SO445: Global Climate Change

Policy Statement Spring 2017

Instructor: Dr. Gina R. Henderson
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Class meeting Place & time: room CH087
Section 5001: MW 1330-1420, T 1330-1520

Online Course Information: via the course website-
http://intranet.usna.edu/Users/oceano/ghenders


Readings:
- Additional readings will be assigned from various climate change resources including those provided in class, via Blackboard and/or materials on reserve in the Nimitz Library.
- **It is your responsibility to complete the assigned readings by the beginning of each class.**
  Questions will be asked in class relating to the assigned readings. Exam questions will be derived from reading, lecture, and lab material. You are responsible for all material covered or presented in class, guest lectures, laboratory, and homework as well as material from assigned readings in the text and supplemental readings.

I. Course Overview & Objectives:

“Climate is what you expect; weather is what you get”, Robert A. Heinlein

The global climate is naturally variable and constantly changing. How has climate changed in the past? How are these changes similar to and different from forecasted anthropogenic-driven (human-forced) climate change? How sensitive is the climate to such forcings, and can past climate records be used to measure that sensitivity?
Attempting to understand and predict current and future climate change, and the potential for human activity to impact global cycles and global climate, involves some of the most challenging, complex, and highly-debated scientific questions of our time.

In this course, we will address the questions posed above by reviewing the processes by which modern climate varies, and by analyzing the record of climate change. In this process we will learn about, compare and employ results from historical data analysis, proxy paleoclimatology, and global climate model simulations.

Lastly, the consequences and the potential socio-economic and global security implications of different climate change scenarios and (national and international) climate change adaptation and mitigation policies and strategies will be discussed, especially as they relate to U.S. National Security and the U.S. Navy and Marine Corps.

Course Goals & Learning Outcomes:
By the conclusion of the semester, students should be able to:

1. Link the primary features of climate variability at resolutions of $10^0$ to $10^6$ years with their underlying physical mechanisms
2. Compare the hypothesized physical processes of pre-anthropogenic and anthropogenic climate change
3. Develop and defend opinions on the sensitivity of climate to natural and versus anthropogenic forcing

And will have practiced the following skills:

1. Interpretation of climate data, proxy climate observations, and general circulation modeling results
2. Formulation, presentation, defense and discussion of a scientific argument

II. Policy Statement

a. Grade weights

<table>
<thead>
<tr>
<th>Activity</th>
<th>% of Final Grade</th>
<th>Comment</th>
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<tbody>
<tr>
<td>In-class Exams</td>
<td>25%</td>
<td>@ 6wks &amp; 12wks respectively</td>
</tr>
<tr>
<td>Labs/concept checks</td>
<td>25%</td>
<td>Approx. 8 labs</td>
</tr>
<tr>
<td>Climate journal discussion/participation</td>
<td>5%</td>
<td>1 individual presentation &amp; associated discussion of climate literature</td>
</tr>
<tr>
<td>Final Research Project &amp; Presentation</td>
<td>15%</td>
<td>EdGCM climate modeling simulation</td>
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<tr>
<td>Final Exam (cumulative)</td>
<td>25%</td>
<td></td>
</tr>
<tr>
<td>Participation</td>
<td>5%</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
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b. Deliverables

i. **Exams:** Two in-class exams (25% of your total grade) will be given at the 6-week and 12-week mark during the semester. A comprehensive final exam (20% of your total grade) will also be given at the end of the semester. Any material covered or presented in class, guest lectures, laboratory, done as homework, distributed in handouts, and/or assigned in the text and supplemental readings may be included in the Exams and Final.

ii. **Lab exercises/concept checks** (25% of final grade):
   a. Laboratory exercises, unless otherwise specified by the Instructor, will be **typed** and turned in no later than the due date specified by the instructor in each lab session. Lab exercises turned late but on the same day will be subject to a penalty of -5% of the full grade. An additional penalty of -10% will be assessed for each additional day the Report is late. A grade of zero will be assigned for Reports not turned in within a week of the original due date or a revised due date scheduled with the instructor.
   b. Concept checks: Will be graded for completion and be based on assigned readings and materials covered in class. Many test questions will be taken directly from these concept checks.

iii. **Final research project/presentation** (15% of final grade): A computer climate modeling semester project will be conducted in groups of two. Each group will conduct a climate forcing experiment, such as CO₂ doubling or changing solar luminosity, using an Educational Global Climate Model (EdGCM). EdGCM is a research-grade GCM with a user-friendly interface, which can be run on a desktop computer to explore climate change issues like researchers do. EdGCM has a GUI interface for such experiments, and facilitates the plotting and visualization of resulting output files.

   Each group will design a climate modeling experiment, hypothesize what the physical outcome to the climate forcing scenario will be and discuss the consequences of this forcing on future climate. Results, including graphical output, will be presented in report format and will include a description of the climate response. Each group will also be required to give an 8-10 minute presentation (+ ~ 5 minutes for questions) summarizing your climate experiment. A written report summarizing the experiment design, results, discussion and conclusions will be submitted after the final presentation.

   Final project turned in after the start of the class on which they are due but on the same day will be subject to a penalty of -5% off the full grade. An additional penalty of -10% will be assessed for each additional day the Final Project is late. A grade of zero will be assigned for Final Project not turned in within a week of the original due date or a revised due date scheduled with the instructor. Final Presentations are due not later than 0730 the day the presentation is to be given. Late presentations will not be accepted and will be assigned a grade of zero.
**Deadlines for final research project/presentation:**

- **Week 8 – Group assignments and approval of project topic**
  - Make an appointment **in advance** to discuss your topic with the instructor and get approval.

- **Week 11 – Experiment design outline for project**
  - You will turn in a detailed, typed outline of your Final Project including your Title, Introduction/background literature, Experiment Design, Hypothesis including expected outcome, and Initial Conclusions/Consequences on future climate. Key points in your argument should be listed in outline format. You will also turn in a draft abstract of 200 words or less that summarizes your project. At this point, you must have full citations for at least 6 references (3 of which can be **credible**, scientific internet sources). Be sure that you can obtain adequate information to complete your project. Consider requesting items from other libraries, institutions, and government agencies.

- **Week 16 – Final project presentations**
  - See guidance to come. More specific guidance in the form of a template will be provided as the deadline approaches. If you have any questions, please contact the instructor.

**iv. Peer reviewed paper presentation & associated discussion (5% of final grade):** Each class member/group will have the opportunity to present a peer reviewed paper based on climate related topics to compliment the topic being covered in class. For each paper selected, the pdf of the paper along with reading focus questions will be made available and become required reading for the entire class prior to the presentation. The presenting person/group will prepare a typed entry on a current topic or event related to global climate change and variability.

Entries will be due electronically via email the morning of the presentation. Entries should follow the **specific format** below AND be included in the main body of the email NOT in an attached document:

- Name:
- Entry Date:
- Paper title:
- Summary (use reading focus questions to help you here):
- Conclusion(s):
- Group’s thoughts/opinion:

Entries should be a factual synopsis of the paper but may also include opinion or information as portrayed in the media or communicated by others during the class discussion. Be sure to always note the source and distinguish between fact and opinion.
You are encouraged to question what you read and hear about climate, and discuss your opinions with the class.

**v. Readings:** You are required to complete the required reading assignments prior to each class. Much of the class content will be based on assigned readings. Announced and unannounced quizzes based on readings may be given periodically.

**vi. Participation** (5% of final grade): You are encouraged to question what you read and hear about climate change, and discuss your opinions with the class.

c. **Section Leader:**
   - A Section Leader and Assistant Section Leader will be assigned and are expected to become thoroughly familiar with COMDTMIDNINST 1080.1.
   - Section Leaders are responsible for calling the section to attention at the beginning & end of class.
   - If a student is not present when class is called to attention, the Section Leader will report an absence.
   - If the instructor is not present at the start of class or during class for any reason, the Section Leader is responsible for maintaining class order until given further instruction or being relieved by a faculty member.

d. **Attendance:**
   - The table of priorities in COMDTMIDNINST 5400 governs attendance. If you will miss a class or a lab due to an authorized absence you must notify the instructor at least one day in advance and make other arrangements.
   - You are responsible for obtaining any materials provided or covered during a missed class or laboratory period.
   - Class presentations, labs, assignments, and handouts can be obtained from another student, downloaded from the course page on Blackboard, or can be obtained by making special arrangements with the instructor.
   - The Instructor reserves the right to give a grade of zero to any assignment, quiz, Laboratory Exercise/Report, or Exam that is missed due to an unexcused absence.

e. **Extra Instruction:**
   - Extra instruction (EI) is available by appointment in advance. Email is the preferred method for scheduling and arranging EI. Please do not hesitate to ask for assistance and do not wait until the last minute.
f. Classroom Policy:
   - Proper military etiquette & courtesy is expected at all times. Use the same standards of appearance & conduct expected by your company officer.
   - Unless required for official watch duties, all cell phones, personal computers, PDAs, or any other electronic devices should be turned off while in class or lab.
   - Walking out of class in the middle of a lecture or laboratory is disruptive to your instructor and classmates. Midshipmen will refrain from leaving during the middle of class unless absolutely necessary. In such cases, get the instructor’s attention, ask permission to leave and, when given permission, quietly excuse yourself. Return promptly and quietly to the classroom, minimizing disruption of the class or lab in session. Leaving class during a Quiz or Exam will only be allowed in special situations.
   - You may bring a personal calculator to class or lab but you may not use it on Exams or Quizzes. Personal calculators may only be used for simple mathematical calculations and will not be pre-programmed or loaded with any additional applications, equations, functions, information, or data related to the course. When required for an Exam or Quiz, a calculator will be provided by the Oceanography Department.
   - Classroom discussion and participation is highly encouraged. Please get the instructor’s attention and be recognized before asking a question or presenting a topic for discussion.
   - Bring a pencil with eraser, pen, and assigned readings/materials to each lab and class.
   - Equation sheets: an equation sheet will be provided by the instructor for quizzes & exams. No notes may be made on the sheet unless specifically indicated. With the exception of a writing utensil & a calculator, the equation sheet is the only outside resource permitted during quizzes & exams.

g. Honor:
As future leaders of the Navy & Marine Corps and our nation, the Honor Concept is always in effect.

“Midshipmen are persons of integrity: We stand for that which is right. We tell the truth and ensure that the full truth is known. We do not lie. We embrace fairness in all actions. We ensure that work submitted as our own is our own, and that assistance received from any source is authorized and properly documented. We do not cheat. We respect the property of others and ensure that others are able to benefit from the use of their own property. We do not steal.”

Plagiarism is stealing, using, and/or presenting someone else’s ideas, words, products, or other intellectual property as your own without permission and without giving proper acknowledgement or credit. Plagiarism is an act of theft and fraud. Be sure you fully and openly credit any sources used. If at any time you have a question or a doubt as to whether your actions or behavior are in accordance with the Honor Concept, it is your duty to immediately bring the issue to the attention of the Instructor for clarification and guidance. This Course Policy Statement is meant to offer additional guidelines specific to this course and in no way supersedes official guidance promulgated in USNINST 1610.3H (HONOR CONCEPT
Additional Resources:

- Intergovernmental Panel on Climate Change (IPCC) ([http://www.ipcc.ch/](http://www.ipcc.ch/))
- United Nations Framework Convention on Climate Change (UNFCCC) ([http://unfccc.int/2860.php](http://unfccc.int/2860.php))
- National Oceanic and Atmospheric Administration (NOAA) Climate Program Office ([http://www.noaa.gov/climate.html](http://www.noaa.gov/climate.html))
- NOAA, National Environmental Satellite, Data, and Information Service (NEDIS), National Climate Data Center (NCDC) ([http://www.ncdc.noaa.gov/](http://www.ncdc.noaa.gov/))
- National Aeronautics and Space Administration’s (NASA) Eyes on the Earth ([http://climate.nasa.gov/](http://climate.nasa.gov/))
- National Academy of Sciences ([http://dels.nas.edu/Climate/Reports-Academies-Findings](http://dels.nas.edu/Climate/Reports-Academies-Findings))
- Pew Center on Climate Change ([http://www.pewclimate.org/](http://www.pewclimate.org/))
- National Center for Atmospheric Research (NCAR) ([http://www.cgd.ucar.edu/CCR/](http://www.cgd.ucar.edu/CCR/))
- MetEd Climate Home Page ([http://www.meted.ucar.edu/](http://www.meted.ucar.edu/))
- Arctic Climate Impact Assessment (ACIA) ([http://www.acia.uaf.edu/](http://www.acia.uaf.edu/))
- US Environmental Protection Agency (EPA) ([http://www.epa.gov/climatechange/](http://www.epa.gov/climatechange/))
- US Historical Climatology Network ([http://cdiac.ornl.gov/epubs/ndp/ushcn/ushcn.html](http://cdiac.ornl.gov/epubs/ndp/ushcn/ushcn.html))
- Maryland Commission on Climate Change ([http://www.mdclimatechange.us/](http://www.mdclimatechange.us/))
- National Snow and Ice Data Center ([http://nsidc.org/](http://nsidc.org/))