

## Review for Earth Science NC Final Exam

### Astronomy: EEn1.1

1. Explain the origin of Earth's motion based on the origin of the galaxy and its solar system.
2. What is Earth's role in the hierarchy of organization within the universe.
3. Describe the planetary orbits, especially that of Earth.
4. What are the relative motions of Earth in the solar system, the solar system in the galaxy, and the galaxy in the universe?
5. Define the following:
  - a. Precession
  - b. Nutation
  - c. Barycenter
6. What is the position of the Sun within our solar system? Is it stationary?
7. Describe daily changes due to rotation, seasonal changes due to the tilt and revolution of the Earth, and tidal impact due to the gravitational interaction between Earth and moon.
8. Explain the difference between nuclear fusion and nuclear fission reactions. Which is done on the stars?
9. Describe the shape of Earth.
10. Identify the forms of energy (electromagnetic waves) produced by the sun and tell how some are filtered by the atmosphere (X-rays, cosmic rays, etc.).
11. How does energy flow from the sun to Earth through space?
12. Explain how the tilt of Earth's axis results in seasons.
13. Explain the differential heating of Earth's surface (land vs water & different latitudes)
14. What process transforms solar energy into chemical energy?
15. Explain how Earth's magnetic field protects the planet from the harmful effects of radiation.

### The Lithosphere: EEn2.1

1. Draw the rock cycle in enough detail to relate the cycling of materials – formation & destruction of the three major rock types to the forces responsible: physical & chemical weathering, heat & pressure, deposition, & foliation. The forms of energy that drive the rock cycle include heat & mechanical energy.
2. Define the following mechanisms (mantle convection, ridge push, gravity pull) and explain how each drives movement of the lithospheric plates.
3. Infer the relationship between the type of plate boundary and the locations of various features such as ocean trenches, mountains ranges and mid-ocean ridges. (Relate to the development of the theory of plate tectonics & geologic time) **For each boundary (transform, divergent, and EACH of 3 variations of convergent):**
  - a. Define the action at each plate
  - b. Give the features formed
  - c. Name a specific location on Earth where this can be seen
4. Compare magma & lava. Locate volcanoes and relate back to plate boundaries. Explain volcanic effects on the lithosphere and relate back to plate boundaries (convergent, divergent, transform) including lahar (mud) flows and ash in the atmosphere.
  - a. Which plate boundaries produce volcanoes?
  - b. Where do volcanoes produce new crust?
  - c. Define lahar and tell which type of volcano create lahar.
5. Describe the anatomy of an earthquake. Locate earthquakes – epicenter & focal point – and relate to different types of plate boundaries. Explain how the release of energy of various types of earthquakes relates to magnitude, and P and S waves.
  - a. Create a sketch of an EQ that shows epicenter, focus & EQ waves
  - b. In terms of plate tectonics, where do most EQs occur?
6. Summarize the major events in the geologic history of NC and the southeastern United States. Explain how current geologic landforms developed such as Appalachian Mountains, fall zone, shorelines, barrier islands, valleys, river basins, etc. using the geologic time scale.
7. Explain how processes change sea-level over time – long & short term. Infer the effects on landforms such as shorelines and barrier islands.

8. Infer the locations of volcanoes, earthquakes and faults (strike-slip, reverse and normal) from soil, geologic and topographic map studies. (relate fault locations/types to plate boundaries)
  - a. Create a sketch for each type fault. Label the hanging wall & foot wall for each.
9. Recall that soil is the result of weathering of rocks and includes weathered particles: sand, silt, and clay.
  - a. How is soil created from rocks? (think of the horizons within the soil profile)
10. Explain differences in chemical and physical weathering . List and describe the factors that affect the RATE of weathering.
11. Name the four agents of erosion and describe the landforms that can be caused as a result of each.
12. Explain precautions that can be made to protect life from various geohazards and include meteorological hazards. Some examples include landslides, earthquakes, tsunamis, sinkholes, groundwater pollution and flooding.

### **Human Influences on the Lithosphere: EEn.2.2**

1. Explain the need for and consequences of various types of land use – such as urbanization, deforestation and agriculture.
2. Explain ways to *mitigate* (means to minimize the effect) detrimental human impacts on the lithosphere and maximize sustainable use of natural resources.
3. Explain the effects of human activity on shorelines, especially in development and artificial stabilization efforts.
4. Explain the effects of human activity on mountainsides, especially in development and artificial stabilization efforts.
5. Compare the methods of obtaining energy resources: harvesting (peat & wood), mining (coal and uranium), drilling (oil & natural gas) and the effect of these activities on the environment.

### **The Hydrosphere: EEn2.3**

1. Explain how the density of ocean water is affected by temperature and how this results in major ocean currents distributing heat away from the equator toward the poles.
2. Explain how the coastal climates are moderated by water in comparison to inland climates.
3. Create a diagram of the hydrologic cycle to explain the connection between groundwater and surface water, detailing how groundwater moves through the lithosphere. (emphasize the processes of evaporation, runoff and infiltration in the conceptual diagram of the water cycle)
4. Explain river systems including NC river basins, aquifers, and watersheds.
  - a. What is the difference between a river basin and a watershed?
  - b. How could a river basin also be related to an aquifer?
  - c. Provide a general description of the river basins in NC.
5. Explain how flood events might be affected by groundwater levels.

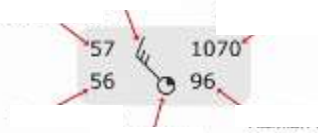
### **Human Influences on the Hydrosphere: EEn2.4**

1. Describe the use by humans of EACH of the following AND give the benefits/consequences for each (ex. wells, aquifer depletion, dams & dam removal, agriculture, recreation)
2. Explain consequences of aquifer depletion (be sure to also include subsidence and salt-water intrusion on the coast).
3. Evaluate the effects of population growth on drinking water resources. What are the implications for the future?
4. Describe how pollutants might flow through a watershed and affect inhabitants that share the same watershed.
5. Evaluate issues of ground and surface water pollution, wetland and estuary degradation, and salt water intrusion.
  - a. How could each occur?
  - b. Who is most likely to be affected by each?
  - c. List possible prevention methods.
6. Analyze how drinking water and wastewater treatment systems impact quantity and quality of potable (drinking) water.
  - a. What is the difference between these two operations?
7. Evaluate water quality of NC streams (chemical, physical properties, biotic index). How could this be done?
8. Give several examples of non-point source pollution and describe the effects on water quality for each.
9. List and describe several conservation measures to maximize quality and quantity of available freshwater resources.

## The Atmosphere: EEn2.5

- Summarize information about the layers of the atmosphere, temperature, chemical composition & interaction with radiant energy.
  - Name each layer and give the corresponding trend in temperature.
  - List two important facts about each layer.
- Describe the main types of air masses and explain what makes them move.
- Explain how interactions of air masses form frontal boundaries (types), clouds (types) and affect wind patterns.
  - List and explain each of the four types of fronts.
  - List and explain the major cloud types
- What are the precautions needed for severe cyclonic storms in order to preserve life and property?
- Explain factors that affect air density and understand their influence on winds, air masses, fronts, and storm systems.
- Interpret and analyze weather maps and relative humidity charts.

a.



b. dry bulb = 20°C  
wet bulb = 24°C  
relative humidity=?

Dry-Bulb Temp (°C)	Difference Between Wet-Bulb and Dry-Bulb Temperature (°C)															
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0	100	95	90	85	80	75	70	65	60	55	50	45	40	35	30	25
1	95	90	85	80	75	70	65	60	55	50	45	40	35	30	25	20
2	90	85	80	75	70	65	60	55	50	45	40	35	30	25	20	15
3	85	80	75	70	65	60	55	50	45	40	35	30	25	20	15	10
4	80	75	70	65	60	55	50	45	40	35	30	25	20	15	10	5
5	75	70	65	60	55	50	45	40	35	30	25	20	15	10	5	0
6	70	65	60	55	50	45	40	35	30	25	20	15	10	5	0	-5
7	65	60	55	50	45	40	35	30	25	20	15	10	5	0	-5	-10
8	60	55	50	45	40	35	30	25	20	15	10	5	0	-5	-10	-15
9	55	50	45	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20
10	50	45	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25
11	45	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30
12	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35
13	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40
14	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
15	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45	-50

- Define each of the following and specify the role water vapor plays on each
- How is acid rain formed? List and describe several human activities that can alter the pH of rain.
- How do each of the following human activities impact the quality of atmospheric composition? (aerosols, chlorofluorocarbons, burning, industrial byproducts, overfarming)
- Give examples of methods to mitigate (minimize the effects) human impacts on the atmosphere.

## Global Climate Change: EEn2.6

- Explain how major climate categories are determined. (Koppen climate classification system) What climate is NC?
- Explain the difference between weather and climate.
- Explain how each of these natural processes can affect global climate (particularly El Nino, La Nina, volcanic eruptions, sunspots, shifts in Earth's orbit and carbon dioxide fluctuations).
- Explain the concept of the greenhouse effect. Name at least 4 specific greenhouse gases and tell why CO<sub>2</sub> is most often the focus of public discussion.
- How does deforestation contribute to global climate change? AND How does the burning of fossil fuels (industrialization) contribute to global climate change?
- How does large-scale development contribute to regional changes in climate? (for ex. heat islands in large cities)
- What actions that can be taken by humans on a local level, as well as on a larger scale, to mitigate global climate change?
- How do changes in global temperatures affect the biosphere? Address EACH of the following: agriculture, species diversity, ecosystem balance.
- How do changes in atmospheric composition contribute to ocean acidification? Analyze its effect on ocean life and its connection to global climate change.
- How do changes in global temperature impact sea level?
- What Earth processes (other than global temperature) can affect sea level?

## How the Biosphere is Affected by the Lithosphere, Hydrosphere, & Atmosphere: EEn2.7

- List several biotic and abiotic factors determine biome classification (temperature, rainfall, altitude, type of plant, latitude, type of animals). Designate each as biotic/abiotic.
- List several biotic/abiotic factors that impact biodiversity AND describe the effect of each.
- Describe the major landforms and soil quality of each major biome.
- Define the biosphere.
- Explain biodiversity in a way that discusses genetic variation within populations, as well as variation of populations.
- What is the relationship between environmental conditions and the plants/animals that live within the various biomes?
- Explain the global impact of biodiversity loss.

8. Explain the effects of human population growth, habitat alteration, introduction of invasive species, pollution, and overharvesting on various plant/animal species in NC.
9. Explain effect of invasive nonnative species (plant/animal) on a NC ecosystem.
10. List and describe several ways to mitigate (minimize the effect) human impact on the biosphere.

### **Can Humans Live Sustainably on Earth? EEn2.8**

1. For EACH alternate energy source (solar, wind, biofuels, nuclear fission, fuel cells, wave power, geothermal) describe the benefits, costs and environmental impact.
2. Which of the above sources of alternative energy may work best in different parts of the state AND why?
3. Describe sustainable methods of agriculture/aquaculture. How do these compare with traditional farming methods?
4. Define carrying capacity. Give an example of this is an animal species. How does this term relate to humans?
5. What could be considered limiting factors to human population growth?
6. How does a growing population affect North Carolina's natural resources?
7. What is a personal ecological footprint? How could this term apply to a larger scale (for a country)
8. How do YOUR personal choices impact the availability of natural resources and environmental quality?
9. What is meant by each of the parts of "reduce, reuse, recycle"? What role do EACH of these play in sustainability?