**PACING ENVIRONMENTAL SCIENCE (4 Quarters)**

***Environmental Science I***

* + - * + **Focus Statement:** Environmental Science I students will analyze and interpret information regarding how living organisms interact with each other and their environment, the earth and its resources, the geography of different earth biomes and ecosystems, and the impact of humans on the environment and ecosystems. Students will also develop and use the scientific method to inventory, compare and evaluate local ecosystems.

The following is expected to be addressed throughout the course sequence:

**11.11.01** Understand and follow procedures relating to scientific investigations, including understanding the design and procedures used to test a hypothesis, organizing and analyzing data accurately and precisely, producing and interpreting data tables and graphs, performing appropriate calculations, applying basic statistical methods to the data, identifying appropriate conclusions, making predictions, and evaluating competing models.

**11.11.02** Distinguish among the following: observing, drawing a conclusion based on observation, forming a hypothesis, conducting an experiment, organizing data, comparing data.

**11.11.03** Identify possible sources of error in an experiment.

**11.11.04** Distinguish and define the following components of typical experiments: constants, variables, experimental group, control group (or control setup).

**11.11.05** Identify a technological design problem inherent in a given product.

**11.11.06** Out of different lists of criteria, select the list of criteria outlining a successful design solution to a given problem.

**11.11.07** Given test results on different models, choose the model which best solves the design problem.

**11.11.08** Given a description of a test to be performed on a model, select from a list of options what are the possible sources of error in conducting the test.

**1ST QUARTER**

COLLEGE READINESS SKILLS (ACT SCORES: 13-16)

**Interpretation of Data**

* Select a single piece of data (numerical or nonnumerical) from a simple data presentation (e.g., a table or graph with two or three variables; a food web diagram)
* Identify basic features of a table, graph, or diagram (e.g., headings, units of measurement, axis labels)

COLLEGE READINESS SKILLS (ACT SCORES: 16-19)

**Interpretation of Data**

* Select two pieces of data from a simple data presentation
* Find specific information in a brief body of text
* Determine how the value of one variable changes as the value of another variable changes in a simple data presentation.

**Scientific Investigation**

* Understand the methods and tools used in a simple experiment
* **S.ES:9 Site Analysis**

Students will analyze and compare physical, ecological and behavioral factors that influence interactions and interdependence of organisms. **(**12B.3a)

* S.ES:9-1 Illustrate and identify plants in the area studied.
* S.ES:9-2 Analyze different soils and compare the soil quality of different areas.
* S.ES:9-3 Analyze different water samples and assess the water quality.
* S.ES:9-4 Perform an animal diversity study and evaluate the diversity of the habitat studied.
* S.ES:9-5 Demonstrate the proper use of field skills in mapping and data collection.
* S.ES:9-6 Assess the abiotic factors that affect a habitat.
* S.ES:9-7 Identify and classify biotic and abiotic factors in an environment that affect organisms and placement of organisms in an food web.
* S.ES:9-8 Compare physical, ecological and behavioral factors that influence interactions and interdependence of organisms.
* S.ES:9-9 Analyze and explain biodiversity issues and its social and ecological impacts.

**S.ES:10 Water**

* Students will compare factors that influence water quality and recommend actions to restore a stream to health. (12B)
* S.ES:10-1 Compare biological, physical, and ecological factors that influence water quality.
* S.ES:10-2 Diagram the water cycle.
* S.ES:10-3 Identify characteristics of healthy streams.
* S.ES:10-4 Identify threats to a healthy stream.
* S.ES:10-5 Recommend actions to restore a stream to health.
* **S.ES:3 Geography of Earth’s Biomes**
  + - Students will classify the location and properties of the biomes of Earth. (12B)
    - S.ES:3-1 Describe the major characteristics of each biome, including weather, plant and animal life and resources.
    - S.ES:3-2 Identify the locations of the different biomes.

**2ND QUARTER**

COLLEGE READINESS SKILLS (ACT SCORES: 20-23)

**Interpretation of Data**

* Select data from a complex data presentation (e.g., a table or graph with more than three variables; a phase diagram)
* Compare or combine data from a simple data presentation (e.g., order or sum data from a table)
* Translate information into a table, graph, or diagram

**Scientific Investigation**

* Understand the methods and tools used in a moderately complex experiment
* Understand a simple experimental design
* Identify a control in an experiment
* Identify similarities and differences between experiments

**Evaluation of Models, Inferences, and Experimental Results**

* Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or a model
* Identify key issues or assumptions in a model
* **S.ES:1 Living Organism Interaction with Each Other and the Environment**
  + - Students will analyze information regarding organisms to determine the variety of interactions between them and their environment. (12B)
    - S.ES:1-1 Compile information regarding the lifestyles of living organisms in their environment.
    - S.ES:1-2 Identify the characteristics of the ecosystems of the Earth.
    - S.ES:1-3 Characterize the different relationships among living organisms.
    - S.ES:1-4 Describe the impact of different organisms on the environment.
* **S.ES:6** **Population**
  + - Students will evaluate population models and predict their effect upon the available resources. (12B)
    - S.ES:6-1 Illustrate and describe the relationship between predator and prey. And its relationship on populations.
    - S.ES:6-2 Identify and compare different regional human population models and their impact on resources.
    - S.ES:6-3 Organize and model trends that occur in a population.

S.ES:6-4 Demonstrate how predator and prey relationships affect populations.

* **Animals and their Behavior**
  + - Students will compare various animal behaviors. (12A, 12B)
    - S.ES:5-1 Categorize various types of animal relationships.
    - S.ES:5-2 Identify animal behaviors used in survival and evaluate their effectiveness.
    - S.ES:5-3 Diagram and describe the interrelationships of animals and their environment.
* **S.ES:8** **Endangered Species**
  + - Students will assess the historical impact and the environmental factors leading to an endangered species. (12B)
* S.ES:8-1 Illustrate the interrelationship of an animal and their changing habitat.
* S.ES:8-2 Identify factors that have lead to an endangered species.
* S.ES:8-3 Demonstrate an understanding of the issues that lead to a species becoming endangered

**3RD QUARTER**

COLLEGE READINESS SKILLS (ACT SCORES: 20-23)

**Interpretation of Data**

* Select data from a complex data presentation (e.g., a table or graph with more than three variables; a phase diagram)
* Compare or combine data from a simple data presentation (e.g., order or sum data from a table)
* Translate information into a table, graph, or diagram

**Scientific Investigation**

* Understand the methods and tools used in a moderately complex experiment
* Understand a simple experimental design
* Identify a control in an experiment
* Identify similarities and differences between experiments

**Evaluation of Models, Inferences, and Experimental Results**

* Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or a model
* Identify key issues or assumptions in a model
* **S.ES:2 Earth and Its Resources**
  + - Students will identify the natural resources on earth and suggest solutions to conserve renewable and nonrenewable resources. (12B)
    - S.ES:2-1 Compare renewable and nonrenewable resources.
    - S.ES:2-2 Describe the relationship of ecosystem changes and their impact on resources.
    - S.ES:2-3 Analyze the usage and conservation of various renewable and nonrenewable resources.
    - S.ES:2-4 Defend the use of different resources.
* **S.ES:12 Earth Science**
* Students will interpret features on maps and interpret data about the formation of Earth. (12B and 12E)
* S.ES:12-1 Interpret the following features using a topographic map and a symbol sheet: elevation, contour interval gradient, latitude-longitude, scale, and cultural features.
* S.ES:12-2 Describe the theory of plate tectonics and list five discoveries that support it.
* S.ES:12-3 Describe how the following movements affect plate boundaries: rifting, subduction, and translation.
* S.ES:12-4 Identify the three major types of volcanic eruptions and give examples of each: shield, cinder, and stratovolcanoes.
* S.ES:12-5 Define the following terms relating to vulcanism: pahoehoe, aa pyroclastic, cinder, volcanic bomb, pumice, block lava, pillow lava, parsitic cone, spatter cone, crater, caldera, and nuees ardente.
* S.ES:12-6 Given a diagram, identify the following intrusive features: batholite, laccolite, sill, dike and stock.

**4TH QUARTER**

COLLEGE READINESS SKILLS (ACT SCORES: 24-27)

**Interpretation of Data**

* Compare or combine data from two or more simple data presentations (e.g., categorize data from a table using a scale from another table)
* Compare or combine data from a complex data presentation
* Interpolate between data points in a table or graph
* Determine how the value of one variable changes as the value of another variable changes in a complex data presentation
* Identify and/or use a simple (e.g., linear) mathematical relationship between data
* Analyze given information when presented with new, simple information

**Scientific Investigation**

* Understand the methods and tools used in a complex experiment
* Understand a complex experimental design
* Predict the results of an additional trial or measurement in an experiment
* Determine the experimental conditions that would produce specified results

**Evaluation of Models, Inferences, and Experimental Results**

* Select a simple hypothesis, prediction, or conclusion that is supported by two or more data presentations or models
* Determine whether given information supports or contradicts a simple hypothesis or conclusion, and why
* Identify strengths and weaknesses in one or more models
* Identify similarities and differences between models
* Determine which model(s) is(are) supported or weakened by new information
* Select a data presentation or a model that supports or contradicts a hypothesis, prediction, or conclusion

* **S.ES:4 Impact of Urbanization on the Environment and Ecosystems**
  + - Students will illustrate the environmental and ecological changes on biomes as a result of urbanization. (12B)
    - S.ES:4-1 Illustrate the environmental changes of an area before and after urbanization.
    - S.ES:4-2 Illustrate ways to address the ecological changes in such areas.
    - S.ES:4-3 Defend the urbanization or preservation of an ecosystem.
* **S.ES:7 Conservation**
  + - Students will outline and assess current trends in conservation. (12B)
    - S.ES:7-1 Identify current trends in conservation.
    - S.ES:7-2 Assess the effects of conservation over time.
    - S.ES:7-3 Relate how conservation affects animals in their habitat.
* **S.ES:11 Conservation/Evaluation**
* Students will evaluate current trends in conservation and their effects on the environment. (12B)
* S.ES:11-1 Research and evaluate the current trends in conservation.
* S.ES:11-2 Assess the effect of conservation over time.
* S.ES:11-3 Identify characteristics of local biomes and their effect on the environment.
* S.ES:11-4 Demonstrate skills in site analysis and conservation.