

<b>Course Title:</b>	<b>Biology IB: ENVIRONMENTAL SCIENCE</b>
<b>Head of Department:</b>	Nadia Iskandarani
<b>Teacher(s) + e-mail:</b>	Ms.NOOR MUTI
<b>Cycle/Division:</b>	High School
<b>Grade Level:</b>	Grade 10
<b>Credit Unit:</b>	1
<b>Duration:</b>	2 semesters / 5 periods per week

<b>Department's Vision:</b>	Create Innovators who can link to life, with scientific understanding and learning.
<b>Department's Mission:</b>	Provide students with the proper knowledge, skills and scientific principles through hands on activities, research and experimentations, and thus creating young innovators who are ready for real life challenges and problem solving.

**COURSE DESCRIPTION:**

This course introduces the atmosphere properties and interactions, water cycle, weather and climate, interactions of organisms, environmental issues and solutions, renewable and nonrenewable resources, and fossil fuels. The laboratory work is based on research and application with a term lab theoretical and practical assessment.

**General Skills:**

**Evaluation skills:** making judgment about knowledge by introducing new text to solve and tackle problems using the related knowledge taught.

**Comprehension:** given scientific text or diagrams to analyze and answer questions about, summarize, compare, relate, or experiment...

**Communication and social skills:** Making movies, ppt., projects, interviews, and presenting the work either individually or with a peer or as a group.

**Investigative skills:** lab work, research, journals, experimentation...

**Mathematical** skills: related to investigations in the lab and application in projects.

**Technological** skills used in science and computer labs.

**Knowledge** skills: list, define, show, demonstrate, invent, relate etc... using the taught concepts..

***GENERAL COURSE LEARNING OBJECTIVES:***

1. Define environmental science and compare environmental science with ecology.
2. List the five major fields of study that contributes to environmental science.
3. Distinguish between renewable and non-renewable resources.
4. Classify environmental problems into three major categories.
5. Describe the composition and structure of earth.
6. Describe earth's tectonic plates.
7. Explain the main cause of earthquakes and their effects.
8. Identify the relationship between volcanic eruption and climate change.
9. Describe the composition of the Earth's atmosphere.
10. 6. Describe the layers of the Earth's atmosphere.
11. 7. Explain three mechanisms of heat transfer in the Earth's atmosphere.
12. 8. Explain the greenhouse effect.
13. Name three major processes in the water cycle.
14. Describe the properties of ocean water.
15. Describe two types of ocean currents
16. Explain how the ocean regulates Earth's temperature.
17. Discuss the factors that confine life to the biosphere.
18. Explain the difference between open and closed systems.
19. Distinguish between biotic and abiotic factors in an ecosystem.
20. Describe how population differs from species.
21. Explain how habitats are important for organisms.
22. Name the three domains and the four kingdoms of organism and list characteristics of each.
23. Explain the importance of bacteria and fungi in the environment.
24. Describe the role of protists in the ocean environment.
25. Describe how organisms interact and depend on each other for survival.
26. Describe how energy is transferred from the sun to producers and then consumers.
27. Describe one way in which consumers depend on producers.
28. Identify two types of consumers.
29. Explain how energy transfer in a food web is more complex than energy transfer in a food chain.
30. Explain why an energy pyramid is a representation of topographic levels.
31. Describe the short term and long term process of the carbon cycle.
32. Identify one way that humans are affecting the carbon cycle.
33. List the three stages of nitrogen cycle.
34. Describe the role that nitrogen- fixing bacteria play in the nitrogen cycle.
35. Explain how the excess use of fertilizer can affect the nitrogen and phosphorus cycle.
36. List two types of ecological succession.
37. Explain how the pioneer species contributes to ecological succession.

38. Explain what happens during old-field succession.
39. Describe the three main properties of a population.
40. Describe exponential population growth.
41. Describe how the reproductive behavior of individuals can affect the growth rate of their population.
42. Explain how population sizes in nature are regulated.
43. Explain the difference between niche and habitat.
44. Give examples of parts of a niche.
45. Describe the five major types of interactions between species.
46. Explain the difference between parasitism and predation.
47. Explain how symbiotic relationships may evolve.
48. Describe how the size and the growth rate of the human population has changed in the last 200 years.
49. Define four properties that scientists use to predict population sizes.
50. Make predictions about population trends based on age structure.
51. Describe the four stages of demographic transition.
52. Explain why different countries may be at different stages of demographic transition.
53. Describe three problems caused by rapid human population growth.
54. Compare population growth problems in more developed countries and less- developed countries.
55. Analyze strategies countries may use to reduce their population growth.
56. Describe worldwide population projections into the next century.
57. Describe the diversity of species on Earth, and relate the difference between known numbers and estimated numbers of species.
58. List and describe three levels of biodiversity.
59. Explain four ways in which biodiversity is important to ecosystems and humans.
60. Analyze the potential value of a single species.
61. Define and give examples of endangered and threatened species.
62. List and describe four types of efforts to save individual species.
63. Explain the advantages of protecting entire ecosystems rather than individual species.
64. Explain the difference between weather and climate.
65. Identify four factors that determine climate.
66. Explain why different parts of earth have different climates.
67. Explain what cause the seasons.
68. Explain why earth's atmosphere is like the glass in a greenhouse.
69. Explain why the carbon dioxide content of the atmosphere is increasing.
70. Identify one possible explanation for the increase in average global temperature.
71. Describe what a warmer earth might be like.
72. List the factors that influence the value of a fuel.
73. Explain how fuels are used to generate electricity in an electric power plant.
74. Compare the advantages and disadvantages of fossil-fuel use.
75. Describe nuclear fission
76. Describe how a nuclear power plant works.
77. List three advantages and three disadvantages of nuclear energy.



78. List six forms of renewable energy, and compare their advantages and disadvantages.
79. Describe the current state of wind energy and technology.
80. Describe three alternative energy technologies.
81. Identify two ways that hydrogen be used as a fuel source in the future.
82. Identify three ways that you can conserve energy in your daily life.
83. List five pollutants, their source, and their possible effects on human health.
84. Explain how scientists use toxicology and epidemiology.
85. 73.. Explain how pollution can come from both natural resources and human activities.
86. Describe the relationship between waste, pollution, and human health.
75. Describe some of the challenges to achieving sustainability.
76. Describe several agreements relating to the environment.
77. Explain how economics and environmental science are related.
78. Compare two ways that governments influence economics.
79. Give an example of a private effort to address environmental problems.
80. Describe two major developments in U.S. environmental history.
81. Give examples of three federal agencies that have environmental responsibilities.
82. Explain the purpose of Environmental Impact Statements
83. Give an example of citizens can affect environmental policy at each level of government local , state and national.
84. Evaluate the media as a source of information about the environment.
85. Identify ways which the choice that you make as an individual may affect the environment.

### **STANDARDS/BENCHMARKS:**

- HS-ESS2-2 Analyze geoscience data to make the claim that one change to Earth's surface can create feedbacks that cause changes to other Earth systems.
- HS-ESS2-5 Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes. \*\*
- HS-ESS2-6 Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere.
- HS-ESS2-7 Construct an argument based on evidence about the simultaneous coevolution of Earth's systems and life on Earth.
- Weather and Climate
- HS-ESS2-4 Use a model to describe how variations in the flow of energy into and out of Earth's systems result in changes in climate.
- HS-ESS3-5 Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth systems. \*\*



Human Sustainability (continued)

HS-ESS3-2 Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios. \* \*\*

HS-ESS3-3 Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity. \*\*

HS-ESS3-4 Evaluate or refine a technological solution that reduces impacts of human activities on natural systems. \*

HS-ESS3-6 Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity.

**RESOURCES:**

HOLT Environmental Biology book and online resources  
One Stop Planner, Linked Lesson presentations, Extended Visual Labs  
You Tube movies  
E-games and links  
Teacher's Extended Handouts  
Lab Handouts

**COURSE OUTLINE:**

**Chapter 1 Science and the Environment.**

Section 1: Understanding Our Environment.

**Chapter 3: The Dynamic Earth**

Section 1: The Geosphere.

Section 2: The Atmosphere.

Section 3: The Hydrosphere and the Biosphere.

**Chapter 4: The Organization of Life**

Section 1: Ecosystems: Everything is connected.



Section 3: The diversity of Living Things.

**Chapter 5: How Ecosystems Work**

Section 1: Energy Flow in Ecosystems.

Section 2: The Cycling of Matter.

Section 4: How Ecosystems Change.

**Chapter 8: Understanding Populations**

Section 1: How Populations Change in Size.

Section 2: How Species Interact with Each Other.

**Chapter 9: The Human Population**

Section 1: Studying Human Population

Section 2: Changing Population Trends.

**Chapter 10: Biodiversity**

Section 1: What is Biodiversity?

Section 2: Biodiversity at Risk.

Section 3: The Future of Biodiversity.

**Chapter 13: Atmosphere and climate change.**

Section 1: Climate

Section 3: Climate change

**Chapter 17: Non renewable Energy**

Section 1: Energy Resources and Fossil Fuels

Section 2: Nuclear Energy.

**Chapter 18: Renewable Energy**

Section 1: Renewable Energy Today

Section 2: Developing Energy Technologies.

**Chapter 20: The Environment and Human Health**



Section 1: Pollution and Human Health.

**Chapter 21: Economics, Policy, and The Future**

Section 1: Economics and International Cooperation.

Section 2: Environmental Policies in the United States.

Section 3: The Importance of the Individual.

**GRADING:**

**1. Quizzes /tests** are given every other week as assigned by school. **Our tests and assessments** consist of multiple-choice, short answer, direct application problems, critical thinking situations, refer to figures, texts, graphs and/or open response items. They are aligned with Michigan benchmarks. A student failing any of his quizzes would have to sit for a **support class and retest** to achieve his 60% which is our passing mark. **A progress report is sent to the parent eventually after sitting for the make up exam.** 40 % is given to students that do not have a medical excuse for missing such an assessment.

**2.Skill Based Assignments** are done in class where a student has his resources all opened in front of him to answer a set of questions under verbal, nonverbal, quantitative, and spatial domains.

**3. Research Sessions** are done where students can debate as groups and check the internet for resources and answers to support their ideas. This kind of assessment is under **Research /Project/ Lab Sessions /Journals**. They are evaluated to info, creativity, presentation, discussion and relation to the subject.

**4.Daily assessments and drop quizzes** take place to check the understanding of students.

**5. Laboratory work** is checked for research, completeness, accuracy, understanding the experiment, group and individual reports and attendance with the lab coats. Every semester has one term practical assessment.

**7. Projects** are integrated across and assigned for every term. They are evaluated to accuracy, creativity, info and relation to the subject.



### Grade Distribution:

<b>SCIENCE DEPARTMENT GRADE DISTRIBUTION</b>	
<b>HIGH SCHOOL</b>	
<b>End of semester assessment</b>	<b>30%</b>
<b>Quizzes</b>	<b>30%</b>
<b>Skill based Assessment</b>	<b>5%</b>
<b>Project</b>	<b>10%</b>
<b>Research/Journal</b>	<b>5%</b>
<b>Labs</b>	<b>10%</b>
<b>MAP</b>	<b>5%</b>
<b>Drop Quizzes</b>	<b>5%</b>

#### **Cross-Curricular Project(s):**

- Once per semester across disciplines.