



COPPELL ISD **SUBJECT** YEAR AT A GLANCE

SUBJECT: AP/IB ENVIRONMENTAL SCIENCE

GRADE 10-12

11 UNITS

Program Transfer Goals

- Ask questions, recognize and define problems, and propose solutions.
- Safely and ethically collect, analyze, and evaluate appropriate data.
- Utilize, create, and analyze models to understand the world.
- Make valid claims and informed decisions based on scientific evidence.
- Effectively communicate scientific reasoning to a target audience.

PACING

First Nine Weeks	Second Nine Weeks	Third Nine Weeks	Fourth Nine Weeks
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Unit 1 1 Week	Unit 2 2.5 Weeks	Unit 3 3 Weeks	Unit 4 4 Weeks	Unit 5 2 Weeks	Unit 6 2 Weeks	Unit 7 4 Weeks	Unit 8 3 Weeks	Unit 9 3 Weeks	Unit 10 2 Weeks	Unit 11 2.5 Weeks
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Assurances for a Guaranteed and Viable Curriculum [STANDARDIZED ACROSS ALL CONTENT AREAS]

Adherence to this scope and sequence affords every member of the learning community clarity on the knowledge and skills on which each learner should demonstrate proficiency. In order to deliver a guaranteed and viable curriculum, our team commits to and ensures the following understandings:

Shared Accountability: Responding to the Needs of All Learners

- High levels of learning for all students.
- The district and course formative assessments aligned to the standards for this course support educators and learners in monitoring academic achievement and leveraging interventions.

Shared Understanding: Curriculum Design

- The district curriculum design weaves together the elements of content, skills and assessments in order to adhere to curriculum design at the macro and micro level, ensuring vertical alignment.
- The district curriculum incorporates standards, scope and sequence, enduring understandings, essential questions, performance assessments, and recommended resources.

Interdependence: Curriculum Units

Members of the learning community utilize the curriculum units, plan collaboratively, and reflect on results for continuous improvement.

The district curriculum units may be found: <http://tinyurl.com/Coppell-Curriculum>

UNIT 1: Environmental Value Systems

TIMELINE: ONE WEEK-FIRST NINE WEEKS

Unit Summary: Learners explore how their views are influenced by outside sources of interactions with media, people, and the environment as well as how these interactions determine our decision making.

- **Transfer Goal:**

1. Evaluate environmental issues with respect to all scientific, political, social and economic factors in order to make informed decisions.
2. Effectively communicate for different purposes and varied audiences and using appropriate media.
3. Develop an open mind in regards to understanding viewpoints other than your own.

Students will know...

- Major Historical Events; Chernobyl, Three Mile Island, Love Canal, and personal background influence our worldview
- Categories of Environmental worldviews
 - Biocentric, ecocentric, anthropocentric

Students will be skilled at...

- Analysis of text for meaning
- Self-reflection
- Using Aurasma Studio for creation of aura's
- Communication through creation of videos using iPads

UNIT 2: SYSTEMS & MODELS

TIMELINE: TWO AND A HALF WEEKS- FIRST NINE WEEKS

Unit Summary: Learners will explore how scientists understand ecological processes and their functionality using a systems approach. This systems approach will be used to understand carbon cycling and the Nitrogen cycle.

- **Transfer Goal:**

1. Evaluate environmental issues with respect to all scientific, political, social and economic factors in order to make informed decisions.
2. Effectively communicate for different purposes and varied audiences and using appropriate media.
3. Develop an open mind in regards to understanding viewpoints other than your own.

Students will know...

- *A systems approach views the functionality of Earth systems as inputs, outputs, flows, transfers, and transformations.*
- *Photosynthesis and respiration play a significant role in the flow of energy in communities.*
- *Energy and matter in a system can be modelled using food chains, food webs and ecological pyramids.*
- *Ecosystems are linked together by energy and matter flows.*
- *The Sun's energy drives these flows, and eventually transformed into unusable forms of energy.*

Students will be skilled at...

- **Construct** a system diagram or a model from a given set of information.
- **Evaluate** the use of models as a tool in a given situation, for example, climate change predictions.

- **Construct** models of feeding relationships—such as food chains, food webs and ecological pyramids—from given data.
- **Explain** the transfer and transformation of energy as it flows through an ecosystem.
- **Analyse** the efficiency of energy transfers through a system.
- **Construct** system diagrams representing photosynthesis and respiration.
- **Explain** the relevance of the laws of thermodynamics to the flow of energy through ecosystems.
- **Analyse** quantitative models of flows of energy and matter.
- **Construct** a quantitative model of the flows of energy or matter for given data.
- **Analyse** the efficiency of energy transfers through a system.
- **Calculate** the values of both GPP and NPP from given data.
- **Calculate** the values of both GSP and NSP from given data.

UNIT 3: EARTH SYSTEMS

TIMELINE: THREE WEEKS- FIRST NINE WEEKS

Unit Summary: Learners explore how energy and matter flow in a system and how the interdependent processes of photosynthesis and respiration allow for the ecology of a system.

Transfer Goal:

1. Evaluate environmental issues with respect to all scientific, political, social and economic factors in order to make informed decisions.
2. Effectively communicate for different purposes and varied audiences and using appropriate media.
3. Develop an open mind in regards to understanding viewpoints other than your own.

Students will know...

- The interactions of species with their environment result in energy and nutrient flows.
- Photosynthesis and respiration play a significant role in the flow of energy in communities.
- The feeding relationships of species in a system can be modelled using food chains, food webs and ecological pyramids.
- Ecosystems are linked together by energy and matter flows.
- The Sun's energy drives these flows, and humans are impacting the flows of energy and matter both locally and globally.
- The soil system is a dynamic ecosystem that has inputs, outputs, storages and flows.
- The quality of soil influences the primary productivity of an area.

Students will be skilled at...

- **Construct** models of feeding relationships—such as food chains, food webs and ecological pyramids—from given data.
- **Explain** the transfer and transformation of energy as it flows through an ecosystem.
- **Analyse** the efficiency of energy transfers through a system.
- **Construct** system diagrams representing photosynthesis and respiration.
- **Explain** the relevance of the laws of thermodynamics to the flow of energy through ecosystems.
- **Analyse** quantitative models of flows of energy and matter.
- **Construct** a quantitative model of the flows of energy or matter for given data.
- **Analyse** the efficiency of energy transfers through a system.
- **Calculate** the values of both GPP and NPP from given data.
- **Calculate** the values of both GSP and NSP from given data.
- **Discuss** human impacts on energy flows, and on the carbon and nitrogen cycles.

- **Outline** the transfers, transformations, inputs, outputs, flows and storages within soil systems.
- **Explain** how soil can be viewed as an ecosystem.
- **Compare and contrast** the structure and properties of sand, clay and loam soils, with reference to a soil texture diagram, including their effect on primary productivity.

UNIT 4: WATER QUALITY

TIMELINE: FOUR WEEKS- FIRST & SECOND NINE WEEKS

Unit Summary: Learners explore the water system with respect to water pollution, water quality, and eutrophication.

- **Transfer Goal:**

1. Evaluate environmental issues with respect to all scientific, political, social and economic factors in order to make informed decisions.
2. Effectively communicate for different purposes and varied audiences and using appropriate media.
3. Develop an open mind in regards to understanding viewpoints other than your own.

Students will know...

- how to measure and identify changes in biotic and abiotic factors.
- how to evaluate the impacts of eutrophication.
- how to identify sources of pollution
- how to manage the pollution

Students will be skilled at...

- Using field equipment for collection of scientific data.
- Use data to predict future outcomes
- Collaborate effectively in large and small groups
- Use empirical evidence from quantitative and qualitative data to determine the state of the environment

UNIT 5: CLIMATE SCIENCE & BIOMES

TIMELINE: TWO WEEKS- SECOND NINE WEEKS

Unit Summary: Learners explore how various biomes develop as a result of the climate and the unique characteristics of each of these biomes.

- **Transfer Goal:**

1. Evaluate environmental issues with respect to all scientific, political, social and economic factors in order to make informed decisions.
2. Effectively communicate for different purposes and varied audiences and using appropriate media.
3. Develop an open mind in regards to understanding viewpoints other than your own.

Students will know...

- Weather is current conditions while Climate is long term patterns
- Climate is determined by temperature and precipitation
- Characteristics of biomes are determined by abiotic factors influenced by climate and location.

Students will be skilled at...

- Evaluating resources using the CRAAP method of evaluation.
- Curating resources using a web based tool
- Creating Infographics to share information

UNIT 6: BIODIVERSITY

TIMELINE: TWO WEEKS- SECOND NINE WEEKS

Unit Summary: Learners will explore how biodiversity is measured and how biodiversity changes over time.

Transfer Goal:

1. Evaluate environmental issues with respect to all scientific, political, social and economic factors in order to make informed decisions.
2. Effectively communicate for different purposes and varied audiences and using appropriate media.
3. Develop an open mind in regards to understanding viewpoints other than your own.

Students will know...

- Population size is affected by the following factors: resource/ habitat availability and species interactions.
- Distinguish between fundamental and realized niches
- Succession is change over time in an ecosystem
- The Lincoln Index allows us to estimate the population of motile organisms while the Simpson's Diversity Index measures the biodiversity of an ecosystem.

Students will be skilled at...

- Interpreting carrying capacity graphs
- Calculating Lincoln Index
- Calculating Simpson's Diversity Index
- Relate calculations to the population size, richness and, evenness of a species.

UNIT 7: CONSERVATION

TIMELINE: FOUR WEEKS- THIRD NINE WEEKS

Unit Summary: Learners explore different conservations efforts on a global and local scale to determine their effectiveness in a data driven project.

Transfer Goal:

1. Evaluate environmental issues with respect to all scientific, political, social and economic factors in order to make informed decisions.
2. Effectively communicate for different purposes and varied audiences and using appropriate media.
3. Develop an open mind in regards to understanding viewpoints other than your own.

Students will know...

- The theory of Evolution by Natural Selection provides evidence for the impact of human activity on biodiversity loss
- Habitat fragmentation as modeled by the Island Biogeography Theory (IBT) explains biodiversity loss
- IBT guides the process of designing protected areas

Students will be skilled at...

- Reading text for understanding
- Communicating and discussing understanding from readings in a group
- Distinguish between extinct, endangered, and rebound species.
- Using data to visualize patterns by creating maps in ArcGIS
- Using databases for research and data collection

UNIT 8: HUMAN POPULATION

TIMELINE: THREE WEEKS- THIRD NINE WEEKS

Unit Summary: Learners explore how the size and functionality of the human populations impacts the surrounding environment as well as the implications of current models of human population growth.

Transfer Goal:

1. Evaluate environmental issues with respect to all scientific, political, social and economic factors in order to make informed decisions.
2. Effectively communicate for different purposes and varied audiences and using appropriate media.
3. Develop an open mind in regards to understanding viewpoints other than your own.

Students will know...

- The EF model accounts for the resources and waste generated by an individual
- Survivorship curves differentiate the reproductive advantages of different species
- Age/sex diagrams and demographic transition models predict population dynamics
- Social, political, economic, and ecological solutions can be employed to address global environmental issues

Students will be skilled at...

- **Calculate** values of CBR, CDR, TFR, DT and NIR.
- **Explain** the relative values of CBR, CDR, TFR, DT and NIR.
- **Analyse** age–gender pyramids and diagrams showing demographic transition models.
- **Discuss** the use of models in predicting the growth of human populations.
- **Explain** the nature and implications of growth in human populations.
- **Analyse** the impact that national and international development policies can have on human population dynamics and growth.
- **Discuss** the cultural, historical, religious, social, political and economic factors that influence human population dynamics.
- **Evaluate** the application of carrying capacity to local and global human populations.
- **Compare and contrast** the differences in the EF of two countries.
- **Evaluate** how EVSs impact the EFs of individuals or populations.

UNIT 9: Human Systems & Resource Use

TIMELINE: 3 WEEKS- 3RD NINE WEEKS

Unit Summary: Learners will explore how natural capital is used within human systems and the impact it can have on ecosystems.

Transfer Goal:

1. Evaluate environmental issues with respect to all scientific, political, social and economic factors in order to make informed decisions.
2. Effectively communicate for different purposes and varied audiences and using appropriate media.
3. Develop an open mind in regards to understanding viewpoints other than your own.

Students will know...

- Renewable and non-renewable natural capital can be degraded such that the time required to replace the resource is infinite.
- Ecosystems services provide the natural capital for human systems.
- Politics, economics, and sociocultural factors can be modified so that outputs from the waste management system can reduce SDW.

Students will be skilled at...

- **Outline** an example of how renewable and non-renewable natural capital has been mismanaged.
- **Explain** the dynamic nature of the concept of natural capital.
- **Evaluate** SDW disposal options.
- **Compare and contrast** pollution management strategies for SDW.
- **Evaluate**, with reference to figure 3, pollution management strategies for SDW by considering recycling, incineration, composting and landfills.

UNIT 10: AIR POLLUTION

TIMELINE: 2 WEEKS- 4TH NINE WEEKS

Unit Summary: Learners will explore how air pollution is created and understand how management strategies can reduce the impact of air pollutants.

Transfer Goal:

1. Evaluate environmental issues with respect to all scientific, political, social and economic factors in order to make informed decisions.
2. Effectively communicate for different purposes and varied audiences and using appropriate media.
3. Develop an open mind in regards to understanding viewpoints other than your own.

Students will know...

- Greenhouse Effect regulates the temperature of Earth
- Air pollution causes ozone depletion, photochemical smog, and acid deposition.
- Air pollution management strategies are often long-term global agreements, i.e. Montreal Protocol.

Students will be skilled at...

- **Outline** the role of the greenhouse effect in regulating temperature on Earth.
- **Evaluate** the role of national and international organizations in reducing the emissions of ozone-depleting substances.
- **Evaluate** pollution management strategies for reducing photochemical smog.
- **Evaluate** pollution management strategies for acid deposition.

UNIT 11: Energy & Climate Change

TIMELINE: 2.5 WEEKS- 4TH NINE WEEKS

Unit Summary: Learners will explore a range of different energy sources and understand the impact of the use of these energy sources as it relates to climate change.

Transfer Goal:

1. Evaluate environmental issues with respect to all scientific, political, social and economic factors in order to make informed decisions.
2. Effectively communicate for different purposes and varied audiences and using appropriate media.
3. Develop an open mind in regards to understanding viewpoints other than your own.

Students will know...

- There is a range of different energy sources available to societies that vary in their sustainability, availability, cost and sociopolitical implications.
- The choice of energy sources is controversial and complex. Energy security is an important factor in making energy choices.
- Climate change has been a normal feature of the Earth's history, but human activity has contributed to recent changes.
- Climate change causes widespread and significant impacts on a global scale.
- Mitigation attempts to reduce the causes of climate change.
- Adaptation attempts to manage the impacts of climate change.

Students will be skilled at...

- **Evaluate** the advantages and disadvantages of different energy sources.
- **Discuss** the factors that affect the choice of energy sources adopted by different societies.
- **Discuss** the factors that affect energy security.
- **Evaluate** the energy strategy of a given society.
- **Discuss** the feedback mechanisms that would be associated with a change in mean global temperature.
- **Evaluate** contrasting viewpoints on the issue of climate change.
- **Discuss** mitigation and adaptation strategies to deal with impacts of climate change.
- **Evaluate** the effectiveness of international climate change talks.