
Professor	Dr. Matthew Lachniet
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Meeting room and time	GUA 2212, Monday/Wednesday 2:30 – 3:45 pm
Office Hours	SEB 3240, Tuesday 2:30-3:30 pm and by appointment
Required textbook (all)	Ruddiman, 2014. Earth's Climate, Past and Future, 3rd Ed.
Required textbook (grads)	Bradley, 2015. Paleoclimatology: Reconstructing Climates of the Quaternary, 3 rd Ed. (UNLV online access)
Recommended textbook	Cronin, 2010. Paleoclimates. Understanding climate change past and present.
Final Exam	Wednesday, Dec. 8, 2021, 3:10-5:10 pm

Topic ListIntroduction: Why it matters: The Climate Crisis

1. Overview of Climate Science
2. Earth's Climate System Today
3. Climate Archives, Data, and Models
- Bradley Chapter 3. Dating Methods I, Sec 3.2.1 and 3.2.3
- Bradley Chapter 3. Dating Methods I, Sec 3.2.1 and 3.2.3
8. Astronomical Control of Solar Radiation
9. Insolation Control of Monsoons; Appendix 1: Isotopes of Oxygen
10. Insolation Control of Ice Sheets
11. Orbital-scale changes in carbon dioxide and methane
12. Orbital-scale Interactions, Feedbacks, and Unsolved Mysteries
13. The Last Glacial Maximum
14. Climate During and Since the Last Glaciation
15. Millennial Oscillations in Climate
16. Humans and preindustrial Climate
17. Climate Changes during the last 1000 years
17. Climate Changes during the last 1000 years
18. Climate Changes since 1850
19. Causes of warming over the last 125 years

Grad Student supplemental Topic List

1. Paleoclimatic Reconstruction
2. Climate and Climatic Variation
3. Dating Methods I
4. Dating Methods II
8. Speleothems
6. Marine sediments
5. Ice cores
10. Nonmarine Geologic Evidence
12. Pollen
13. Tree rings
14. Corals
15. Historical Documents

Course Background:

GEOL 437/637 is a 3 credit, upper-level undergraduate/graduate course in Paleoclimatology, the interdisciplinary study of the climatic history of the Earth, from its origin to the modern. Although we will discuss climate changes back to the pre Cambrian, the emphasis will be on the Quaternary Period (last 1.6 ma), and Holocene Epoch (last 10 ka). We will investigate numerous paleoclimate proxies and mechanisms of climate change at time scales from millions to <1 yr will be considered. An introduction to time series analysis and statistical treatment of paleoclimatic data will also be presented. The class will meet two days per week and consist of combined lectures and discussions of assigned readings. I assume knowledge of basic geological concepts like rocks and minerals, some structural geology, geomorphology, sedimentology, and common data analysis techniques such as graphing, units, conversion, basic algebra, and basic geologic terminology.

Learning outcomes and objectives:

The objectives of this class are to achieve competency with current, cutting-edge research in paleoclimatology, and to provide a knowledge base for the student to either understand or to conduct their own research in paleoclimatology. These objectives will be met by a thorough reading of the textbooks and selected research articles. Graduate students will be expected to demonstrate a detailed and comprehensive understanding of paleoclimatic concepts. By the end of the course, students should demonstrate understanding of the main concepts relating to Earth's climate history, including but not limited to: 1) Earth's modern climate and processes; 2) the broad details of Earth's climate history for the past 65 Ma; 3) the main proxies used to reconstruct past climate; 4) the Greenhouse effect and role of the carbon cycle in Earth's climate; 5) the role of ice sheets, ocean circulation, and orbital insolation on Earth's climate; 6) changes in sea level related to climate change; 7) main characteristics of climate of the common era (last 2 ka), 8) evidence for anthropogenic global warming; 9) concept of time series and time series analysis.

Attendance:

Attendance in lecture is required. It is your responsibility to attend and be on time for lecture. It is the student's responsibility to inform the instructor no later than the last day of late registration of classes to be missed for religious holidays.

Grading policy

Your grade for this class will be determined as follows.

Assignments	10%
Exam 1 (not cumulative)	25%
Exam 2 (not cumulative)	25%
Final project	15%
Final Exam (cumulative)	25%
Total	100%

What do the grades mean?

"A" = exceptional performance and demonstration of expertise; if you were an employee, I would give you a raise

"B" = above average but not exceptional, demonstrating proficiency but not expertise; if you were an employee, you might get a raise if funds were available but don't count on it.

"C" = average, just meets expectations; student has attained basic competency in the course material; if you were an employee, you would not get a raise and your job security is tenuous

"D" = does not meet expectations; if you were an employee, you would likely be let go

"F" = the student has not demonstrated a basic level of competency in the course material. If you were an employee, you would be instantly fired.

To earn an "A" in this class, you should demonstrate exceptional knowledge of the course material. An "A" typically requires that you should: 1) read **all** the assigned readings, 2) attend class every day and arrive on time, 3) know all of the terminology and be able to discuss all of the concepts we discuss in lecture, and 4) perform well on exams. Most importantly, students who are naturally curious and ask questions are more likely to perform well.

To earn an "A" in this course, graduate students will be expected to demonstrate expertise at and above the level of the text book and show a proficient understanding of the selected readings from the primary literature. Undergraduates will be expected to demonstrate proficiency at the level of the textbook and lectures, and a working knowledge of the literature discussed in class.

How much time should you spend studying outside of class to attain expertise? A useful guide is 2 to 3 hours of studying for each credit hour.

University Policies

Public Health Directives

Face coverings are mandatory for all faculty and students in the classroom. Students must follow all active UNLV public health directives while enrolled in this class. UNLV public health directives are found at [Health Requirements for Returning to Campus](https://www.unlv.edu/coronavirus/health-requirements), <https://www.unlv.edu/coronavirus/health-requirements>. Students who do not comply with these directives may be asked to leave the classroom. Refusal to follow the guidelines may result in further disciplinary action according to the [UNLV Student Conduct Code](https://www.unlv.edu/sites/default/files/page_files/27/StudentConduct-Code.pdf), https://www.unlv.edu/sites/default/files/page_files/27/StudentConduct-Code.pdf, including being administratively withdrawn from the course.

Academic Misconduct

Academic integrity is a legitimate concern for every member of the University community. We all share in upholding the fundamental values of honesty, trust, respect, fairness, responsibility, and professionalism. By choosing to join the UNLV community, students accept the expectations of the Student Academic Misconduct Policy, and are encouraged to always take the ethical path whenever faced with choices. Students enrolling at UNLV assume the obligation to conduct themselves in a manner compatible with UNLV's educational mission. An example of academic misconduct is plagiarism. Plagiarism is using the words or ideas of another person, from the Internet or any other source without proper citation of the source(s). See the [Student Conduct Code](https://www.unlv.edu/studentconduct/student-conduct), <https://www.unlv.edu/studentconduct/student-conduct>.

Auditing a Course

Auditing a course allows a student to continue attending the lectures and/or laboratories and discussion sessions associated with the course, but the student will not earn a grade for any component of the course. Students who audit a course receive the same educational experience as students taking the course for a grade, but will be excused from exams, assessments, and other evaluative measures that serve the primary purpose of assigning a grade.

Classroom Conduct

Students have a responsibility to conduct themselves in class and in the libraries in ways that do not interfere with the rights of other students to learn, or of instructors to teach. Use of devices such as cellular phones and pagers, or other potentially disruptive activities are only permitted with the prior explicit consent of the instructor. Students are specifically prohibited to record classes without instructor authorization, including online/remote classes (either audio only, or video and audio). The instructor may rescind permission at any time during the class. If a student does not comply with established requirements or obstructs the functioning of the class, the instructor may initiate an administrative withdrawal of the student from the course.

Since the COVID-19 pandemic forced some instruction to be delivered remotely starting in Spring 2020, numerous students have asked instructors to record their synchronous classes, so that they can access them at their convenience. Instructors who agree to record their classes (audio only, or video and audio) should inform students in advance. Recorded lectures may not be broadly released to anyone, but made available exclusively to those students enrolled in the class during the particular academic term. Recorded lectures must be stored securely, and are subject to the Nevada System of Higher Education's Records Retention Policy, meaning that the recordings can only be deleted 120 days after the end of class (i.e., after grades are posted). Once this requirement is met, the recordings should be deleted. Class recordings are protected from disclosure, as they are deemed part of an educational record under the Family Educational Rights and Privacy Act (FERPA).

Copyright

The University requires all members of the University Community to familiarize themselves with, and to follow copyright and fair use requirements. You are individually and solely responsible for violations of copyright and fair use laws. The University will neither protect nor defend you, nor assume any responsibility for student or employee violations of fair use laws. Violations of copyright laws could subject you to federal and state civil penalties and criminal liability, as well as disciplinary action under University policies. Additional [copyright policy information](https://www.unlv.edu/provost/copyright) is available at <https://www.unlv.edu/provost/copyright>.

Disability Resource Center (DRC)

The [UNLV Disability Resource Center](https://www.unlv.edu/drc) (Student Services Complex, SSC-A, Room 143, <https://www.unlv.edu/drc>, telephone 702-895-0866) provides resources for students with disabilities. Students who believe that they may need academic accommodations due to a permanent disability, temporary or permanent medical need, or academic support due to pregnancy are encouraged to contact the DRC as early as possible in the academic term. A Disabilities Specialist will discuss what options may be available to you. Students who are already registered with the DRC should request their accommodations online each semester, and make an appointment to discuss their accommodations with their instructors.

Final Examinations

The University requires that final exams given at the end of a course occur on the date and at the time specified in the Final Exam schedule. The Final Exam schedule is typically available at the start of the semester, and the classroom locations are available approximately one month before the end of the semester. See the [Final Exam Schedule](https://www.unlv.edu/registrar/calendars), <https://www.unlv.edu/registrar/calendars>.

Identity Verification in Online Courses

All UNLV students must use their Campus-issued ACE ID and password to log in to WebCampus-Canvas.

UNLV students enrolled in online or hybrid courses are expected to read and adhere to the [Student Academic Misconduct Policy](https://www.unlv.edu/studentconduct/misconduct/policy), <https://www.unlv.edu/studentconduct/misconduct/policy>, which states that “acting or attempting to act as a substitute for another, or using or attempting to use a substitute, in any academic evaluation or assignment” is a form of academic misconduct. Intentionally sharing ACE login credentials with another person may be considered an attempt to use a substitute, and could result in investigation and sanctions, as outlined in the Student Academic Misconduct Policy.

UNLV students enrolled in online courses are also expected to read and adhere to the [Acceptable Use of Computing and Information Technology Resources Policy](https://www.it.unlv.edu/policies/acceptable-use-computing-and-information-technology-resources-policy), <https://www.it.unlv.edu/policies/acceptable-use-computing-and-information-technology-resources-policy>, which prohibits sharing university accounts with other persons without authorization.

To the greatest extent possible, all graded assignments and assessments in UNLV online courses should be hosted in WebCampus-Canvas or another UNLV-managed platform that requires ACE login credentials for access.

Incomplete Grades

The grade of "I" (Incomplete) may be granted when a student has satisfactorily completed three-fourths of course work for that semester/session, but cannot complete the last part of the course for reason(s) beyond the student's control and acceptable to the instructor, and the instructor believes that the student can finish the course without repeating it. For undergraduate courses, the incomplete work must be made up before the end of the following regular semester. Graduate students receiving "I" grades in 500-, 600-, or 700-level courses have up to one calendar year to complete the work, at the discretion of the instructor. If course requirements are not completed within the period indicated, a grade of "F" will be recorded, and the student's GPA will be adjusted accordingly. Students who are fulfilling an Incomplete grade do not register for the course, but make individual arrangements with the instructor who assigned the "I" grade.

Library Resources

Librarians are available to consult with students on research needs, including developing research topics, finding information, and evaluating sources. To make an appointment with a subject expert for this class, please visit the [Libraries' Research Consultation](https://guides.library.unlv.edu/appointments/librarian) website, <https://guides.library.unlv.edu/appointments/librarian>. You can also [ask the library staff](https://ask.library.unlv.edu/) questions via chat and text message at <https://ask.library.unlv.edu/>.

Missed Classwork

Any student missing class, quizzes, examinations, or any other class or laboratory work because of observance of religious holidays will be given an opportunity during that semester to make up the missed work. The make-up opportunity will apply to the religious holiday absence only. It is the responsibility of the student to notify the instructor within the first 14 calendar days of the course for Fall and Spring courses (except for modular courses), or within the first 7 calendar days of the course for Summer and modular courses, of their intention to participate in religious holidays which do not fall on state holidays or periods of class recess. For additional information, please visit the Missed Classwork policy, under Registration Policies, on the [Academic Policies](https://catalog.unlv.edu/content.php?catoid=32&navoid=8271&hl=) webpage, <https://catalog.unlv.edu/content.php?catoid=32&navoid=8271&hl=>.

In accordance with the policy approved by the Faculty Senate regarding missed class time and assignments, students who represent UNLV in any official extracurricular activity will also have the opportunity to make up assignments, provided that the student submits official written notification to the instructor no less than one week prior to the missed class(es).

The spirit and intent of the policy for missed classwork is to offer fair and equitable assessment opportunities to all students, including those representing the University in extracurricular activities. Instructors should consider, for example, that in courses which offer a "Drop one" option for the lowest assignment, quiz, or exam, assigning the student a grade of zero for an excused absence for extracurricular activity is both contrary to the intent of the Faculty Senate's policy, and an infringement on the student's right to complete all work for the course.

This policy will not apply in the event that completing the assignment or administering the examination at an alternate time would impose an undue hardship on the instructor or the University that could be reasonably avoided. There should be a good faith effort by both the instructor and the student to agree to a reasonable resolution. When disagreements regarding this policy arise, decisions can be appealed to the Department Chair/School Director, College/School Dean, and/or the Faculty Senate Academic Standards Committee.

For purposes of definition, extracurricular activities may include, but are not limited to academic recruitment activities, competitive intercollegiate athletics, fine arts activities, liberal arts competitions, science and engineering competitions, and any other event or activity sanctioned by a College/School Dean, and/or by the Executive Vice President and Provost.

Rebelmail

Rebelmail is UNLV's official email system for students and by University policy, instructors and staff should only send emails to students' Rebelmail accounts. Rebelmail is one of the primary ways in which students receive official University communications, information about deadlines, major Campus events, and announcements. All UNLV

students receive a Rebelmail account after they have been admitted to the University. Sending emails within WebCampus-Canvas is also acceptable.

Tutoring and Coaching

The Academic Success Center (ASC), at the Claude I. Howard Building, provides tutoring, academic success coaching, and other academic assistance for all UNLV undergraduate students. For information regarding tutoring subjects, tutoring times, and other ASC programs and services, please visit the [ASC website](https://www.unlv.edu/asc), <https://www.unlv.edu/asc>, or call 702-895-3177. The ASC is located across from the Student Services Complex (SSC). Academic success coaching is located on the second floor of SSC A, Room 254. Drop-in tutoring is located on the second floor of the Lied Library, and on the second floor of the College of Engineering building (TBE A 207).

UNLV Writing Center

One-on-one or small group assistance with writing is available free of charge to UNLV students at the [Writing Center](https://writingcenter.unlv.edu/), <https://writingcenter.unlv.edu/>, located in the Central Desert Complex, Building 3, Room 301 (CDC 3–301). Walk-in consultations are sometimes available, but students with appointments receive priority assistance. Students may make appointments in person or by calling the Center, telephone 702-895-3908. Students are requested to bring to their appointments their Rebel ID Card, a copy of the instructions for their assignment, and two copies of any writing they have completed on their assignment.

Diversity Statement

As an institution of higher learning, UNLV represents a rich diversity of human beings among its faculty, staff, and students, and is committed to aspiring to maintain a Campus environment that values that diversity. Accordingly, the University supports understanding and appreciation of all members of its community, regardless of race, sex, age, color, national origin, ethnicity, creed, religion, disability, sexual orientation, gender, gender identity, marital status, pregnancy, genetic information, veteran status, or political affiliation. Please see [University Statements and Compliance](https://www.unlv.edu/about/statements-compliance), <https://www.unlv.edu/about/statements-compliance>.

A successful learning experience requires mutual respect and trust between the students and the instructor. Accordingly, the instructor asks that students be willing to listen to one another's points of view, acknowledging that there may be disagreements, keep discussion and comments on topic, and use first person, positive language when expressing their perspectives.

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