego, CA
January 5 - 7, 2020

Lint Barrage
Department of Economics, U.C. Santa Barbara

Michael Greenstone
Department of Economics and EPIC, University of Chicago

Gilbert Metcalf
Department of Economics, Tufts University

Climate change is widely considered one of the greatest risks to human well-being on the planet and is often discussed as a moral problem that is beyond economics. This course surveys what is now a rich and varied literature that grounds climate change in economics and makes clear that societies' best hope for managing the climate challenge requires a nuanced understanding of its economics. Specifically, this course surveys both classic and recent research in the economics of climate change with a focus on measuring the damages from greenhouse gas (GHG) emissions, the use of models to improve our understanding of the core tradeoffs underlying the climate problem, and the role of policy in reducing emissions. Special attention is paid to a rapidly emerging empirical body of evidence about the economics of climate change. Rather than a comprehensive survey of research in climate change economics, we present results from a select body of research to illustrate key findings and general conclusions. A brief description of each topic follows.

Sunday, January 5

The Global Energy Challenge: Balancing Energy and Growth, Climate Change, and Local Pollution (Greenstone). *The global energy challenge requires balancing the need for inexpensive and reliable energy to foster economic growth with the needs to limit environmental and health damages and guard against disruptive climate change. This lecture will explore key energy trends and outline the market, policy, and technology choices available to help the world trade off these key goals and in doing so confront the global energy challenge. The remainder of this course will focus on climate change, but an underlying theme is that societal choices about climate cannot be viewed in isolation because they have implications for energy consumption, economic growth, and local environmental challenges.*

Climate Science Overview (Metcalf). *This lecture lays out basic facts about climate change that economists studying or teaching the issue should know. This includes information about greenhouse gas (GHG) emissions, the relation among various GHG's, and trends in emissions, temperature, extreme weather, and other indicators of climate change.*

Monday, January 6

Basic Climate Change Economics (Greenstone). *The economist Martin Weitzman famously described climate change as the problem from hell. Finding a solution is difficult for several reasons, including: 1) its solution requires current generations to forego consumption for uncertain and widely dispersed future benefits; 2) effective solutions rely on largely voluntary global cooperation in a setting where non-cooperation offers immediate rewards; and 3) the trade-off between current and future consumption varies greatly across countries. This lecture will lay out the basic economic theory of the climate problem and in so doing illustrate the nature of the problem it poses, the current valuation of future climate costs, including how it varies across countries, the nature of efficient pricing and innovation policy, and then connect these fundamentals to some empirical facts about climate change.*

Integrated Assessment and Macro Models of Climate Change (Barrage). *This lecture consists of two parts. Part I provides an overview of Integrated Assessment Modeling (IAM) and macroeconomic analyses of climate change. Part II describes teaching options for IAMs, specifically focusing on a 'learning-by-doing' approach. We begin Part I with a review of the seminal DICE model (Nordhaus, 1992-present) and a brief history of the field. Second, we survey a range of approaches in the climate-economy modeling literature, ranging from detailed partial equilibrium/simulation models to recent macroeconomic analyses. Third, we review some of this new macro literature in more detail, including advancement such as on modeling uncertainty, heterogeneity, and technological change. Part II then briefly describes a teaching option for Integrated Assessment Modeling where students build their own mini-IAMs in Excel. We describe the approach, discuss possible variations for students at different levels, and provide suggestions for specific exercises and uses of the models, such as calculating the social cost of carbon.*

What do we know about Climate Change's Impacts? (Greenstone). *The first part of the lecture will detail the development of the United States Government Social Cost of Carbon, which is the present value of the monetized damages from the release of an additional ton of carbon dioxide. The second part of the lecture will summarize the rapidly growing empirical evidence on the projected damages of climate change. A great challenge for this literature is to balance empirical credibility with the need to develop estimates that reflect the costs and benefits of adaptation; the lecture will discuss these issues, including recent advances.*

Climate-Economy Models: New Frontiers and Critical Challenges (Barrage). *This lecture contains two parts. The first describes advances in climate-economy modeling to address*

important issues such as strategic interactions and unintended spillovers across countries in climate policy adoption and implementation, equity considerations, etc. The second part presents some more fundamental critiques of the IAM approach. This includes, for example, the “Dismal Theorem” (Weitzman, 2009) and questions of whether cost-benefit analysis is appropriate in the face of potentially catastrophic climate change.

Policy Overview (Metcalf). *This lecture discusses the various and competing policy goals, both at the national and international level, that shape the optimal choice of policies to reduce emissions. It also addresses political constraints that impact policy making.*

Tuesday, January 7

Review and assessment of climate policy options (Team). *The Tuesday sessions survey policy options to reduce greenhouse gas emissions both in the United States and internationally. Focusing on a few key papers, we distil key insights about various policy options that raise the price of GHG emitting fuels relative to low- or non-GHG emitting fuels. This includes carbon taxes, cap-and-trade programs, renewable portfolio standards, and tax subsidies for low- or non-GHG emitting fuels. We also focus on regulatory approaches including the use of the Clean Air Act in the power sector, energy efficiency programs, and Corporate Average Fuel Economy (CAFE) standards in transportation, among others. We also discuss the role that information programs, nudges, and other voluntary actions can play in reducing emissions. Special attention will be paid to recent empirical evidence documenting these policies’ costs per ton of carbon dioxide abated as well as distributional impacts of policies.*

A reading list will be sent to registered participants prior to the course.