

Looking Toward The Future

EES 3310/5310

Global Climate Change

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Class #41: Friday, April 29 2022

Final Exam

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- Will be posted to Brightspace later today.
- Due 11:00 AM Saturday May 7.
- Turn it in on Brightspace
 - Take-Home Final Exam assignment
- 2 essay questions
- Open book, notes, etc.

Questions and Discussion

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- Questions you have about climate change
 - Science
 - Technology
 - Policy
- Thoughts and Discussion:
 - About what we've read
 - About what the future of climate holds
 - About policy options

Reviewing the Semester

- What do we know? (Science)
- What can we do? (Technology, Policy)
- How can we decide? (Politics, Ethics)

What Do We Know?

What Do We Know for Sure?

- Human activity is raising CO₂ to the highest levels in more than 800,000 years
- The planet is rapidly warming
- The greenhouse effect is well-established science
- Rising levels of CO₂ make oceans acidic

What Do We Know Very Confidently?

- Human activity is responsible for most observed warming
- CO₂ levels will remain high for thousands of years after we stop burning fossil fuels
- Even if CO₂ stops rising, temperature and sea level will continue to change for centuries

What Do We Know With Some Uncertainty?

- The planet will warm around 3°C for every doubling of CO₂
- Sea-level will rise 1–2 meters this century
- Extreme heat waves will become much more common
- Drought will become more common in much of the world

What Do We Not Know (Much Uncertainty)?

- Regional responses to climate change (e.g., Tennessee)
- Details about drought, rain, floods, etc.
- Tipping points for catastrophe (runaway sea-level rise, runaway methane releases, ...)
- Severe storms (hurricanes, tornadoes, ...)
- Impacts on agriculture

What Can We Do?

What Can We Do?

- Mitigate Warming:
 - Efficiency (less energy)
 - Clean energy
 - Nuclear
 - Solar
 - Wind
 - ...
- Adaptation
- Geoengineering

How Can We Do it?

- “Top-Down” Policy:
 - Use science to choose temperature goal
 - Temperature → GHG concentration
 - GHG concentration → emissions
 - Emissions → clean energy requirements
- “Bottom-Up” Policy:
 - What measures are most practical?
 - How can we combine them into coherent policy?

How Can We Decide?

Problems for Politics

- Dangers are serious, uncertain, and irreversible
- Climate change is not the only danger
 - How do we set priorities?
 - What principles to use?
 - Maximize expected utility
 - Insurance approach
 - Social justice
- Emissions are today, most damage is far in the future
 - How to balance needs & capabilities of current and future generations?