Spring 2017
PGEOG 38305/70505 – The Paleoclimate Scientist's Toolbox
Hunter North 1021
Monday-Wednesday, 3:10-4:25 PM

Instructor: **Dr. Charuta Kulkarni**
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Brief description/purpose of course

In science, understanding "how we know" is as important as understanding "what we know". PGEOG 38305/70505 The Paleoclimate Scientist's Toolbox is a hands-on earth science course, which will introduce you to the geological, chemical, biological, and statistical tools and skills ("how") that are commonly utilized to determine the nature of past climate changes ("what"). This course will allow you to acquire a working knowledge and vocabulary from the disciplines of paleoclimatology and paleoceanography while you experiment with the published datasets that are utilized for the reconstruction of key climatic events in the Earth's history. This course will serve as a toolbox for prospective earth scientists for pursuing graduate studies in the fields of earth, climatic and environmental sciences and their interdisciplinary sub-disciplines including paleoecology, and archaeological geology dealing with integrated socio-ecological systems.

The course will satisfy 3 credits of required electives for the Environmental Studies major and Track B, Physical and Environmental Geography, of the undergraduate Geography major.

Undergraduate prerequisites

GEOL 10100: Introduction to Geology Laboratory **and**
GEOL 28000: Marine Geology **or** PGEOG 25000: Earth System Science **or** the permission of the instructor.

Graduate students need permission of the graduate advisor to register for this course.

Required textbook and readings

You will require a physical copy of the following textbook for this class:
Kristen St. John, R. Mark Leckie, Kate Pound, Megan Jones, and Lawrence Krissek. 2012. ***Reconstructing Earth's Climate History: Inquiry-based Exercises for Lab and Class*** Wiley-Blackwell. ISBN-10: 1118232941; ISBN-13: 978-1118232941

The textbook will be available at the Hunter College Bookstore, Shakespeare & Co., and also at the Hunter College Library. It could also be bought online, but please make sure you buy a new and physical copy of the text.

Since the textbook provides actual exercises with a brief discussion of the theoretical background, **I will post one to two chapter-specific articles every week through Blackboard**. Reading these articles will be essential for understanding the background information for the lab component.

You will also need:

- a plastic binder to compile your lab work.
- a notebook/notepad for noting down important points from the classroom discussion - old/used notebooks are fine with me.
- a pen(s), a pencil(s), an eraser, a calculator, and a metric ruler.

This course will cover:

- how marine and terrestrial (land) sediments are used as earth history archives
- how to apply stratigraphic principles
- the use of fossils and paleomagnetic signals as age indicators
- the fundamentals of using stable isotopes as climate proxies
- Cenozoic climate change and the role of CO_2 as a climate regulator

At the end of the course, the successful student will be able to:

- read and to analyze sedimentary records
- bring together a variety of datasets (geological, chemical, biological, chronological) in order to reconstruct the nature of past climatic events
- understand and to evaluate published scientific datasets
- practice developing and testing hypotheses associated with climate history problems
- infer the broader implications of scientific results in the field of paleo-climatology
- develop appreciation for scientific methodology

Course structure

- This is a 3 hour/3 credit course.
- Each class will start with an introduction and discussion on important concepts (lecture component) necessary to deal with the lab exercises that will follow. The introduction-discussion component could take up to 45 minutes-1 hour whereas you will spend roughly 2 hours on the lab component.
- I strongly feel that lengthy non-interactive lectures are counterproductive, so I would rather start with a short introduction and then encourage a few short discussions over the course of the session. The principal component of this course is lab exercises, which require us to go back-and-forth between concepts and methods every now and then. This is advantageous for both you and me, your instructor, in terms of effectively managing the classroom time.
- Overall, there will be a 1:2 ratio between lecture and lab work over the course of each week.

Course evaluation/grading

Assignments	**Undergrads**	**Grads**
7 lab exercises (8 Chapters)	56% (8% each)	49% (7% each)
Final Exam	30%	30%
Graduate Students Presentations		7%
Classroom participation	7%	7%
Attendance and punctuality	7%	7%

The final exam is cumulative in every sense: although each chapter includes information on a specific proxy/method with a certain temporal and spatial resolution, all of them have a common goal of reconstructing climate across the time. **Do not miss the final exam.** A make-up exam will not be given except under the most extraordinary circumstances such as documented illness, documented death in the family, etc. You must contact me within 48 hours of the scheduled day/time of the final exam to make arrangements to present your documentation and complete a Contract to Resolve an Incomplete Grade form.

Graduate students' presentations

Graduate students are expected to present results related to their own work, or on some topic of interest to you, that is related to course materials. You are expected to make a ten-minute presentation followed by two minutes of Q&A/discussion time. The topics of the presentations will be discussed with, and approved by, me in advance.

Attendance and punctuality (and transparency!)

You are urged to **attend all classes**. Attendance will be taken in each class session and is included in your course grade **(7% = ¼% for each class session)**; this includes lateness. If you miss a class session in above circumstances*, do not wait until the next meeting, but email me as soon as you can. Keeping me informed about your absence will allow me to put you on an excused absence; I will allow one such excused absence. Every unexcused absence or habitual lateness (or leaving early) can result in **¼%** deducted from your course grade. Remember, **there is a direct correlation between good grades and good attendance-communication**; being absent (and keeping me uninformed about your absence) will automatically allow me to deduct ¼% from your classroom participation grades (See 'Class preparation and participation' below).

To qualify for **Credit/No Credit** (available only to undergraduate students), you must have completed all seven lab exercises, have taken the final exam, and have satisfactory attendance and participation. Credit/No Credit forms will be accepted up to 15 minutes prior to the scheduled start of final exam. I will not accept a Credit/No Credit slip after the final exam is distributed. The Hunter College grading system will be used in this class and can be viewed in the latest undergraduate catalog available online at http://catalog.hunter.cuny.edu/.

A final grade of IN (incomplete) is not given in this course except, again, under the most extraordinary and documented circumstances. You must contact me within 48 hours of the scheduled day/time of the final exam and complete a Contract to Resolve an Incomplete Grade. Otherwise, I will average your lab work, exam, and attendance and participation grades and record what you have earned.

Class preparation and participation (or how to get good grades!)

Come to class prepared. I expect you to have read the assigned articles and chapter exercises listed for each class *prior* to the beginning of that class period. The exercises are complex, and if you do not read them before class you will have difficulty turning them in on time. In general, the more time you put in, the better your grades will be.

More importantly, **your class preparation will reflect your ability to discuss concepts during classroom discussions, which is an integral part of your class grade (7%).** This is a 300-level course, which requires you to evaluate key scientific datasets based on published research, so communicating your ideas with your colleagues and instructor is an essential part of the process.

Lab work submission

At the end of each lab, you must **compile all the assigned lab exercises, relevant figures, charts, graphs etc. in a binder**. These pages are to be taken out carefully from the textbook and are to be hole-punched into the binder so that both sides of a page are easily readable. Remember to refer to the page and figure numbers that pertain to your answer/conclusions. I will explain the procedure once again, when we complete the first set of lab exercises.

As outlined in the syllabus, you are required to complete one lab exercise approximately every one to two class periods, although occasionally some of the lab exercises will need to be completed at home. Since the lab exercises will count for 56% of your total course grade, it is important for you to do the assigned work in timely manner.

- Entire lab work must be done in pen, unless otherwise instructed.
- Answer all questions in full sentences.
- Keep your lab work clear and legible. If you need to change an answer, etc., cross out the original with a single line, and clearly make the desired change. I must be able to grade your notebooks efficiently and, if I cannot find your answers easily or if your handwriting is illegible, points will be deducted.
- The submitted work must be in your own words. You may work with other students at your table, but each of you needs to submit your own lab work. Lab exercises must have your name printed neatly in the upper-right corner of the first page.
- The presentation of your work is very important and will influence your grade. Grading of your lab exercises will be based on the quality, accuracy, thoroughness and appearance of your work.

Lab work submission deadlines

See the Class Schedule below for Lab exercise due dates. Late lab exercises will have your **grade reduced 20% (o simply, by 1 point) for each day received late** unless you have a valid excuse that can be documented. Once labs are collected, any labs handed in are considered late**.** This policy will be strictly enforced.

Also, **no extra credit is given in this course**. Whatever effort you would put into an extra credit assignment put into completing the lab exercises, studying for the exam and preparing yourself in discussing your ideas during the classroom discussions.

Classroom policies

- There is no texting permitted in the classroom — turn your cellphones off.
- Earphones/earbuds are not to be worn in the classroom either on ears or around your neck.
- Laptops/netbooks, etc. are not to be used for taking notes.
- No electronic devices are allowed during exams.
- No food or drink is allowed in the classroom.
- Samples and equipment must be handled gently.

Email policy

When emailing me, always include "PGEOG 38305/70505" in the subject line and sign your name as it appears in CUNYfirst. Anonymous emails will not be answered. You can expect a response from me within 24 hours except over the weekend when you should expect a 48-hour reply window. Do not email me the night before a lab is due and expect an answer from me.

Hunter College statement on Academic Integrity

Hunter College regards acts of academic dishonesty (e.g., plagiarism, cheating on examinations, obtaining unfair advantage, and falsification of records and official documents) as serious offenses against the values of intellectual honesty. The College is committed to enforcing CUNY Policy on Academic Integrity and will pursue cases of academic dishonesty according to the Hunter College Academic Integrity Procedures. Plagiarism, dishonesty, or cheating in any portion of the work required for this course will be punished to the full extent allowed according to Hunter College regulations.

ADA Policy

In compliance with the American Disability Act of 1990 (ADA) and with Section 504 of the Rehabilitation Act of 1973, Hunter College is committed to ensuring educational parity and accommodations for all students with documented disabilities and/or medical conditions. It is recommended that all students with documented disabilities (Emotional, Medical, Physical, and/or Learning) consult the Office of AccessABILITY to secure necessary academic accommodations.

Schedule of topics and readings

I reserve the right to change the schedule and/or assignments as necessary.

No.	Date-Day	Chapter	Assignments Due
1	January 30 M	Introduction	
2	February 1 W	**Chapter 1**: Introduction to Paleoclimate Records	
3	February 6 M	**Chapter 1**	
4	February 8 W	**Chapter 1**	
	February 13 M	Lincoln's Birthday – No Classes!	
5	February 15 W (Monday Schedule)	**Chapter 2**: Seafloor Sediments	
	February 20 M	President's Day – No Classes!	
6	February 22 W	**Chapter 2**	Chapter 1 lab exercises
7	February 27 M	**Chapter 2**	**Graduate students**: Discuss topic ideas with me.
8	March 1 W	**Chapter 2**	
9	March 6 M	**Chapter 3**: Microfossils and Biostratigraphy	
10	March 8 W	**Chapter 3**	Chapter 2 lab exercises
11	March 13 M	**Chapter 3**	**Graduate students**: Email one-page abstract for your topic of presentation.
12	March 15 W	**Chapter 3**	
13	March 20 M	**Chapter 6**: Foraminiferal and oxygen isotope records	
14	March 22 W	**Chapter 6**	Chapter 3 lab exercises
15	March 27 M	**Chapter 6**	
16	March 29 W	**Chapter 6**	
17	April 3 M	**Chapter 4**: Paleomagnetism and Magnetostratigraphy	
18	April 5 M	**Chapter 4**	Chapter 6 lab exercises
	April 10-18	Spring Recess!	
19	April 19 W	**Chapter 5**: CO_2 as a Climate Regulator	**Graduate students**: Discuss the progress of your topical presentation.
20	April 20 Th (Monday Schedule)	**Chapter 5**	Chapter 4 lab exercises
21	April 24 M	**Chapter 8**: Climate Cycles	
22	April 26 W	**Chapter 8**	
23	May 1 M	**Chapter 11**: Northern Hemisphere Glaciation	
24	May 3 W	**Chapter 11**	Chapters 5 and 8 lab exercises
25	May 8 M	**Chapter 11**	
26	May 10 W	**Chapter 11**	
27	May 15 M	**Graduate Student Presentations**	Chapter 11 lab exercises
28	May 17 W	Review and Wrap-up	
Monday, May 22, 2016		**Final Exam – 1:45 to 3:45 PM**	