



Course Name: Climate Science

Course Number: ATS 201

Credits: 4 Credits

Course Description

Physical laws governing the Earth's climate and their interactions with chemical and biological processes on land and in the atmosphere, oceans, and cryosphere. Past, present, and potential future climate changes due to natural and human causes are assessed using a variety of observations, models, and laboratory exercises. (Bacc Core Course)

Communication

Please post all course-related questions in the General Discussion board so that the whole class may benefit from our conversation. Please email your instructor and/or TA for matters of a personal nature, **including the text "ATS 201" in the subject heading**. The instructors will reply to course-related questions and email within 24-48 hours. Assignments and grades for course activities will be returned to the students within one week of the due date, unless noted otherwise.

Course Credits

This course combines approximately 120 hours of instruction, online activities, and assignments for 4 credits.

Technical Assistance

If you experience computer difficulties, need help downloading a browser or plug-in, assistance logging into the course, or if you experience any errors or problems while in your online course, contact the OSU Help Desk for assistance. You can call (541) 737-3474, email osuhelpdesk@oregonstate.edu or visit the [OSU Computer Helpdesk](#) online.

Learning Resources

There is no required textbook for this course. We use a variety of free online resources and written/multimedia material prepared for this course.

Canvas

This course will be delivered via Canvas where you will interact with your classmates and with your instructor. Within the course Canvas site you will access the learning materials, such as the syllabus, class discussions, assignments, projects, and quizzes. To preview how an online course works, visit the [Ecampus Course Demo](#). For technical assistance, please visit [Ecampus Technical Help](#).

Measurable Student Learning Outcomes

Students who have successfully completed ATS 201 will be able to:

1. Explain physical, chemical, geological, and biological controls on Earth's climate.

2. Describe and compare various natural and human influences on Earth's climate over a range of time scales.
3. Apply concepts to analyze complex systems.
4. Understand the utility and limitations of various climate data sources including proxy records, direct observations, and climate model output.
5. Report various projected future climate impacts, characterize the level of certainty in each, and interpret how the level of certainty is related to the underlying climate processes.
6. Assess the opportunities, challenges, and side consequences of various technical and policy options to mitigate and / or adapt to climate change.

The specific learning outcomes described above for this course are designed to fulfill the general **Bacc Core learning outcomes for a course in physical science** by exploring *specific climate and climate change topics*:

- 1. Recognize and apply concepts and theories of basic physical science.** *The processes that determine Earth's climate are constrained by laws of physics including the conservation of energy, the conservation of mass, and Newton's laws of motion. These physical conservation laws interact with one another and with chemical and biological processes to form the basis of climate system science. Students will be expected to describe essential elements of the physical basis underlying the study of Earth's climate and to explain how different climate system components interact.*
- 2. Apply scientific methodology and demonstrate the ability to draw conclusions based on observation, analysis, and synthesis.** *This class will use climate data obtained from various sources to examine hypotheses for observed and projected climate change. Some examples of data sources include proxy-based measurements of climate (e.g., from ice cores), climate model output, and observations obtained either directly (e.g., thermometer) or indirectly (e.g., satellite). Multiple analyses based on distinct, but complementary, data sources and methods will be used to analyze and synthesize the current scientific understanding of several key climate processes and their interaction.*
- 3. Demonstrate connections with other subject areas.** *Understanding the past and present as well as projecting the future trajectory of Earth's climate rely not only on the basic sciences (mathematics, physics, chemistry, and biology), but also on our ability to understand and adequately characterize technological, socioeconomic, and political changes that have an influence on the climate system. Anticipating and planning for future climate changes therefore requires cross-disciplinary and interdisciplinary approaches. Students will be expected to link concepts derived from various disciplinary perspectives to evaluate climate change science, impacts, and policy alternatives. Students will be expected to critically evaluate interdisciplinary connections using several targeted case studies.*

The course content in ATS 201 is also designed to contribute to each of the learning outcomes identified for the Climate Science Option within the Earth Sciences B.S. degree at Oregon State University.

Bacc Core

Successful completion of this course partially fulfills OSU's Baccalaureate Core course requirements in the Perspectives category under Physical Science with Laboratory.

Evaluation of Student Performance

Evaluation will be through weekly quizzes, laboratory exercises, class and group discussions, two midterm exams, and a comprehensive final exam. Exams **WILL** be proctored. See below for proctoring information. The course schedule can be found on Canvas and lists the exact dates/times of the exams. The various evaluation components are weighted according to the following list:

- (10%) Eight (8) quizzes covering material from the required reading and lectures
- (40%) Eight (8) laboratory exercises, each accounts for 5% of your overall course grade
- (10%) Participation in discussion board, group discussions
- (20%) Two midterms. Comprehension and application of key concepts from roughly a third of the course will be tested in each. The lower score from the two midterms will be dropped. Midterm exams will cover material from the readings, lectures, and laboratory exercises.
- (20%) Final exam: comprehensive test of critical knowledge and synthesis of key concepts. The final exam will cover material from the readings, lectures, and laboratory exercises from the entire term.

Course Content

Earth's climate is influenced by the interactions of physical, chemical, and biological processes on land and in the atmosphere, ocean, and cryosphere. This introductory course surveys aspects of the Earth's energy budget, the greenhouse effect, characteristics and budgets of important greenhouse gases, as well as the influence of various other physical, chemical, and biological (including human) processes. Past, present, and potential future climate changes are assessed and compared using a variety of observations and climate models. Future climate impacts projected to result from the human influence on Earth's climate will be explored along with technical and policy alternatives for mitigation and adaptation. The certainty (or uncertainty) of each aspect will be considered.

Week 1: Climate overview

Week 2: Energy balance

Week 3: Greenhouse Earth

Week 4: Greenhouse gases and other climate forcings

Week 5: Past climate

Week 6: Climate sensitivity and climate models

Week 7: Future climate change

Week 8: Climate change impacts

Week 9: Choices: energy and tech

Week 10: Cross-discipline aspects

Course Policies

Late Work

Late work is not accepted unless you have received PRIOR approval from the instructor. Approved late work may still receive credit, but detailed feedback cannot be guaranteed. **Exceptions will not be made.**

Exam Time Limits

Exams in this class are timed; if you exceed the time limit on an exam, you will be assessed a penalty of 10% for every five-minute interval beyond the time limit.

Exam Proctoring Information

Proctored exams are necessary to ensure the integrity of assessments in courses such as ATS 201 where students are tested on the information provided in the course lectures. **You must arrange for a proctor in order to access the exam.** However, the proctoring process is straightforward and accommodating:

1. Identify a suitable proctor in your area and make an appointment *directly* with that person to take your midterms and final exam. Check the course schedule posted in Canvas for the dates the midterms and final will be open in Canvas. Exams will be available for a minimum of three days and you may take the exam at any time during that window. Permission may be granted to take an exam on an alternate date, in extenuating circumstances, if arranged well in advance with the instructor.

Acceptable exam proctors include college or university testing centers, college or university instructors, public librarians, school teachers, administrators, or counselors, educational service offices on military installations, and work supervisors (if your employer is paying for you to take this course). Unacceptable exam proctors include co-workers, friends, and relatives. Students who can come to Corvallis can take their proctored exams during testing sessions provided by extended campus, while students elsewhere can use testing centers at their nearest university or community college (see list at <http://ecampus.oregonstate.edu/services/proctoring/testsites.htm>). Proctoring using a webcam is available through ProctorU, a pay service.

2. Once you have chosen your proctor and made an appointment with that person, fill out the exam proctoring form at <http://ecampus.oregonstate.edu/services/proctoring/>. You will need to include the contact information for your proctor. This step is necessary so that ecampus can send your proctor the information for your exam, such as the access code. When you arrive for a proctored exam, your proctor will check your ID. You will then login to the course in Canvas, navigate to the exam, and your proctor will enter the password to open the exam. The exams in Canvas work the same way the quizzes do.

Incompletes

Incomplete (I) grades will be granted only in emergency cases (usually only for a death in the family, major illness or injury, or birth of your child), and if the student has turned in 80% of the points possible (in other words, usually everything but the final exam). If you are having any difficulty that might prevent you completing the coursework, please don't wait until the end of the term; let me know right away.

Guidelines for a Productive and Effective Online Classroom

Students are expected to conduct themselves in the course (e.g., on discussion boards, email) in compliance with the university's regulations regarding civility.

Civility is an essential ingredient for academic discourse. All communications for this course should be conducted constructively, civilly, and respectfully. Differences in beliefs, opinions, and approaches are to be expected. In all you say and do for this course, be professional. Please bring any communications you believe to be in violation of this class policy to the attention of your instructor.

Active interaction with peers and your instructor is essential to success in this online course, paying particular attention to the following:

- Unless indicated otherwise, please complete the readings and view other instructional materials for each week before participating in the discussion board.
- Read your posts carefully before submitting them.
- Be respectful of others and their opinions, valuing diversity in backgrounds, abilities, and experiences.
- Challenging the ideas held by others is an integral aspect of critical thinking and the academic process. Please word your responses carefully, and recognize that others are expected to challenge your ideas. A positive atmosphere of healthy debate is encouraged.

Statement Regarding Students with Disabilities

Accommodations for students with disabilities are determined and approved by Disability Access Services (DAS). If you, as a student, believe you are eligible for accommodations but have not obtained approval please contact DAS immediately at 541-737-4098 or at <http://ds.oregonstate.edu>. DAS notifies students and faculty members of approved academic accommodations and coordinates implementation of those accommodations. While not required, students and faculty members are encouraged to discuss details of the implementation of individual accommodations.

Accessibility of Course Materials

All materials used in this course are accessible. If you require accommodations please contact [Disability Access Services \(DAS\)](#).

Additionally, Canvas, the learning management system through which this course is offered, provides a [vendor statement](#) certifying how the platform is accessible to students with disabilities.

Expectations for Student Conduct

Student conduct is governed by the university's policies, as explained in the [Student Conduct Code](#).

Academic Integrity

Students are expected to comply with all regulations pertaining to academic honesty. For further information, visit [Student Conduct and Community Standards](#), or contact the office of Student Conduct and Mediation at 541-737-3656.

OAR 576-015-0020 (2) Academic or Scholarly Dishonesty:

- a) Academic or Scholarly Dishonesty is defined as an act of deception in which a Student seeks to claim credit for the work or effort of another person, or uses unauthorized materials or fabricated information in any academic work or research, either through the Student's own efforts or the efforts of another.
- b) It includes:
 - i) CHEATING - use or attempted use of unauthorized materials, information or study aids, or an act of deceit by which a Student attempts to misrepresent mastery of academic effort or information. This includes but is not limited to unauthorized copying or collaboration on a test or assignment, using prohibited materials and texts, any misuse of an electronic device, or using any deceptive means to gain academic credit.
 - ii) FABRICATION - falsification or invention of any information including but not limited to falsifying research, inventing or exaggerating data, or listing incorrect or fictitious references.
 - iii) ASSISTING - helping another commit an act of academic dishonesty. This includes but is not limited to paying or bribing someone to acquire a test or assignment, changing someone's grades or academic records, taking a test/doing an assignment for someone else by any means, including misuse of an electronic device. It is a violation of Oregon state law to create and offer to sell part or all of an educational assignment to another person (ORS 165.114).
 - iv) TAMPERING - altering or interfering with evaluation instruments or documents.

- v) PLAGIARISM - representing the words or ideas of another person or presenting someone else's words, ideas, artistry or data as one's own, or using one's own previously submitted work. Plagiarism includes but is not limited to copying another person's work (including unpublished material) without appropriate referencing, presenting someone else's opinions and theories as one's own, or working jointly on a project and then submitting it as one's own.
- c) Academic Dishonesty cases are handled initially by the academic units, following the process outlined in the University's Academic Dishonesty Report Form, and will also be referred to SCCS for action under these rules.

Conduct in this Online Classroom

Students are expected to conduct themselves in the course (e.g., on discussion boards, email postings) in compliance with the [university's regulations regarding civility](#).

Tutoring

[NetTutor](#) is a leading provider of online tutoring and learner support services fully staffed by experienced, trained and monitored tutors. Students connect to live tutors from any computer that has Internet access. NetTutor provides a virtual whiteboard that allows tutors and students to work on problems in a real time environment. They also have an online writing lab where tutors critique and return essays within 24 to 48 hours. Access NetTutor from within your Canvas class by clicking on the Tools button in your course menu.

OSU Student Evaluation of Teaching

Course evaluation results are extremely important and are used to help me improve this course and the learning experience of future students. Results from the 19 multiple choice questions are tabulated anonymously and go directly to instructors and department heads. Student comments on the open-ended questions are compiled and confidentially forwarded to each instructor, per OSU procedures. The online Student Evaluation of Teaching form will be available toward the end of each term, and you will be sent instructions via ONID by the Office of Academic Programs, Assessment, and Accreditation. You will log in to "Student Online Services" to respond to the online questionnaire. The results on the form are anonymous and are not tabulated until after grades are posted.