

The Course Website.

You have the perfect study guide / review material available to you anytime: the course website with all the cookbooks, slide decks, videos, quizzes, and assignments.

The Climate Change Big Questions.

The Summary Notes provided for each Big Question include sections to help you evaluate your learning.

- Review Questions you should be able to answer.
- Terms and Concepts you should understand.
- Discussion Topics.

What is Science?

Science is evidence-based reasoning: You don't believe in science, you accept the evidence for it.

- Remember Feynman - see <https://youtu.be/kBqemHR49-c>
- Remember CONPTT - science is consistent, observable, natural, predictable, testable, and tentative - these are the parameters of scientific inquiry and thinking.

Fact: Something that we know to exist or to have happened.

Hypothesis: A proposed explanation based on deductive reasoning that is testable.

Theory: A set of explanations for a substantial number of natural occurrences that have been confirmed by a substantial number of experiments and observations.

The Limits of Science.

Science, except in trivial cases, cannot produce indisputable proof or truth.

Science can produce a robust consensus based on a process of inquiry that is subject to continued scrutiny, re-examination, and revision. (Oreskes, 2004)

Science can only ascertain what is, but not what should be, and outside of its domain value judgments of all kinds remain necessary. Albert Einstein (1879-1955)

Science does not deal with "Truth".

Truth is based on your belief or faith.

Science deals with hypotheses we can test using evidence.

You should be able to.

1. Explain Richard Feynman's explanation of science as shown in-class.
2. Differentiate between a fact, a hypothesis, and a scientific theory.
3. Summarize the current scientific consensus on climate change.
4. Summarize the main reasons why we know that humans are the primary cause of global warming today.
5. Explain why human behavior creates the largest uncertainty in climate prediction.
6. Explain why climate models are reliable and useful.
7. Explain the 'New Normal' in the context of climate change and the associated potential for more extreme weather events.
8. Explain the 'Tragedy of the Commons' dilemma in the context of global warming.
9. Describe some of the most important and costly impacts of climate change in Massachusetts.
10. Discuss the vulnerability of Western Massachusetts with respect to climate change impacts.
11. Discuss the connections between human-caused global warming, vulnerability, and social justice.
12. Explain the steroid analogy in the context of global warming and the associated potential for more extreme weather events.
13. Explain the role of CO₂ in the context of plant growth.
14. List and explain some of the other issues associated with the dependence on fossil fuels such as energy security and public health.
15. Explain the concept of a decision grid.
16. Use a decision grid for making rational choices in the face of uncertainty.
17. Distinguish between current carbon emissions (e.g. in 2020) and cumulative carbon emissions since the start of the Industrial Revolution in terms of responsibility for global warming.
18. Distinguish between total and per-capita carbon emissions.
19. Explain the different types of responsibilities in the context of pollution and climate change.
20. List, explain, and discuss solutions for global warming that you consider particularly effective.
21. Explain the sustainability donut diagram and the associated concepts.
22. Explain the social cost of carbon and provide specific examples.
23. Summarize the basic economic arguments of climate change.
24. Explain the effects of volcanic eruptions on temperature.
25. Explain the concept of solar radiation management (SRM).

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