# Course Syllabus

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Section 1
Instructor, Course Information & Objectives

Advanced Academic Programs
Zanvyl Krieger School of Arts and Sciences
Johns Hopkins University

425.602: Science of Climate Change and Its Impact

Instructor Information
Instructor: Daniel Barrie
E-mail Address: dbarrie1@jhu.edu
Office Hours: Tuesdays 8-8:30pm Eastern Time, Fridays 10-10:30am Eastern Time unless otherwise noted. We will meet via our Adobe Connect meeting room.

Course Description
The course will present the fundamental science of how the climate system works and describe both natural and human-forced variability in climate. Students will also learn about the observed and projected impacts of climate change through the examination of observational data and climate/Earth system model predictions and projections. Material in the course will be organized around three central themes: (1) physics and chemistry of the atmosphere, focused on the greenhouse effect; (2) the carbon cycle and its relation to the energy system; and (3) predictions and projections of climate change. Students will engage with the material through class discussions and a diverse set of assignments.

No prerequisites.

Course Goals & Learning Objectives
By the end of this course, you will have the ability to:

(1) apply knowledge of the fundamental behavior of the climate system in professional circumstances,
(2) synthesize and present the latest climate-related research results,
(3) describe regional climate adaptation issues,
(4) evaluate climate and Earth system models and the predictions and projections they produce,
(5) debate the drivers and implications of climate change, and
(6) analyze climate model, observational, and reanalysis data.
Section 2
Course Materials

Textbook/s (required for purchase)
Kerry Emanuel, What We Know About Climate Change, 2012, ISBN 0262018438 || Available from Amazon and the publisher amongst other sources.

Other Readings (no purchase necessary)
Highlights of the Third National Climate Assessment. Available for download at the following link (In the “Highlights” row, click “21.42 MB” to download the low-resolution version of “111.99 MB” to download the high-resolution version).
NAS Report, Assessment of Intraseasonal to Interannual Climate Prediction and Predictability.

Other equipment/software/websites/online resources (no purchase necessary)
NAS Climate Modeling 101
Koninklijk Nederlands Meteorologisch Instituut Climate Explorer
Climate Resilience Toolkit
Introduction to climate dynamics and climate modeling (Modelling)

Specific Technology Requirements & Skills for this Course
This course requires the use of a computer that complies with the following hardware specifications: computer-attached microphone and webcam to enable audio and video capture. Please see the links to Panopto and YouTube system requirements, below, to ensure that your computer has adequate resources for the type of media that will be used in this class.
Panopto basic system requirements
YouTube basic system requirements
You may find the Blackboard Browser Support page helpful in ensuring that you have the correct browser installed for the optimum use and compatibility of Blackboard.

Learning online requires some basic knowledge of computer technology. At a minimum, you need to be able to:
- Navigate in and use Blackboard; the Blackboard Student Orientation course on your “My Institution” page
- Create and save MS Word documents; see MS Word training and tutorials for PC users (all versions); Word Help for Mac users
Online Course Syllabus

- Find basic resources on the Internet
- Create and organize files & folders on your computer
- Send, receive, and manage e-mail

Section 3
About Your Course

Course Topics

Week 1: Fundamentals of Radiation
Week 2: A discretized atmosphere
Week 3: Greenhouse effect and constituents
Week 4: Atmospheric dynamics/structure
Week 5: Weather/climate connections
Week 6: Weather/climate system modeling
Week 7: Climate system feedbacks
Week 8: Natural carbon cycle, fossil fuels, and energy
Week 9: Human interaction with the carbon cycle
Week 10: Paleo and historic climate
Week 11: Term project – debate/organization
Week 12: Climate change indicators/climate impacts
Week 13: Climate change indicators/climate impacts (continued)
Week 14: Catch Up

Directions for Students

Next Steps: Carefully review the remaining sections of the syllabus before beginning the Week 1 activities, which are located in the Lessons folder in your online course.

- Once you feel that you are ready to dive into the first week’s activities, click on the Lessons button on the left-side navigation menu. Then, click on Week 1 to begin with the Introduction and Objectives.

What To Expect in this Course

This course is 14 weeks in length and includes individual, group, and whole group activities in a weekly cycle of instruction. Each week begins on a Wednesday and ends on the following Tuesday. Please review the course syllabus thoroughly to learn about specific course outcomes and requirements.

Each week, you will complete readings that may include videos, multimedia presentations, web-based resources, textbook content, and articles from professional journals. A reading may be integrated within an activity during the week or provide some key information to assist your learning.

In this course, you will also experience online learning activities, which include discussion boards, synchronous sessions, group work, the use of Web 2.0 tools (which allow for creating, collaborating, editing, and sharing user-generated content, e.g. Blackboard), and online multimedia presentations. Web 2.0 tools such as VoiceThread, Doodle, Google Docs, and YouTube may be used at various points during the class.
Be sure to refer to the Checklist each week, which provides a week-at-a-glance and shows targeted dates for the completion of activities.

Course Structure
The course flows from the fundamental physics and chemistry of the climate system, to the fundamental physical behavior of that system in response to that physical and chemical makeup, to the causes and results of climate change. Given that this course is part of a larger curriculum on climate and energy policy, attention will be paid to how our energy choices interact with and drive the climate. We will primarily follow the structure of David Archer’s textbook, which moves through all of the above-described topics. This format helps to build from the basics up to a knowledge base that will help students evaluate and apply the knowledge of the functioning of the climate system.
## Assessments and Grading Policy

### Assignments

<table>
<thead>
<tr>
<th>Assignments</th>
<th>Due Dates</th>
<th>Points Possible</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introductory Syllabus Quiz: This will ensure that you have read through and are familiar with the syllabus.</td>
<td>Week 1</td>
<td>10</td>
</tr>
<tr>
<td>Assignment 1: Homework 1, which will cover topics discussed in weeks 1-3. Homework will have a few short-answer or brief essay questions. Homework will be timed.</td>
<td>Week 4</td>
<td>30</td>
</tr>
<tr>
<td>Assignment 2: Homework 2, which will cover topics discussed in weeks 4-7. Homework will have a few short-answer or brief essay questions. Homework will be timed.</td>
<td>Week 8</td>
<td>30</td>
</tr>
<tr>
<td>Assignment 3: Homework 3, which will cover topics discussed in weeks 8-13. Homework will have a few short-answer or brief essay questions. Homework will be timed.</td>
<td>Week 14</td>
<td>30</td>
</tr>
<tr>
<td>Assignment 4: Term project, which will entail the coverage of an organization based within 115 miles of the student’s primary location which has dealt with, or may in the future deal with, climate change. More details below.</td>
<td>Week 11</td>
<td>50</td>
</tr>
<tr>
<td>Assignment 5: Course Engagement You are expected to have an active presence in course discussions, and complete course activities as noted in the assignment guidelines to maximize your learning. Participation in activities should be consistent, of high quality, and reflect both a high level of academic thought and your own personal perspectives, opinions, and ideas. Engagement will be evaluated based on quality, not quantity of engagement within blackboard, quality of collaboration with the instructor and your class peers, demonstrable engagement with course materials, etc.</td>
<td>Ongoing</td>
<td>50</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>200</td>
</tr>
</tbody>
</table>
Assignment 4 (term project) details

Research whether and how an organization (e.g., business, agency, etc.) operating within a 115-mile radius of your location during the semester has taken changes in climate (natural and human) into account in its operations and/or planning. The focus should be on adaptation (an organization preparing for or increasing its resilience to climate change) as opposed to mitigation (reducing the organization’s impacts on the climate). Around Washington, D.C. (if that’s where you’re located), this radius includes parts of six states and the District of Columbia, and intentionally includes a number of diverse ecological/physical zones (mountain, ocean shore, bay, agricultural land, urban, river, etc.). The organization should have a local stake and a focused scope – think local business as opposed to large state or federal agency. However, smaller government organizations are acceptable. You should make direct contact (phone, email, in-person) with one or more members of the organization, and relate their operational decisions to issues in the physical climate (e.g., changes in precipitation/temperature, sea level rise, etc.). It is important to choose an organization that has already or will likely see impacts of climate change on its operations.

You should bring context into the project – e.g., if you’re studying a regional entity vulnerable to sea level rise, how has sea level rise already impacted that organization’s region? How is sea level rise expected to impact the region/organization in the future? How do organizations like the one selected typically respond to these types of threats? Half of the term project grade will be based upon a ten-minute voice thread posted to the appropriate forum in addition to extra supporting materials posted alongside the voice thread, and a written summary which will account for the other half of the project grade. The presentation should provide context for your project and chosen organization, indicate the contact you had with the organization, what you found, and your analysis of that organization’s approach to climate adaptation and resilience, especially in the context of potential response to climate change for an organization like yours. The written summary should describe the same elements with additional details uncovered during your research. The summary should be brief enough to efficiently communicate your findings; there are no page requirements. Please include references and citations in your preferred format.

Project deadlines are as follows:

- 5/31 Project topic specified – the organization, its location, and its link to climate change adaptation issues should be specified (e-mail to me).
- 6/14 Contact for project specified – tell me who you are speaking with at the organization (e-mail).
- 6/28 Update on project – how is the contact going? Are you getting good information?
- 7/12 Update on project – how is the research going; are you getting close to being finished?
- 7/26 Project due – post in the forum a voice thread and materials on this date.

Duplicate organizations will not be allowed, so the earlier you submit, the better. Your written summary is due to me electronically (dbarrie1@jhu.edu) the week of the in-class presentations.

Grading

Grades are determined based on the quality, not the quantity of your work. Concise and thoughtful assignment responses will be rewarded more than lengthy, all-inclusive responses. A curve may be applied to final course grades depending on the distribution of raw student grades after all assignments are complete. Extra credit is not available. Late and missed work is not tolerated except in emergency cases that you can clearly document to me. A late assignment will lose 5% per each calendar day it is late, e.g., an assignment late by 7 days will lose 35%. Participation will be graded according to the thoughtfulness, not the volume of participation. This is particularly true for any discussion boards.
Assignment Guidelines

How should assignments be submitted?

Homework and tests will be done and submitted through Blackboard. I recommend you do Blackboard work offline in a word editor such as Text Editor or Microsoft Word and save it — in case there are any issues with Blackboard, you don’t want to lose your work. The term project will be done via discussion boards or recordings. The written components of the term project should be submitted to me via Blackboard by any indicated deadline. Specific instructions on submission will be distributed with the assignment. References can be presented in your preferred style; my only requirement is that you keep a consistent style throughout your work.

The weekly directions will indicate where assignments will be posted (e.g. to an assignment submission link within the Lessons area). If submitting documents for an assignment or discussion forum, please specify the assignment name in the document title and/or the discussion thread. When creating files, include your name and an abbreviated name of the assignment in the file title. Also, please be sure to only include one period in file names. The period should be between the file name and the extension. For example: dbarrie_assignment1.doc

When will assignments be due?

Assignment and activity due dates are listed in this syllabus and the weekly checklists. The instructor via an announcement in your online classroom will announce changes. Some larger assignments will be completed over several weeks. It is my expectation that you will manage the necessary work to complete such assignments on time. Some reminders and markers will be provided.

When will completed assignments be returned?

The instructor will aim to return assignments to you within 21 days following the due date, depending on the length of the assignment. You will receive feedback under the My Grades link in the left-hand menu of your course.

What is the policy for late assignments?

You are expected to contact your instructor in advance if you think you cannot meet an assignment deadline. However, if an assignment is late and prior arrangements have not been made with the instructor, the assignment score will drop by 5% per day for each late day. For example, an assignment that is one week length will have 35% deducted from the graded score.

Letter Grade | Percentage
--- | ---
A+ | 98% to 100%
A | 94% and less than 98%
A- | 90% and less than 94%
B+ | 88% and less than 90%
B | 84% and less than 88%
B- | 80% and less than 84%
C | 70% and less than 80%
F | 0% and less than 70%
Time Management Expectations

What is the time demand and schedule of the course?

Because this is a graduate-level course that is offered in a condensed format, the rigor and time commitment is higher than a traditional 15-week semester course. It is expected that you look ahead to schedule your time. Plan to complete coursework across several days of the week rather than all in one day. Be sure to consider how group activities impact your schedule as well.

Some assignments require that you work on them for multiple weeks. Be sure to review the assignment directions at the beginning of the course so that you can plan your time accordingly. Please seek help before becoming frustrated and spending a significant amount of time to resolve an issue.
Section 5
Course Participation & Communication Policy

Participation

What are the participation requirements?
You are expected to log into the Blackboard at least three times a week, though a daily check-in is recommended so as to stay on top of and participate in discussions. It is your responsibility to read all announcements and discussion postings within your assigned forums. You should revisit the discussion multiple times over the week to contribute to the dialogue.

What are the requirements for working in groups?
You are expected to work equitably within your group to complete collaborative group activities. At different points in the course, you will have an opportunity to privately rate your own participation and that of your group mates.

What if I have travel (vacation or otherwise) scheduled?
It is your responsibility to fit this course into your life. The online, asynchronous nature of the course should enable it to fit into your weekly time commitments. If you have too much going on in your life this semester, or have significant conflicts with assignment due dates, you should consider not taking this course at this time. Two sections of this course are being offered simultaneously; there are too many students enrolled for me to track and accommodate customized situations for particular students. As such, I cannot offer make-up homework, provide support if you miss a week for scheduled travel, etc.

Network Etiquette (i.e. “Netiquette”)

In this course, online discussion will primarily take place in our online discussion board. In all textual online communication it’s important to follow proper rules of netiquette.

What is netiquette? Simply stated, it’s network etiquette -- that is, the etiquette of cyberspace. And “etiquette” means the social and cultural norms of communicating with others in a proper and respectful way. In other words, netiquette is a set of rules for behaving and interacting properly online.

The Netiquette “Core Rules” linked below are a set of general guidelines for cyberspace behavior. They probably won’t cover all situations, but they should give you some basic principles to use in communicating online.

For Netiquette Core Rules visit The Core Rules of Netiquette web page.

I expect all students in this class to behave respectfully toward me and your fellow students in any communications. There is sometimes a tendency for etiquette to slip in an online or virtual format. Please remember that I am a human being and deserve to be treated with respect. The same goes for you and your classmates – I will treat you with respect and expect you will treat each other with respect. If you wouldn’t say something
Online Course Syllabus

to my or another students face in an in-person classroom setting, do not express it online. Also, be mindful of how your tone may come across to others in your writing. **Failure to maintain a constructive and respectful etiquette will impact your participation grade.**

**Contacting the Instructor**

Please contact me at dbarrie1@jhu.edu with comments, questions, and concerns. You will receive a response within three days of your e-mail. All e-mail messages will be sent to you via your JHU e-mail account, so you should be in the habit of checking that account regularly or you should ensure that your JHU e-mail account forwards messages to another account of your choice. All communication in this course should occur via either Blackboard or Johns Hopkins e-mail.
How will I know about changes to the course?
Frequently, you will find new announcements posted in the Announcements section of Blackboard. These announcements may contain information about current course activities that you are working on and any changes to the course. Please check announcements every time that you log into your online course. I will also generally e-mail with updates.

How should I communicate with others in this course?
You should communicate often with your classmates and with your instructor. The majority of communication will take place within the Discussion forums. When you have a question about an assignment or a question about the course, please contact your instructor, or post your question in the course’s “Syllabus & Assignment Question” forum.

Are there any requirements for sending e-mail messages?
When you send an e-mail message to the instructor or to another participant in the course, please observe the following guidelines:
- Include the title of the course in the subject field (JHU 425.602).
- Keep messages concise, and check spelling and grammar.
- Sign your full given name (the sender’s e-mail address is not always obvious).
### Section 7
Course Topics, Activities & Schedule

**Tentative Course Schedule**

**Important Note:** Activity and assignment details will be explained within each week's learning module. If you have questions, please contact me. The agenda is subject to change; any changes will be noted in the Announcements section of the Blackboard site.

<table>
<thead>
<tr>
<th>Week</th>
<th>Dates</th>
<th>Topics</th>
<th>Activities/Reading</th>
<th>Due Dates</th>
</tr>
</thead>
</table>
| 1    | 5/10 – 5/16 | Fundamentals of Radiation                 | Archer preface (p. vii)  
Archer chapter 1 (pp. 1-6), Archer chapter 2 (pp. 9-18),  
Emanuel part 1 (pp. IX (preface) - 49) |                                            |
| 2    | 5/17 – 5/23 | A discretized atmosphere; basic energy flows | Archer chapter 3 (pp. 19-28), Emanuel part 2 (pp. 51-83) |                                            |
| 3    | 5/24 – 5/30 | Greenhouse effect and constituents         | Archer chapter 4 (pp. 29-42)                                                      | Project topic due          |
| 4    | 5/31 – 6/6  | Atmospheric dynamics/structure             | Archer chapter 5 (pp. 43-56)                                                      | Homework 1 due by the end of the week |
| 5    | 6/7 – 6/13  | Weather/climate connections                | Archer chapter 6 (pp. 57-70)                                                      | Organizational contact due |
| 6    | 6/14 – 6/20 | Weather/climate system modeling            | NAS Climate Modeling 101  
Modelling the Climate System (sections 3.1, 3.2, and 3.5),  
Climatic Change piece by Reto Knutti |                                            |
| 7    | 6/21 – 6/27 | Climate system feedbacks                   | Archer chapter 7 (pp. 73-86)                                                      | First update on project due |
| 8    | 6/28 – 7/4  | Natural carbon cycle, fossil fuels, and energy | Archer chapter 8 (pp. 89-102), Archer chapter 9 (pp. 103-117) | Homework 2 due by the end of the week |
| 9    | 7/5 – 7/11  | Human interaction with the carbon cycle    | Archer chapter 10 (pp. 119-132)                                                   | Second update on project due |
| 10   | 7/12 – 7/18 | Paleohistoric (observed) climate change    | Archer chapter 11 (pp. 135-152)                                                   |                                            |
| 11   | 7/19 – 7/25 | Term project –organization                 | Archer chapter 12 (pp. 153-166), Highlights of the Third National Climate Assessment pt. 1 (pp.4-41) | Term Project due          |
| 12   | 7/26 – 8/1  | Climate change impacts                     | Highlights of the Third National Climate Assessment pt. 1 (pp.42-93)              |                                            |
| 13   | 8/2 – 8/8   | Climate change indicators/climate impacts (continued) | Highlights of the Third National Climate Assessment pt. 1 (pp.42-93)              |                                            |
| 14   | 8/9 – 8/15  | Catch Up                                  | | Homework 3 due 8/11 |

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Advanced Academic Programs Krieger School of Arts and Sciences  
Johns Hopkins University
Section 8
University Policies

General
This course adheres to all University policies described in the academic catalog. Please pay close attention to the following policies:

Students with Disabilities
Johns Hopkins University is committed to providing reasonable and appropriate accommodations to students with disabilities. Students with documented disabilities should contact the coordinator listed on the Disability Accommodations page. Further information and a link to the Student Request for Accommodation form can also be found on the Disability Accommodations page.

Ethics & Plagiarism
JHU Ethics Statement: The strength of the university depends on academic and personal integrity. In this course, you must be honest and truthful. Ethical violations include cheating on exams, plagiarism, reuse of assignments, improper use of the Internet and electronic devices, unauthorized collaboration, alteration of graded assignments, forgery and falsification, lying, facilitating academic dishonesty, and unfair competition. Report any violations you witness to the instructor. You are expected to familiarize yourself with the plagiarism policy, but in brief, from the Johns Hopkins definition:

“At a minimum, please remember that any words taken verbatim from a source must be cited and contained within quotation marks. Even if you have paraphrased an idea from a source you must provide the appropriate citations. Ignorance of these principles will not be an acceptable excuse for violation of the policy.” From the Hopkins Notice on Plagiarism.

I take plagiarism very seriously and will pursue disciplinary action for any instances of plagiarism. You need to cite all information obtained or quoted from elsewhere. Do not represent writing or thoughts as your own that are not your own. I will assume that you are familiar with and recognize what constitutes plagiarism is and that you have reviewed the notice on plagiarism linked below and described above.

Read and adhere to JHU’s Notice on Plagiarism.

Dropping the Course
You are responsible for understanding the university’s policies and procedures regarding withdrawing from courses found in the current catalog. You should be aware of the current deadlines according to the Academic Calendar.

Getting Help
You have a variety of methods to get help on Blackboard. Please consult the resource listed in the “Blackboard Help” link for important information. If you encounter technical difficulty in completing or submitting any online assessment, please immediately contact the designated help desk listed on the AAP online support page. Also, contact your instructor at the email address listed in the syllabus.

Copyright Policy
All course material are the property of JHU and are to be used for the student's individual academic purpose only. Any dissemination, copying, reproducing, modification, displaying, or transmitting of any course material content for any other purpose is prohibited, will be considered misconduct under the JHU Copyright Compliance Policy, and may be cause for disciplinary action. In addition, encouraging academic dishonesty or cheating by distributing information about course materials or assignments which would give an unfair advantage to others may violate AAP’s Code of Conduct and the University's Student Conduct Code. Specifically, recordings, course materials, and lecture notes may not be exchanged or distributed for commercial purposes, for compensation, or for any purpose other than use by students enrolled in the class. Other distributions of such materials by students may be deemed to violate the above University policies and be subject to disciplinary action.