

Planet Earth: Wind, Water, and Fire

GEOG/ENVR 250

***Instructor:***

Todd Lookingbill (he/him/his)

How to reach me:

Office hours: Thursdays noon-1:00 pm or TTh after class

Carole Weinstein International Center Room 311

Pop in or if you know ahead of time you'd like to chat at a specific time, email me first

Email: tlooking@richmond.edu

Course schedule and attendance:

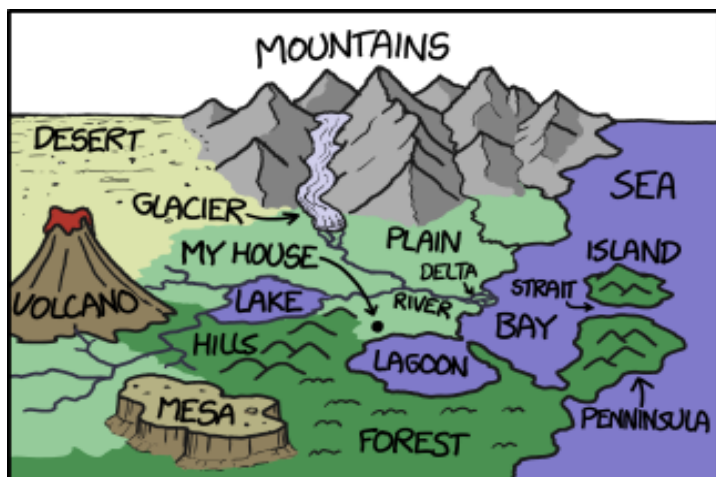
Lecture: TTh, 9:00-10:15, INTC 229

Lab: F, 9:00-11:40, Location changes from week to week. See schedule.

Now, what is this course about?

The Earth is changing in unprecedented ways. This course introduces the characteristics and interrelationships of the Earth's climates, landforms, soils, and natural vegetation, with special emphasis on human relationships with their environment. A geographic approach emphasizes interconnectedness and spatial components of these relationships. The subject matter is particularly relevant to current social and scientific interest in global climate change and the spatial inequalities in environmental pollution and resources that benefit some communities and disadvantage others. The course is divided into five units: (1) concepts and tools of physical geography, (2) air (wind), (3) water, (4) landforms (fire), and (5) biodiversity.

We will take a systems perspective and sequentially study each of these separate systems in turn, emphasizing linkages between the Earth's systems. Human and other components of the biosphere will be discussed throughout the semester. The material is global in scale, though we will illustrate many of the concepts using local examples from campus and the city of Richmond.



Are you taking this course to fulfill your Web of Inquiry Natural Science (AINS) requirement?

The field of natural science is concerned with the physical universe from subatomic to cosmic levels of organization, including inanimate as well as living systems, their structure, diversity, interaction, and evolution. Based upon the generation and testing of hypotheses, scientific inquiry is restricted to the study of repeatable, measurable, and verifiable phenomena. Within this field, knowledge may be gained either by controlled experiment or diligent observation, depending upon the phenomena being studied. Similarly, some of the field's methodologies rely upon quantitative analysis, while others are primarily qualitative. The natural science requirement is designed to enhance your appreciation of the beauty of science as well as your understanding of the challenges of doing science. Through this course, you will gain experience in the formulation and testing of hypotheses and be introduced to scientific methodology.

Course Materials:

The required textbook for the course is *Geosystems Core, 1st Edition*. 2017. Robert W. Christopherson, Stephen Cunha, Charles E. Thomsen, Ginger Birkeland. Pearson. ISBN: 978-0321834744. There are multiple versions available in the book store and online. Feel free to shop around to find your best price. There is also one copy of the textbook on reserve in the library. Additional readings from other sources will be assigned during the semester. 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 also will be available on Blackboard. Some labs require additional material and you will be notified of these requirements ahead of time.

How can you earn the 1000 points that make up your final grade?

500pts Exams

The course grade will be based in part on two mid-terms and the final exam. Mid-term exams will combine short answer, fill-in, multiple choice, and three to four half-page essay questions. Each mid-term will be worth ~12.5% of the final grade for a total of 25% (250 points). If you must miss an exam for a legitimate, documented reason you

must inform me ahead of time to schedule a make-up. Missing a mid-term exam without pre-approval will result in a zero for that assignment.

The final exam will be cumulative but will emphasize the biosphere section of the course. The format of the final exam will be similar to the two mid-term exams. The final exam will be worth 25% of your grade. Labs are intended to reinforce lecture material and provide a deeper understanding of geographic principles. The material from lab exercises therefore may also be included in the exams, for example as examples to illustrate concepts from class, though the majority of questions will come directly from the lecture portion of the class.

250pts Laboratory exercises

Labs are intended to be inquiry driven exercises that focus on scientific methods including the development of testable hypotheses. This is an interactive, hands-on course and students are expected to work out laboratory exercises with the help of the lab material, textbook 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. Lab instructions are posted before each lab period. To get the most out of the in-class time, it is imperative that you read over the assignment before coming to class; there may be a short quiz at the beginning of the period as an accountability check on this preparation.

Many of the labs require data to be submitted electronically at the conclusion of the lab period. Some of the labs will involve working in pairs or groups. There will also be homework components to many of the labs including formal lab write-ups that will be completed as homework assignments. *For homework, feel free to ask questions of me and your classmates or work together on general concepts, but all written work should be completed on your own and follow the Honor Code:*

<https://studentdevelopment.richmond.edu/student-handbook/honor/pdfs/statutes.pdf>

100pts Class participation

Class participation is absolutely essential to keeping up with the material, and is worth 10% of your grade. Participation includes active engagement in both full-class and small-group exercises. These exercises and homeworks are evaluated pass/fail based on completion of assignments. So if you miss class for an unexcused absence, you automatically miss any relevant assignments that day too. These assignments can not be made up unless your absence is excused by the instructor before class.

Research Reporter: As part of the class participation grade, you must find and review 2 different physical geography stories from different media sources and either share 2 comments in class or post responses to 2 of the stories identified by your classmates:

- 1. One popular press story** - these stories can come from a newspaper, magazine, radio, or television. These should be about relevant events going on in the world (e.g., earthquakes, hurricanes, meteor strikes, droughts...). Post to the relevant Blackboard/Discussion board, a one paragraph summary and one paragraph interpretation of the significance of the story to Earth's systems. Include a link to the story. The story must be from within the past 7 days.

2. **One scientific article** - these stories should be about a new scientific study that came out relevant to Earth's systems. One good way to find an article is to track down the primary reference for the study reference in a news story and read the original scientific article. Or you can do a search on a topic of interest in one of the databases we learn about in class. This article **can not** be one that you use in your lab reports. Include a full citation to the study itself (e.g., an article in the journal Nature) use proper citation methods that we learn in class. The study must be from within the past 1 year.

Once you have posted your summary, you can present the summary in class. Your in-class presentation should include one slide with a graphic that summarizes the main finding, which should be added to the slideshow [here](#). You will have a strictly-timed one to two minutes to present your story, so you should rehearse beforehand to make sure you can succinctly communicate a summary and interesting element of the story that you can clearly link to our course content. One summary allowed per week, and two oral summaries total required by the end of the semester.

3. Part of your participation grade also includes listening to and responding to the in-the-news stories that your classmates present. In addition to posting your own summaries, you must comment on at least 2 news/scientific study entries from your classmates. You can either share a comment, perspective, or question about the story orally in class immediately after the presentation or post a written comment of at least four sentences to the summary that was posted by your classmates on Blackboard. Feel free to comment on more than two entries and the three people that share the most comments will receive extra credit on the final exam (1, 2, and 3 points, respectively). All comments are due by midnight Friday on the last week of class.

News stories will not be covered in the mid-term exams, but may be included as examples in the final exam as they reinforce concepts covered in the course.

125pts Online reading quizzes

Weekly online quizzes will be evaluated as an accountability check for the reading assignments. These quizzes, which will be administered on Blackboard, will be brief, multiple choice and short answer questions and will be open book. Quizzes will generally be due Monday nights, at which point the quiz shuts down. You can take the quiz as many times as you like, and only your final answers will be graded. You can not complete a quiz after the deadline has passed.

25pts International Education Week and Local-Global Reflections

This year's [International Education Week](#) is focused on Costa Rica! This exciting week will provide many opportunities to illustrate physical geography and the human-physical interactions that we will be learning this semester, including as part of the EcoChallenge that week (extra credit will be given to the highest scores from our class). There are additional opportunities to interact with our local and global environments through field trips and on-campus events and visitors throughout the semester. These opportunities will be posted, and each one-page reflection on an event will earn five points of credit.

Final grades will therefore be calculated out of a 1000 pts as follows:

(250 pts total) two in-class mid-terms
 (250 pts) Cumulative final exam (emphasizing the biosphere)
 (250 pts) Laboratory assignments
 (100 pts) Class participation
 (125 pts) Online quizzes
 (25 pts) International Education Week projects

- The grading scheme will follow standard University of Richmond guidelines (<http://registrar.richmond.edu/services/policies/grading.html>).

A > 93 pts	B 87-83	C 77-73	D 67-63
A- 93-90	B- 83-80	C- 73-70	D- 63-60
B+ 90-87	C+ 80-77	D+ 70-67	F < 60 pts

Academic Honesty:

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.

<https://studentdevelopment.richmond.edu/student-handbook/honor/pdfs/statutes.pdf>

Use of AI Tools:

Our understanding of AI tools (like ChatGPT) is constantly evolving. While I encourage you to explore how these technologies can help you select appropriate analyses to conduct in your assignments (e.g., t-test or regression), provide proper syntax for excel formulas, or even provide additional explanations of difficult to understand concepts (e.g., Coriolis effect) ... you are **prohibited** from using these tools to complete course assignments including any written assignments and online quizzes unless I have explicitly asked you to do so. Unauthorized use of these tools will be considered an Honor Code violation in this class.

Time-on-Task Expectations:

To be successful in this course, you should expect to devote an average of 10-14 hours each week reading for class and conducting online quizzes (2-3 hours), participating in class and lab sessions (5 hours), completing lab exercises at home (2-4 hours), and studying for exams, completing In-the-News, International Week, and other homework assignments (1-2 hours). These are all average values for the entire semester; some weeks will require greater effort in some areas and less effort in others.

Additional support services are available at:

Disability Services

The University of Richmond's office of Disability Services strives to ensure that students with disabilities and/or temporary conditions (i.e., concussions & injuries) are provided opportunity for full participation and equal access. Students who are experiencing a barrier to access due to a disability and/or temporary condition are encouraged to apply for accommodations by visiting: disability.richmond.edu. Disability Services can be reached at disability@richmond.edu or 804-662-5001.

Once accommodations have been approved, students must 1) Submit their Disability Accommodation Notice (DAN) to each of their professors via the Disability Services Student Portal available at this link: sl.richmond.edu/be, and 2) Request a meeting with each professor to create an accommodation implementation plan. It is important to complete these steps as soon as possible because accommodations are never retroactive, and professors are permitted a reasonable amount of time for implementation. Disability Services is available to assist, as needed.

Weinstein Learning Center

Academic Skills Center (asc.richmond.edu): Academic coaches assist students in assessing and developing their academic and life-skills (e.g., critical reading and thinking, information conceptualization, concentration, test preparation, time management, stress management, etc.). Peer tutors offer assistance in specific subject areas (e.g., calculus, chemistry, accounting, etc.) and will be available for appointments in-person and virtually. Peer tutors are listed on the ASC website. **Email Roger Mancastropa** (rmancast@richmond.edu) **for coaching appointments in academic and life skills.**

English Language Learning assists multi-lingual and international students in honing their language, academic, and/or intercultural skills. Among other available services for students are one-on-one tutoring, group workshops, and semester-long classes on writing and U.S. culture. **Please contact Leslie Bohon** Leslie.Bohon@Richmond.edu **for more information and appointments.**

Quantitative Resource Center: (grc.richmond.edu): Provides services related to quantitative and computational learning across curriculum through tutoring, consultation and training. **Email Erica Modeste** erica.modeste@richmond.edu **for more info.**

Speech Center: (speech.richmond.edu): Assists with preparation and practice in the pursuit of excellence in public expression. Recording, playback, coaching and critique sessions are offered by teams of trained student consultants. During scheduled **appointments**, consultants assist in developing ideas, arranging key points for more effective organization, improving style and delivery, and handling multimedia aids for individual and group presentations.

Technology Learning Center: (tlc.richmond.edu): The TLC is a staffed public lab dedicated to supporting digital media projects. Services include camera checkout, video/audio recording assistance, virtual reality, poster printing, 3D printing and modeling. The TLC is located on the second floor of Boatwright Library.

Writing Center (writing.richmond.edu): Assists writers at all levels of experience, across all majors. Students can attend [walk-in hours](#) at Boatwright Library (room 171A) with trained writing consultants who offer friendly critiques of written work.

Other Campus Services

Boatwright Library Research Librarians: (library.richmond.edu/help/ask/ or 289-8876): Research librarians help students with all steps of their research, from identifying or narrowing a topic, to locating, accessing, evaluating, and citing information resources. Librarians support students in their classes across the curriculum and provide individual appointments, class library instruction, tutorials, and [research guides](https://libguides.richmond.edu) (libguides.richmond.edu). Students can [contact an individual librarian](#) (library.richmond.edu/help/liaison-librarians.html) or ASK a librarian for help via email (library@richmond.edu), text (804-277-9ASK), or [chat](https://library.richmond.edu/chat.html) (library.richmond.edu/chat.html).

Career Services: (careerservices.richmond.edu or 289-8547): Can assist you in exploring your interests and abilities, choosing a major or course of study, connecting with internships and jobs, and investigating graduate and professional school options. Update your profile in [Handshake](#) and schedule an appointment with a career advisor early in your time at UR.

Counseling and Psychological Services: (caps.richmond.edu 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 brief consultations, short-term counseling, skills-building classes, therapy groups, crisis intervention, psychiatric consultation, and related services.



Class Schedule

This schedule will be followed approximately. And the documented will updated with the most recent version always available on Blackboard. Some changes may be made as the class proceeds but the exam dates will not change. Time permitting, we will conclude each major section with an in-class review. Chapter readings in *Geosystems Core* textbook provided in parentheses.

Unit:	Week of:	Topics covered:	Lab:	Assignments:
INTRODUCTORY MATERIAL - Concepts and Tools of Physical Geography				
Week 1	Aug 26	Introduction to course and Earth's Systems. Definitions. Science of Geography. Systems components, interactions, dynamics & feedbacks. Tools of the Physical Geographer: Maps. Remote sensing. GIS. GPS. Earth geometry. Map projections and spatial coordinates. Scale. Scientific method. (Ch. 0 – introduction chapter)	Scientific Method, Mapping Fundamentals, and Eco-Corridor Introduction - meet in Eco-Corridor and be prepared to walk to the river and kayak	Spatial Coordinates and Landsat Homework due before class on Thurs (submit in Week 1/Homework folder on Blackboard) Scientific Method homework due before Lab on Fri (submit in Week 1/Lab folder) Reading Quiz due Fri by midnight (located in Week 1/Homework folder)
THE ATMOSPHERE (WIND)				
Week 2	Sept 2	The Earth in the Solar System. The Sun, Energy, and the Electromagnetic	Particulate Matter Mapping (field component) –	Reading Quizzes; please note there are two short quizzes for this week:

		Spectrum. Seasons. Radiation Balance. Atmospheric Composition and Structure. Pollution: Ozone. (Ch. 1)	meet in the Eco-Corridor be prepared to travel off-campus and walk in the city	Chapter 1a due Tues at midnight Chapter 1b due Thurs at midnight
Week 3	Sept 9	Energy and Temperature. Global Temperature Patterns. Human Influences on Temperature. Urban Heat Island Effect. (Ch. 2)	Particulate Matter Mapping (GIS component) – meet in Spatial Analysis Lab (INTC 300)	Research on ozone due Tues before class (submit in Week 3/Homework folder) Reading Quizzes: Ozone due Tues at midnight Chapter 2 due Thurs at midnight Library Tutorial due before lab on Friday (submit in Week 3/Lab folder)
Week 4	Sept 16	Global Pressure Patterns. Upper Atmospheric Circulation. Local and Regional Winds. (Ch. 3)	Albedo and the Urban Heat Island – meet in INTC 230	Chapter 3 Reading Quiz due Wed midnight Annotated Bibliography due before class on Tues (submit in Week 3/Lab folder) View Cooked video and answer questions before lab (link is in Lab folder; submit in Week 4/Homework folder) Air Quality lab Introduction Write-up and Map due before lab on Friday (submit in Week 4/Lab folder)
Week 5	Sept 23	REVIEW and FIRST EXAM	Excel Tutorial, Introduction to Statistical	

			Hypothesis Testing, and Discussion of Final Projects – meet in SAL	
THE HYDROSPHERE (WATER)				
Week 6	Sept 30	Atmospheric Water and Weather. Clouds. Precipitation processes. Fronts and air masses. Hurricanes. Midlatitude cyclones. (Ch. 4)	Little Westham Creek Restoration (field component) – meet behind Gottwald to get waders and then we'll walk down to Eco-Corridor	Chapter 4 Reading Quiz due Wed midnight Albedo Write-up due before lab (submit in Week 6/Lab folder) View Eco-Corridor Restoration video and post question and recommendation to Blackboard DiscussionBoard before lab
Week 7	Oct 7	Water Resources. Hydrologic cycle. Distribution of Earth's water. Watersheds. Water supply and demand. Water balance. (Ch. 5)	Little Westham Creek Restoration (GIS component) – Meet in SAL	Chapter 5 Reading Quiz due Wed midnight Cape Town Water Crisis Assignment due before Thurs class (submit in Week 7/Homework folder)
Week 8 (Fall Break Mon-Tues)	Oct 14	Global Climate and Climate Change (Ch. 6-7)	Tree Planting – meet in Eco-Corridor and be prepared to get dirty planting trees	Chapter 6-7 Reading Quiz due Wed midnight Tree planting “anticipation” assignment due before lab (submit to Week 8/Lab folder) Reflection due by the end of the day Sunday (submit to Week 8/Lab folder)
THE LITHOSPHERE (FIRE)				

Week 9	Oct 21	Introduction to the Lithosphere. Geologic structure of the Earth. Geologic cycles. (Ch. 8) Sustainability for the Forgotten. (**** Lecture on Wed 5:00 in Gottwald Auditorium; email me ahead of time if can't make it)	Campus Tree Diversity and Carbon Storage (field component); Part 1 Tree Identification Quiz – meet in Eco-Corridor	Chapter 8a Reading Quiz due Wed midnight Machlis Sustainability reading and lecture post reflection/question to Blackboard DiscussionBoard before Thurs class Little Westham Creek METHODS & RESULTS write-up due before lab (submit in Week 9/Lab folder)
Week 10	Oct 28	Plate tectonics. Mountain building. Endogenic Processes. Crustal formation/deformation processes. Earthquakes and Volcanism. (Ch. 8)	Campus Tree Diversity and Carbon Storage (GIS component); Part 2 Tree Identification Quiz – meet in SAL	Chapter 8b Quiz due Wed midnight Really, Big One Earthquake Assignment due before class on Thurs (submit in Week 10/Homework folder)
Week 11	Nov 4	Exogenic Processes. Soils, weathering and mass movement. Erosion, transport, and deposition. (parts of Ch. 9-12)	Rock pools geology and biodiversity (Field component) – meet at Eco-Corridor prepared to be outside scrambling on slippery rocks	Chapters 9-12 Reading Quiz due Wed midnight Campus Trees lab Discussion write-up due before lab on Friday (submit in Week 11/Lab folder)
Week 12	Nov 11	REVIEW and SECOND EXAM	Final Projects Data Collection	Final project proposals due to the BlackboardDiscussion before lab Register for the Eco-Challenge
THE BIOSPHERE AND EARTH LINKAGES				

Week 13	Nov 18	Conservation biogeography. Ecosystems. Biodiversity. Species distributions in place and time. (Ch. 13) Biodiversity of Costa Rica (**** Lecture on Tues 4:30 in INTC Commons (email me ahead of time if you can't make it))	Final Projects Data Analysis	Costa Rican Biodiversity reflection due before class on Thurs (submit in Week 13/Homework folder) Rock pool lab write-up due before lab on Friday (submit in Week 13/Lab folder)
Week 14 (Thanksgiving Break Wed-Fri)	Nov 25	Biomes. Biological gradients. Habitat loss and fragmentation. Island biogeography. (Ch. 14)		Chapters 13/14 Reading Quiz due Tues midnight
Week 15	Dec 2	Wrap-up Biosphere and the semester	Final Project Presentations	Marine Protected Area assignment due before Tues class (submit in Week 15/Homework folder) Final Lab write-ups due by midnight on Friday (submit in Week 15/Lab folder)
All work including Research Reporter In-the-News summaries and comments on news stories must be submitted by Friday, December 6 by midnight				
FINAL EXAM: Monday, December 16th, 9:00 am – noon				