

# ESCI-1310: PHYSICAL GEOGRAPHY

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## Cuyahoga Community College

### Viewing: ESCI-1310 : Physical Geography

#### Board of Trustees:

January 2023

#### Academic Term:

Fall 2023

#### Subject Code

ESCI - Earth Science

#### Course Number:

1310

#### Title:

Physical Geography

#### Catalog Description:

The course is an introductory study of physical elements of geography. Exploration of the natural systems that shape our physical environment, including anthropogenic influences, and the resultant spatial patterns discernible on Earth's surface. Study includes earth-sun relationships, maps, atmospheric components and interactions, elements and controls of weather and climate, water resources and their distribution, vegetation associations, ecological relationships, soil types, landforms, and plate tectonics. The importance of spatial data literacy is highlighted. To fulfill laboratory science requirements, students should also enroll in related laboratory course.

#### Credit Hour(s):

3

#### Lecture Hour(s):

3

#### Lab Hour(s):

0

#### Other Hour(s):

0

## Requisites

#### Prerequisite and Corequisite

ENG-0985 Introduction to College Literacies or appropriate score on English Placement Test.

Note: ENG-0980 Language Fundamentals I taken prior to Fall 2021 will also meet prerequisite requirements.

## Outcomes

#### Course Outcome(s):

Apply scientific principles to illuminate process, scale and systems to the five main themes of geography.

#### Essential Learning Outcome Mapping:

Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.

#### Objective(s):

1. Explain the interrelationships of the atmosphere, hydrosphere, lithosphere, and biosphere.
2. Use the theory of plate tectonics to determine landforms and continent locations and sizes.
3. Describe the seasons in terms of sun angles.
4. Determine the relationship of heating and cooling of the atmosphere to energy transmission, reception and reradiation.
5. Construct the hydrologic cycle and define its components.
6. Explain the global patterns of airflow as related to pressures.

7. Identify the weather patterns of different parts of the earth and the reasons for the variations that occur from one place to another.
8. Relate the different climates of the earth to vegetation patterns and soil.
9. Define the relationships existing between different biotic components of the biosphere.
10. Explain the effect of different landforms on weather, climate, biota and soils.
11. Describe and give examples of the human and physical scope of geography.
12. Describe the various forms of energy (radiant, potential, kinetic and chemical).
13. Retrieve and utilize spatial data in order to identify patterns, solve problems, and answer questions in relationship to earth's spheres, and the five themes of geography.

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**Course Outcome(s):**

Apply the principles of physical geography to current events.

**Essential Learning Outcome Mapping:**

Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.

**Objective(s):**

1. Explain the relationship of climate to agricultural issues.
2. Determine the effect of changes in weather patterns in current years.
3. Relate plate tectonics to recent seismic activity.
4. Explain the relationship between global warming and climate change.
5. Explain the anthropogenic influence on the natural environment.
6. Identify credible sources of data in relationship to current events (volcanism, earthquakes, hurricanes, coastal erosion, mass wasting).
7. Identify critical aspects of freshwater supply.

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**Course Outcome(s):**

Demonstrate the ability to make connections between concepts across geography

**Essential Learning Outcome Mapping:**

Quantitative Reasoning: Analyze problems, including real-world scenarios, through the application of mathematical and numerical concepts and skills, including the interpretation of data, tables, charts, or graphs.

**Objective(s):**

1. Read and interpret graphical and spatial data.
2. Explain the driving forces that shape the climate system.
3. Identify and utilize current data to explain real-world event.
4. Describe several types of data and imagery used for forecasting meteorological events.
5. Interpret near-to-real-time data, as applicable to concepts in physical geography.
6. Discuss and identify water resources, energy resources, and the human use of resources, scarcity, and abundance, and sustainable use.

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**Methods of Evaluation:**

- a. Quizzes
- b. Lecture examinations
- c. Participation in class/discussion boards
- d. Reports on current literature, summaries
- e. Weekly chapter homework reviews

**Course Content Outline:**

- a. Introduction
  - i. The scope of physical geography
  - ii. History of geography

- iii. Earth origin and location
- iv. Spheres of the earth, biosphere, atmosphere, hydrosphere and geosphere
- b. Mapping
  - i. The geographic grid
  - ii. Map projections and their properties
  - iii. Essential components of maps
  - iv. Isolines
  - v. Scales
  - vi. Topographic maps
  - vii. Role of remote sensing
  - viii. GPS (global positioning system)
  - ix. GIS (geographic information system)
- c. Earth-sun relationships
  - i. Primary motions of the earth
  - ii. Secondary motions of the earth
- d. Atmosphere
  - i. Composition and layers of the atmosphere
  - ii. The earth-atmosphere system
  - iii. Energy transfer mechanisms
  - iv. Causes of local imbalances in the energy budget
  - v. Heating and cooling of the atmosphere
- e. Temperature
  - i. Temperature measurements and trends
  - ii. Mechanisms of heat transfer
  - iii. Vertical and latitudinal temperature trends
  - iv. Human activity and air temperatures
- f. Pressure and winds
  - i. Atmospheric pressure measurements
  - ii. Vertical and latitudinal pressure trends
  - iii. Wind measurement, direction and velocity
  - iv. Planetary wind systems
  - v. Local wind systems
  - vi. Geostrophic winds
  - vii. The jet stream
  - viii. Currents
  - ix. Large scale climate oscillations (El Nino/La Nina, PDO)
- g. Water in the atmosphere
  - i. The hydrologic cycle
  - ii. Atmospheric moisture
  - iii. Measurement of humidity
  - iv. Condensation - fogs and clouds
  - v. Precipitation types and causes
  - vi. Geographic distribution of precipitation
  - vii. Seasonal distribution of precipitation
  - viii. Human activity and precipitation patterns
- h. Meteorology
  - i. Air masses
  - ii. Types of fronts
  - iii. Severe storms - thunderstorms, tornadoes, hurricanes
  - iv. Weather prediction
  - v. Human activity and weather patterns
- i. Climatology
  - i. Determining factors of climate
  - ii. Köppen climate system
  - iii. Description of the different climate types
  - iv. Causes of climate change

- v. Glacial climates and their cause
- vi. Human activity and climate patterns
- j. Hydrology
  - i. Properties of water
  - ii. The hydrologic cycle
  - iii. Groundwater
  - iv. Types of aquifers
  - v. Water withdrawal from aquifers
  - vi. Ocean water
  - vii. Surface waters
  - viii. The Great Lakes
  - ix. Human activity and water availability
- k. Pedology
  - i. Production of soils and soil horizons
  - ii. Soil properties
  - iii. Soil chemistry
  - iv. Soil classification
  - v. Global distribution of soils
  - vi. Human activity and soils
- l. Ecology
  - i. Ecosystem component
  - ii. Energy flow
  - iii. Food chains
  - iv. Nutrient cycles
  - v. Biotic relationships
  - vi. Human activity and ecosystems
- m. Flora and fauna
  - i. Controls on vegetation
  - ii. Life forms of plants
  - iii. Terrestrial biomes and their distribution
  - iv. Ecological succession and community structure
  - v. Animal types, relationships, adaptations and distribution
  - vi. Human activity and biotic patterns
- n. Geology
  - i. Earth structure and composition
  - ii. Rock types and methods of formation
  - iii. The theory of Plate Tectonics
- o. Landforms
  - i. The influence of climate on erosional and depositional processes
  - ii. The influence of bedrock and soils on erosional and depositional processes
  - iii. The effects of landforms on weather, climate, and biota
  - iv. Stream erosion and deposition
  - v. Ground water erosion and deposition
  - vi. Glacial erosion and deposition
  - vii. Aeolian erosion and deposition

## Resources

Daniel Hess and Dennis Tasa. *McKnight's Physical Geography*. 12th edition. Pearson, 2017.

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Christopherson, R. W. *An introduction to Physical Geography: Geosystems*. 10th edition. Hoboken New Jersey, Pearson, 2017.

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Harm J. de Blij, Peter O. Muller, and Richard S. Williams Jr. *Physical Geography of the Global Environment*. 5th edition. Oxford: Oxford Press, 2015.

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James F. Petersen, Dorothy Sack, Robert E. Gabler . *Physical Geography*. 10th edition. Belmont, CA: Brooks Cole, 2012.

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McKnight, Tom L. *Physical Geography - a Landscape Appreciation*. 12th edition. Hoboken, NJ. Pearson, 2016.

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### Resources Other

- a. **Articles and Research Used as Additional reading in the course:** Christopherson, R. W. *Elemental Geosystems - A Foundation in Physical Geography*. 7th ed. Prentice-Hall, 2008.
- b. De Blij, H. J., Williams, R.S, and P. O Muller. *Physical Geography of the Global Environment*. 3rd ed. Oxford: Oxford Press, 2004.
- c. Gabler, R. E., Peterson, J.F., Sack, D., Trapasso, L.M. *Physical Geography*. 9th ed. Belmont, CA: Brooks Cole, 2008.
- d. Hess. *McKnight's Physical Geography*. 11th ed. Pearson, 2013.
- e. Hess, Darrell. *Laboratory Manual for Physical Geography: A Landscape Appreciation*. 11th. Prentice Hall, 2013.
- f. Strahler, Alan. *Laboratory Manual for Physical Geography*. 1st ed. Wiley, 2004.
- g. McKnight. *Physical Geography-Lab Manual*. 10th. Pearson, 2010.
- h. Bradshaw M., and R. Weaver. *Foundations of Physical Geography*. 2nd. Wm. C. Brown, 1999.
- i. McKnight, Tom L. *Physical Geography - a Landscape Appreciation*. 11th ed. Pearson, 2013.
- j. Soil Science Society of America. "Why is Soil Important?" Accessed: 6/12/18; <https://soils.org/files/science-policy/sss-marketing-2013.pdf>
- k. Steele, Erin M. *Correlation of Terraces in the Chagrin River Valley with Ancestral Levels of Lake Erie, Northeastern Ohio Akron, OH* : University of Akron, 2007; <https://olc1.ohiolink.edu/record=b42127699~S0> (<https://olc1.ohiolink.edu/record%3Db42127699%7ES0/>)
- l. Book Title: *Water on Earth: Physicochemical and Biological Properties*
- m. Title: Chapter 2: Theories about the Origin of Water on Earth Author: Lécuyer, Christopher
- n. Book Editors: Mariotti, André (<https://onlinelibrary.wiley.com/action/doSearch?ContribAuthorStored=Mariotti%2C%2BAndr%C3%A9>) and Jean-Charles Pomerol (<https://onlinelibrary.wiley.com/action/doSearch?ContribAuthorStored=Pomerol%2C%2BJean-Charles>) Web Address: <https://doi.org/10.1002/9781118574928.ch2> Publisher: Wiley Online Library Published: 02/10/2014
- o. Title: Earthguide Online Classroom, a part of the Scripps Institute of Oceanography Web Address/Origin: <http://earthguide.ucsd.edu/> Date: 06/26/2013
- p. Title: What Is Geoengineering? Oxford Geoengineering Program Web Address/Origin: <http://www.geoengineering.ox.ac.uk/> <http://www.geoengineering.ox.ac.uk/wha> (<http://www.geoengineering.ox.ac.uk/www.geoengineering.ox.ac.uk/what-is-geoengineering/what-is-geoengineering/>) t-is-geoengineering/what-is-geoengineering/ (<http://www.geoengineering.ox.ac.uk/www.geoengineering.ox.ac.uk/what-is-geoengineering/what-is-geoengineering/>) Date: 07/29/2018
- q. Title: *Ocean fertilization: a potential means of geoengineering?* Journal: *Philosophical Transactions of the Royal Society*. Authors: R.S Lampitt, (<https://royalsocietypublishing.org/doi/full/10.1098/rsta.2008.0139>) E.P Achterberg, (<https://royalsocietypublishing.org/doi/full/10.1098/rsta.2008.0139>) T.R Anderson, (<https://royalsocietypublishing.org/doi/full/10.1098/rsta.2008.0139>) J.A Hughes, (<https://royalsocietypublishing.org/doi/full/10.1098/rsta.2008.0139>) M.D (<https://royalsocietypublishing.org/doi/full/10.1098/rsta.2008.0139>) Iglesias-Rodriguez, (<https://royalsocietypublishing.org/doi/full/10.1098/rsta.2008.0139>) B.A Kelly-Gerreyn, (<https://royalsocietypublishing.org/doi/full/10.1098/rsta.2008.0139>) E.E Popova, (<https://royalsocietypublishing.org/doi/full/10.1098/rsta.2008.0139>) R Sanders, (<https://royalsocietypublishing.org/doi/full/10.1098/rsta.2008.0139>) J.G (<https://royalsocietypublishing.org/doi/full/10.1098/rsta.2008.0139>) Shepherd, (<https://royalsocietypublishing.org/doi/full/10.1098/rsta.2008.0139>) D Smythe-Wright, (<https://royalsocietypublishing.org/doi/full/10.1098/rsta.2008.0139>) A Yool (<https://royalsocietypublishing.org/doi/full/10.1098/rsta.2008.0139>) Web address/Origin: <https://royalsocietypublishing.org/doi/full/10.1098/rsta.2008.0139> Date: 09/29/2008
- r. Title: Climate change: Climate engineering through stratospheric aerosol injection Journal: *Progress in Physical Geography: Earth and Environment*, 36(5), 694–705. Author: Hulme, Mike. Web Link/Address: <https://doi.org/10.1177/0309133312456414> (<https://doi.org/10.1177/0309133312456414/>) Date: 2012
- s. Title: Coasts in Crisis Author: Watson, John, United States Geological Society (USGS). Web Address/Origin: <https://pubs.usgs.gov/circ/c1075/change.html> Date: 08/04/08
- t. Title: What is an Estuary? National Oceanic and Atmospheric Administration. Author: NOAA, National Ocean Service Date: 6/25/2018. Web Address/Origin: <https://oceanservice.noaa.gov/facts/estuary.html>
- u. Title: Tides, Ocean Explorer, Multimedia Mission. Author: National Oceanic and Atmospheric Administration Date: 02/12/2013. Web Address/Origin: <https://oceanexplorer.noaa.gov/edu/learning/player/lesson10.html>
- v. Title: Tides and Currents, Education. Author: National Ocean Service, National Oceanic and Atmospheric Administration. Web Address/Origin: <https://tidesandcurrents.noaa.gov/education.html> Date: 08/08/2018.
- w. Title: The Entangled History of Oceanography and Medicine. Author: Adler, Anthony, Official Website of the International Commission of the History of Oceanography.

- x. Web Link/Address: <https://oceansciencehistory.wordpress.com/2014/11/19/the-entangled-history-of-oceanography-and-medicine/> (https://oceansciencehistory.wordpress.com/2014/11/19/the-entangled-history-of-oceanography-and-medicine/). Date: November 19, 2014.
- y. Title: New Cures from the Sea. Author: Scripps Institute of Oceanography, Center for Marine Biotechnology and Biomedicine. Web Address/Link: <https://scripps.ucsd.edu/cmabb/research> (https://scripps.ucsd.edu/cmabb/research/) Date: 2019
- z. Title: Our oceans are haunted by ghost nets: Why that's scary and what we can do. Author: Hancock, Lorin. Web Link/Address: <https://www.worldwildlife.org/stories/our-oceans-are-haunted-by-ghost-nets-why-that-s-scary-and-what-we-can-do-22/> (https://www.worldwildlife.org/stories/our-oceans-are-haunted-by-ghost-nets-why-that-s-scary-and-what-we-can-do-22/) Date: 06/25/2019.
- aa. Title: US tuna companies face class-action lawsuits over "Dolphin-Safe" claims. Author: Blank, Christine. Web Link/Address: <https://www.seafoodsource.com/news/supply-trade/us-tuna-companies-face-class-action-lawsuits-over-dolphin-safe-claims/> (https://www.seafoodsource.com/news/supply-trade/us-tuna-companies-face-class-action-lawsuits-over-dolphin-safe-claims/) Date: 06/15/2019
- bb. Title: Ch. 15: Biogeochemical Cycles. Climate Change Impacts in the United States: The Third National Climate Assessment. Author(s): Galloway, J. N., W. H. Schlesinger, C. M. Clark, N. B. Grimm, R. B. Jackson, B. E. Law, P. E. Thornton, A. R. Townsend, and R. Martin, 2014; J. M. Melillo, Terese (T.C.) Richmond, and G. W. Yohe, Eds. Publisher: U.S. Global Change Research Program, 350-368, doi:10.7930/J0X63JT0. Web Address: <https://nca2014.globalchange.gov/report/sectors/biogeochemical-cycles> (https://nca2014.globalchange.gov/report/sectors/biogeochemical-cycles/)
- cc. Title: The Earth's Dynamic Cryosphere and the Earth System, Professional Paper 1386-A. Author: Williams Jr., Richard U.S. Geological Survey, Woods Hole Coastal and Marine Science Center. Web Address/Origin: [https://pubs.usgs.gov/pp/p1386a/pdf/notes/cover-sheet\\_508.pdf](https://pubs.usgs.gov/pp/p1386a/pdf/notes/cover-sheet_508.pdf) Date: December 2012.
- dd. Title: State of the Ocean Observing System. Author: National Oceanic and Atmospheric Administration Atlantic Oceanographic and Meteorological Laboratory, Physical Oceanography Division. Web Address/Origin: <https://www.aoml.noaa.gov/phod/soto/> Date: 07/29/2019.
- ee. Title: The Ocean and Climate Change, Issue Brief. Author: International Union of for the Conservation of Nature, Global Marine and Polar Programme. Web Address/Origin: <https://www.iucn.org/resources/issues-briefs/ocean-and-climate-change/> (https://www.iucn.org/resources/issues-briefs/ocean-and-climate-change/). Date: 11/2017
- ff. Title: El Niño, theme page. Author: Pacific Marine Environmental Laboratory, United States National Oceanic and Atmospheric Administration, Web Address/Origin: [https://www.pmel.noaa.gov/el\\_nino/](https://www.pmel.noaa.gov/el_nino/) Date: 07/29/2019
- gg. Title: What's in a Name? Global Climate Change, Vital Signs of the Planet. Author: National Aeronautics and Space Administration, Jet propulsion laboratory. Web Address/Origin: <https://climate.nasa.gov/resources/global-warming/> (https://climate.nasa.gov/resources/global-warming/). Date: 07/23/2019.
- hh. Title: What happens to all that plastic? Author: Cho, Renee, Earth Institute, Columbia University. Web Address/Origin: <https://blogs.ei.columbia.edu/2012/01/31/what-happens-to-all-that-plastic/> (https://blogs.ei.columbia.edu/2012/01/31/what-happens-to-all-that-plastic/). Date: 11/27/2017.
- ii. Title: Deep-sea observatories to offer new view of seabed earthquakes. Author: National Science Foundation, News Release 18-015. Web address/Link: [https://www.nsf.gov/news/news\\_summ.jsp?cntn\\_id=244653](https://www.nsf.gov/news/news_summ.jsp?cntn_id=244653) Date: 04/08/2018.
- jj. Title: Global Fishing Watch. Author: Oceana, SkyTRUTH, Google Map data: ©2018 Google, ©2018 NASA, INEGI, TerraMetrics Web Address/Link: <https://globalfishingwatch.org/map/> Date: 2018
- kk. Title: The Ocean Floor, What we know and how we know it. Author: Mountain, S. Gregory, Lamont-Doherty Earth Observatory, Rutgers University. Web address/Link: <https://www.ideo.columbia.edu/video/the-ocean-floor/> (https://www.ideo.columbia.edu/video/the-ocean-floor/) Date: 4/13/2008.
- ll. Title: How Thailand's Dying Shrimp Are Killing an Indian Village. Author: Narayan, Lakshmi Web Address/Link: <https://www.pbs.org/wgbh/nova/article/shrimp-pokkali/> (https://www.pbs.org/wgbh/nova/article/shrimp-pokkali/). Date: 9/14/2014.
- mm. Title: Southern McMurdo Sound Project, Antarctica," from *Studies from the ANDRILL, Southern McMurdo Sound Project, Antarctica, Initial Science Report on AND-2A*. Authors: Harwood, D.M., Florindo, F., Talarico, F., et al. Web Address/Link: <http://www.mna.it/english/Publications/TAP/volume14.html> Date: 2008–2009
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- pp. Title: How the Isthmus of Panama Put Ice in the Arctic. Author: Haug, Gerald and Lloyd Keigwin, Woods Hole Oceanographic Institution. Web Address/Link: <https://www.whoi.edu/oceanus/feature/how-the-isthmus-of-panama-put-ice-in-the-arctic/> (https://www.whoi.edu/oceanus/feature/how-the-isthmus-of-panama-put-ice-in-the-arctic/). Date: 3/22/2004.
- qq. Title: New Geoengineering Scheme Tackles Ocean Acidification, too. Author: Madrigal, Alexis. Web Address/Link: <https://www.wired.com/2008/07/new-geoengineer/> Date: 07/22/2008.

rr. Title: "How Maps Lie," *Syracuse University Magazine*: Vol. 8 : Iss. 1 , Article 7. Fleckenstein, Leah (1991).

ss. Title: A New approach to preventing human induced Earthquakes Jennifer Chu | MIT News Office, Publication Date: July 28, 2021

## **Instructional Services**

### **OAN Number:**

Ohio Transfer 36 TMNS and Transfer Assurance Guide OSS006

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