

Class 1: How Science Works

Themes:

- Scientific knowledge construction
- Peer review & scientific authority (like IPCC)
- Chronology, systemic/interdisciplinary approach

This first session introduces how scientific knowledge is constructed and validated, with climate science as a central case. We will question the idea of a single “scientific method” and instead see how knowledge emerges through experimentation, uncertainty, and interdisciplinary collaboration. Special focus will be given to peer review and scientific authority, using the IPCC as an example of how credibility is established at a global level.

The readings and podcasts (*Redefining the Scientific Method*, the Stanford *Scientific Method* entry, and *How to Be a GREAT Peer Reviewer*) highlight the philosophical, institutional, and practical aspects of knowledge production, while *Students’ ideas about the scientific underpinnings of climate change* invites reflection on how public perceptions shape authority.

Music will serve as a cultural lens: Aurora’s “*Inhale Exhale*”, Billie Eilish’s “*All the Good Girls Go to Hell*”, and Cat Stevens’s “*Where Do the Children Play*” each raise questions about fragility, morality, and intergenerational responsibility. Students should prepare reflections on how these songs connect emotionally and thematically to the week’s discussions.

By the end of the class, students will better understand how climate science is built, communicated, and culturally interpreted.

Articles:

- “Redefining the scientific method” (Oxford University Press, 2024):
→ <http://eprints.lse.ac.uk/122615/1/pgae112.pdf>

→ *The article argues that many major scientific discoveries were not made using the classic three-step scientific method (observation, experimentation, hypothesis testing). What does this suggest about the importance of sophisticated tools and methods in scientific progress, especially for solving complex sustainability problems?*

→ *Krauss redefines scientific methodology as the use of sophisticated instruments and techniques that extend our cognitive abilities. Can you think of examples from environmental science or sustainability where new instruments or analytical methods have changed what scientists are able to observe or solve?*

- “Scientific Method” (Stanford Encyclopedia of Philosophy)
→ <https://plato.stanford.edu/entries/scientific-method/>
→ *According to the article, scientific method is shaped by aims such as discovery, ordering, and explanation—not just recording facts. What does this mean for how new environmental policies or*

sustainable solutions are created and justified?

→ *The reading presents scientific reasoning as involving induction, prediction, and analogy as well as deduction. How might these reasoning tools help us address uncertainty or complexity in ecological transitions and sustainability planning?*

- “Students' ideas about the scientific underpinnings of climate change” (TandF, 2025)

→ <https://www.tandfonline.com/doi/full/10.1080/03057267.2024.2395206#d1e162>

→ *The article describes that students often have misconceptions about climate change, such as misunderstanding the roles of natural and human causes. Why is it important for educators and communicators to address these misconceptions in sustainable development?*

→ *In the study, some students did not recognize oceans as major carbon reservoirs. How might improving scientific understanding of the carbon cycle and atmospheric CO₂ help inform better sustainable practices and policy decisions?*

Podcasts:

- BBC Radio 4: “The Scientific Method – In Our Time: Science”. → <https://podcasts.apple.com/fr/podcast/the-scientific-method/id463701000?i=1000343872181&l=en-GB>

→ *How did historical thinkers like Francis Bacon, Isaac Newton, and Karl Popper help shape what we now call the scientific method, and why do some experts on this podcast say it's still difficult to define today?*

- Podcast – “How to be a GREAT Peer Reviewer”

→ <https://www.dementiaresearcher.nihr.ac.uk/podcast-how-to-be-a-great-peer-reviewer/>

→ *According to this podcast, what are two important skills or attitudes that make someone an effective and constructive peer reviewer, and how do these qualities improve the scientific process?*

Music:

Listen carefully to the three assigned songs and read through their lyrics. In preparation for class, reflect on the following questions: How do these songs connect to the themes we are exploring this week? In what ways do they highlight social, cultural, or ecological dimensions of the climate crisis? Finally, describe your personal response to the music—what emotions, images, or ideas did it evoke, and why do you think it felt meaningful (or not) in relation to our discussions?

- “Inhale Exhale” – Aurora
- “All the Good Girls Go to Hell” – Billie Eilish
- “Where do the Children Play”-- Yusuf/Cat Stevens
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