

**The Archaeology of Climate Change
ANT 324L-57 (Unique #31675) and
GRG 356 (Unique #37025)**

Spring 2019

Time: Mondays and Wednesdays, 1:00 pm – 2:30 pm

Location: PAR 1

Dr. Arlene Rosen

Office: RLP 4.402

Office Hours: Wednesdays 2:30 pm – 4:00 pm, or by appointment

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Class Teaching Assistant: Ms Manda Adam mandaadam@utexas.edu

Course Description: Climate change has impacted human societies over the course of human existence on the planet. It has played a role in everything from hominin evolution to the rise and fall of civilizations through to the present day economic and ethical decision-making. In this course we will examine why climate changes, the methods for recording climate change, and discuss case studies of the varied responses of past human societies to climate change in different geographic regions and time periods with varying socio-political and economic systems. We will explore aspects of resilience and rigidity of societies and issues of environmental sustainability in the past as well as the present. Finally we will compare and contrast modern responses to climate change on a global scale with those of past societies.

Goals: To familiarize students with the evidence for climate change and methods of climate change research; to increase their understanding of the social, economic and technological issues human societies faced in the past when dealing with climate change. To understand what were adaptive and maladaptive human strategies. To help students evaluate the modern politics and social responses to climate change. On successful completion of this course a student should understand how climate change is recorded and the basic climatic record for the period of human occupation of the earth. To be familiar with current debates about how human societies adapt to climate change. To be able to think critically about issues and arguments proposed in the literature, and to write a coherent essay arguing a point of view.

Flags:

Ethics

This course carries the Ethics and Leadership flag. Ethics and Leadership courses are designed to equip you with skills that are necessary for making ethical decisions in your adult and professional life. You should therefore expect a substantial portion of your grade to come from assignments involving ethical issues and the process of applying ethical reasoning to real-life situations.

Global Cultures

This course carries the Global Cultures flag. Global Cultures courses are designed to increase your familiarity with cultural groups outside the United States. You should therefore expect a substantial portion of your grade to come from assignments covering the practices, beliefs, and histories of at least one non-U.S. cultural group, past or present.

Requirements: The class will have regular lectures and class discussions; student participation is required. Students are expected to regularly attend all classes, complete the assigned readings in advance of class, and come ready to discuss readings or topics.

In addition to consistent classroom attendance and active participation, each student must complete all of the following:

- 1) Three in-class quizzes (10% each = 30% total) (**Dates: Feb 20th, March 27th, and April 29th 2019**)
- 2) A short (2-3-minute) in-class presentation concerning the impact of climate change on past societies, and ethics of adapting to climate change (20%) (**May 1st, May 6th, and May 8th**. – **attendance at all three sessions mandatory for all students**).
- 3) A one or two-page written review of a “peer-reviewed” article or book chapter – *not an unpublished Internet article from the web* – on a topic related to archaeology and climate change (10%). **DUE DATE: Friday, February 22nd, 2019.**
- 4) A five-page Term Paper on a topic concerning ethical issues of combating global climate change, past, present or future (30%). **DUE DATE: Friday, April 26th, 2019.**
- 5) Class participation (i.e. active involvement in discussions, attendance, etc.) will count for 10% of the final grade. Please Note. ***Attendance is considered part of class participation and is Mandatory*** for each class session, unless the instructor excuses you.

Policy on late assignments: A late assignment **will only be accepted** with prior approval from the instructor. In this case, only a one-week extension of the deadline will be granted and 50% of the points possible may be deducted from the final assignment grade, at the discretion of the instructor.

Grading Scale: Grades will be determined based on the following designation. Please note: to ensure fairness, all numbers are absolute, and will not be rounded up or down at any stage. Thus, a B- will be inclusive of all scores of 80.000 through 83.999. The University does not recognize the grade of A+.

A = 94-100; A- = 90-93; B+ = 87-89; B = 84-86; B- = 80-83; C+ = 77-79; C = 74-76;
C- = 70-73; D+ = 67-69; D = 64-66; D- = 60-63; F = 0-59.

Schedule and Assigned Readings

Subject to change

Theme 1: Tools for Understanding the Human Face of Climate Change

1) January 23: Introduction to the Class: Course organization, assignments and objectives;
Historical and Theoretical Background: Historical background to the discovery that climates change; Theoretical Perspectives: Climatic Determinism (the ‘zip-code lottery’ of climate and culture), Cultural Ecology, Political Ecology; Nature/Culture Debates.

2) January 28: Why does the climate change? Earth’s Climates in the Past, Present, and Future: Astronomical Forcing, Solar Cycles, Volcanism, Continental Drift, ENSO, The Human Factor.

Reading: Ruddiman, William F. (2008). *Earth's Climate: Past and Future*. 2nd ed. W.H. Freeman, New York, Chapter 7, pp. 119-136.

3) January 30: Reconstructing Past Climate Change: How do we learn about climate change in the past? Isotopic Records from Sea and Ice Cores; Pollen Studies; the Terrestrial Geological Record.

Reading: Roberts, Neil (2013). *The Holocene: An Environmental History*. Blackwell, Oxford, Chapter 2, pp. 32-61.

4) February 4: In Class Exercise: Building and Interpreting a Climatic History

Read the following chapter. Come to class prepared to use the data described in this chapter to construct a climatic sequence graph. Please bring graph paper, pencils, erasers, etc. You will work together in small teams.

Reading: Menking, Kirsten M. (2000). A Record of Climate Change from Owens Lake Sediment. In *The Earth around Us: Maintaining a Livable Planet*, edited by J. S. Schneiderman, pp. 322-335. Freeman, New York.

5) February 6: The Anthropocene: Human-caused Climate Change, Biodiversity, Quaternary Extinctions, Sea Level Rise, and the Ethics of Climate Change.

Reading: Kirch, Patrick V. (2005). Archaeology and Global Change: The Holocene Record. *Annual Review of Environment and Resources* 30(1):409-440.

6) February 11: The Impact of Climate Change on Human Communities: Human Responses to Climate Change; Perception of Climate Change; Scales of Change; Adaptation; Resilience; Sustainability.

Reading: McIntosh, R. J., J. A. Tainter and S. K. McIntosh. 2000. Climate, history, and human action. In *The Way the Wind Blows: Climate, History, and Human Action*, edited by R. J. McIntosh, J. A. Tainter and S. K. McIntosh, pp. 1-42. Columbia University Press, New York.

Reading: Rosen, Arlene M. (2007). *Civilizing Climate: Social Responses to Climate Change in the Ancient Near East*. Altamira, Lanham, MD. , Chapter 1, pp. 1-16.

Recommended but not required:

- 1) Billman, Brian R., and Gary Huckleberry (2008). Deciphering the Politics of Prehistoric El Niño Events on the North Coast of Peru. In *El Niño, Catastrophism, and Culture Change in Ancient America*, edited by D. H. Sandweiss and J. Quilter, pp. 101-128. Dumbarton Oaks and Harvard University Press, Washington D.C.
- 2) Bolles, Edmund Blair (1999). *The Ice Finders: How a Poet, a Professor, and a Politician Discovered the Ice Age*. Counterpoint, Washington, D.C., Part I, pp. 3-30)

Theme 2: Climate Change, Human Origins and Colonization of the Globe

7) February 13: Climate Change and our Early Ancestors; How did global climate change and a catastrophic volcanic blast help shape us?

Reading: Ambrose, Stanley H. (1998). Late Pleistocene human population bottlenecks, volcanic winter, and differentiation of modern humans. *Journal of Human Evolution* 34:623-651.

Reading: Gibbons, Ann (2013). How a Fickle Climate Made Us Human. *Science* 341:474-479.

8) February 18: Climatic influences on human environments from the Late Pleistocene to the Middle Holocene. Hunter-gatherer adaptations to fluctuating climates; how changing landscapes and coastlines influenced migrations and human adaptations.

Reading: Hublin, Jean-Jacques and Wil Roebroeks (2009). Ebb and flow or regional extinctions? On the character of Neandertal occupation of northern environments. *Comptes Rendus Palevol* 8(5):503-509.

Reading: Erlandson, Jon M., Michael H. Graham, Bruce J. Bourque, Debra Corbett, James A. Estes and Robert S. Steneck (2007). The Kelp Highway Hypothesis: Marine Ecology, the Coastal Migration Theory, and the Peopling of the Americas. *The Journal of Island and Coastal Archaeology* 2(2):161-174.

9) February 20: In Class Quiz

Theme 3: The Role of Climate Change in the Origins and Spread of Agriculture

10) February 25: Did climate change force the origins of agriculture? The critical importance of agriculture for the origins of civilization and complex societies. What was the role of climate change in the beginnings of cultivation?

Reading: Richerson, Peter J., Robert Boyd and Robert L. Bettinger (2001). Was Agriculture Impossible during the Pleistocene but Mandatory during the Holocene? A Climate Change Hypothesis. *American Antiquity* 66(3):387-411.

Reading: Rosen, Arlene Miller and Isabel Rivera-Collazo (2012). Climate change, adaptive cycles, and the persistence of foraging economies during the late Pleistocene/Holocene transition in the Levant. *PNAS* 109(10):3640-3645.

11) February 27: Spread of Rice Farming and its Impact: The spread of rice farming in the Chinese Neolithic and beyond. How climate influenced farmers – how farmers influenced climate;

Reading: Ruddiman, William F. (2005). Chapters 8 and 9, Pp. 76-94 in *Plows, Plagues, and Petroleum: How Humans Took Control of Climate*. Princeton University Press, Princeton.

12) March 4: The Desert vs the Sown: Farmers and pastoral nomads in marginal lands.

Reading: Kuper, Rudolph and Stefan Kröpelin (2006). Climate-Controlled Holocene Occupation in the Sahara: Motor of Africa's Evolution. *Science* 313(5788):803-807.
<http://www.sciencemag.org/content/313/5788/803.full>

Reading: Fagan, Brian M. (1999). Chapter 11, pp. 203-22 in *Floods, Famines, and Emperors: El Niño and the Fate of Civilizations*. Basic Books, New York.

13) March 6: Discussion Topic: Perceiving and Managing Risk, is it better to be a farmer or forager when climates change? One article-reading assignment will be handed out to each discussion group in the previous week. Groups will assemble in-class and prepare a discussion. Articles to be confirmed (Smith 2001; Asouti and Fuller, Zeder, Bar-Yosef; Rosen, Arlene M. (2010). Natufian plant exploitation: Managing risk and stability in an environment of change. *Eurasian Prehistory* 7(1):117-131.)

Theme 4: Climate Change and the Collapse of Civilizations (Nature pleads “not guilty”)

14) March 11: The Rise and Collapse of Early Bronze Age cities of the Near East (Climate or Culture, Who is to blame?)

Reading: Lawrence, D., G. Philip, H. Hunt, L. Snape-Kennedy and T. J. Wilkinson (2016). Long Term Population, City Size and Climate Trends in the Fertile Crescent: A First Approximation. *PLoS One* 11(3):e0152563.

Reading: Rosen, Arlene M. (2007). Chapter 7, pp. 128-149 in *Civilizing Climate: Social Responses to Climate Change in the Ancient Near East*. Altamira, Lanham, MD.

15) March 13: China's Sorrow: Feast and Famine along the Yellow River.

Reading: Hilgers, Lauren (2011). Reading the Yellow River. *Archaeology* 64 (2): 18-23.
http://archive.archaeology.org/1103/features/china_han_dynasty_yellow_river.html

Reading: Fagan, Brian M. (2008). Chapter 12: China's Sorrow, pp. 213-227, in *The Great Warming: Climate Change and the Rise and Fall of Civilizations*. Bloomsbury Press, New York.

March 18 – 22: Happy Spring Break!

16) March 25: Roman Expansion into the Desert: Better Climate or Good Organizational Skills?

Reading: Barker, Graeme (2002). A tale of two deserts: Contrasting desertification histories on Rome's desert frontiers. *World Archaeology* 33(3):488-507.

Reading: Rosen, Arlene M. (2007). Chapter 8, pp. 150-171 in *Civilizing Climate: Social Responses to Climate Change in the Ancient Near East*. Altamira, Lanham, MD.

16) March 27: In Class Quiz

17) April 1: Southeast Asia: Climate Change and the Demise of Angkor, Cambodia

Reading: Fletcher, Roland, et al. (2008). The Water Management Network of Angkor, Cambodia. *Antiquity* 82:658-670.

Reading: Buckley Brendan M., Kevin J. Anchukaitisa, Daniel Penny, Roland Fletcher, et al. (2010). Climate as a Contributing Factor in the Demise of Angkor, Cambodia. *PNAS* 107:6748-6752.

18) April 3: Easter Island

Reading: Hunt, Terry L. (2007). Rethinking Easter Island's ecological catastrophe. *Journal of Archaeological Science* 34(3):485-502.

Reading: Diamond, Jared M. (2005). Chapter 2: Easter Island, pp. in *Collapse: How societies choose to fail or survive*. Penguin Books, London.

19) April 8: Student-Led Class Discussion: Maya Collapse, Did Climate Change Play a

Role? One article-reading assignment will be handed out to each discussion group in the previous week. Groups will assemble in-class and prepare a discussion.

Reading Group 1: Diamond, Jared M. (2005). Chapter 5: The Maya collapses, pp. in *Collapse: How societies choose to fail or survive*. Penguin Books, London.

Reading Group 2: Gill, Richardson B., Paul A. Mayewski, Johan Nyberg, Gerald Haug, and Larry C. Peterson (2007). Drought and the Maya Collapse. *Ancient Mesoamerica* 18 (2007): 283-302.

Reading Group 3: Kennett, D. J., S. F. Breitenbach, V. V. Aquino, Y. Asmerom, J. Awe, J. U. Baldini, P. Bartlein, B. J. Culleton, C. Ebert, C. Jazwa, M. J. Macri, N. Marwan, V. Polyak, K. M. Prufer, H. E. Ridley, H. Sodemann, B. Winterhalder and G. H. Haug (2012) Development and disintegration of Maya political systems in response to climate change. *Science* 338(6108):788-791.

Reading Group 4: Lawler, Andrew (2010). Collapse? What collapse? *Science* 330, 12 November 2010: 907-909.

Reading Group 5: Lucero, Lisa J. (2002). The Collapse of the Classic Maya: A Case for the Role of Water Control. *American Anthropologist* 104:814-826.

Reading Group 6: McAnany, Patricia A. and Tomás Gallareta Negrón (2010). Bellicose Rulers and Climatological Peril? Retrofitting Twenty-First-Century Woes on Eighth-Century Maya Society. In *Questioning Collapse*, ed. by Patricia A. McAnany & Norman Yoffee, pp. 142-175. Cambridge University Press, Cambridge.

20) April 10: Film: “Ancient Apocalypse: Death on the Nile”

21) April 15: The Political Ecology of Drought Cycles in Native America: Cahokia, Native Anasazis, Colonial Spaniards and the Pueblo Revolt.

Reading: Spielmann, K. A., T. Clark, D. Hawkey, K. Rainey & S. K. Fish (2009).

"...being weary, they had rebelled": Pueblo subsistence and labor under Spanish colonialism. *Journal of Anthropological Archaeology*, 28(1), 102-25.

Reading: Benson, Larry V., Timothy R. Pauketat, and Edward R. Cook (2009) Cahokia's Boom and Bust in the Context of Climate Change. *American Antiquity*.

22) April 17: The Little Ice Age and its impact on the Greenland Norse populations.

Reading: Fagan, Brian M. (1999). Chapter 10: The Little Ice Age, pp. 181-201 in *Floods, Famines, and Emperors: El Niño and the Fate of Civilizations*. Basic Books, New York.

Reading: Dugmore, A., C. Keller & T. H. McGovern (2007). Norse Greenland Settlement: Reflections on Climate Change, Trade, and the Contrasting Fates of Human Settlements in the North Atlantic Islands. *Arctic Anthropology*, 44, 12-36.

23) April 22: Student Discussion: Societal Responses to Climate Change in Recent History

Reading Group 1: Hassan, Fekri (2007). Extreme Nile Floods and Famines in Medieval Egypt (AD 930–1500) and their Climatic Implications. *Quaternary International* 173-174:101-112.

Reading Group 2: Oster, Emily (2004). Witchcraft, Weather and Economic Growth in Renaissance Europe. *Journal of Economic Perspectives* 18:215-228.

Reading Group 3: Wood, Gillen (2008). The Volcano Lover: Climate, Colonialism, and the Slave Trade in Raffles's 'History of Java'. *Journal of Early Modern Cultural Studies* 8: 33-55.

Reading Group 4: Scheffran, Jurgen (2008). Climate Change and Security. *Bulletin of the Atomic Scientists* 64(2):19-25, 59-60.

Reading Group 5: Zhang, David D., Peter Brecke, Harry F. Lee, Yuan-Qing He, and Jane Zhang (2007). Global Climate Change, War, and Population Decline in Recent Human History. *Proceedings of the National Academy of Sciences* 104:19214-19219.

24) April 24: The Ethics of Climate Change in our Modern Age; The impact of global climate change on localities today, how climate change is represented in the media – are there hidden messages behind the coverage? Who controls information about climate change in politics and education? Who will be the ‘winners’ and who the losers with global warming? Global climate change: What Lies Ahead?

Diamond, Jared A. (2005). *Collapse: How Societies Choose or Fail to Succeed*. Viking Press, New York. Chapter 16, ‘The World as a Polder: What Does it all Mean to Us Today?’ pp. 486-525.

Fagan, Brian (2008). *The Great Warming: Climate Change and the Rise and Fall of Civilization*. Bloomsbury Press, New York, chapter 13

van der Leeuw, Sander E. (2008). Climate and Society: Lessons from the Past 10,000 Years. *Royal Swedish Academy of Sciences* 14:476-482.

25) April 29: In Class Quiz

26) May 1: Student Presentations:

Five-minute Presentation Topics: Does climate change force cultural change? Environmental Change, Climatic Opportunism, and Collapse of Past Societies.

Attendance is mandatory for all sessions of presentations; 5% subtracted if absent without acceptable excuse (my definition)

27) May 6: Student Presentations;

28) May 8: Student Presentations;

UNIVERSITY POLICIES

Use of E--mail for Official Correspondence to Students: All students should be familiar with the University's official e--mail student notification policy. It is the student's responsibility to keep the University informed as to changes in his or her e--mail address. Students are expected to check e--mail on a frequent and regular basis in order to stay current with University--related communications, recognizing that certain communications may be time--critical. The complete text of this policy and instructions for updating your e--mail address are available at <http://www.utexas.edu/its/policies/emailnotify.html>.

Religious Holy Days: A student who misses classes or other required activities, including examinations, for the observance of a religious holy day should inform the instructor as far in advance of the absence as possible, so that arrangements can be made to complete an assignment within a reasonable time after the absence.

Students with Disabilities: You will need to provide documentation to the Dean of Student's Office so the most appropriate accommodations can be determined. Specialized services are available on campus through Services for Students with Disabilities (SSB 4.104, 471-6259). Any student who requires special accommodations must obtain a letter that documents the disability from the Services for Students with Disabilities area of the Division of Diversity and Community Engagement (471- 6259 voice or 471-4641 TTY for users who are deaf or hard of hearing).

Present the letter to the professor at the beginning of the semester so that needed accommodations can be discussed. The student should remind the professor of any testing accommodations no later than five business days before an exam. For more information, visit <http://www.utexas.edu/diversity/ddce/ssd/>.

Emergency evacuation: Notice from the Office of Campus Safety and Security, 512-471-5767, <http://www.utexas.edu/safety/>

Policy on Scholastic Dishonesty: Students who violate University rules on scholastic dishonesty are subject to disciplinary penalties, including the possibility of failure in the course and/or dismissal from the University. Since such dishonesty harms the individual, all students and the integrity of the University, policies on scholastic dishonesty will be strictly enforced. For further information, please visit the Student Judicial Services web site at <http://deanofstudents.utexas.edu/sjs/> . 9

University of Texas Core Values and Honor Code: The core values of The University of Texas at Austin are learning, discovery, freedom, leadership, individual opportunity, and responsibility. Each member of the university is expected to uphold these values through integrity, honesty, trust, fairness, and respect toward peers and community. As a student of the University of Texas at Austin, I shall abide by the core values of the University and uphold academic integrity.

UT Honor Code (or statement of ethics) and an explanation or example of what constitutes plagiarism: <http://registrar.utexas.edu/catalogs/gi09-10/ch01/index.html>).