**LANE COMMUNITY COLLEGE SCIENCE DEPARTMENT**

 **Fall Term 2016**

# ENSC 182, Atmospheric Environment and Climate Change

**Course Number: ENSC 182**

**Class Hours:**

**Course Credit: 4**

**Catalog Description:**

Causes, consequences, geologic history and science of climate change and atmosphere. Topics and labs include weather, sun-Earth cycles, air pollution, ozone layer, greenhouse effect, ocean/atmosphere/ice systems, climate models and data, predictions, feedbacks, tipping points, carbon sequestration, energy options. Advise G102, or GEOG141 first.

**Instructor:** Dr. Claudia Owen

**Office Location:** Rm 190A, Bldg 16

**Office Hours:**

**Telephone:** 541-463-5052

**E-Mail Address:** owenc@lanecc.edu

**Class Web Site (Moodle Site):** classes.lanecc.edu

**Required Texts:**

David Archer and Stefan Rahmstorf, *The Climate Crisis: An Introductory Guide to Climate Change*, Cambridge University Press, 2010.

Richard Alley, *The Two Mile Time Machine: Ice cores, abrupt climate change and our future*, Princeton University Press, 2002.

**Recommended Text:**

Storm Dunlop: *The Weather Identification Handbook.* 2003, Lyons Press.

**Attendance Policy:** Regular attendance is necessary. See Class Participation below.

**Class Structure/Teaching Methods and Grading Policy:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Option\Category | Lab/Homework/Class Participation | Quizzes | Exams | Final |
| Option 1 | 35% | 20% | 30% | 15% |
| Option 2\*\* | 35% | 10% | 20% | 35% |

### Community of Scholars: Think of yourself, your fellow students and your instructor as a community of scholars. You are the only one who can learn for yourself, but in a community of scholars, we can all assist each other in learning and discovery. Be resourceful. Be here because you want to learn, not because you want to make a grade.

### Class Participation is based on attendance and turning in class questions each day. Three absences are allowed without penalty, but missing class is not recommended due to the material that will be missed.

### Exams and quizzes include 3 quizzes online, two midterms, and a cumulative final, with multiple choice, short answer, diagrams, and essay questions. The final exam is comprehensive. \*\*For students who show improvement on the final, it will automatically count more; see Option 2 above. Contact Claudia by e-mail immediately to makeup exams or quizzes; provide valid reason.

### Labs, Homework, and Projects include experiments, exercises, activities, and research that commonly require the use of materials and assistance only available during class time and in some cases in the Science Resource Center, Bldg 16, Rm 193. Some homework will be assigned on Moodle. If you miss a lab, you are still responsible for the material covered. Contact Claudia for help.

### Reading assignments from your textbooks are listed on the Course Outline on the next sheet. Additional readings will be posted on Moodle each week. You should read these both before and after we discuss them in class.

**Additional Credit:**

### Current Events/Signs of Progress: for extra credit. See Current Events Forum on Moodle for instructions.

**Class Objectives/Student Outcomes:** More detailed outcomes will be posted on the class Web site

*Upon successful completion of this course, the student should be able to:*

1. Evaluate and perform scientific procedures and methods. Make detailed observations, gathering and assessing information, formulating hypotheses, and thinking creatively about weather, atmospheric chemistry and climate variables and climate changes over time.
2. Interpret and compare some basic characteristics of the atmosphere and processes that influence weather and climate.
3. Conduct experiments and make measurements of atmospheric variables such as temperature, pressure, relative humidity and calculate or estimate other atmospheric variables from these.
4. Summarize weather hazards and compare their effects on advantaged and disadvantaged human populations.
5. Predict potential consequences of global warming to ecologic, hydrologic, marine, meteorological, and human systems.
6. Describe the natural and “enhanced” greenhouse effect and its causes.
7. Analyze the complexity of the Earth’s climate system including the carbon cycle and explain many of its feedbacks and the possibility of tipping points.
8. Describe and analyze the varied evidence for past climate change and assess the reliability and range of error of these data.
9. Evaluate her or his contribution to climate change and personal role in mitigating that contribution.
10. Apply analysis of methods of climate stabilization wedges, carbon sequestration and carbon accounting to assess the potential for easing the collective effect of humans on the climate.
11. Explain the chemistry of the ozone layer and its depletion and analyze the possible consequences of increasing ozone-destroying gases in the atmosphere.
12. Distinguish the greenhouse effect and ozone depletion from each other, and elucidate their commonalities.

**In case emergencies, including medical, call** Public Safety, 541-463-5555

Courtesy phones are located on the second floor of the Science Building.

**Accessibility and Accommodations:**

To request assistance or accommodations related to disability, contact the Center for Accessible Resources at (541) 463-5150 (voice), 711 (TTY), AccessibleResources@lanecc.edu (e-mail), or stop by Building 1, Room 218.

**Freedom from Harassment and Discrimination:**

At Lane Community College, students, faculty, and staff are protected from, and prohibited from engaging in, harassment and discrimination. This includes, but is not limited to harassment based on race, ethnicity, national origin, sex, marital status, familial relationship, sexual orientation, gender identity/ expression, pregnancy, age, disability, religion, or veteran status. Furthermore, a class setting is one in which it is expected that all ideas and opinions are to be respected and that the class be offered in a non-threatening environment. I expect all participants to afford respect and civility to each other.

**If you believe you have been harassed or discriminated against, wish to report someone engaging in discrimination, or for more information, contact the Counseling Office; immediate needs can be met by calling x8888 or (541) 463-8888.**

# Tentative Course Outline for ENSC 182 Atmospheric Environment and Climate Change

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| --- | --- | --- | --- |
| Week | Topics  | Labs | Readings, Exams |
| **1** | ***Introduction/overview:*** Outline of course***Atmosphere Structure and Make-up*** Intro. Atmospheric make-upOzone layer | Lab 1 Ozone  | Week 1 Reading |
| **2** |  Ozone depletion***Weather*** variables, humidity, clouds, air masses, and winds | Lab 2 Humidity and Clouds | Dunlop p. 1-101Week 2 Reading |
| **3** |  Fronts, precipitation, thunderstorms, tornadoes, hurricanes***Air Pollution*** chemistry, acid deposition, | Lab 3 Fronts and Weather Maps | Dunlop p. 142-183Week 3 Reading  |
| **4** | Air pollution effects, especially on disadvantaged populations | Lab 4 Air Pollution and Acid Rain | Week 4 Reading Exam 1  |
| **5** | ***Overview*** of global climate change ***Energy Introduction:*** Earth’s energy budget, greenhouse effect, | Lab 4 Greenhouse Effect | Archer: Ch 1-2Week 5 Reading  |
| **6** | Energy resources, carbon, energy strategy overview, solar and wind ***Current Climate Changes:*** Climate system dynamics.  | Lab 5 Energy Resources and Carbon Cycle | Archer: Ch 3, 9 Alley: Part I-IIWeek 6 Reading  |
| **7** | ***Snow, Ice, Glaciers:*** Changes in the cryosphere ***Climate History:*** Paleoclimatology, Pleistocene and glaciations, Holocene climate.***Ocean Changes:*** Ocean carbon, ocean currents, ocean acidification. ocean energy | Lab 6 Milankovitch CyclesLab 7 Thermohaline Circulation and Ocean Acidification | Archer: Ch 4-6Alley: Part III-IV Week 7 Reading  |
| **8** | ***Climate Models*** ***and Future Climate:*** Intergovernmental Panel on Climate Change (IPCC), climate models, climate economics, ethics and inequity, adaptation strategies | Lab 8 Climate Models and Future | Archer: Ch 7-8Alley: Part V Week 8 Reading Exam 2  |
| **9** | ***Climate Misinformation:*** Debunking***Thanksgiving*** | Lab 9 Debunking Climate Misconceptions | Week 9 Reading  |
| **10** | ***Action Strategy:*** Innovation, climate change in politicsinternational, national, state, local | Lab 10 Climate Adaptation Strategies | Archer: Ch 9, 10Alley: Part V Week 10 Reading  |
| **Finals** | Final Examination ⎯ Cumulative  |  | Final at normal class time |