

## Introduction to Climate Science (11:670:102)

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### Course Description

Major mechanisms influencing climate, including Earth's energy balance, water cycle, and atmospheric circulation; spatial distribution of climate and climate classification; natural climate variability, including El Niño; past climate variations; and the carbon cycle and human-induced climate change.

### Learning Goals

- 1) Understand and apply basic physical principles in climate science.
- 2) Identify and critically assess the issue of climate change and its impact on society.

### Course Outline

Week 1	Introduction; What is climate and how do we observe it?
Week 2	Tools for studying climate: Physics, units, and statistics; Composition and structure of the atmosphere
Week 3	Other climate system components: Ocean, ice, and land; Electromagnetic radiation
Week 4	Earth's energy balance; Atmospheric circulation
Week 5	Earth's water cycle; <b>First hourly exam</b>
Week 6	Why do different places have different climates? Polar climates
Week 7	Midlatitude climates; Tropical climates
Week 8	Global climate patterns; Natural climate variability: El Niño and the Southern Oscillation
Week 9	Natural climate variability: Annular modes; Natural climate variability: Pacific and Atlantic multidecadal variability
Week 10	<b>Second hourly exam</b> ; How climate can change: Forcing, feedback, and sensitivity
Week 11	Documenting past climate: Modern observations and natural archives; Climates of the last millennium
Week 12	The ice ages; Climates of the more distant past: Warm and cold
Week 13	Human influences on the carbon cycle and climate; Tools for projecting future climate change
Week 14	Projections of future climate: Global responses; Projections of future climate: Extreme events
Week 15	<b>Final exam</b>