

GEOG-2030: ENVIRONMENTAL GEOGRAPHY

Cuyahoga Community College

Viewing: GEOG-2030 : Environmental Geography

Board of Trustees:

October 2020

Academic Term:

Fall 2021

Subject Code

GEOG - Geography

Course Number:

2030

Title:

Environmental Geography

Catalog Description:

Study of the impact humans have on the surrounding environment by exploring environmental processes and the impact consumption, population dynamics, and technology use have on a range of topics including: climate change, energy profiles, agricultural ecosystems, species diversity, habitat health in such systems as forests and wetlands, and air and water pollution. Topics will be explored using the lenses of ecological principles, public policy, and economics, from global to local scales.

Credit Hour(s):

3

Lecture Hour(s):

3

Lab Hour(s):

0

Other Hour(s):

0

Requisites

Prerequisite and Corequisite

ENG-0995 Applied College Literacies, or appropriate score on English Placement Test; or departmental approval.

Note: ENG-0990 Language Fundamentals II taken prior to Fall 2021 will also meet prerequisite requirements.

Outcomes

Course Outcome(s):

Evaluate and imagine solutions to major environmental issues, while identifying the complex needs of stakeholders to that issue.

Essential Learning Outcome Mapping:

Civic Responsibility: Analyze the results of actions and inactions with the likely effects on the larger local and/or global communities.

Objective(s):

1. Explore potential solutions to current issues regarding climate change, air and water pollution, habitat degradation, energy use, and sustainable growth.
2. Use and document credible information regarding current environmental debates to articulate support for or against elements of those debates.

Course Outcome(s):

Integrate sustainability into one's own life and encourage/advocate those around you to engage in sustainable practices that will help to improve our impact on the environment.

Objective(s):

1. Identify ways that humans interact with nutrient cycles and energy flow across issues such as food production, water and air pollution, climate change, and sustainable energy use.
 2. Prepare written or oral assignments, which demonstrate an understanding of the relationship between current events and topics covered in this class.
 3. Examine one's own ecological footprints in order to understand the IPAT model (Impact=Population X Affluence X Technology).
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Course Outcome(s):

Examine the environmental processes behind the environmental patterns seen across regions and from global to local scale.

Objective(s):

1. Interpret and analyze data in charts related to population change over time, energy use, air and water pollution, and other issues as appropriate.
 2. Explore empirical and theoretical impacts of human impact on the environment caused by a combination of economic behaviors, population change, and technology.
 3. Apply principles of environmental geography to the local environmental situations.
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Methods of Evaluation:

1. Class discussion and participation
2. Quizzes
3. Final examination
4. Written assignments

Course Content Outline:

1. Introduction to a geographic approach to environmental issues
2. Population Dynamics
 - a. Carrying capacity
 - b. Human Population Models
 - i. NeoMalthusian
 - ii. Political/Economic models
 - iii. Boserup
 - c. Factor's that affect Fertility rate
 - d. Population Momentum
 - e. Demographic transition model
3. Nutrient cycles
 - a. Carbon cycle
 - b. Nitrogen cycle
 - c. Phosphorus cycle
4. Agricultural production and hunger
 - a. Pyramid of energy flow
 - b. Food insecurity
 - c. Subsistence vs. industrialized agriculture
 - d. Green revolution
 - e. Sustainable agriculture practices
 - i. Integrated pest management
 - ii. Soil erosion
5. Water supply and water quality
 - a. Water cycle
 - b. Freshwater availability
 - i. Aquifers
 - ii. Irrigation
 - iii. Dams
 - iv. Watersheds
 - c. Local and global solutions to overuse
 - i. Virtual water and water footprint
 - ii. Water wars
 - d. Mechanisms for clean water

- i. Wetlands
 - ii. Point and Nonpoint source pollution
 - 1. Cuyahoga River
 - 2. Clean drinking water
 - iii. Biological oxygen demand
 - iv. Cultural eutrophication
 - 1. Lake Erie
 - 2. Chesapeake Bay
- 6. Biodiversity and biomes
 - a. Speciation
 - b. Species richness/species evenness
 - c. Biogeography
 - i. Deserts
 - ii. Grasslands
 - iii. Forests
 - 1. Deforestation
 - 2. Succession
 - 3. Habitat fragmentation
 - iv. Endangered species
 - d. Ecosystem functions
 - i. Species interaction
 - ii. Roles of species, niche functions
 - iii. Ecological service
 - 1. Forests
 - 2. Wetlands
- 7. Global atmospheric circulation
 - a. Layers of the atmosphere
 - b. Formation of climate zones
 - i. Global circulation and circulation cells
 - ii. Rain shadow effect
 - iii. Ocean currents
 - iv. Difference between weather and climate
 - c. Natural greenhouse effect
 - i. Composition of the atmosphere
 - ii. Greenhouse gases
 - iii. Energy budget
- 8. Energy generation
 - a. Renewable
 - i. Wind
 - ii. Solar
 - 1. Passive
 - 2. Active
 - iii. Geothermal
 - iv. Hydro
 - b. Nonrenewable
 - i. Nuclear
 - ii. Coal
 - iii. Oil
 - iv. Natural gas
 - c. Patterns of energy use
 - d. Energy policy and its impacts on supply and demand
 - e. Energy efficiency
 - i. Laws of thermodynamics
 - ii. Net energy yields
 - iii. Solutions to maximize energy efficiency
 - 1. Cogeneration
 - 2. Smart grids
 - 3. Fuel efficiency and Corporate average fuel economy (CAFE) standards
 - 4. Building design

9. Non-fuel minerals
 - a. Rock cycle
 - b. Uneven distribution of mineral resources
 - c. Economic depletion
 - d. Types of mining
 - e. Effects of mining
 - i. Environmental
 - ii. Uneven Economics
 - iii. Mineral Wars
10. Global climate change
 - a. Paleoclimatology and the History of the Earth's climate
 - b. Natural vs. enhanced greenhouse effect
 - i. Six main greenhouse gases
 - ii. Warming potential and residence time of greenhouse gasses
 - c. Feedback loops
 - i. Ocean and cloud
 - ii. Cloud
 1. Cumulus
 2. Cirrus
 - iii. Aerosol and soot pollutants
 - d. Current climate science
 - i. Climate models
 - ii. Tipping point
 - e. Effects of climate change
 - i. Physical impacts
 1. Melting glaciers
 2. Warmer oceans
 3. Permafrost melt
 4. Change in weather patterns
 5. Biodiversity
 6. Drought
 - ii. Social Impact
 - iii. Food and water access
 1. Disease
 2. Economic disruptions
 - f. Slowing climate change
 - i. Intergovernmental panel on climate change (IPCC)
 - ii. Prevention and reduction
 - iii. Carbon capture and storage
 - iv. Geoengineering
 - v. Cap-and-trade approach vs. energy tax
 - g. Adaptation
 - i. Carbon neutral
 - ii. Corporate actions
 - iii. Local and state initiatives
11. Hazardous wastes
 - a. Types of toxic chemicals
 - b. Impact on the human body
 - i. immune system
 - ii. nervous system
 - iii. endocrine system
 - c. Biomagnification
 - i. Polychlorinated biphenyl (PCB)
 - ii. Bisphenol A (BPA)
 - d. Risk Assessment
 - i. Toxicity
 - ii. Dose-response model

- iii. Epidemiological studies
 - iv. Evaluating risk
- e. Risk Management
- 12. Air Pollution
 - a. Stratosphere and ozone layer
 - b. Ozone depletion
 - i. Process
 - ii. Regulation of chloroflourocarbons (CFC)
 - c. Major air pollutants
 - i. Primary and secondary pollutants
 - ii. Industrial and photochemical smog
 - iii. Acid rain
 - d. Temperature inversions
 - e. Health impacts of air pollution
 - f. Solutions to air pollution
 - g. Industrial and photochemical smog
- 13. Environmental Justice
 - a. Resilience
 - b. Adaptive capacity
 - c. Protection of environmental infrastructure
 - d. Role of local and global governance in environmental quality
 - e. Environmental justice
 - i. Clean water
 - ii. Clean air
 - iii. Toxin exposure
 - iv. Pipelines and territory control
- 14. Sustainable growth and urban land use
 - a. Major population trends in urban areas
 - b. Urbanization advantages and disadvantages
 - i. Urban sprawl
 - ii. Land use planning and zoning
 - iii. Models of urban planning for the environment
 - c. Models of urban planning for the environment
 - i. Smart growth
 - ii. Ecocities
 - iii. New urbanism
 - d. Measuring economic growth
 - i. Sustainable economic growth vs. market driven economic growth
 - 1. Full cost pricing
 - 2. Alternative economic approaches'
 - ii. Cost benefit analysis
 - iii. Poverty reduction's impact on environmental problems
 - e. Ecological world views

Resources

Miller, Tyler, G and Scott E Spoolman. *Living in the Environment*. 19th ed. Cengage, 2020.

Duram, Leslie. *Environmental Geography: People and the Environment*. ABC-CLIO, 2018.

Dastrup, Adam. *Physical Environments and Natural Disasters*. <https://slcc.pressbooks.pub/physicalgeography/>. 2020.

Pidwirny, Michael and Scott Jones. *Physical Geography*. 2018. <http://www.physicalgeography.net/>

Zehnder, Caralyn, et al. *Introduction to Environmental Science*. 2nd ed. 2018. <https://open.umn.edu/opentextbooks/textbooks/562>

Resources Other

1. An Introduction to Geology: <http://opengeology.org/textbook/>
2. IPopulation Reference Bureau <https://www.prb.org/>
3. United States Census Bureau International Programs <https://www.prb.org/>
4. Seed Map <http://map.seedmap.org/>
5. Monterey Bay Aquarium Seafood Watch <https://www.seafoodwatch.org/>
6. US Environmental Protection Agency [epa.gov](http://catalog.tri-c.eduepa.gov) (<http://catalog.tri-c.eduepa.gov>)
7. US Geological Service Streamer <https://txpub.usgs.gov/DSS/streamer/web/>
8. Ohio Environmental Protection Agency- Total Maximum Daily Load Program (<https://www.iucnredlist.org/>) <https://epa.ohio.gov/dsw/tmdl/index> (<https://epa.ohio.gov/dsw/tmdl/index/>)
9. Floods.Global Flood mapping inter (<https://www.iucnredlist.org/>)face <http://floods.global/#5/40.212/-112.917/CREST/MAXQ/0/0> (<http://floods.global/#5/40212/-112917/CREST/MAXQ/0/0>)
10. Water Footprint Calculator <https://www.watercalculator.org/>
11. The IUCN Red List <https://www.iucnredlist.org/>
12. US Fish and Wildlife Service Endangered Species List <https://www.fws.gov/endangered/>
13. USGS Mineral Resources Online Spatial Data <https://mrddata.usgs.gov/>
14. Solar Scorecard <http://www.solarscorecard.com/>
15. US Energy Information Administration- Ohio: <https://www.eia.gov/state/?sid=OH#tabs-4>
16. US Energy Information Administration- Renewables: <https://www.eia.gov/renewable/>
17. The Global E-Waste Statistics Partnership <https://globalewaste.org/map/>
18. NASA Global Climate Change <https://climate.nasa.gov/>
19. Cool Climate Network <https://coolclimate.org/calculator> (<https://coolclimate.org/calculator/>)
20. Internal Displacement Monitoring Centre <https://www.internal-displacement.org/database/displacement-data> (<https://www.internal-displacement.org/database/displacement-data/>)
21. NOAA Climate.gov <https://www.climate.gov/news-features/category/extreme-events> (<https://www.climate.gov/news-features/category/extreme-events/>)
22. Environmental Justice Atlas <https://ejatlas.org/>
23. BreezoMeter <https://breezometer.com/>
24. American Lung Association State of the Air <http://www.stateoftheair.org/>
25. The Good Country Index <https://www.goodcountry.org/index/results> (<https://www.goodcountry.org/index/results/>)

Instructional Services

OAN Number:

Ohio Transfer 36 TMSBS

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