

Geog/Envr 250: Introduction to Earth Systems and Physical Geography

Professor: Dr. Stephanie Spera

Office: International Center (INTC) 308

Email: sspera@richmond.edu

Office Hours: Wednesday, 1-3 and by appt

Time and Location:

Lecture: M/W 10:30-11:45, B-school 225

Lab A: Thurs 9 – 11:40 am, Richmond 201

Lab B: Thurs 1:30-4:10 pm, Weinstein 209

Course Description

2019 was the second hottest year on record. So what? What happens if Earth's temperature [increases more than 1.5°C](#) (0.83°F)? How do scientists make these predictions? How are all of earth's systems/spheres related? Our natural environment results from an array of climatic, biogeographic, and physical processes that have changed dramatically over time in response to natural and human-induced disturbance. Changes in the physical environment often result from complex interactions among earth's four principal spheres: the atmosphere (air things), hydrosphere (water things), lithosphere (rock things), and biosphere (living things). While meteorologists, geologists, biologists, and hydrologists often deal with each system separately, physical geographers are interested in the relationships and interactions among climate, water, vegetation, landforms, etc. This course begins by presenting the fundamentals of atmospheric processes; then examines the physical controls on the resulting global pattern of landforms, soils, and vegetation biomes across spatial and temporal scales; and ultimately explains the form and pattern of the earth's physical geography. This course will also address the role of human disturbance on these natural processes through shifts in global climate, land use, deforestation and other anthropogenic mechanisms.

Course Objectives

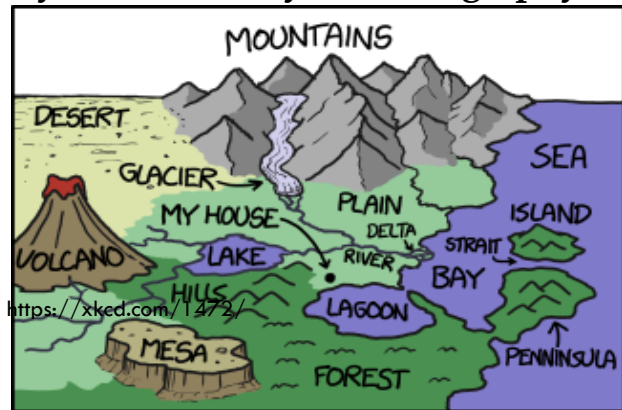
By the end of this class, you should be able to:

Course-material wise:

- 🌀 Explain how interactions between hydrology, climate, soils, geology and vegetation shape local and global landform patterns.
- 🌀 Create, refine, and interpret graphical data
- 🌀 Communicate the why, how, and so what of experiments you conduct through a traditional 'scientific manuscript' format
- 🌀 Understand how natural and anthropogenic processes influence Earth's atmosphere, hydrosphere, lithosphere, and biosphere over time

Life wise:

- 🌀 Think critically; approach the world (particularly the media) with the cautious skepticism of a scientist



IF I COULD LIVE ANYWHERE, I WOULD CHOOSE THE EXAMPLE MAP FROM GEOGRAPHY BOOKS THAT EXPLAINS WHAT EVERYTHING IS CALLED.

- ☞ Improve your written, oral, and visual communication skills
- ☞ Appreciate the impressive simplicity and complexity of the natural environment that surrounds you
- ☞ Realize that, in the words of Jane Goodall, “You cannot get through a single day without having an impact on the world around you. What you do makes a difference, and you have to decide what kind of difference you want to make.”

Course Materials

Required: David Owen’s 2017, [Where the Water Goes](#)

Suggested: The textbook for this course is [Geosystems: Core. 1st ed.](#) 2017. Christopherson, Cunha, Thomsen, Birkeland. Pearson. It isn’t required, but it’s a great textbook that should be used as a resource

Additional readings from other sources will be assigned during the semester, because what we’re learning about is always in the news. These readings will be accessible through the course web page. The web site for the class can be found on Blackboard:

<http://blackboard.richmond.edu/>. Lab material will also be available on Blackboard. Some labs require additional material and you will be notified of these requirements ahead of time.

Course Work

These course objectives will be assessed through **weekly lab exercises, exams, reading reflections, a poster project, in-class exercises, and class participation.**

Exams (35% of grade)

Exam questions are derived from class material and readings. Exams 1 and 2 will be worth 10% of your final grade each. The final exam is worth 15% of your grade. No make-up final exams will be given. Dates of exams are noted in the course calendar below.

Labs (30%)

Science is hard! Labs are intended to be inquiry driven exercises that focus on scientific methods including the development of testable hypotheses. You will likely find yourself struggling through complex ideas, failed experiments, wonky data, no seemingly right answers, all of the fun stuff that comes with doing science, but embracing and learning from the science is what makes the learning meaningful. This is an interactive course and you are expected to fully engage in the learning process by working out each laboratory exercise with the help of the lab material, textbook, peers, me, internet, and lecture notes. There will be a short introduction preceding each lab; this is an excellent opportunity to ask any questions or ask for clarification. Some labs will have things to be handed in immediately after class but there will also be homework components to many of the labs including formal lab write-ups that will be completed as homework assignments. Most of the labs will involve working in pairs or groups. However, each student must submit their own write-up with the names of other group members listed at the top of the page for all assignments. You cannot use Google Sheets for lab data analysis. Excel, R or any other pre-approved software is required.

Attendance at labs is critical. You MUST contact me beforehand via e-mail if you will be missing class. Even if you inform me orally of your absence, I still need an e-mail from you. Unexcused absences will result in a zero for the assignment.

The last weeks of the semester will be spent in small project teams working on self-designed experiments to address hypotheses developed on your own related to the physical environment. A final lab report along with an oral presentation will be due during the last lab.

Colorado River Poster Project (10%)

April 22, 2020 marks the 50th anniversary of Earth Day! Individually or in groups (maximum 3), you will put together a scientific poster based on what you think some physical- geography aspect of the Colorado River watershed will look like in 50 years. Throughout class, we will read David Owen's *Where the Water Goes* and link – as best we can - the processes we discussing in class to the Colorado River watershed. By the end of January, you will have to discern a topic for a poster presentation. A poster presentation is one of the many ways scientists present the results of their research to their peers at conferences. There are two key words that your group should keep in mind at all stages of this project: CONTENT and PRESENTATION. Content fuels this entire project. Thus, all members of the group need to contribute to brainstorming research topics, learning about that topic, writing analyses, and creating the poster.

The rich content of your poster needs to be matched with effective presentation. In other words, your group needs to think about how to distill all that you've learned, how to identify the key themes that you want to share, and how to successfully portray ideas and findings. The presentation should clearly document research you have done on your chosen topic. These posters will also be hung in the Hanging Lounge in THC between April 13-17 as part of the Geography Department's Earth Day Celebration. **More information to come.**

Reading Reflections, In-Class Activities (20%)

1. Reading Reflections. We will have reading assignments throughout the semester: short readings from the news for Monday, to motivate our topic of the week; and longer readings from *Where the Water Goes* on Wednesday. You will be asked to read assigned chapters or papers and answer a short set of questions before each class on Monday and Wednesday.
2. In-Class Assignments. Attendance is mandatory, let me know ahead of time if you cannot make it to class. You are responsible for all materials presented in class, including any announced changes to the syllabus. In the event of an absence, you are encouraged to obtain missed notes from fellow classmates when necessary. We will often have unannounced in-class activities. These points cannot be made-up unless you notify me of your absence in advance, and only in verifiable, extenuating circumstances.
3. Speaker Series Reflections. You have to attend two guest speaker talks as part of this class, and post a short 300- to 500-word reflection on the talk. It can be about what you

learned; what you found interesting; any questions you had; how the content of the talk is related to the class. Whatever you're feeling when you walk out of the talk. **One of the two required talks you attend *must* be on Tuesday, Feb 18 at 4:30 in Gottwald Auditorium by Dr. Sam Bova.** See page 6 for a list of talks.

Participation (5%)

Your participation grade will be divided into two equal parts, as described below.

1. Blogstagram. For this portion of the participation grade, for each unit (Atmosphere, Hydrosphere, Lithosphere, Biosphere) you will need to take a photo (which definitely can but doesn't not have to be a selfie) of something you come across in your everyday life (but not during lab) related to physical geography and post it on the Blackboard blog with the following info:
 - a. Physical geography process & sphere [atmo/hyrdo/litho/bio]
 - b. Two-three sentence description of physical geography process (i.e. explain what's going on in your photo as you would to your classics major friend who has sworn off all science)
 - c. Optional. Punny hashtags) – i.e. #Meandergram at a river meander. (I Instagram-physical-geography-pun-hashtag peaked in 2015.)

With your permission, I will post these photos on the [new] class Instagram throughout the term, @spera.lab.ur. It's completely okay if you do not want your photos posted on Instagram, just let me know either way. Each photo is due at the end of each unit:

- Atmosphere photo due Friday, 2/14.
- Hydrosphere photo due Friday, 2/28
- Lithosphere photo due Friday, 3/3
- Biosphere photo due Friday, 4/24

2. Engaged participation. Engaged participation will be evaluated using the following guidelines:

Grade	Behavior
9-10/10	Always well prepared for class; facilitates productive peer discussions; offers reasoned responses of high quality and asks thoughtful questions on an ongoing basis.
7-8/10	Contributes regularly; generally prepared; asks questions and provides occasional responses of moderate quality; handles direct questions satisfactorily.
6/10	Participates infrequently; needs to be prodded; weak preparation; allows other to carry the ball in class discussions
5/10	Often inadequately prepared; little involvement in class discussions; repeatedly late or leaves during class.

0-4/10 Unprepared; disruptive in class; unauthorized use of computers during class – e.g. email, gChat; general browsing; repeated talking with other students about topics not related to class.

The final grade will be determined based on University of Richmond [guidelines](#):

A > 93.5; A- 89.5 – 93.4; B+ 87.5 -89.4, B 83.5-87.4; B- 79.5-83.4; C+ 77.5-79.4; C 73.5-77.4; C- 69.5-73.4; D+ 67.5-69.4; D 59.5-67.4; E < 59.5

Course Policies

Late work. For each day an assignment is late, you can only earn 90% of the previous day's total value (i.e. if you turned in the assignment on time, and you did well enough to earn a 93; if you turn in this same assignment a day late, you earn an 84 (93×0.9), if you turn it in two days late, you earn a 75 ($93 \times 0.9 \times 0.9$), etc. Late work won't be accepted if it is more than five days late. However, I understand that sometimes life gets in the way, so if you know you're going to have a problem attending class, turning in an assignment, e-mail me or stop by my office to chat **beforehand** so we can work out a solution.

Respect. The classroom is a place of learning and respect. In order to maintain the proper learning environment, you should not engage in any other activities during class time. Please do not distract others by arriving late, leaving early, or chatting during class.

We will foster an inclusive and respectful environment in the classroom. I expect this classroom to be a place where you will be treated with respect, and I welcome individuals of all ages, backgrounds, beliefs, ethnicities, genders, gender identities, gender expressions, national origins, religious affiliations, sexual orientations, ability – and other visible and nonvisible differences. If you ever feel uncomfortable in class, please do not hesitate to let me know.

If you prefer to go by an alternate name or gender pronoun, please let me know so I can honor that.

eDevices. This course generally has a no cell phone policy – but sometimes we'll use our phones for science. Laptops may be used, but, know that all of the research shows that the use of laptops in classrooms often contributes to multitasking and off-task behaviors (e.g., Kay & Lauricella, 2011) which, in turn, interfere with their performance (e.g., Fried, 2008; Hembrooke & Gay, 2003; Krausharr & Novak, 2010) and that of their peers (Sana et al. 2013). Even in the absence of off-task behaviors, such as internet browsing, notetaking via laptops compared to longhand may lead to shallower processing and, thus, less retention of course material (e.g., Mueller & Oppenheimer, 2014). Data do not favor the use of electronics in classrooms for lecture and discussion. So, you get to be the decider here. But know that I can absolutely tell when you are taking notes vs. scrolling through Facebook, on iMessage, online shopping, etc., and, like Bartleby the Scrivener, I would prefer not to call you out. And in fact, I would completely prefer it, if you were old-school about note-taking. Using your laptop for more than just note-taking or in-class activities will impact your participation grade.

Make-up exams and labs. Possible *only* for official university-related activities. Please discuss these with me well in advance.

Literature Citation Guide

The department of Geography and Environment uses the APA style to cite literature when appropriate. A comprehensive reference guide to APA citation style can be found [here](#) and on Blackboard.

Academic Honesty

All students are expected to abide by the University of Richmond's Honor Code. 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.

Religious Observances

Some students may wish to take part in religious observances that occur during this academic term. If you have a religious observance that conflicts with your participation in the course, please meet with me before January 17th to discuss appropriate accommodations.

Time-on-Task Expectations:

To be successful in this course, you should expect to devote an average of 10-14 hours each week to preparing for class, participating in class and lab sessions, studying course related materials, and completing course assignments.

Student Needs

If you experience difficulties in this course, do not hesitate to come chat with me. There are also other resources that can support you in your efforts to meet course requirements, including,

The *Academic Skills Center* (<http://asc.richmond.edu>, 289-8626 or 289-8956) assists students in assessing their academic strengths and weaknesses; honing their academic skills through teaching effective test preparation, critical reading and thinking, information conceptualization, concentration, and related techniques; working on specific subject areas (e.g., calculus, chemistry, accounting, etc.); and encouraging campus and community involvement. Hours at the Center are: Sunday through Wednesday 3:00-9:00 p.m. and Thursday 3:00-7:00 p.m. On-call tutors are also available.

Boatwright Library Research Librarians (<http://library.richmond.edu/help/ask/> or 289-8876): Research librarians assist students with identifying and locating resources for class assignments, research papers and other course projects. Librarians also provide research support for students and can respond to questions about evaluating and citing sources. Students can email, text or IM or schedule a personal research appointment to meet with a librarian in his/her office on the first floor Research and Collaborative Study area.

The academic environment at UR is challenging, our semesters are intensive, and classes are not the only demanding part of your life. *Counseling and Psychological Services* (<http://wellness.richmond.edu/offices/caps/> or 289-8119) assists currently enrolled, full-time, degree-seeking students in improving their mental health and well-being, and in handling challenges that may impede their growth and development. Services include short-term counseling and psychotherapy, crisis intervention, psychiatric consultation, and related services.

The *Speech Center* (<http://speech.richmond.edu> or 289-6409) assists with preparation and practice in the pursuit of excellence in public expression. Recording, playback, coaching and critique sessions offered by teams of student consultants trained to assist in developing ideas, arranging key points for more effective organization, improving style and delivery, and handling multimedia aids for individual and group presentations.

The *Writing Center* (<http://writing.richmond.edu> or 289-8263) assists writers at all levels of experience, across all majors. Students can schedule appointments with trained writing consultants who offer friendly critiques of written work.

The Office of Disability Services (<https://disability.richmond.edu/students/index.html> or 289.8032) works to ensure that qualified students with a disability (whether incoming or current) are provided with reasonable accommodations that enable that student to participate fully in activities, programs, services and benefits provided to all students. **Students with special needs that require an accommodation or an academic adjustment, please arrange a meeting with Dr. Spera within the first two weeks of the semester.**

Potential Guest Speaker Talks (any new talks will be announced in class)

- Thursday, Feb 13, 5 pm, Brown-Alley Room
 - Kai Bosworth *"This land is our land: Private property, settler colonialism, and the affective territories of populism in pipeline opposition movements"*
- ****REQUIRED****: Tuesday, Feb 18, 4:30 pm, Gottwald Auditorium?
 - Samantha Bova, **"Putting climate change in context: reconstructing the history of Earth's climate with seafloor sediments"**
- Thursday, Feb 20, 7 pm, Alice Haynes Room
 - Fred Bahson, *"Considering the Spirituality of Food"*
- Thursday, Feb 27, 4:30 pm, Gottwald Auditorium
 - Greg Jaczko, *"Nuclear Power: Climate Savior or Foe?"*
- Wednesday, Mar 18, noon, International Center Common
 - Anne Witt, title TBD
- Friday, April 10, 5pm, Brown-Alley Room
 - Neel Ahuja, *"From Insurgency to Adaptation: Bangladesh & the Figure of the Climate Refugee"*

Calendar (*highly* subject to change)

<u>Week</u>	<u>Date</u>	<u>Topic</u>	<u>Readings</u>	<u>Major Due Dates</u>
THE ATMOSPHERE				
1	1/13, Mon	Introduction, spheres, systems, maps, geography tools	Intro & Chapter 1	<i>*Prof Spera out of town</i>
	1/15, Wed			<i>*Day 1 assignment due</i>
	1/15, Thurs	Lab 1		
2	1/20, Mon	No Class		
	1/22, Wed	Earth, sun, the electromagnetic spectrum	Ch 1; WTWG, Ch 1-4	
	1/23, Thurs	Lab 2		<i>Lab 1 Due</i>
3	1/27, Mon	Radiation balance, seasons, the atmosphere	Ch. 1; WTWG, Ch 5-8	Poster Topics Due Stop by Prof Spera's office
	1/29, Wed			
	1/30, Thurs	Lab 3		<i>Lab 2 Due</i>
4 *Prof Spera out of town	2/3, Mon	Surface energy balance, controls on temperature	Ch. 2; WTWG Ch 9-12	
	2/5, Wed			
	2/6, Thurs	Lab 4		<i>Lab 3 Due</i>
5	2/10, Mon	General circulation of atmosphere & ocean; Guest Speaker Dr. Sam Bova	Ch. 3; WTWG Ch 13-16	
	2/12, Wed			
	2/13, Thurs	Lab 5		Poster Lit Review Due, <i>Lab 4 Due</i>
THE HYDROSPHERE				
6	2/17, Mon	EXAM	Ch. 3 & 4; WTWG, Ch 17-18	EXAM
	2/19, Wed	ENSO, precipitation processes, fronts/masses		
	2/20, Thurs	Lab 6		<i>Lab 5 Due</i>
7	2/24, Mon	Weather, the hydrologic cycle, distribution of Earth's water and climates,	Ch. 4-6; Blackboard Readings	
	2/26, Wed			
	2/27 Thurs	Lab 7		Poster Draft Due <i>Lab 6 Due</i>
THE LITHOSPHERE				
8	3/2, Mon	Distribution of Earth's climate, geologic structure of earth, the rock cycle; Midsemester feedback	Ch. 6, 8; Blackboard Readings	
	3/4, Wed			
	3/5, Thurs	<i>Poster Due; Poster Presentations</i>		
SPRING BREAK				
9	3/16, Mon	Earthquakes, volcanoes, mountain building, hazards	Ch. 8 & 9; Blackboard Readings	
	3/18, Wed			

	3/19, Thurs	Lab 8		<i>Lab 7 Due</i>
10	3/23, Mon	EXAM		EXAM
	3/25, Wed	Weathering, erosions, and river systems	Ch 9 & 10; Blackboard Readings	
	3/26, Thurs	Lab 9		<i>Lab 8 Due</i>
11	3/30, Mon	Coastal, glacial erosional and depositional environments	Ch. 11 & 12; Blackboard Readings	
	4/1, Wed			
	4/2, Thurs	Development of final lab		<i>Lab 9 Due</i>
THE BIOSPHERE				
12	4/6, Mon	Biogeochemical cycles, Ecosystems, trophic systems	Ch. 13 & 14; Blackboard Readings	
	4/8, Wed			
	4/9, Thurs	Data collection for final lab		
13	4/13, Mon	Ecosystem organization, habitat loss, conservation biogeography; climate change	Ch. 14 & Ch. 7; Blackboard Readings	
	4/15, Wed			
	4/16, Thurs	Data collection for final lab		
14	4/20, Mon	Climate change	Ch. 7; Blackboard Readings	
	4/22, Wed			
	4/23, Thurs	<i>Final lab presentations</i>		
Tuesday, April 28, 9am – 12 pm Final Exam				