# Environmental Science Course No. 03003 Credit: 1.0

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| --- | --- | --- | --- |
| **Student name:** |  | **Graduation Date:** |  |

Pathways and CIP Codes:Biochemistry Pathway (14.1401)

Course Description: **Introductory Level:** Environmental Science courses examine the mutual relationships between organisms and their environment. In studying the interrelationships among plants, animals, and humans, these courses usually cover the following subjects: photosynthesis, recycling and regeneration, ecosystems, population and growth studies, pollution, and conservation of natural resources.

Directions:The following competencies are required for full approval of this course. Check the appropriate number to indicate the level of competency reached for learner evaluation.

**RATING SCALE:**

4. Exemplary Achievement: Student possesses outstanding knowledge, skills or professional attitude.

3. Proficient Achievement:Student demonstrates good knowledge, skills or professional attitude. Requires limited supervision.

2. Limited Achievement:Student demonstrates fragmented knowledge, skills or professional attitude. Requires close supervision.

1. Inadequate Achievement:Student lacks knowledge, skills or professional attitude.

0. No Instruction/Training:Student has not received instruction or training in this area.

## Benchmark 1: Click or tap here to enter text.

### Competencies

| **#** | **DESCRIPTION** | **RATING** |
| --- | --- | --- |
| 1.1 | Define environmental problems facing the world (i.e., Overpopulation, pollution, resource depletion). |  |
| 1.2 | Identify the components of an ecosystem. |  |
| 1.3 | Explains food relationships (i.e., food web, trophic levels, biomass pyramid). |  |
| 1.4 | Explains the relationship between energy and nutrients (e.g. energy flow, nutrient cycling) |  |
| 1.5 | Explains interspecies relationships (e.g., parasitism, predator-prey, commensalism, mutualism, competition, herbivory). |  |
| 1.6 | Comprehends population dynamics (e.g., population size (N), population density, population growth, carrying capacity, biotic potential, environmental resistance). |  |

## Benchmark 2: Water cycle

### Competencies

| **#** | **DESCRIPTION** | **RATING** |
| --- | --- | --- |
| 2.1 | Outlines the water treatment process (i.e., aeration, sedimentation, filtration, disinfection). |  |
| 2.2 | Performs water testing activities (e.g., hardness, turbidity, coliform, pH, minerals). |  |
| 2.3 | Paraphrases EPA water quality standards. |  |

## Benchmark 3: Human Impact on the Environment

### Competencies

| **#** | **DESCRIPTION** | **RATING** |
| --- | --- | --- |
| 3.1 | Outlines human population growth characteristics (e.g., pattern over history, recent explosion, changes in birth and death rates). |  |
| 3.2 | Explains the importance of population demographics (e.g., population size, density, total fertility rate). |  |
| 3.3 | Predicts the environmental consequences of population explosion in developing countries. |  |
| 3.4 | Summarizes how changes in food production has affected population growth (i.e., Early agriculture, 1st Agricultural Revolution, 2nd Agricultural Revolution, Hybrid crops and the Green Revolution, Polyculture to Monoculture, Factory Farms). |  |
| 3.5 | Predicts impact of soil degradation on human population (e.g., physical degradation: erosion, soil compaction; chemical degradation: salinization, nutrient depletion, over fertilization, pesticides.). |  |
| 3.6 | Predicts what sustainable agriculture might look like (wind breaks, filter strips, contour plowing, crop rotation, cover crops and crop residues, trickle-drip irrigation, organic farming). |  |

## Benchmark 4: Importance of water

### Competencies

| **#** | **DESCRIPTION** | **RATING** |
| --- | --- | --- |
| 4.1 | Explain basic water chemistry. |  |
| 4.2 | Identify sources of water. |  |
| 4.3 | Diagram the water cycle. |  |
| 4.4 | Summarizes uses of water. |  |
| 4.5 | Recognizes water pollution. |  |
| 4.6 | Major types of pollutants- pathogens, inorganic chemicals, organic chemicals, radioactive materials. |  |
| 4.7 | Pollutants that cause ecosystem disruption- sediments, plant nutrients, oxygen demanding wastes, thermal. |  |
| 4.8 | Outlines drinking water treatment processes. |  |
| 4.9 | Explains laws related to drinking water (i.e., Safe Drinking Water Act, Clean Water Act). |  |
| 4.10 | Soil |  |
| 4.11 | Describes soil properties (i.e., permeability, capillary water, soil texture, pH). |  |

## Benchmark 5: Biodiversity

### Competencies

| **#** | **DESCRIPTION** | **RATING** |
| --- | --- | --- |
| 5.1 | Recalls definitions for changes in wildlife status (i.e., endangered, threatened, extirpation). |  |
| 5.2 | Analyzes causes of extinction. |  |
| 5.3 | Identifies the importance of terms used to describe habitat fragmentation and edges (e.g., area, perimeter, safe area, effect on interior vs. edge species). |  |
| 5.4 | Describes efforts to preserve biological diversity (e.g., Endangered Species Act, Convention on International Trade in Endangered Species (CITES), World Conservation Union, Hunting and Fishing Organizations, Zoos and Nature Preserves). |  |

## Benchmark 6: Biomes

### Competencies

| **#** | **DESCRIPTION** | **RATING** |
| --- | --- | --- |
| 6.1 | Defines climate and ecosystems terms (i.e., temperature, rainfall, climate graphs). |  |
| 6.2 | Illustrates a map of the world showing geographical distribution of ecosystems. |  |
| 6.3 | Recalls the relationship between elevation and ecosystems. |  |
| 6.4 | Labels the world biomes on a map (i.e., temperate forest, boreal forest, tropical rainforest, temperate rainforest, shrub-lands, and grasslands: prairies and savannas, tundra, desert. |  |

## Benchmark 7: Air resources

### Competencies

| **#** | **Description** | **RATING** |
| --- | --- | --- |
| 7.1 | Explains the parts of the atmosphere (i.e., troposphere, stratosphere, mesosphere, thermosphere). |  |
| 7.2 | Describes the effects of major air pollutants (e.g., suspended particulate matter, volatile organic compounds, Nitrogen Oxides, Sulfur Dioxide, lead, ozone). |  |
| 7.3 | Explains the causes of stratospheric ozone depletion (e.g., UV radiation, CFC’s, Montreal Protocol). |  |
| 7.4 | Summarizes the Greenhouse effect and global climate change using appropriate terminology (e.g., greenhouse gases, changes in surface temperatures, changes in organism distribution, melting ice and rising sea levels, changing rainfall patterns, Kyoto Protocol). |  |

## Benchmark 8: energy

### Competencies

| **#** | **Description** | **RATING** |
| --- | --- | --- |
| 8.1 | Identifies energy resources (i.e., fossil fuels, ways to generate electricity (coal, nuclear, hydropower, wind), renewable vs. Nonrenewable). |  |
| 8.2 | Explains forms of energy consumption (e.g., personal uses of energy, changes in energy use over time). |  |
| 8.3 | Defines energy reserves (e.g., proven vs. Potential, technologically and economically feasible, conventional and nonconventional). |  |
| 8.4 | Outlines causes of pollution caused by searches for energy (i.e., strip mining, deep mining, mountain top removal/valley fills, habitat destruction). |  |
| 8.5 | Predicts the impact of future sources of energy on the environment (e.g., Geo-engineering, Alternatives: nuclear, hydropower, solar, wind, hydrogen fuel cells, bio-fuels, thermal conversion, anaerobic digester “cow power”). |  |

## Benchmark 9: Hazardus substances

### Competencies

| **#** | **Description** | **Rating** |
| --- | --- | --- |
| 9.1 | Gives an example of the Estrogen Effect. |  |
| 9.2 | Defines Hazardous Materials (HAZMAT). |  |
| 9.3 | Gives an example of HAZMAT “accidents” (e.g., Bhopal, India, Love Canal). |  |
| 9.4 | Recognizes significant legislation regulations (e.g., Superfund (CERCLA), Emergency Planning and Community Right-to-Know Act (EPCRA), Resource Conservation and Recovery Act (RCRA)). |  |
| 9.5 | Explains several methods of disposal of HAZMAT (e.g., deep well injection, surface impoundment, landfill, incineration, bioremediation, chemical neutralization, source reduction). |  |

I certify that the student has received training in the areas indicated.

Instructor Signature:

For more information, contact:

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