

ASL375  
CLIMATE OF THE PAST: LESSONS FOR THE FUTURE

COURSE POLICY,  
CONTENT,  
REFERENCE  
MATERIALS

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# COURSE OBJECTIVES

- Through this course students will learn about the fundamentals of past climates. In particular, they will understand how the Earth's climate has changed over time and what the major drivers are.
- The students will also learn about the impact of climate on beginning, flourishing and collapse of societies through time such as the Indus Valley, Mesopotamia or more recently the Mayan and Viking civilizations and the lessons that can be learnt for future climate change.
- Throughout the course modules, the students will be able to make a connection between past climate at various timescales and inferences for future.

# LECTURE OUTLINE

Module No.	Topic	No. of Hrs
1	Overview of Climate Science – Components of climate system, climate forcing, climate system responses, Timescales of forcing versus response; Feedbacks	3
2	Climate archives: dating, resolution; climate data; past climate reconstructions using various archives	4
3	Tectonic scale climate change; CO <sub>2</sub> and long-term climate	4
4	Greenhouse Climate; sea level changes and climate; Greenhouse to Ice house climate	4
5	Orbital scale climate change, Insolation control of Ice sheets and Ice ages	4
6	Monsoon circulation: insolation control; orbital monsoon hypothesis	4
7	Orbital-Scale changes in carbon dioxide and methane, feedbacks and unsolved mysteries in long term climate change	2
8	Deglacial Climate change: Last Glacial Maximum; climate during and since the last deglaciation; current stable warm period: the Holocene; climate optimums and beginning of ancient human civilizations	4
9	Climate change and evolution of civilizations: Impact of climate on Early civilizations; Early Impacts of humans on climate; Historical climate change: Humans and Preindustrial Climate	4
10.	Climate change during the last millennium	3
11.	Climate changes since 1850: Observational records since the Industrial revolution, Causes of warming over the last 125 years: natural causes, anthropogenic causes;	4
12.	Future Climate change and climate analogues from paleoclimates	2
	Total Lecture hours (14 times 'L')	42

# COURSE POLICY

Audit Pass:

>35% marks and 60% attendance

1. Assignment #1 = 20% marks
2. In-class quizzes (#2/3)
3. Minor Exam = 30%
4. Major Exam = 30%

Relative grading

## REFERENCE MATERIALS

1. Ruddiman, William F., Earth's Climate Third Edition ©2014 Publishers, New York: W.H. Freeman
2. Imbrie and Imbrie, Ice Ages: solving the mystery, 1979 Publishers: Short Hills, N.J., Enslow Publishers. Chicago
3. Bradley, Raymond, Paleoclimatology: Reconstructing Climates of the Quaternary, Third Edition 2015, Academic Press Inc. USA
4. Weiss, Harvey (ed.), Megadrought and Collapse: From Early Agriculture to Angkor (New York, 2017; online edn, Oxford Academic, 19 Oct. 2017),