

## ESCI 200 Syllabus Introduction to Environmental Earth Science

Fall 2023

4 credit hours

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Instructor Student Drop-In Hours: T 12:15-1:00 and W 1:00-2:00 pm or by appointment

Course Catalog Description: (3 lecture, 3 laboratory) An exploration of the complex changes in Earth's environment, the science behind these changes, and impacts on human populations requiring interdisciplinary strategies to solve problems.

Course Description: We will cover topics including:

- Foundations of Environmental Earth Science
- Earth Processes and Natural Hazards
- Energy
- Water
- Climate Change and Extinctions

### Liberal Arts Curriculum & GT Pathways

This course is a part of the Liberal Arts Curriculum at UNC and fulfills 4 credit hours of the Natural & Physical Sciences category. The Colorado Commission on Higher Education has approved ESCI 200 for inclusion in the Guaranteed Transfer (GT) Pathways program in the GT-SC[1] category. For transferring students, successful completion with a minimum C–grade guarantees transfer and application of credit in this GT Pathways category. For more information on the GT Pathways program, go to <http://highered.colorado.gov/academics/transfers/gtpathways/curriculum.html>

UNC's LAC outcomes in Natural & Physical Sciences are aligned with the State of Colorado's GT Pathways student learning outcomes, competencies, and content criteria for SC[1]. This includes CDHE competencies and student learning outcomes in Inquiry & Analysis and Quantitative Literacy.

LAC Natural & Physical Sciences Learning Outcomes + GTP Competencies & SLOs	Course Mapping
<b>Inquiry &amp; Analysis:</b> Inquiry is a systematic process of exploring issues/objects/works through the collection and analysis of evidence that results in informed conclusions/judgments. Analysis is the process of breaking complex topics or issues into parts to gain a better understanding of them.	In-class practice problems, discussions and laboratory assignments, students will practice these skills. In the summative assessment, students will:  SLO 4a

<p><b>Student Learning Outcomes (SLOs)</b>  <i>Students should be able to:</i></p> <p><b>4. Select or Develop a Design Process</b></p> <p>a. Select or develop elements of the methodology or theoretical framework to solve problems in a given discipline.</p> <p><b>5. Analyze and Interpret Evidence</b></p> <p>a. Examine evidence to identify patterns, differences, similarities, limitations, and/or implications related to the focus.</p> <p>b. Utilize multiple representations to interpret the data.</p> <p><b>6. Draw Conclusions</b></p> <p>a. State a conclusion based on findings.</p>	<ul style="list-style-type: none"> <li>– Select a design process to determine if natural resources are distributed equitable in a community</li> <li>– Select a design process to determine bank erosion in the cutbank of a river</li> </ul> <p>SLO 5a</p> <ul style="list-style-type: none"> <li>– Explain trends and relationships/patterns in a graph of CO<sub>2</sub> concentrations and temperature over time, and implications/limitations of the relationship</li> <li>– Explain trends and relationships/patterns in a maps of demographics and a contaminant or resource and discuss implications/limitations of the relationship</li> </ul> <p>SLO 5b</p> <ul style="list-style-type: none"> <li>– Use information from the rock record in combination with plots of modern CO<sub>2</sub> to interpret relationships among CO<sub>2</sub> and temperature</li> </ul> <p>SLO 6a</p> <ul style="list-style-type: none"> <li>– Use information (table) provided about carbon offsetting to infer the most effective strategy to reduce carbon emissions</li> <li>– Describe a public legislation strategy based on either reducing carbon emissions or reducing water use</li> <li>– Give information about demographics and a contaminant or resource, draw a conclusion about environmental justice for the demographic populations and the contaminant/resource</li> </ul>
<p><b>Quantitative Literacy:</b>  Competency in quantitative literacy represents a student’s ability to use quantifiable information and mathematical analysis to make connections and draw conclusions. Students with strong quantitative literacy skills understand and can create sophisticated arguments supported by quantitative evidence and can clearly communicate those arguments in a variety of formats (using words, tables, graphs, mathematical equations, etc.).</p> <p><b>Student Learning Outcomes (SLOs)</b>  <i>Students should be able to:</i></p> <p><b>1. Interpret Information</b></p> <p>a. Explain information presented in mathematical forms (e.g., equations, graphs, diagrams, tables, words).</p> <p><b>2. Represent Information</b></p>	<p>In-class practice problems, discussions and laboratory assignments, students will practice these skills. In the summative assessment, students will:</p> <p>SLO 1a</p> <ul style="list-style-type: none"> <li>– Read and explain information presented in a graph of CO<sub>2</sub> concentrations and temperature over time</li> <li>– Read and explain information presented in a Flood Frequency Plot</li> <li>– Read and explain information in a Bowen’s Reaction Series diagram</li> <li>– Explain information presented in map of demographics and a contaminant or resource</li> </ul> <p>SLO 2a</p> <ul style="list-style-type: none"> <li>– Extract information (points) from a plot of CO<sub>2</sub> concentrations and temperature over time and put in table format</li> </ul>

<p>a. Convert information into and between various mathematical forms (e.g., equations, graphs, diagrams, tables, words).</p>	<ul style="list-style-type: none"> <li>– Determine the rate of increase (slope) of a trend on a plot of CO<sub>2</sub> concentrations over time</li> <li>– Plot data presented in table format onto a Discharge-Return Period flood frequency plot</li> <li>– Extract information (points) from a Discharge-Return Period flood frequency plot</li> <li>– Convert information from a table of carbon offsets into a carbon reduction for a population</li> </ul>
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Content Criteria for Natural & Physical Sciences (GT-SC[1])	Course Mapping
<p><b>1. The <u>lecture content</u> of a GT Pathways science course (GT-SC1 or GT-SC2): Students should be able to:</b></p> <ul style="list-style-type: none"> <li>a. Develop foundational knowledge in specific field(s) of science.</li> <li>b. Develop an understanding of the nature and process of science.</li> <li>c. Demonstrate the ability to use scientific methodologies.</li> <li>d. Examine quantitative approaches to study natural phenomena.</li> </ul> <p><i>(If the course does not have a lab, do not include #2 below.)</i></p> <p><b>2. The <u>laboratory content</u> of a GT Pathways science course (GT-SC1):</b> Students should be able to:</p> <ul style="list-style-type: none"> <li>a. Perform hands-on activities with demonstration and simulation components playing a secondary role.</li> <li>b. Engage in inquiry-based activities.</li> <li>c. Demonstrate the ability to use the scientific method.</li> <li>d. Obtain and interpret data, and communicate the results of inquiry.</li> <li>e. Demonstrate proper technique and safe practices.</li> </ul>	<p>In laboratory questions, exam questions, in-class discussions, and summative assessments, students will:</p> <p>1</p> <ul style="list-style-type: none"> <li>a. Explain the fundamental concepts related to Environmental Earth Science, including where mineral, fossil fuel, and water resources come from, how they are used, and associated environmental impacts. Material is presented in lecture and practiced in laboratory exercises.</li> <li>b. Develop an understanding of the nature and process of science by investigating case-studies of Earth Science investigations and changing thoughts through time, through the topic, for example, of Plate Tectonic Theory</li> <li>c. Demonstrate the ability to use scientific methodologies, such as mineral identification.</li> <li>d. Examine quantitative approaches to study natural phenomena, such as through creating a flood frequency plot and extracting flood probabilities and recurrence intervals.</li> </ul> <p>2</p> <ul style="list-style-type: none"> <li>a. Perform hands-on activities and demonstrations such as CO<sub>2</sub> release and sequestration and acid mine drainage metal precipitation</li> <li>b. Engage in inquiry-based activities through case-studies of environmental justice assessments</li> <li>c. Demonstrate the ability to use the scientific method of mineral identification</li> <li>d. Obtain and interpret data, and communicate the results of inquiry through a case-study</li> </ul>

	investigation of environmental justice mapping e. Demonstrate proper technique and safe practices when, for example, identifying minerals

#### Required Text/Course Materials:

**Readings:** I will assign you weekly readings and you will be expected to come to class with your associated assignment/discussions completed. We will use an open-source textbook: *Exploring Geoscience Across the Globe* by Chris King, 2022. Published by International Geoscience Education Organisation, IGEO. Available as pdf. 238pp. ISBN: 978-1-9996264-0-2 cost - free via internet, <http://www.igeosied.org/teaching-resources/geoscience-text-books/> then go to 'Exploring-Geoscience-across-the-globe'.

**Materials:** Come prepared with a pencil, eraser, extra paper, and a calculator if you have one, and anything else you usually need (small stapler, pencil sharpener, etc.). You should have a binder to keep your materials organized.

**Computer:** We will use computers from time to time and you will need them for assignments and reports. The department has some laptops for use during class and laptops can be check out from the library <https://www.unco.edu/library/services/equipment-checkout/laptops.aspx> and there is now a virtual computer lab with access to software <https://unco.apporto.com/>

**Course Policies: Late Policy:** You must be present to complete the lab for the week. If you are not present, you will receive a zero for that lab. If you know you will be absent, contact your instructor immediately and they may approve of your attendance in a different section. You must contact the section instructor BEFORE their section to receive permission to attend. If you do this the same day, or even the day before, the instructor may not have time to get back to you, so plan accordingly. Labs are due at the beginning of the next lab period and will be returned to you the following lab period, leaving a two-week lag in returning graded labs. If you have an excusable absence or other circumstance, you may contact Student Outreach and Support <http://www.unco.edu/dean-of-students/offices-resources/student-outreach-support/>. Your instructor will work with SOS and you to discuss appropriate action. Without an excusable absence, late work will not be accepted.

**Extra Credit:** No extra credit will be given so please do not ask.

**Academic Integrity:** One of the student responsibilities at UNC is to act in accordance with commonly accepted standards of academic conduct. You are expected to practice academic honesty in every aspect of this course. Students who engage in academic misconduct are subject to grading consequences with regard to this course and/or university disciplinary procedures through the Office of Community Standards and Conflict Resolution. If you are found to be cheating or plagiarizing, you will receive a zero for the assignment in question. Depending upon the nature of the infraction, you may also receive a grade of F for the course and be referred to the University for disciplinary action. Texting (or with other methods/technology) questions and answers is cheating. Copying work is cheating. Do your own work and write things in your own words.

**Statement on Equity and Inclusion:** The University of Northern Colorado embraces the diversity of students, faculty, and staff, honors the inherent dignity of each individual, and welcomes their unique perspectives, behaviors, and worldviews. In this course, people of all races, religions, national origins, sexual orientations, ethnicities, genders and gender identities, cognitive, physical, and behavioral abilities, socioeconomic backgrounds, regions, immigrant statuses, military or veteran statuses, size and/or shapes are strongly encouraged to share their rich array of perspectives and experiences. Course content and campus discussions will heighten your awareness to each other's individual and intersecting identities. If you would like to report an incident or learn more about identity-based discrimination/harassment, please visit

[www.unco.edu/institutional-equity-compliance](http://www.unco.edu/institutional-equity-compliance). If you are perceived to inflict an oral or physical threat or altercation to someone based on any of the above criteria, you will be asked to leave and we may take official action through the Office of Community Standards and Conflict Resolution. If you have a nickname, or a preferred pronoun that is different from what may be assumed, please let your instructor know and they will do their best to follow your preferences.

**Sexual Misconduct:** The University of Northern Colorado is committed to providing a safe and inclusive learning environment for all students that is free from discrimination and harassment, including sexual harassment, sexual assault, domestic violence, dating violence, and stalking. Students who have experienced (or who know someone who has experienced) any of these concerns should know that they are not alone. UNC has staff members in the University's [Office of Institutional Equity and Compliance](http://www.unco.edu/institutional-equity-compliance) (OIEC) who are trained to support students in navigating these concerns and are able to provide on- and off-campus resources and supports, referrals to health and counseling services, academic and housing modifications, and mutual no-contact orders between individuals.

Please be aware all UNC instructors and most staff members are required to report their awareness of sexual misconduct to the OIEC. This means that if students tell an instructor about a situation involving sexual harassment, sexual assault, dating violence, domestic violence, or stalking, the instructor must share that information with the Title IX Coordinator and Equity Officer, Dr. Matt Ricke. Dr. Ricke or a trained staff member in OIEC will contact the reporting students to let them know about resources and support services at UNC as well as their options to pursue an investigation through OIEC, law enforcement, or both. Students who have experienced these types of incidents are not required to speak with OIEC staff regarding the incident. Students' participation in OIEC processes are entirely voluntary.

If students do not want the Title IX Coordinator notified, instead of disclosing this information to the instructor, students can speak confidentially with the following people on campus and in the community. They can connect you with support services and help explore options now, or in the future. UNC has confidential victim advocates available 24/7 by phone – students can contact the [Assault Survivors Advocacy Program](http://www.unco.edu/assault-survivors-advocacy-program) (ASAP) at 970-351-1490 to seek confidential guidance and support. UNC Counseling Center: (970) 351-2496 or [www.unco.edu/counseling](http://www.unco.edu/counseling)  
UNC Psychological Services: (970) 351-1645 or [www.unco.edu/cebs/psych\\_clinic](http://www.unco.edu/cebs/psych_clinic)

#### **Student Conduct Code:**

<http://unco.smartcatalogiq.com/2013-2014/Undergraduate-Catalog/Undergraduate-Information-and-Policies/Student-Resources/Student-Engagement-and-Dean-of-Students-Office-of-Student-Conduct-Code>

**Generative AI Use:** In all academic work, the ideas and contributions of others must be appropriately acknowledged and work that is presented as original must be, in fact, original. Using an AI-content generator (such as ChatGPT) to complete coursework without proper attribution or authorization is a form of academic dishonesty. If you are unsure about whether something may be plagiarism or academic dishonesty, please contact your instructor to discuss the issue. (from University of Iowa)

#### **Student Rights and Responsibilities:**

<http://www.unco.edu/dean-of-students/offices-resources/student-rights-responsibilities/>

#### **Student Support:**

Research shows that college students experience food insecurity at higher rates than the American household rate, and that food insecurity can negatively impact academic performance and persistence. In recognition of this problem, UNC offers assistance to students facing food insecurity through an on- campus food pantry. The Bear Pantry is located in University Center 2166, and is open for regular hours throughout the semester. Please visit [www.unco.edu/bear-pantry](http://www.unco.edu/bear-pantry) for more information.

Any student who faces challenges securing their food or housing and believes this may affect their performance in the course is also urged to contact Student Outreach and Support (SOS) for assistance. SOS can assist students during difficult circumstances which may include medical, mental health, personal or family crisis, illness or injury. SOS can be reached at [sos@unco.edu](mailto:sos@unco.edu) or via phone at (970) 351-2796.

**Pronouns/methods of address:** If you have a name or pronoun that is different from what your instructor may assume, please inform them and they will do their best to comply. Some students may have changed their names to better reflect their gender identity or for other reasons. The process to request that the University change the name that appears on Canvas and on the course roster is available here: <https://www.unco.edu/registrar/name-change.aspx>.

**Religious/Spiritual Accommodations:** I will make every effort to provide reasonable accommodations for any of you who, because of religious/Spiritual observances, have conflicts with scheduled exams, assignments, or attendance in our class. To help me in doing this, please review the course schedule at the beginning of the semester to see if there are any dates when you would need accommodation. If you could let me know at least two weeks before the date, that would be ideal. While I am happy to provide such accommodations, I understand that approaching a faculty member within this context may be intimidating; if that's the case, you can contact student support services to aid in this conversation. For a quiet, private space to pray or meditate you may access the prayer/meditation room in Ross 2240A (opens Sept 2023).

**Ombuds Conflict Development:** The Columbia Encyclopedia (online edition, 2008), describes the work of the ombudsman in the following way: "As a government agent serving as an intermediary between citizens and the government bureaucracy, the ombudsman is usually independent, impartial, universally accessible, and empowered only to recommend." The Ombuds Office acts as a no-barrier, first-stop for students, faculty and staff seeking guidance in conflict including but not limited to sexual harassment, discrimination, supervisory conflict, interdepartmental conflict, production processes, personality conflict, personal problems, and general dispute resolution. <https://www.unco.edu/ombuds/>

**Cultural and Affinity Groups:** There are way more centers and groups on campus than I can list here, but here is a good place to start: <https://www.unco.edu/admissions/cultural-centers.aspx>

**Language/Cultural Support:** Intensive English Program and Cultural Adjustment support at Office of Global Support <https://www.unco.edu/global/>

**Wellness and Fitness:** I am always amazed when juniors and seniors don't know about the amazing recreation opportunities on campus, including excellent fitness classes. Check it out here: <https://www.unco.edu/campus-recreation/> Also check out the checkout equipment from Outdoor Pursuits, including gear like hiking shoes you might need for this class! <https://www.unco.edu/campus-recreation/outdoor-pursuits/gear-shop.aspx>

**BearConnect:** Student events are listed on Bearcave <https://www.unco.edu/clubs-organizations/bearcave-information.aspx>

- **AGES** is a collaboration between the Departments of Anthropology, Earth Sciences, and Geography, GIS, and Sustainability at UNC. Our faculty and students work together to provide hands on learning in our courses, research and outreach opportunities, and student support and development opportunities. <https://unco.campuslabs.com/engage/organization/ages>
- **Earth Science Club** hosts activities such as movie nights, field trips, and other social and professional events related to Earth Science [https://unco.campuslabs.com/engage/organization/earth\\_science\\_club](https://unco.campuslabs.com/engage/organization/earth_science_club)
- **Earth Guardians** hosts events around campus to bring attention to environmental issues and engage with fellow students! <https://unco.campuslabs.com/engage/organization/earthguardians>
- **Student Leadership for Environmental Action Fund (LEAF)** <https://unco.campuslabs.com/engage/organization/studentleaf>

**Course Grading Scale/Assignments:** Your grade will be based on **1)** In Class Activities, **2)** Reading Assignments, **3)** Labs/Projects, and **4)** Midterm and **5)** Final Exam. If you are going to miss a lecture/lab and need to make arrange for a makeup, contact me as soon as possible. If you have a verifiable, excusable absence, your instructor may approve a makeup lab. You will be asked to contact the appropriate office such that they can inform the instructor of the excused absence or extenuating circumstance. If you have too many missing assignments and/or an unreasonable time has past, I maintain the right to refuse arranging a makeup as I simply will not have the time to commit to your makeup nor will you realistically have the time to complete the work.

Letter	GPA	Percentage
A	4.000	90.0 – 100
B+	3.334	87.0 – 89.9
B	3.000	80.0 – 86.9
C+	2.334	77.0 – 79.9
C	2.000	70.0 – 76.9
D+	1.334	67.0 – 69.9
D	1.000	60.0 – 66.9
F	0	0 – 59.9

Course Calendar/Schedule:

Week	Date	Unit
1	8/21/2023	Intro
2	8/28/2023	Intro
3	9/4/2023	Earth: Minerals
4	9/11/2023	Earth: Soils
5	9/18/2023	Earth: Mining
6	9/25/2023	Earth: Energy
7	10/2/2023	Renewable Energy
8	10/9/2023	Climate; <i>Midterm</i>
9	10/16/2023	Water: Precipitation
10	10/23/2023	Water: Surface Water
11	10/30/2023	Water: Flooding
12	11/6/2023	Geo Hazards
13	11/13/2023	Geo Health
14	11/20/2023	Sustainable Development
15	11/27/2023	Wrapup/TBD
—	12/7/2023	<i>Final:</i> 10:45 - 1:15