

ATS 606 Introduction to Climate - Spring 2022

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Web: Class webpage is available on Canvas. Please let me know if you have trouble. Class notes, homework, and discussion papers will be posted on this site.

Class Schedule: Class meets in 101 ATS from 10 a.m.-10:50 a.m. Tue and Thur.

Expected work outside the class: At least 2 hours of effort are expected to complete the homework and computing assignments outside of class for each hour of class time.

Student Learning Goals and Objectives: The successful student will gain a broad graduate level process-oriented understanding of the Earth's climate system. The material will provide a strong foundation for further specialized study on the climate system that provides contributions to the peer-reviewed scientific literature.

Textbooks: No textbook will be required, and I will largely use my own notes for the course, which will be posted on Canvas. Three good references are: 1) *Global Physical Climatology*, by D.L. Hartmann (second edition); 2) *Atmospheric Science: An Introductory Survey*, by J. M. Wallace and P. V. Hobbs, Second Edition; 3) *Atmosphere, Ocean, and Climate Dynamics, An Introductory Text*, by John Marshall and Alan Plumb.

Grading: +/- grades will be assigned for a final course grade.

First and second exam, each: 20%

Presentation of AR6 topic: 20%

Class Project: 30%

Class Participation: 10%

No late homework assignments are accepted without prior approval.

Modeling Project: The modeling project will entail developing a simple heuristic climate model in one dimension. The model uses the concept of radiative-convective equilibrium in a single column. The project will involve a multistep programming project that first models a multi-layer atmosphere in radiative equilibrium, then a many layer atmosphere in radiative equilibrium with a stratosphere, followed by a column in radiative-convective equilibrium, and simple slab oceans of different depths. The project will be assigned in steps, with individual modeling assignments expected to be turned in on an assigned schedule. You can work on the project alone or in pairs, but everybody has to submit their own set of answers.

Presentation of a AR6 FAQ: In pairs of two, from the recent AR6 report, choose one FAQ or one section from a chapter. Present a) the problem or question, b) past and ongoing research efforts and c) open research questions and hypotheses in class (10-15min).

<https://www.ipcc.ch/report/ar6/wg1/>

Course Outline:

Date	W	Tuesday	Thursday	Deadlines
01/17-01/23	1	Climate system components, atmospheric temperature profile	Radiation and global energy balance	
01/24-01/30	2	Radiative transfer	Radiative-convective equilibrium	Presentation subject due Thursday 02/27
01/31-02/06	3	Clouds in the energy budget	Timescales of climate system components	Homework #0 due Friday 02/04
02/07-02/13	4	Spatially varying energy budgets	Surface energy balance	
02/14-02/20	5	Hydrological cycle	Hydrological cycle	Project #1 due Friday 02/18
02/21-02/27	6	Atmospheric general circulation	Atmospheric general circulation	
02/28-03/06	7	Ocean circulation	Ocean circulation	Project #2 due Friday 03/04
03/07-03/13	8	Climate sensitivity and feedbacks	Exam 1	
03/14-03/20		Spring break	Spring break	
03/21-03/27	9	More atmospheric and ocean circulation	More atmospheric and ocean circulation	Project #3 due Friday 04/01
03/28-04/03	10	The physics of sea ice	Sea ice variability and change	
04/04-04/10	11	Climate variability	3 presentation	Project #4 due Friday 04/15
04/11-04/17	12	Climate variability	3 presentation	
04/18-04/24	13	Climate change during deep-time	3 presentation	Homework #5 due Friday 04/29
04/25-05/01	14	Climate change in the 20 th century	Exam 2	
05/02-05/08	15	Climate change in the 21 st century	3 presentations	

Statement on Academic Integrity:

This course will adhere to the CSU Academic Integrity Policy as found in the General Catalog (<http://catalog.colostate.edu/general-catalog/policies/students-responsibilities/#academic-integrity>) and the Student Conduct Code (<https://resolutioncenter.colostate.edu/conduct-code/>). At a minimum, violations will result in a grading penalty in this course and a report to the Conflict Resolution Services and Student Conduct Services.

CSU Atmospheric Science promotes inclusive community:

CSU Atmospheric Science is a leading global institution, and as such, all members of our community regardless of race, ethnicity, culture, religion, sexual orientation, gender identity and expression, physical ability, age, socioeconomic status or nationality are welcome as equal contributors. We value and appreciate diversity, and we believe that diversity on our campus strengthens our entire scientific community.

Covid/absence:

Please stay at home if you're sick and also if you're in doubt about having been in contact with sick people or if you don't feel comfortable in the classroom (in the latter case let me know). The classes will be recorded and/or streamed <https://zoom.us/j/94861898853>. Use the same link for talking to Maria during office hours.

CSU Covid rules (as of 01/11/2022):

Masks are required inside university buildings. You must also meet university vaccine or exemption requirements.

All students are expected and required to report to the COVID Reporter(<https://covid.colostate.edu/reporter/>) when:

- You suspect you have symptoms of COVID, regardless of whether or not you are vaccinated and even if your symptoms are mild
- You have tested positive for COVID through a non-CSU testing site, such as home test or test at a pharmacy
- You believe you may have been exposed to COVID go to the COVID Reporter and follow the guidance under “I believe I have been in close contact with someone who has COVID-19.” This guidance will depend upon your individual circumstances

You will not be penalized in any way for reporting symptoms or concerns.

Do not ask me as your instructor to report for you. It is your responsibility to report through the COVID Reporter promptly.

As your instructor I may not ask you about vaccination status or if you have COVID but you may freely volunteer to send me information from a public health official - if you have been asked to isolate or quarantine.

When you complete the COVID Reporter, the CSU Public Health office is notified. Once notified, that office will contact you and, depending upon each situation, will conduct contact tracing, initiate any necessary public health requirements and notify you if you need to take any steps.

If you do not have internet access to fill out the online COVID-19 Reporter, please call (970) 491-4600.

For the latest information about the University’s COVID resources and information, including FAQs about the spring semester, please visit the **CSU COVID-19 site** <https://covid.colostate.edu/>.