GEO170 Earth Science and Society

Sample Syllabus

(Departmental approval for Common Core submission: March 12, 2025)

Course Description

3 hours, 3 credits. Structures and interactions between four main Earth layers: hydrosphere, atmosphere, biosphere and lithosphere in the context of societal activities.

Course Texts

1. The Essential Guide to Planet Earth, by Benjamin J Burger, Open Educational Resource, available at, https://open.umn.edu/opentextbooks/textbooks/the-essential-guide-to-planet-earth
2. Science, Technology, and Society, by Bill Freedman and Nick Baker, Open Educational Resource, available at: https://ecampusontario.pressbooks.pub/sciencesociety/front-matter/preface-2/
3. Introduction to Environmental Sciences and Sustainability, by Emily P. Harris, Open Educational Resource, available at: https://pressbooks.uwf.edu/envrioscience/front-matter/introduction/
4. Selected peer-reviewed articles related to Earth Science and societal issues will be provided for students during the course.

Learning Outcomes

- Demonstrate understanding of main Earth layers, associated societal needs and pressing issues.
- Demonstrate understanding of Earth Science terminology.
- Demonstrate understanding of global earth data.
- Demonstrate understanding of the role and use of global earth data in decision-making.

Course Schedule

Week	Topic	Societal Relation
1	Earth Science history. Development of ideas about the Earth systems evolution and processes. Noosphere, Gaia, Anthropocene, Anthropocentric vs Ecozoic. Development of scientific method. Assessment: quiz with multiple-choice, multiple answer, true/false, calculated formula, fill in the blank, etc. Homework: a brief essay on advantages and deficiency of the scientific method.	• Perception on earth science through ages and its relationship with earth system elements, such as atmosphere, hydrosphere, biosphere and litosphere. • Globalization of society and need for global data on earth system
2	Earth science data collection and analysis: review of local and global data methods collections and measurements Assessment: quiz with multiple-choice, multiple answer, true/false, calculated formula, fill in the blank, etc. Homework: a brief essay to distinguish between global measurements in four spheres of the Earth.	• Role of data in decision making • Environmental impact and assessment, natural resources management and conservation, natural hazards, political importance of earth systems, global measurements*
3	Lithosphere: structure and its main elements Assessment: quiz with multiple-choice, multiple answer, true/false, calculated formula, fill in the blank, etc. Homework: a brief essay on how earthquake hazard and geologic composition affect urban design in Manhattan.	• Patterns of settlements, natural hazards, global measurements
4	Lithosphere: earth materials and soils Assessment: quiz with multiple-choice, multiple answer, true/false, calculated formula, fill in the blank, etc. Homework: a brief essay on how rare metals in Ukraine (their source and availability) played role in negotiations between USA and Russia to stop the current war.	• Mining, agriculture, landfills (including hazardous sites), urban growth, economics, politics, global measurements

Week	Topic	Societal Relation
5	Lithosphere: surface processes Assessment: quiz with multiple-choice, multiple answer, true/false, calculated formula, fill in the blank, etc. Homework: a brief essay on how landslide hazards are linked with all four spheres of the earth.	• Impact of natural hazards, global measurements
6	Hydrosphere: water cycle and humans Assessment: quiz with multiple-choice, multiple answer, true/false, calculated formula, fill in the blank, etc. Homework: a brief essay on the role of rain forests in global hydrologic cycle and methods of global observation.	• Role of water in society from the life origin to space explorations, global measurements
7	Hydrosphere: surface and ground water Assessment: quiz with multiple-choice, multiple answer, true/false, calculated formula, fill in the blank, etc. Homework: a brief essay on New York City (NYC) water supply, methods of monitoring and associated political conflict between NYC and upstate communities.	• Agriculture, water supply, global measurements, fisheries
8	Hydrosphere: natural hazards Assessment: quiz with multiple-choice, multiple answer, true/false, calculated formula, fill in the blank, etc. Homework: a brief essay on flood hazards, human impact and climate change with at least two local/regional examples.	• Droughts, floods, hurricanes, climate change, global measurements
9	Atmosphere: atmospheric structure Assessment: quiz with multiple-choice, multiple answer, true/false, calculated formula, fill in the blank, etc. Homework: a brief essay on the role of atmospheric structure on climate change	• Space exploration, weather predictions, climate change, global measurements

Week	Topic	Societal Relation
10	Atmosphere: atmospheric chemistry Assessment: quiz with multiple-choice, multiple answer, true/false, calculated formula, fill in the blank, etc. Homework: a brief essay on the role of aerosols in human health and climate change; where data come from?	• Climate change (contributions to greenhouse gases), impact of volcanic eruptions, global measurements
11	Atmosphere: atmospheric processes and hazards Assessment: quiz with multiple-choice, multiple answer, true/false, calculated formula, fill in the blank, etc. Homework: a brief essay on jet streams and atmospheric rivers in weather predictions	• Hurricanes, tornadoes, jet streams, climate change, global measurements
12	Biosphere: origin and evolution Assessment: quiz with multiple-choice, multiple answer, true/false, calculated formula, fill in the blank, etc. Homework: a brief essay on biologic evolution in connection with modifications in lithosphere, hydrosphere and atmosphere for the past 4.5 billion years	• Extinctions, bio and natural hazards, global measurements
13	Biosphere: structure and elements Assessment: quiz with multiple-choice, multiple answer, true/false, calculated formula, fill in the blank, etc. Homework: a brief essay on global measurements of the biosphere elements by NASA.	• Landcover, land use, population, biomes, global measurements
14	Biosphere: interaction with hydrosphere, atmosphere and litosphere Assessment: quiz with multiple-choice, multiple answer, true/false, calculated formula, fill in the blank, etc. Homework: a brief essay on relationship between globalization and environmental degradation.	• Natural hazards, climate change, globalization, politics and environmental conservation/degradation, geoengineering

* **global measurements:** NASA observation systems (including collaborative projects with European Space Agency and other international partners)

Weekly Quizzes

Weekly quizzes will be conducted at the beginning of each class for 15-20 minutes. They will cover material learned in previous lecture in a series of multiple-choice, multiple answer, true/false, calculated formula, fill in the blank, etc.

Weekly Homework Assignments

Homework assignments consist of a specific problem solving, paper/data review or analysis that students can work on during the week between classes and submit as a short essay, graph, diagram or map.

Term paper (optional)

Term paper should highlight research on one of the topics that we covered in class. It should include literature review, a hypothesis and analytical part with methodology, data analysis, discussion and conclusions.

Grading

Weekly Quizzes: 50%
Weekly Homework Assignments: 35%
Term Paper (optional, extra credit): + 15%
Attendance and Participation: 15%