Class 2: Understanding Climate

This session introduces the foundations of climate science, focusing on the **interactions between oceans, continents, and the atmosphere**, the distinctions between **climate and weather**, and the science behind the **greenhouse effect**. Students will also examine how greenhouse gases are measured and modeled, and how scenarios developed by the **IPCC**help anticipate possible climate futures.

The readings provide complementary perspectives: a systematic review of climate change impacts and adaptation strategies highlights the global scientific framework, while *Indigenous Climate Change Studies* (Kyle Whyte) and a recent *Nature Portfolio* article emphasize how Indigenous Peoples and local communities directly experience and report ongoing climate impacts. These works foreground the importance of combining Western scientific models with Indigenous knowledge systems.

The podcasts extend this conversation by exploring how **Indigenous science and perspectives on biodiversity and conservation** enrich our understanding of climate change and sustainability. Students are encouraged to choose an episode from the *Indigenous Climate Hub Podcast* and also listen to *CBC Quirks & Quarks* on Indigenous science, reflecting on how these narratives challenge or complement conventional scientific approaches.

Finally, music provides a cultural lens: Joni Mitchell's *"Big Yellow Taxi"*, Marvin Gaye's *"Mercy Mercy Me (The Ecology)"*, and Bob Dylan's *"A Hard Rain's Gonna Fall"* each underscore the emotional, moral, and social stakes of ecological change. Students will reflect on how these songs connect to the scientific and cultural themes of the class, and what personal responses they evoke.

By the end of the session, students will understand both the **scientific mechanisms** of climate systems and the **cultural and Indigenous perspectives** that enrich how climate knowledge is produced and acted upon.

Themes:

- Ocean/continent/atmosphere exchange
- Climate vs. weather; greenhouse effect
- Measuring greenhouse gases, IPCC scenarios

Articles:

- "A review of the global climate change impacts, adaptation ..." (PMC, 2022): Systematic literature review focusing on global climate change impacts and how scientists measure and attribute them

→ https://pmc.ncbi.nlm.nih.gov/articles/PMC8978769/

—> *What are the main differences between climate change adaptation and mitigation, and how do researchers measure the effectiveness of these strategies in sectors such as agriculture and energy?*

—> *Why is it important to develop both national and international policies for climate adaptation and mitigation, and what challenges could arise when trying to coordinate these policies across different regions of the world?*

- "Indigenous Climate Change Studies" by Kyle Whyte — An academic survey of Indigenous environmental science and perspectives on biodiversity and ecological change

→https://kylewhyte.marcom.cal.msu.edu/wp-content/uploads/sites/12/2018/07/IndigenousClimateChangeStudies.pdf

—> According to Kyle Whyte, how do Indigenous climate-change studies support the capacities of Indigenous peoples in responding to anthropogenic climate change, and what kinds of knowledge or strategies are emphasized?

—> Why is it important to consider cultural knowledge and community perspectives—such as tribal elders' observations—when developing climate action plans for Indigenous communities?

- "Indigenous Peoples and local communities report ongoing impacts of climate change on their lands and livelihoods" Published in *Communications Earth & Environment* (Nature Portfolio), 2024

→https://www.nature.com/articles/s43247-023-01164-y

—> What are some examples of locally observed climate change impacts reported by Indigenous Peoples and local communities, and how do these local experiences contribute to global climate research?

—> The study recommends incorporating Indigenous and local knowledge into climate adaptation policies. What are the benefits of using local observations and experiences when designing solutions for climate challenges?

Podcasts:

- Indigenous Climate Hub Podcast: Episodes include stories on biodiversity and conservation from Indigenous perspectives: **CHOOSE YOUR OWN EPISODE** https://open.spotify.com/show/49ec0XU3NhCY2byLdgYAHy

—> What is one example of how Indigenous community knowledge or traditional ecological practices can help protect biodiversity and build resilience to climate change, as described in episodes from the Indigenous Climate Hub Podcast?

- How Indigenous science could help us with our sustainability and diversity crisis — CBC Quirks & Quarks https://www.cbc.ca/radio/quirks/jun-5-shark-extinction-event-caffeine-can-t-keep-you-functional-the-pachyderm-s-proboscis-and-more-1.6052388/how-indigenous-science-could-help-us-with-our-sustainability-and-diversity-crisis-1.6052394

—> According to this episode, how do Indigenous approaches to environmental stewardship and biodiversity differ from mainstream Western science, and why might these differences be important for solving today's sustainability challenges?

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?

- “Big Yellow Taxi” – Joni Mitchell
- “Mercy Mercy Me” – (The Ecology) by Marvin Gaye (1971)
- “A Hard Rain’s Gonna Fall” – Bob Dylan