Science of Global Climate Change (ATS 150)

Basic Course Information

Course Name: Science of Global Climate Change – ATS 150

Semester: Spring 2026

Credits: 3 Hours

Prerequisites/Co-requisites: None

Meetings/Times: Tuesday and Thursday from 9:30 – 10:45 AM

Location: Wagar Building – Room 232

Web: Class website is available on canvas.

Instructor Information

Instructor Name / Email : Dr. Peter Marinescu (peter.marinescu@colostate.edu)

Graduate Teaching Assistant Name / Email: Ann-Casey Hughes (hughesao@colostate.edu)

Office Hours:

Dr. Peter Marinescu: Thursday, 12:00-1:00 PM, Scott Building, Room 301 (Odyssey Design Studio)
Ann-Casey Hughes, [TBD]

Communication Policy: We will try to respond to emails within 24 hours. Please communicate via office hours or email. If using email, please include 'ATS150' in the subject line. This helps us keep track of your emails and better support you.

Course Materials

Textbook / Course Readings

Required course readings are all available on Canvas. The majority of the readings are materials developed by Dr. Scott Denning.
An optional / supplemental textbook for this course can also be used if students are looking for additional information. This text book is "Introduction to Climate Science" by Andreas Schmittner and can be found here: https://open.oregonstate.education/climatechange/.

Materials & Equipment

We will be using iClicker software for in-class discussion and attendance. Colorado State University provides this software to students free of charge. Learn more about getting iclicker on your devices here: https://canvas.colostate.edu/iclicker/student-information/

Course Description & Objectives

We'll answer the three important questions about climate change: the Three S's of Climate Change:

- SIMPLE: How does it work?
- SERIOUS: How bad will it get?
- SOLVABLE: What are we going to do about it?

This course will not crush your soul! Most of the material you've seen is probably focused on the middle S (Serious). It is deadly serious! But there's no point obsessing about how bad things could get, so we sandwich the middle S between the other two critical pieces, giving them all roughly equal time and attention. We will spend 4-6 weeks on each. By the end of the course, I hope you will agree that mitigating global climate change is definitely feasible and requires fundamental changes that will make the world a better place. It's inspiring!

Upon the completion of this course, students will be able to:
1. Describe how changes in radiation balance affect Earth's climate
2. Define and enumerate physical bases for climate forcing, feedback, and sensitivity
3. Calculate the relationships among emissions, CO2, and warming
4. Describe the principles, strengths, & weaknesses of global climate models
5. Explain the use of emission scenarios and climate projections
6. Identify impacts of climate change on ecosystems and society
7. Articulate the structure of and critique economic analyses of climate change
8. Compare technical & policy approaches to climate mitigation & adaptation
9. Identify key opportunities for decarbonizing the world's economy
10. Think carefully about how YOU can help build a better world!

COURSE MODULES

The course is divided into three units of modules. Each module is usually completed in about a week and includes readings, videos, a written assignment, and a quick quiz. The idea is to reduce stress by including many low-stakes assessments and avoid having the final grade depend on just mid-term and final exams.

Module 1: Simple Serious Solvable

SIMPLE: CLIMATE CHANGE MECHANISMS

- Module 2: Energy and Radiation
- Module 3: How Climate Works
- Module 4: Forcing, Feedback, and Sensitivity
- Module 5: Climate Change of the Past

SERIOUS: WHY CLIMATE CHANGE SUCKS

- Module 6: Observed Climate Change and Impacts
- Module 7: Climate Modeling

- Module 8: Future Climate Change and Impacts
- Module 9: Fate of Fossil CO2

SOLVABLE: WHAT WE'RE GOING TO DO ABOUT IT

- Module 10: Carbon Economics
- Module 11: Social Cost of Carbon
- Module 12: Climate Change Policy
- Module 13: Deep Decarbonization
- Module 14: Cleaning Up the Mess
- Module 15: Building a Better World

Course Materials & Equipment

We will use custom web-based interactive modules that are located on CANVAS that have been developed for this class. Therefore, you will need access to a desktop computer, laptop, or tablet.

Course Schedule (tentative)

Week	Dates	Module	Notes:
1	Jan 20, 22	1. Simple, Serious, Solvable	
2	Jan 27, 29	2. Energy / Electromagnetic Radiation	Guest Lect.: Dr. Jennie Bukowski (CSU)
3	Feb 3, 5	3. How Climate Works	
4	Feb 10, 12	4. How Climate Changes	
5	Feb 17, 19	5. Past Climate Change	
6	Feb 24, 26	No Module This Week	**Exam 1 on Thursday, February 26 (in class)**
7	Mar 3, 5	6. Recent Climate Change	
8	Mar 10, 12	7. Climate Modeling & Scenarios	Guest Lect.: Dr. Christina McCluskey (NCAR)
9	Mar 17, 19	Spring Break	Have a good and safe break!
10	Mar 24, 26	8. Future Climate Change	
11	Mar 31, Apr. 2	9. What Happens to CO2?	
12	Apr 7, 9	10. Economics of Carbon 11. Markets and Damages	
13	Apr. 14, 16	No Module This Week	Guest Lect. Dr. Russ Schumacher (Col. Climate Center) **Exam 2 on Thursday, April 16 (in class)**
14	Apr. 21, 23	12. Ethics and Policy	Tentative Guest Lecture (TBD)
15	Apr. 28, 30	13. Deep Decarbonization	Tentative Guest Lecture (TBD)
16	May 5, 7	14. Cleaning Up / 15. Stories We Tell	
17	May 11-14	Final Exams	

Course Policies (attendance, late assignments, make-up exams)

ATTENDANCE IN CLASS IS MANDATORY!

Remember how much you hated zoom classes during COVID? We want to form a community of

learners this semester. We will have in-class polling with iClicker. You will get participation points for answering the inclass polls, but you won't be penalized for wrong answers. These participation points will count

5% toward your final semester grade. Download the iClicker app on your phone (iOS or Android), and join the class by clicking the following link: [TBD]

There will be no makeup midterm or final exams, unless circumstances are extraordinary.

No late homework will be accepted.

Because life sometimes throws us unexpected challenges, we will drop 1 homework and 1 quiz with your lowest grade.

Teaching Philosophy

Expand on any of the statements below to make this your own:

- I believe that each and every student who enrolls in this course belongs here.
- We recognize and celebrate the diverse backgrounds, experiences, and perspectives that each student brings to the classroom.
- Learning is a collective effort, and we encourage active participation from all students. Through student-student interactions and meaningful dialogue with instructors, we aim to create a dynamic and engaging academic atmosphere.
- Our role as educators is to provide the resources, encouragement, and community necessary for students to reach their full potential.
- In this classroom, we will recognize our differences as our greatest strengths.
- I'm always happy to discuss strategies to improve access and help you to locate other campus resources that can assist you.
- I am committed to supporting your success and well-being.
- My goal is to ensure that all students feel safe, heard, and empowered to engage fully in their learning.

Classroom Norms (or Community Agreement)

- We will listen to each other with the intent to understand different perspectives

Grading Policy

Your grade for this class will be based upon the following:

- Homework assignments (25%)
- Weekly Quizzes (25%)
- 3 Exams (40%)
- In-Class Participation (10%)

Total numerical scores may also be curved at the end of the class before final grades are assigned. Grades assigned for the class include: A+, A, A-, B+, B, B-, C+, C, D, F. CSU does not use grades of C-, D+, or D-.

GRADE	RANGE
A+	100% to 96.67%
A	<96.67% to 93.33%
A-	<93.33% to 90.0%
B+	<90.0% to 86.67%
B	<86.67% to 83.33%
B-	<83.33% to 80.0%
C+	<80.0% to 76.67%
C	<76.67% to 70.0%
D	<70.0% to 60.0%
F	<60.0% to 0.0%

As a student enrolled in this course, one of your responsibilities is to submit course work by the due dates listed in Canvas. With that said, we take our roles as your instructors very seriously! We really do care about how well you do in this course and that you have a satisfying, rewarding experience. We commit to respond individually to the work you submit in this class and to return your work in a timely manner. Weekly assignments will be graded within ~ 1 week.

CANVAS INFORMATION & TECHNICAL SUPPORT

Canvas is where course content, grades, and communication will reside for this course.
• Login for Canvas / Canvas Support
For passwords or any other computer-related technical support, contact the Central IT Technical Support Help Desk. (970) 491-7276 help@colostate.edu
The Technical Requirements page identifies the browsers, operating systems, and plugins that work best with Canvas. If you are new to Canvas quickly review the Canvas Student Orientation materials

Morgan Library Services Desk

The Morgan Library Services Desk provides both research (ph. 970-491-1841) and technical (ph. 970-491-7276) support. In addition, you can contact a librarian for assistance at Ask Us! or find a research guide at Research Help.

CSU Principles of Community

Inclusion: We create and nurture inclusive environments and welcome, value and affirm all members of our community, including their various identities, skills, ideas, talents and contributions.

Integrity: We are accountable for our actions and will act ethically and honestly in all our interactions.

Respect: We honor the inherent dignity of all people within an environment where we are committed to freedom of expression, critical discourse, and the advancement of knowledge.

Service: We are responsible, individually and collectively, to give of our time, talents, and resources to promote the well-being of each other and the development of our local, regional, and global communities.

Social Justice: We have the right to be treated and the responsibility to treat others with fairness and equity, the duty to challenge prejudice, and to uphold the laws, policies and procedures that promote justice in all respects.

Additional Syllabus Information and Policies

The QR code below links you to a web page that provides policies relevant to their courses and resources to help with various challenges they you may encounter.

GUARANTEED TRANSFER PATHWAYS DESIGNATION:

The Colorado Commission on Higher Education has approved ATS 150 for inclusion in the Guaranteed Transfer (GT) Pathways program in the GT-SC2 category. For transferring students, successful completion with a minimum C– grade guarantees transfer and application of credit in this GT Pathways category. For more information on the GT Pathways program, go to https://cdhe.colorado.gov/guaranteed-transfer-gt-pathways-general-education-curriculum

Content Criteria Content Competencies pertain to the knowledge base, methods, concepts, and content-related learning that students should garner from participation in a course. Students should be able to demonstrate acquisition of such content-focused learning as a result of participation in courses in each category of the AUCC.	**Core Student Learning Outcomes** Core Student Learning Outcomes are transferable skills that students garner in a variety of educational settings and that have wide applicability across fields and in life.
The **lecture** content of a science course: a. Develop foundational knowledge in specific field(s) of science. b. Develop an understanding of the nature and process of science. c. Demonstrate the ability to use scientific methodologies. d. Examine quantitative approaches to study natural phenomena. e. Develop concepts of accuracy, precision, and the role of repeatability in the acquisition of scientific knowledge. f. Develop connections between the specific subject matter being taught and other areas of scientific endeavor or human activity. The **laboratory** (either a combined lecture and laboratory, or a separate laboratory tied to a science lecture course) content of a science course: a. Perform hands-on activities with demonstration and simulation components playing a secondary role. b. Engage in inquiry-based activities. c. Demonstrate the ability to use the scientific method. d. Obtain and interpret data and communicate the results of inquiry. e. Demonstrate proper technique and safe practices.	*Inquiry & Analysis* 1) **Select or Develop a Design Process** a) Select or develop elements of the methodology or theoretical framework to solve problems in a given discipline. 2) **Analyze and Interpret Evidence** a) Examine evidence to identify patterns, differences, similarities, limitations, and/or implications related to the focus. b) Utilize multiple representations to interpret the data. 3) **Draw Conclusions** a) State a conclusion based on findings. *Quantitative Literacy* 4) **Interpret Information** a) Explain information presented in mathematical forms (e.g., equations, graphs, diagrams, tables, words). 5) **Represent Information** a) Convert information into and between various mathematical forms (e.g., equations, graphs, diagrams, tables, words).