

Global temperatures are increasing, sea level is rising, ice is melting. Global climate change is one of the most pressing issues of our time. In this course, we will explore environmental physics, chemistry, biology, and geology to explain the mechanisms and processes of past and future global environmental and climate change.

Pre-reqs: Either (a) [SCIE 001](#) or (b) one of [CHEM 111](#), [CHEM 121](#), [CHEM 154](#) and one of [MATH 101](#), [MATH 103](#), [MATH 105](#), [MATH 121](#) and one of [PHYS 101](#), [PHYS 107](#), [PHYS 117](#), [PHYS 153](#), [PHYS 157](#).

Course Learning Goals: By the end of this course, students will be able to...

1. Critically EVALUATE evidence in order to explain how Earth’s climate system works
2. Critically EVALUATE hypotheses on what causes climate change, including both natural and human contributions
3. EXPLAIN how paleo-, historical, and modeling data all inform predictions of future climate
4. Critically EVALUATE arguments made in public debate on global climate change

You will also be able to...:

1. Explain how the greenhouse effect works, in terms of energy flows
2. Explain when and why some components of Earth’s climate system are “forcings” and others are “feedbacks”
3. Apply systems dynamics thinking (stocks, flows, amplifying and stabilizing feedbacks, delays) to all aspects of Earth’s climate system
4. Evaluate uncertainty estimate for climate metrics, both in observations and modeling

Additional specific learning goals are associated with each class day.

INSTRUCTORS:

Phil Austin (course coordinator), EOS-South 157, 604-822-2175, paustin@eoas.ubc.ca

Office hours: Announced on Canvas or by appt (send an email)

TEACHING ASSISTANTS

Colin Rowell crowell@eoas.ubc.ca

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TA Office hours: TBA Announcements will be sent by the TAs through Canvas.

CLASS MEETINGS:

T/Th, 11:00 – 12:20 am, Zoom

CLASS RESOURCES:

1. **Textbook:** *An Introduction to Modern Climate Change* by Andrew Dessler, 2nd edition (2015). The textbook is available in the bookstore or as a kindle ebook. Some required readings are from this textbook.

2. **Course Website:** Go to <http://lthub.ubc.ca/guides/canvas/> and login to our course using your campus-wide login (CWL). If you do not yet have a CWL, go to <http://www.it.ubc.ca/cwl> to request one. All information (syllabus, notes, what to read, assignments, pre-class quizzes, your marks, etc)

you need for this course is posted on our CANVAS website. We will frequently use tools in CANVAS for online quizzes and surveys. Familiarize yourself quickly with the course website.

The Piazza Discussion Board: Use this space to communicate with your fellow students. Go to piazza.com, click on “Students Get Started” and search UBC for our course (e.g. EOSC 340) for the current term. You can post and answer questions, see other students’ questions, and form study groups. Instructors & TAs will also check the discussion board and sometimes answer student questions for all to see. To register use the piazza link in the canvas left sidebar

Review sessions: We will schedule help sessions with the TAs. See Canvas announcements as we proceed.

SCHEDULE

See the “Schedule” file on Canvas for the basics of each class day. The most up-to-date information will always be posted on CANVAS.

You can expect the following general weekly schedule:

Pre-class preparation, with short on-line “Warm-Up” quizzes due by 8 pm on Monday and/or Wednesday. Approximately weekly homework assignments including both quantitative problems and analyses of articles about climate change.

Expect to work an average of about 6.5 hours on this course per week, outside of class time

For midterm dates see the “Schedule” document.

EVALUATION

Research on how people learn shows that humans must engage with material on a regular, ongoing basis in order to incorporate new knowledge into what’s already in our brains. Evidence from past EOAS courses shows that students who participate continuously during the term statistically perform far better on high-stakes exams. We have structured this course to provide several different ways for you to grapple with the course material. Here’s the breakdown for evaluation. See notes below for details on expectations, marking, and tips for doing well.

In class questions	5%
Pre-class Warm Up Quizzes	5%
Weekly Homework	10%
In class quizzes (4 quizzes)	40%
Final exam	40%
TOTAL	100%
Extra credit – surveys & other extras	+1%

In class Questions (5% of your mark):

During every class, we will ask questions that the class will answer electronically, using the iclicker system. The purpose of these questions is for you to focus on a particular aspect of the material, right then and there, in class, and for you to make a decision about what you think. This is low-stakes practice with the material, and it’s OK to get the answers wrong! Some of the most useful learning comes from getting something wrong. Often, we will encourage you to discuss the clicker questions with students near you before answering. Sometimes, we’ll ask you to answer individually. The expectations for particular clicker questions will be clear during class.

Marks for clicker questions and how to do well:

1. You may earn between 0 and 5% for participating in clicker questions.
2. You are allowed 20% “grace space”, which means you are free to skip up to 20% of the time, with no penalty. This means that if you respond to 80% of the clicker questions during the course, you’ll earn the full 5% for clicker participation. For participation less than 80%, we’ll scale your

score between 0 and 5%. You do not need to tell us about the times you've missed or the reasons – that's what the "grace space" is for.

3. Often, it will be helpful to skim the class notes ahead of time for the upcoming class to be prepared for the clicker questions. There may also be questions from past classes to help you gauge your retention of the material.
4. To maximize the benefit of the clicker questions, the best thing you can do is focus your attention on the questions when they arise, and participate.
5. Clicker questions are intended to be low-stakes practice. Some of the best learning experiences come from getting the answers wrong and illuminating a misconception. We want to keep this activity low-stakes and low-stress. To that end, **if your final exam mark is higher than your cumulative clicker mark for the term, we'll replace your clicker mark with your final exam mark.**

Pre-Class Warm Up Quizzes (5% of your mark):

There will be daily on-line quizzes throughout the term, administered in CANVAS. The purpose of these Pre-Class Quizzes is to (1) have you learn some of the basics outside of class, so we can spend class time on higher level concepts, (2) have classes in which the majority of the participants have already thought some about the material, ahead of time, and (3) give you ongoing practice with the material, including some types of questions that will be on the higher-stakes exams. If you participate in the clicker questions and quizzes, and use the discussion board, you will not need to cram for the exams and you are far more likely to learn something new in this course.

Pre-Class Quizzes are individual work. We expect each of you to complete the preparation and reading.

Marks for quizzes and how to do well:

1. We will toss out your bottom 4 quiz scores.
2. This means you have the opportunity to have internet problems, skip a quiz because of scheduling problems, or whatever, with no penalty. You do not need to tell us when or why you've skipped a quiz, just be aware you have 4 freebies. There are no make-up quizzes.
3. To do well on the quizzes, prepare beforehand! Do the reading and/or short assignment before you start the quiz. Clarify your understanding by using the discussion board.
4. Learn from your mistakes. You can review your answers to the pre-class quizzes after the quiz period has closed. Use this opportunity to practice for the higher-stakes exams.

Assignments (10% of your mark):

Expect weekly homework assignments, which is administered through Canvas. We will arrange for help sessions for the homework. We do not toss out any of the assignments except in exceptional circumstances

Note that to make grading feasible within our TA budget, we may not grade every question in a pre-class quiz or assignment. It is still important for your learning that you complete each question.

In-class quizzes (40% of your mark):

You'll have the opportunity to write 3 in-class quizzes in this course.

Marks for in-class exams and how to do well:

1. Our own data show that students who participate in in-class and out-of class activities score on average about 10% higher on high-stakes exams than students who don't. So...again...it is to your advantage to participate in the clicker questions, activities and quizzes to maximize both your learning and your exam scores.
2. If you have a documented, excused absence for a midterm (e.g. illness or emergency *with* documentation) and you contact us immediately (e.g. before or directly after the midterm), then we will likely transfer your midterm % to your final exam %.

Final Exam (40% of your mark):

The final exam will be cumulative with questions similar in format to those on the quizzes and midterms. It will have two stages, like the midterms. If you miss the final exam for whatever reason, it is your responsibility to visit your Advising office and apply for deferred standing.

As above, if your final exam mark is higher than your clicker mark, we will replace your clicker mark with your final exam mark.

Extra credit surveys:

You can earn 1% extra credit by filling out surveys). These might happen in class or online in CANVAS.

ACADEMIC CONDUCT

Neither we nor the University is sympathetic to academic dishonesty. For more information, here is the University's webpage about academic conduct and misconduct:

<http://www.students.ubc.ca/calendar/index.cfm?tree=3,54,111,959>

The rules governing formal examinations are here:

<http://www.students.ubc.ca/calendar/index.cfm?tree=3,41,90,0>