ENV 230—Global Climate Change

Winter quarter, 2010

Logistics

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Office hours: Tuesday & Thursday 9:30–10:00 am or by appointment

Textbook (required): *Dire Predictions: Understanding Global Warming*, Mann & Kump
ISBN 978-0-1360-4435-2

Course overview

The official description: "This course introduces the student to the general principles of climate changes and how it affects weather, agriculture, ocean levels, etc. In recent years, the problem of global climate change became one of the most important issues in science and politics. This course will cover topics like natural and human made climate changes, the handling of proxy data and data methods, and social behavior." This course is designed to convey the basic science of global climate change and to explore potential solutions to this complex problem. To gain a historical perspective, we will briefly review the science and policy responses for another environmental problem: stratospheric ozone depletion. This introductory subject serves as a model for untangling the complex interactions between emissions, atmospheric processes and societal impacts. After studying the science behind the greenhouse effect, we will review a range of topics associated with global climate change. These topics will be developed with the perspective of Earth as an integrated system having properties including both stability/resilience and the capacity for sudden and non-linear change. The course will be primarily based on recent research findings and syntheses presented by the Intergovernmental Panel on Climate Change (Fourth Assessment Report, 2007) and the textbook which is based on this report. Our coverage of this report will provide students with an understanding of the science behind media headlines. Using the knowledge developed in this class, students will create final projects that explore solutions to the problem of global climate change. The over-arching objective of this class is a solid understanding of global climate change science and an appreciation of the challenges in creating solutions to this environmental problem.

Course philosophy

We will strive to have an interactive discussion on the topics addressed in this class. Science is difficult to learn passively—classroom participation promotes active learning. Student learning is the focus of this class, and I expect student participation and feedback in reaching the objectives of the course. Students will be encouraged to provide both formal and informal feedback throughout the semester on course direction, topics and teaching methodology. Also, helpful criticism is always appreciated via email, office hours and after class.

Policies

Daily discussion: Most class sessions will have a reading assignment provided on the blackboard site. Associated with the reading, there will be 3–5 questions. At the beginning of class, we will spend 10–15 minutes talking over the readings. The questions are designed to provide each student with a baseline of information and as a starting point for our discussion. Written answers to the questions should be submitted via the blackboard site and consist of approximately 3–4 sentences per question. Your answers are intended to be exploratory writing to prepare you for the in-class discussion, and grades will be: 100% for outstanding, 90% for expected and 60% for poor. These assignments are due at midnight of the day BEFORE class. For example, Thursday's discussion questions are due at 11:59pm on the preceding Wednesday. To allow for an evolution of discussion topics, these questions will be posted online three days before the class.

In-class presentations: Groups of students (3–4) will create final presentations that cover a possible solution to the issue of global climate change. The format of the presentation is left open, but should meet the following guidelines. You will have 25 minutes to present the report, which needs to include at least 10 minutes of class discussion based on questions you provide one week prior to your report. Possible presentation formats include an oral lecture, a poster with a question & answer session or a video. The group's presentation will count as 60% of the grade. An initial literature review (a bibliography with at least 10 sources, 5 of which are peer-reviewed) is due **Thursday, Feb 4** (10%). A formal project proposal is due on **Thursday, Feb 18** (10%) and should include a detailed outline of slides/presentation content and a 500 word abstract detailing the concepts addressed in the presentation. Finally, EACH student will INDIVIDUALLY submit a one-page (500–600 word) policy brief that details legislation that could support their solution (due **Wednesday, March 24**, 20%).

Exams: There will be a midterm for the course given on **Thursday, Feb 25**. The midterm will focus on the science of climate change, but will also included material associated with ozone depletion. The final exam (**Thursday, March 25**) will cover the policy responses to climate change discussed during the student presentations.

Quizzes: Each Tuesday there will be a short quiz to assess your understanding and to prepare you for the midterm. These are 'low-stakes' quizzes, so 50% of the grade will be based on participation and the two lowest grades will be dropped.

Attendance: Attendance is required for all classes. You will be allowed to miss two classes without penalty during the quarter. This should cover all 'routine' absences such as illness, doctor appointments, etc. Further excused absences will only be granted in exceptional circumstances with appropriate documentation. You are still responsible for the discussion questions. After the first two absences, approximately 1 percentage point for each missed class will be taken off your final grade. Exams must be taken at the scheduled time. Any exceptions to this policy must be arranged in advance (e.g., athletic competitions).

Blackboard: In an effort to reduce paper usage, all class materials and grades will be available on the Blackboard site. I will post all lectures on the Blackboard site within 24 hours after the class. We will also use Blackboard for all assignment submissions.

Late assignments: All assignments are due at midnight via Blackboard the day before the class. Any late assignment received after due date will have a 10% grade penalty per day.

Academic Integrity: According to the DePaul University Student Handbook, "Violations of academic integrity include but are not limited to the following categories: cheating; plagiarism; fabrication; falsification or sabotage of research data; destruction or misuse of the university's academic resources, alteration or falsification of academic records; academic misconduct; and complicity." The Handbook also states that, "If an instructor finds that a student has violated the Academic Integrity Policy, the appropriate initial sanction is at the instructor's discretion." To support this policy, your assignments may be submitted to the website turnitin.com. For more information, definitions, and examples, see DePaul University's Academic Integrity website at http://academicintegrity.depaul.edu.

Grading

Grades in this class will be determined on the following scale:

>=93	92–90	89–87	86–83	82–80	79–77	76–73	72–70	69–67	66–60	<60
A	**A-**	**B+**	**B**	**B-**	**C+**	**C**	**C-**	**D+**	**D**	**F**

I may change these grade boundaries, but this will always be in favor of the students and will be applied uniformly to the entire class. Grades will be determined from the individual components of the course by the following allocation:

Attendance	Discussion questions	Quizzes	Midterm exam	Final presentation	Final exam
15%	15%	10%	20%	25%	15%

Sources of help

If you think you may have special learning needs, please feel free to see me as soon as possible, and every effort will be made to reasonably accommodate your needs.

- **PLuS Program**: for students with learning disabilities and/or attention deficit disorders
- **Writing Center**: for students who need help with writing
- **OSD**: for students with physical disabilities
- **Dean of Students**: accommodations with health or family emergencies

Scientific Inquiry domain

Courses in the Scientific Inquiry domain are designed to provide students with an opportunity to learn the methods of modern science and its impact on the world around us. Courses are designed to help students develop a more complete perspective about science and the scientific process, including: an understanding of the major principles guiding modern scientific thought; a comprehension of the varying approaches and aspects of science; an appreciation of the connection among the sciences; the fundamental role of mathematics in practicing science; an awareness of the roles and limitations of

theories and models in interpreting, understanding, and predicting natural phenomena; and a realization of how these theories and models change or are supplanted as our knowledge increases.

Goals and Learning Outcomes

Below are listed the learning goals and outcomes for the Science Inquiry Domain. Each goal is listed followed by learning outcomes associated with the goal. Most of this document conforms to the National Science Education Standards.

1. Students will understand the major principles guiding modern scientific thought. Students will demonstrate a mastery of the science content knowledge of their SID courses.
2. Students will know that science, technology, and math serve as mechanisms for inquiry into the nature of the universe.
3. Students will understand and appreciate the interrelationships among science, technology and math.
4. Students will understand and appreciate the role of science in society and in their lives.
5. Students will understand the nature of science, technology, and mathematics.

Upon completion of this class, you will be able to (class-specific learning outcomes):

- Explain what global climate change is
- Understand how CFCs cause stratospheric ozone loss and the ozone hole over Antarctica
- Describe how the Montreal Protocol drastically reduced CFC emissions and how this could apply to policies for reducing carbon dioxide emissions
- Understand the greenhouse effect and how fossil fuel combustion increases surface temperatures by ramping up the greenhouse effect
- Appreciate how aspects of computational thinking allow scientists to predict future climate conditions given uncertainties in emissions and the global climate models
- Know the strengths and weaknesses of proposed strategies to reduce carbon dioxide emissions
- Appreciate the ethical dimensions of climate change impacts and proposed reduction strategies

Syllabus

Week	Dates	Tuesday	Thursday
1	**Jan 5 & 7**	Introduction to climate and weather	Stratospheric ozone depletion
2	**Jan 12 & 14**	International regulation	The greenhouse effect
3	**Jan 19 & 21**	Paleoclimate	History of global warming science
4	**Jan 26 & 28**	Global carbon cycle	Global climate models
5	**Feb 2 & 4**	Global dimming	Global change impacts **(literature review due)**
6	**Feb 9 & 11**	Uncertainty & climate stability	Environmental ethics
7	**Feb 16 & 18**	Sustainability	Regulating carbon emissions **(project proposals due)**
8	**Feb 23 & 25**	Carbon sequestration	**Midterm**
9	**Mar 2 & 4**	Student presentations	Student presentations
10	**Mar 9 & 11**	Student presentations	Student presentations

The above schedule is a framework, and changes will be communicated in class and via the Blackboard site.

Class times: Tuesday & Thursday 8:00–9:30 am
Class location: McGowan South room 106
Final exam: Thursday, Mar 18 8:45–11:00 am