GEOL4325/5325 Paleoclimate & Climate Change
Spring Semester 2018

Instructor: Arne Winguth, Associate Professor
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Faculty Profile: https://www.uta.edu/profiles/anne-winguth
Office Hours: Tuesday & Thursday 13:30 -14:30 or after appointment

Section Information:
Lecture GEOL4325-001 undergraduate students
Lecture GEOL5325-001 graduate students

Time and Place of Class Meetings:
Lecture: Tuesday & Thursday 11:00 pm – 12:20 pm, Geosciences Room 104

Description of Course Content: Climate change throughout geologic time, especially the last 100 Million years: Models of the climate system, reconstruction and modeling of past climates, abrupt climate change, warm climates, paleoclimatology, climate change and mass extinctions.

Student Learning Outcomes: After completion of this class, students will be familiar with the key terminology pertaining to the climates of the past and will have a well-rounded understanding of the major paleoclimate reconstructions and climate forcings and feedback process as well as complex interactions with the various components of the climate system. This knowledge will enable them to have a fundamental knowledge in scientific problems and a better understanding of great societal important topics, such as future climate change, mass extinction, resources, and environmental sustainability.

The student will be able to:
• Understand the feedbacks of components of the Earth’s climate system (atmosphere, terrestrial biosphere, cryosphere, and geosphere).
• Analyze the atmospheric and the oceanic circulation system.
• Describe the principles involved in the transition to hot house climates and cold house climates.
• Explain the role of weathering and erosion, and plate tectonics on the global climate.
• Explain the relationship between plants and animals in the ocean and land and how they affect the cycling of carbon among the ocean, atmosphere, land and sediments and build-up of geologic resources.
• Identify the consequences of a rise in sea level on the coastal zone and society.
• Identify major factors leading to climate change, and assess future climate projections.
• Discuss the societal relevance of paleoclimatology and climate change for global initiatives and political decisions.

This knowledge will enable the students to better understand topics of great societal importance, such as future climate change, geologic resources, and environmental sustainability.


**Descriptions of major assignments and examinations:** Major course requirements are weekly homework assignments in which students present the results, examinations, and quizzes.

**Attendance:** At The University of Texas at Arlington, taking attendance is not required but attendance is a critical indicator in student success. However, while UT Arlington does not require instructors to take attendance in their courses, the U.S. Department of Education requires that the University have a mechanism in place to mark when Federal Student Aid recipients “begin attendance in a course.” UT Arlington instructors will report when students begin attendance in a course as part of the final grading process. Specifically, when assigning a student a grade of F, faculty report the last date a student attended their class based on evidence such as a test, participation in a class project or presentation, or an engagement online via Blackboard. This date is reported to the Department of Education for federal financial aid recipients.

**Grading:**

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage of Course</th>
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<tbody>
<tr>
<td>Lecture Portion</td>
<td>75%</td>
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<tr>
<td>Signature Assignment &amp; Proposal</td>
<td>25%</td>
</tr>
<tr>
<td>Proposal of the Assignment</td>
<td>4%</td>
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<tr>
<td>Signature Assignment</td>
<td>21%</td>
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<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage of Course</th>
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</thead>
<tbody>
<tr>
<td>ECHO360 Online-Quizzes</td>
<td>2.5%</td>
</tr>
<tr>
<td>Quizzes (Top 3)</td>
<td>7.5% (2.5% each)</td>
</tr>
<tr>
<td>Exams (3)</td>
<td>45% (15% each)</td>
</tr>
<tr>
<td>Final Exam</td>
<td>20%</td>
</tr>
</tbody>
</table>

**Final grade calculation:**
0.25 x signature project & proposal + 0.10 x quizzes + 0.45 x exams + 0.20 x final exam
Score will be translated into a grade based on class average. Maximum average grade of each category will be no more than 100%.

Grades will not be released over the phone or by email. Grades must be either obtained in person or from the UTA online database.

**Exams:** Exams will be multiple-choice questions and problem solving questions. There are no early exams.

Students are expected to keep track of their performance throughout the semester and seek guidance from available sources (including the instructor) if their performance drops below satisfactory levels; see “Student Support Services,” below.

**Make-up Exams:** Make-up exams can be only taken in cases of illness or family emergency. A note from the University disciplinary officer or doctor may be required in these cases. Students who do not take an exam receive zero points as a grade on that exam. Make-up exams are scheduled and set by the instructor.

**Quizzes:** Quizzes consist of Echo360 online and pop quizzes that are not announced. ECHO360 quizzes are graded by participation. The 3 best pop quizzes out of 4 will be counted towards the total grade. There are no make-up quizzes.

**Extra Credits:** Extra credit opportunities will be announced during the lecture.

**Signature project:** A signature research assignment in the area of paleoclimatology is part of the assessment and is designed to stimulate critical thinking skills, communication skills, and empirical and quantitative skills. The project is split up into an one-page proposal (4% of the total grade) and the final term 6-page paper and presentation (21% of grade). The oral presentation counts 25% of the final signature paper grade. The total report length for each final signature paper will be 6 pages including at least 4 written pages, figures and references, letter size, 1.5-spaced, 12 pt times new roman font. Each student will present the project in a 10-minute presentation. Identical copy of a term paper from web or other sources (plagiarized papers or web pages) will result in an F (see also the UT Arlington Honor Code). Do not check against data base in Blackboard for proposal submission. Plagiarism and self-plagiarism will be penalized (20 % per 10% plagiarism).

**Expectations for Out-of-Class Study:**
A general rule of thumb is this: for every credit hour earned, a student should spend 3 hours per week working outside of class. Hence, a 3-credit course might have a minimum expectation of 9 hours of reading, study, homework, etc.

**Grade Grievances:**
Any appeal of a grade in this course must follow the procedures and deadlines for grade-related grievances as published in the current University Catalog: http://catalog.uta.edu/academicregulations/grades/#undergraduatetext
for graduate courses, see http://catalog.uta.edu/academicregulations/grades/#graduatetext.

**Drop Policy:** Students may drop or swap (adding and dropping a class concurrently) classes through self-service in MyMav from the beginning of the registration period through the late registration period. After the late registration period, students must see their
academic advisor to drop a class or withdraw. Undeclared students must see an advisor in the University Advising Center. Drops can continue through a point two-thirds of the way through the term or session. It is the student's responsibility to officially withdraw if they do not plan to attend after registering. **Students will not be automatically dropped for non-attendance.** Repayment of certain types of financial aid administered through the University may be required as the result of dropping classes or withdrawing. For more information, contact the Office of Financial Aid and Scholarships (http://www.uta.edu/aao/fao/).

**Disability Accommodations:**
UT Arlington is on record as being committed to both the spirit and letter of all federal equal opportunity legislation, including *The Americans with Disabilities Act (ADA)*, *The Americans with Disabilities Amendments Act (ADAAA)*, and *Section 504 of the Rehabilitation Act*. All instructors at UT Arlington are required by law to provide “reasonable accommodations” to students with disabilities, so as not to discriminate on the basis of disability. Students are responsible for providing the instructor with official notification in the form of a letter certified by the Office for Students with Disabilities (OSD). Only those students who have officially documented a need for an accommodation will have their request honored. Students experiencing a range of conditions (Physical, Learning, Chronic Health, Mental Health, and Sensory) that may cause diminished academic performance or other barriers to learning may seek services and/or accommodations by contacting:

**The Office for Students with Disabilities, (OSD)** www.uta.edu/disability or calling 817-272-3364. Information regarding diagnostic criteria and policies for obtaining disability-based academic accommodations can be found at www.uta.edu/disability.

**Counseling and Psychological Services, (CAPS)** www.uta.edu/caps/ or calling 817-272-3671 is also available to all students to help increase their understanding of personal issues, address mental and behavioral health problems and make positive changes in their lives.

**Non-Discrimination Policy:**
*The University of Texas at Arlington does not discriminate on the basis of race, color, national origin, religion, age, gender, sexual orientation, disabilities, genetic information, and/or veteran status in its educational programs or activities it operates. For more information, visit uta.edu/eos.*

**Title IX Policy:**
The University of Texas at Arlington (“University”) is committed to maintaining a learning and working environment that is free from discrimination based on sex in accordance with Title IX of the Higher Education Amendments of 1972 (Title IX), which prohibits discrimination on the basis of sex in educational programs or activities; Title VII of the Civil Rights Act of 1964 (Title VII), which prohibits sex discrimination in employment; and the Campus Sexual Violence Elimination Act (SaVE Act). Sexual misconduct is a form of sex discrimination and will not be tolerated. For information regarding Title IX, visit www.uta.edu/titleIX or contact Ms. Michelle Willbanks, Title IX Coordinator at (817) 272-4585 or titleix@uta.edu
Academic Integrity:
Students enrolled all UT Arlington courses are expected to adhere to the UT Arlington Honor Code:

I pledge, on my honor, to uphold UT Arlington’s tradition of academic integrity, a tradition that values hard work and honest effort in the pursuit of academic excellence.

I promise that I will submit only work that I personally create or contribute to group collaborations, and I will appropriately reference any work from other sources. I will follow the highest standards of integrity and uphold the spirit of the Honor Code.

UT Arlington faculty members may employ the Honor Code in their courses by having students acknowledge the honor code as part of an examination or requiring students to incorporate the honor code into any work submitted. Per UT System Regents’ Rule 50101, §2.2, suspected violations of university’s standards for academic integrity (including the Honor Code) will be referred to the Office of Student Conduct. Violators will be disciplined in accordance with University policy, which may result in the student’s suspension or expulsion from the University. Additional information is available at https://www.uta.edu/conduct/. Faculty are encouraged to discuss plagiarism and share the following library tutorials http://libguides.uta.edu/copyright/plagiarism and http://library.uta.edu/plagiarism/

Lab Safety Training:
Students registered for this course must complete all required lab safety training prior to entering the lab and undertaking any activities. Once completed, Lab Safety Training is valid for the remainder of the same academic year (i.e., Fall through Summer II) and must be completed anew in subsequent years. There are no exceptions to this University policy. Failure to complete the required training will preclude participation in any lab activities, including those for which a grade is assigned.

Electronic Communication:
UT Arlington has adopted MavMail as its official means to communicate with students about important deadlines and events, as well as to transact university-related business regarding financial aid, tuition, grades, graduation, etc. All students are assigned a MavMail account and are responsible for checking the inbox regularly. There is no additional charge to students for using this account, which remains active even after graduation. Information about activating and using MavMail is available at http://www.uta.edu/oit/cs/email/mavmail.php.

Campus Carry:
Effective August 1, 2016, the Campus Carry law (Senate Bill 11) allows those licensed individuals to carry a concealed handgun in buildings on public university campuses, except in locations the University establishes as prohibited. Under the new law, openly carrying handguns is not allowed on college campuses. For more information, visit http://www.uta.edu/news/info/campus-carry/

Student Feedback Survey:
At the end of each term, students enrolled in face-to-face and online classes categorized as “lecture,” “seminar,” or “laboratory” are directed to complete an online Student Feedback Survey (SFS). Instructions on how to access the SFS for this course will be sent directly to
each student through MavMail approximately 10 days before the end of the term. Each student’s feedback via the SFS database is aggregated with that of other students enrolled in the course. Students’ anonymity will be protected to the extent that the law allows. UT Arlington’s effort to solicit, gather, tabulate, and publish student feedback is required by state law and aggregate results are posted online. Data from SFS is also used for faculty and program evaluations. For more information, visit http://www.uta.edu/sfs.

Final Review Week:
The purpose of this week is to allow students sufficient time to prepare for final examinations. During this week, there shall be no scheduled activities such as required field trips or performances; and no instructor shall assign any themes, research problems or exercises of similar scope that have a completion date during or following this week unless specified in the class syllabus. During Final Review Week, an instructor shall not give any examinations constituting 10% or more of the final grade, except makeup tests and laboratory examinations. In addition, no instructor shall give any portion of the final examination during Final Review Week. During this week, classes are held as scheduled. In addition, instructors are not required to limit content to topics that have been previously covered; they may introduce new concepts as appropriate.

Emergency Exit Procedures:
Should we experience an emergency event that requires us to vacate the building, students should exit the room and move toward the nearest exit by following the exit signs. When exiting the building during an emergency, one should never take an elevator but should use the stairwells. Faculty members and instructional staff will assist students in selecting the safest route for evacuation and will make arrangements to assist individuals with disabilities. Students should also be encouraged to subscribe to the MavAlert system that will send information in case of an emergency to their cell phones or email accounts. Anyone can subscribe at https://mavalert.uta.edu/ or https://mavalert.uta.edu/register.php

Student Support Services:
UT Arlington provides a variety of resources and programs designed to help students develop academic skills, deal with personal situations, and better understand concepts and information related to their courses. Resources include tutoring, major-based learning centers, developmental education, advising and mentoring, personal counseling, and federally funded programs. For individualized referrals, students may visit the reception desk at University College (Ransom Hall), call the Maverick Resource Hotline at 817-272-6107, send a message to resources@uta.edu, or view the information at http://www.uta.edu/universitycollege/resources/index.php.

The IDEAS Center (2nd Floor of Central Library) offers free tutoring to all students with a focus on transfer students, sophomores, veterans and others undergoing a transition to UT Arlington. To schedule an appointment with a peer tutor or mentor email IDEAS@uta.edu or call (817) 272-6593.

The English Writing Center (411LIBR):
The Writing Center Offers free tutoring in 20-, 40-, or 60-minute face-to-face and online sessions to all UTA students on any phase of their UTA coursework. Our hours are 9 am to 8 pm Mon.-Thurs., 9 am-3 pm Fri. and Noon-6 pm Sat. and Sun. Register and make appointments online at http://uta.mywconline.com. Classroom Visits, workshops, and specialized services for graduate students are also available. Please see www.uta.edu/owl for detailed information on all our programs and services.
The Library’s 2nd floor Academic Plaza offers students a central hub of support services, including IDEAS Center, University Advising Services, Transfer UTA and various college/school advising hours. Services are available during the library’s hours of operation. http://library.uta.edu/academic-plaza

<table>
<thead>
<tr>
<th>Emergency Phone Numbers: In case of an on-campus emergency, call the UT Arlington Police Department at 817-272-3003 (non-campus phone), 2-3003 (campus phone). You may also dial 911. Non-emergency number 817-272-3381</th>
</tr>
</thead>
</table>

Library Home Page library.uta.edu

Librarian to Contact: Andy Herzog,
Ph.: 817-272-7517, Email: amherzog@uta.edu, Office: Central Library, 516B

Resources for Students

Academic Help
Academic Plaza Consultation Services library.uta.edu/academic-plaza
Ask Us ask.uta.edu/
Library Tutorials library.uta.edu/how-to
Subject and Course Research Guides libguides.uta.edu
Subject Librarians library.uta.edu/subject-librarians

Resources
A to Z List of Library Databases libguides.uta.edu/az.php
Course Reserves pulse.uta.edu/vwebv/enterCourseReserve.do
FabLab fablab.uta.edu/
Special Collections library.uta.edu/special-collections
Study Room Reservations openroom.uta.edu/

Teaching & Learning Services for Faculty
Copyright Consultation library-sc@listserv.uta.edu
Course Research Guide Development, Andy Herzog amherzog@uta.edu or your subject librarian
Data Visualization Instruction, Peace Ossom-Williamson peace@uta.edu
Digital Humanities Instruction, Rafi Mirza rafia@uta.edu
Graduate Student Research Skills Instruction, Andy Herzog amherzog@uta.edu or your subject librarian
Project or Problem-Based Instruction, Gretchen Trkay gtrkay@uta.edu
Undergraduate Research Skills Instruction, Gretchen Trkay gtrkay@uta.edu or your subject librarian.
# GEOL 4325/5325 Paleoclimate and Climate Change - Course Schedule

As the instructor for this course, I reserve the right to adjust this schedule in any way that serves the educational needs of the students enrolled in this course. —Arne Winguth

<table>
<thead>
<tr>
<th>Week</th>
<th>Days</th>
<th>Topics</th>
<th>Reading Chapter</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Aug. 23, 28</td>
<td>Introduction to the Climate System</td>
<td>Ruddiman 1</td>
</tr>
<tr>
<td>2</td>
<td>Aug. 30, Sept. 4</td>
<td>Present Day Climate Climate Archives, Data, and Models</td>
<td>Ruddiman 2</td>
</tr>
<tr>
<td>3</td>
<td>Sept. 6, 11</td>
<td>CO₂ and Long-Term Climate Plate Tectonics and Long-Term Climate</td>
<td>Ruddiman 4</td>
</tr>
<tr>
<td>4</td>
<td>Sept. 18, 20</td>
<td>Greenhouse Climate &amp; KP extinction</td>
<td>Ruddiman 6</td>
</tr>
<tr>
<td>5</td>
<td>Sept. 25, 27</td>
<td>The Last 50 Million Years</td>
<td>Ruddiman 7</td>
</tr>
<tr>
<td>6</td>
<td>Oct. 2, 4</td>
<td>Astronomical Variations in Radiation</td>
<td>Ruddiman 8</td>
</tr>
<tr>
<td>7</td>
<td>Oct. 9, 11</td>
<td>Insolation Control of Monsoons</td>
<td>Ruddiman 9</td>
</tr>
<tr>
<td>8</td>
<td>Oct. 18</td>
<td>Insolation Control of Ice Sheets</td>
<td>Ruddiman 10</td>
</tr>
<tr>
<td>9</td>
<td>Oct. 23</td>
<td>Orbital Scale Variation of CO₂ Orbital Scale Feedbacks</td>
<td>Ruddiman 11</td>
</tr>
<tr>
<td>10</td>
<td>Oct. 25, 30</td>
<td>Last Glacial Maximum, Last Deglaciation</td>
<td>Ruddiman 13</td>
</tr>
<tr>
<td>11</td>
<td>Nov. 1</td>
<td>Millennial Variations of the Climate Human and Preindustrial Climates</td>
<td>Ruddiman 15</td>
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<tr>
<td>12</td>
<td>Nov. 6, 8</td>
<td>Millennial Variations of the Climate Human and Preindustrial Climates</td>
<td>Ruddiman 16</td>
</tr>
<tr>
<td>13</td>
<td>Nov. 13, 15</td>
<td>The Hockey Stick (Last Millenium) Climatic Changes since 1850</td>
<td>Ruddiman 17</td>
</tr>
<tr>
<td>14</td>
<td>Nov. 20, 27</td>
<td>Causes of the 20th Century Warming Future Climate Change</td>
<td>Ruddiman 19</td>
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<tr>
<td>15</td>
<td>Nov. 29</td>
<td>Student Presentations Review</td>
<td>Ruddiman 20</td>
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<tr>
<td>16</td>
<td>Dec. 4</td>
<td>Student Presentations Review</td>
<td>Ruddiman 20</td>
</tr>
<tr>
<td>17</td>
<td>Dec. 6</td>
<td>Final Paper Due</td>
<td>Ruddiman 20</td>
</tr>
<tr>
<td>18</td>
<td>Final Paper Due</td>
<td>6-Page Signature Project Due</td>
<td>Ruddiman 20</td>
</tr>
<tr>
<td>19</td>
<td>Final Paper Due</td>
<td>6-Page Signature Project Due</td>
<td>Ruddiman 20</td>
</tr>
<tr>
<td>20</td>
<td>Final Paper Due</td>
<td>6-Page Signature Project Due</td>
<td>Ruddiman 20</td>
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