

Math 1901
Freshman Seminar
Mathematical Climate Models

Fall 2024
1:00 - 2:15 Mondays and Wednesdays
Vincent Hall 213

Richard McGehee, Instructor
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course website
https://www-users.cse.umn.edu/~mcgehee/Course/Math1901/

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Math 1901
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Greta Thunberg
The Climate Book
Penguin Press 2023

https://www.penguinrandomhouse.com/books/709837/the-climate-book-by-greta-thunberg/

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The Discovery of Climate Change
Michael Oppenheimer

In the beginning, it was a scientific curiosity rather than a problem. Svante Arrhenius, a Swedish chemist, created an equation that, in 1896, he published in one of his papers. It was a simple one, but it showed that the atmosphere through heating and humidification would gradually warm Earth by several degrees. His findings were almost universally ignored until the 1930s, when a handful of scientists started to take the warning signs more seriously. In 1938, a young meteorologist, Professor Manabe, developed the first serious computer simulation of the climate. The prediction of how hot Earth would become showed that Arrhenius was not off by much. Manabe's work then came a series of scientific research that started to show a picture of progressively increasing temperatures, and by the late 1970s a scientific consensus had emerged that the world was warming. It was a gradual process, but it was undeniable. In the 1980s, the greenhouse effect was a topic of science fiction, and the climate became a major concern. In 1995, the Intergovernmental Panel on Climate Change (IPCC) was established. It was a global effort to bring the world's scientists together to study the problem. In 1995, the IPCC published its first report, and it was clear that the world was warming. The report was a landmark document, and it was the first time that the world's scientists had agreed on a common goal. The report was a landmark document, and it was the first time that the world's scientists had agreed on a common goal. The report was a landmark document, and it was the first time that the world's scientists had agreed on a common goal.

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theclimatebook.org

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Select Region: GLOBE

WARMING STRIPES LABELLED STRIPES BARS BARS WITH SCALE

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Information: Region: GLOBE, Date Range: 1850-2023, Data Source: UK Met Office, Creator: Ed Hawkins, Licensor: University of Reading, License: CC BY-NC-SA

Global temperature change (1850-2023)

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Select Region
Region: GLOBE

Information
Region: GLOBE
Date Range: 1850-2022
Data Source: UK Met Office

Creator: Ed Hawkins
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Global temperature change
Rescaled to average of 1850-1910 = 0°C

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atmospheric CO₂

ppm (parts per million)

420 ppm: for every one million molecules of atmosphere, 420 of them are CO₂

<https://bergenia.com/the-keeling-curve-and-40-years-of-blah-blah-blah/>

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Mauna Loa Observatory
Scripps Institution of Oceanography

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Can we measure greenhouse gasses?

Mauna Loa Observatory

https://research.noaa.gov/Portals/0/EasyDNNnews/1502/2006060p587EDNmain10061mlc_sign_miller.jpg

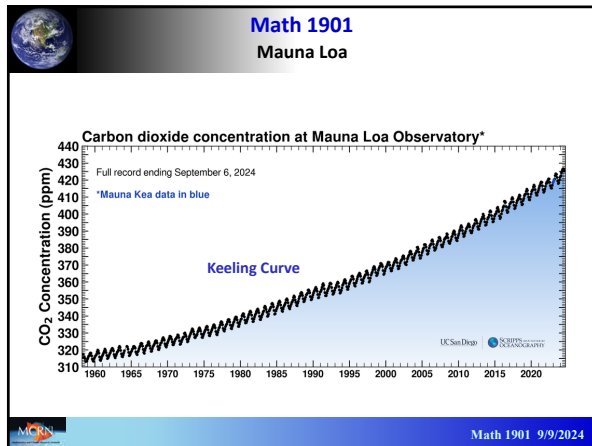
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<https://keelingcurve.ucsd.edu/>

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