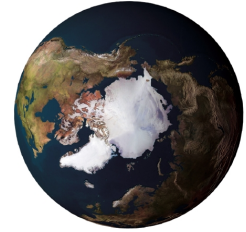




ARCTIC SYSTEM SCIENCE  
GEOG 119  
Sackler 321  
Meetings: Tues/Thurs 4:15-5:30pm



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## FALL 2015 SYLLABUS

**Instructor:** Dr. Prajjwal Panday  
Email: [ppanday@clarku.edu](mailto:ppanday@clarku.edu)  
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**TA:** Nick Cuba  
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Office Hours: Mondays 4:00–5:30pm, Wednesdays 4:00–5:30pm, or by appointment

**Texts:** *Impacts of a Warming Arctic* (2004). New York, NY: Cambridge University Press, 139 pp. (freely available at <http://www.acia.uaf.edu/> and via Moodle).  
*Arctic Climate Impact Assessment: Scientific Report* (2005). New York, NY: Cambridge University Press, 1042 pp. (freely available at <http://www.acia.uaf.edu/> and via Moodle).  
*Arctic Report Card: Update for 2014* (2014). NOAA Pacific Marine Environmental Laboratory, 75 pp. (freely available at <http://www.arctic.noaa.gov/reportcard/> and via Moodle).  
Additional supplemental readings to be provided on the Moodle course website.

### Course

**Objectives:** *Arctic System Science* is the study of the Arctic as a system, that is, the land, atmosphere, ocean, ice and human dimensions of the Arctic and how these components interact with one another. The Arctic is now experiencing some of the most rapid and severe climate change on earth. Over the next century, climate change is expected to accelerate, contributing to major physical, ecological, social, and economic changes, many of which have already begun. Changes in arctic climate will also affect the rest of the world through increased global warming and rising sea levels. This course will focus on the interfaces of systems in the Arctic, including land-atmosphere-ocean-ice-human interactions. Topics will include arctic hydrology, climatology, biogeochemical cycling, permafrost, glacier/ice sheet dynamics, terrestrial and marine ecology, sea ice, physical oceanography, and human-environment interactions. The course will also give students a perspective on arctic climate variability over past, present, and predicted future time scales. Upon completion of this course, students will:

- Understand the basic land, atmosphere, ocean, ice and human dimensions of the Arctic and how these components interact with one another.
- Understand recent impacts of climate warming in the Arctic and how these feed back to global processes.
- Learn about ongoing Arctic research (to include guest lectures given by world-renowned Arctic researchers).
- Conduct a final project (to include a presentation and term paper) based on learned concepts in Arctic System Science.

## **Student Responsibilities:**

As a student in this course, it is your responsibility to attend each class meeting, read the assigned text materials, and complete the homework assignments. Your grade will be determined from four components: Class participation, homework assignments, midterm exams, and a final project (to include a presentation and written term paper). As a culminating experience to the course, the final project will give you an opportunity to more fully explore a component of Arctic System Science that interests you.

### **1) Class Participation (10%)**

Owing to the nature of this course, it is imperative that you attend class regularly. Attending class and being an active participant in the course will benefit you greatly, by obtaining guidance from me, engaging in discussions, watching film footage, learning from guest lectures of scientists at the forefront of arctic research, and even learning from your fellow classmates.

### **2) Homework Assignments (30%)**

Five homework assignments will be given during the semester. These assignments will vary from problem-set type assignments to written assignments.

### **3) Midterm Exams (40%)**

Two preliminary midterm exams (each worth 20% of your grade) will be held on October 1 and November 19. Unless you have prior consent from me, no exams may be taken at a later time. If you know you will not be available on those dates, contact me as soon as possible to arrange to take the exam early.

### **4) Final Project (Presentation and Paper) (20%)**

The final presentation and term paper are an opportunity to focus on a component of Arctic System Science that interests *you*. The final project will involve a ~5 minute oral presentation and a ~10 page term paper. A one-page proposal for your project is due on October 22 and will allow me to give you feedback before you begin your project. Start thinking about what topic you would like to more fully investigate – the earlier the better! I strongly encourage you to incorporate real data into your project (e.g., arctic environmental data are freely available from the National Snow and Ice Data Center at [www.nsidc.org](http://www.nsidc.org) and from the National Science Foundation's Arctic System Science Data Coordination Center at [www.nsidc.org/arcss](http://www.nsidc.org/arcss)). Please see me at any time if you have questions or would like some guidance.

**Late Policy:** Assignments are due by the beginning of class on each of the due dates. For each day the assignment is late, 10% of the total points for the assignment will be deducted.

## **Course**

**Website:** Readings, assignments, announcements, and other documents will be placed on Moodle.

## **Honor**

**Code Policy:** There are clear policies of academic integrity at Clark University. Please see [www.clarku.edu/offices/aac/integrity.cfm](http://www.clarku.edu/offices/aac/integrity.cfm) if you have any questions about what this entails.

**ADA Policy:** Clark University is committed to providing students with documented disabilities equal access to all university programs and facilities. If you have or think you have a disability and require academic accommodations, you must register with Student Accessibility Services (SAS), which is located in room 430 on the fourth floor of the Goddard Library. If you have questions about the process, please contact The Director of Accessibility Services, Emily Tarconish, at [etarconish@clarku.edu](mailto:etarconish@clarku.edu) or (508)798-4368. If you are registered with SAS, and qualify for accommodations that you would like to utilize in this course, please request those accommodations through SAS in a timely manner.

## Course Schedule\*

WEEK	DATE	TOPIC**	ASSIGNMENTS & EXAMS
1	8/25 8/27	Course Overview & Introduction to the Arctic Introduction to the Arctic	
2	9/1 9/3	Arctic Climate: Past & Present The Cryosphere (Glaciers, Ice Sheets, Permafrost, Sea Ice)	
3	9/8 9/10	The Cryosphere (Glaciers, Ice Sheets, Permafrost, Sea Ice) The Cryosphere (Glaciers, Ice Sheets, Permafrost, Sea Ice)	
4	9/15 9/17	NOVA: Extreme Ice Arctic Hydrology & Freshwater Systems	<b>Assignment 1 Due</b>
5	9/22 9/24	Arctic Hydrology & Freshwater Systems Arctic Marine System	<b>Assignment 2 Due</b>
6	9/29 10/1	Arctic Marine System <b>Midterm Exam 1</b>	<b>Midterm Exam 1</b>
7	10/6 10/8	Future Arctic Climate Change Future Arctic Climate Change	
8	10/13 10/15	<b><i>Fall Break: No Classes</i></b> Library Research Orientation (Tony Penny)	
9	10/20 10/22	Arctic Tundra and Boreal Forest Ecosystems Arctic Tundra and Boreal Forest Ecosystems	<b>Assignment 3 Due Project Proposals Due</b>
10	10/27 10/29	<b>Guest Lecture:</b> Brendan Rogers, Woods Hole Research Center Conservation of Arctic Biodiversity & Wildlife	
11	11/3 11/5	Conservation of Arctic Biodiversity & Wildlife <b>Guest Lecture:</b> Sue Natali, Woods Hole Research Center	<b>Assignment 4 Due</b>
12	11/10 11/12	Indigenous Peoples in the Arctic Societal, Economic & Human Health Issues in the Arctic	<b>Assignment 5 Due</b>
13	11/17 11/19	Guest Lecture: TBD <b>Midterm Exam 2</b>	<b>Midterm Exam 2</b>
14	11/24 11/26	Final Project Presentations <b><i>Thanksgiving Recess: No Classes</i></b>	<b>Project Presentations</b>
15	12/1 12/3	Final Project Presentations Final Project Presentations	<b>Project Presentations Project Presentations</b>
	12/8	<b>Final papers due by noon</b>	<b>Final papers due by noon</b>

\*This course schedule is subject to change as necessary; advance notice will be provided to the extent possible

\*\*Weekly readings will be provided via the Moodle course website