Department of Geosciences
Core Class Assessment 2017-2018
Part 2: Earth Science

There are two core lecture classes with accompanying labs in the Geology division of the Department of Geosciences. Both fulfill science core requirements in Fulbright College.

General Geology is a 1000-level survey course that is designed to familiarize students with the basic principles of physical geology. Earth Science is a 1000-level course that builds on the basic principles covered in General Geology and focuses on the interactions of the atmosphere, hydrosphere, and geosphere and the interactions between humans and the environment.

The class goals are laid out in the syllabi and learning outcomes are assessed through a pre-test, post-test assessment system. Only the aggregate statistics are used in the assessment.

GEOS 1133: Earth Science

Course Description and Goals: Earth Science is the study of the dynamic earth system, particularly the atmospheric, hydrospheric, and lithospheric systems that govern the environment at the surface of the earth. Following the agricultural revolution, humanity has emerged as a potent force for environmental change. This course will emphasize the cumulative human impact on environmental change. This course will emphasize the cumulative human impact on environmental processes, including the energy balance of earth, surface and groundwater systems, natural resources, and landscape change. We will also examine the societal impact of natural processes such as earthquakes, floods, and extreme weather, and how anthropogenic environmental change may be aggravating the effects of these natural phenomena. We will emphasize the positive, and explore rational solutions and adaptations.

The key learning objectives of this course will be to develop a better understanding of:

1. geochemical hazards to human health
2. physical hazards in the geological environment and the spatial distribution of human populations
3. factors that govern modern water supply and distribution
4. the relationship between water quality, human health, and natural ecosystem function
5. physical meteorology and climatology
6. the causes and consequences of global environmental change

The questions are appended at the end of this report.

GEOS 1133 Most Recent Assessment Results

The questions are appended to the end of this report.

Data for responses to individual questions are available for the fall 2017 class. The overall class mean score from the most recent results for the pre-test was 46%, while the class mean score for the post-test was 82%, demonstrating a marked overall improvement.
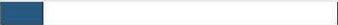
GEOS1133 Earth Science – Core Assessment Test

MULTIPLE CHOICE: Carefully read each question and all possible answers and choose the best answer.

1. A potent neurotoxin that can cause blindness, kidney disease, hypertension, stroke, heart disease, and death:
   a. hard water   b. radon   c. asbestos   d. lead

2. The so-called "Cold Tongue" is located in the
   a. eastern equatorial Pacific
   b. western equatorial Pacific
   c. subpolar North Atlantic

3. A sound scientific hypothesis is:
   a. the prevailing opinion of informed experts
   b. an explanation that has been approved by the National Academy of Science
   c. a proposed explanation that includes predictions that can be observed and tested.

4. The hydrologic cycle is a static, two dimensional, and largely a theoretical concept.
   a. True   b. False

5. What is hypoxia?
   a. flesh eating bacteria responsible for massive fish kills
   b. a harmful algae bloom responsible for red tide
   c. an epidemic disease in anadromous fish like salmon
   d. extremely low levels of dissolved oxygen in natural waters

6. Which nutrient is most harmful in freshwater ecosystems (i.e., may cause eutrophication if too abundant)?
   a. calcium   b. nitrogen   c. phosphorus

7. In the USA, which sector uses the most water?
   a. Residential   b. Industrial   c. Electrical power   d. Agricultural

8. Where is the depletion of the Ogallala or High Plains aquifer the greatest?
   a. Nebraska   b. South Dakota   c. Colorado   d. Texas

9. Almost 90% of the freshwater consumed in the United States each year comes from surface reservoirs and streams.
   a. True   b. False

10. Why do we have seasonal changes in climate here on Earth?
   a. The Earth's orbit around the Sun is oval-shaped and summer comes when we're closest, winter when we're farthest from the Sun
   b. Earth's rotation axis is not perpendicular to its orbital plane (the plane of the ecliptic)
   c. Earth rotates counter clockwise around the Sun
   d. Earth spins on its axis

11. What is the principal wavelength band of solar radiation transmitted to the surface of Earth?
   a infrared   b. visible   c. ultraviolet

12. What is the most important factor in the greenhouse effect?
   a. carbon dioxide (CO2)   b. methane   c. water vapor
   d. chloroflourocarbons (CFC's)   e. deforestation

13. What is the most important function of stratospheric ozone?
    a. traps longwave radiation that would otherwise escape to space
    b. forms clouds in the stratosphere
    c. has a high albedo and cools the earth
    d. blocks harmful ultraviolet radiation (UVB)

14. The declination of the sun varies throughout the year from
    a. 0ºN to 90ºN   b. 10ºN to 10ºS   c. 23.5ºN to 23.5ºS   d. 66.5ºN to 66.5ºS

15. Earth's major climate zones are classified primarily by
    a. temperature and precipitation
    b. cloud cover and wind systems
    c. lapse rate and the pressure gradient force

16. The movement of air (i.e., wind) is caused by
    a. differences in altitude
    b. changes in humidity
    c. gravity
    d. pressure changes

17. What is the Hadley Circulation?
    a. The paired convection cells in the lower atmosphere that straddle the equator
    b. the zonal (east-west) convection cell along the equator and over the Pacific Ocean
    c. the circulation pattern due to the gradient from the Azores high into the Icelandic low
    d. the meridional overturning of the deep ocean

18. What is the positive feedback mechanism involved in tropical cyclones?
    a. adiabatic heating in the central eye
    b. the latent heat of condensation
    c. a mesocyclone in the mid troposphere
    d. the jet stream

19. The global average temperature of earth has increased since 1900 by approximately
    a. 0.3ºC   b. 0.8ºC   c. 1.8ºC   d. 2.3ºC

20. What is the current human population of the world?
    a. 3.03 billion
    b. 5.03 billion
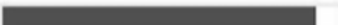   c. 7.03 billion
    d. 9.03 billion
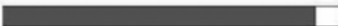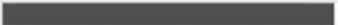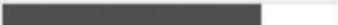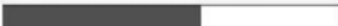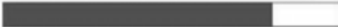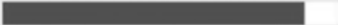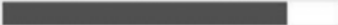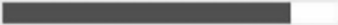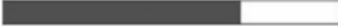
PRE-TEST
Test Item Statistics Report

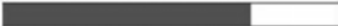| Question		Summary Statistics				Reliability		
Question	Points	Graded	Correct	Incorrect	Missing	Point Biserial	Percent Correct	
Question1	1	99	45	54	0	0.21	45.45	
Question2	1	99	13	86	0	0.05	13.13	
Question3	1	99	90	9	0	0.29	90.91	
Question4	1	99	68	31	0	0.41	68.69	
Question5	1	99	64	35	0	0.30	64.65	
Question6	1	99	47	52	0	0.08	47.47	
Question7	1	99	54	45	0	0.38	54.55	
Question8	1	99	20	79	0	0.43	20.20	
Question9	1	99	36	63	0	0.31	36.36	
Question10	1	99	24	75	0	0.42	24.24	
Question11	1	99	9	90	0	0.11	9.09	
Question12	1	99	8	91	0	-0.12	8.08	
Question13	1	99	68	31	0	0.46	68.69	
Question14	1	99	50	49	0	0.43	50.51	
Question15	1	99	83	16	0	0.43	83.84	
Question16	1	99	76	23	0	0.51	76.77	
Question17	1	99	20	79	0	0.10	20.20	
Question18	1	99	31	68	0	0.07	31.31	
Question19	1	99	25	74	0	0.17	25.25	
Question20	1	99	82	17	0	0.25	82.83	

46% CORRECT

POST-TEST

Test Item Statistics Report

Question		Summary Statistics				Reliability		
Question	Points	Graded	Correct	Incorrect	Missing	Point Biserial	Percent Correct	
Question1	1	94	90	4	0	0.24	95.74	
Question2	1	94	60	33	1	0.57	63.83	
Question3	1	94	93	1	0	0.02	98.94	
Question4	1	94	87	7	0	0.42	92.55	
Question5	1	94	87	7	0	0.42	92.55	
Question6	1	94	92	2	0	-0.08	97.87	
Question7	1	94	62	32	0	0.66	65.96	
Question8	1	94	72	22	0	0.56	76.60	
Question9	1	94	64	30	0	0.52	68.09	
Question10	1	94	71	23	0	0.42	75.53	
Question11	1	94	55	39	0	0.53	58.51	
Question12	1	94	85	9	0	0.35	90.43	
Question13	1	94	75	19	0	0.65	79.79	
Question14	1	94	84	10	0	0.27	89.36	
Question15	1	94	91	3	0	0.11	96.81	
Question16	1	94	79	15	0	0.46	84.04	
Question17	1	94	69	25	0	0.03	73.40	
Question18	1	94	80	14	0	0.41	85.11	
Question19	1	94	66	27	1	0.43	70.21	
Question20	1	94	87	7	0	0.36	92.55	

82% CORRECT