Standard ID	Standard Text	Edgenuity Lesson Name
§112.37.	Environmental Systems, Beginning with School Year 2010-2011 (One Credit).	
(a).	General requirements. Students shall be awarded one credit for successful completion of this course. Suggested prerequisite: one unit high school life science and one unit of high school physical science. This course is recommended for students in Grade 11 or 12.	
(b).	Introduction.	
(1).	Environmental Systems. In Environmental Systems, students conduct laboratory and field investigations, use scientific methods during investigations, and make informed decisions using critical thinking and scientific problem solving. Students study a variety of topics that include: biotic and abiotic factors in habitats, ecosystems and biomes, interrelationships among resources and an environmental system, sources and flow of energy through an environmental system, relationship between carrying capacity and changes in populations and ecosystems, and changes in environments.	
(2).	Nature of science. Science, as defined by the National Academy of Sciences, is the "use of evidence to construct testable explanations and predictions of natural phenomena, as well as the knowledge generated through this process." This vast body of changing and increasing knowledge is described by physical, mathematical, and conceptual models. Students should know that some questions are outside the realm of science because they deal with phenomena that are not scientifically testable.	
(3).	Scientific inquiry. Scientific inquiry is the planned and deliberate investigation of the natural world. Scientific methods of investigation can be experimental, descriptive, or comparative. The method chosen should be appropriate to the question being asked.	
(4).	Science and social ethics. Scientific decision making is a way of answering questions about the natural world. Students should be able to distinguish between scientific decision-making methods and ethical and social decisions that involve the application of scientific information.	
(5).	Scientific systems. A system is a collection of cycles, structures, and processes that interact. All systems have basic properties that can be described in terms of space, time, energy, and matter. Change and constancy occur in systems as patterns and can be observed, measured, and modeled. These patterns help to make predictions that can be scientifically tested. Students should analyze a system in terms of its components and how these components relate to each other, to the whole, and to the external environment.	
(c).	Knowledge and skills.	
(1).	Scientific processes. The student, for at least 40% of instructional time, conducts hands-on laboratory and field investigations using safe, environmentally appropriate, and ethical practices. The student is expected to:	
(A).	demonstrate safe practices during laboratory and field investigations, including appropriate first aid responses to accidents that could occur in the field such as insect stings, animal bites, overheating, sprains, and breaks	Laboratory Safety

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(B).	demonstrate an understanding of the use and conservation of resources and the proper disposal or recycling of materials	Resource Conservation
(2).	Scientific processes. The student uses scientific methods during laboratory and field investigations. The student is expected to:	
(A).	know the definition of science and understand that it has limitations, as specified in subsection (b)(2) of this section	Scientific Inquiry
(B).	know that scientific hypotheses are tentative and testable statements that must be capable of being supported or not supported by observational evidence. Hypotheses of durable explanatory power which have been tested over a wide variety of conditions are incorporated into theories	Hypotheses, Theories, and Laws
(C).	know that scientific theories are based on natural and physical phenomena and are capable of being tested by multiple independent researchers. Unlike hypotheses, scientific theories are well-established and highly-reliable explanations, but may be subject to change as new areas of science and new technologies are developed	Hypotheses, Theories, and Laws
(D).	distinguish between scientific hypotheses and scientific theories	Hypotheses, Theories, and Laws
(E).	follow or plan and implement investigative procedures, including making observations, asking questions, formulating testable hypotheses, and selecting equipment and technology	Scientific Inquiry Hypotheses, Theories, and Laws Collecting and Organizing Data
(F).	collect data individually or collaboratively, make measurements with precision and accuracy, record values using appropriate units, and calculate statistically relevant quantities to describe data, including mean, median, and range	Collecting and Organizing Data
(G).	demonstrate the use of course apparatuses, equipment, techniques, and procedures, including meter sticks, rulers, pipettes, graduated cylinders, triple beam balances, timing devices, pH meters or probes, thermometers, calculators, computers, Internet access, turbidity testing devices, hand magnifiers, work and disposable gloves, compasses, first aid kits, binoculars, field guides, water quality test kits or probes, soil test kits or probes, 100-foot appraiser's tapes, tarps, shovels, trowels, screens, buckets, and rock and mineral samples	Laboratory Safety

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(H).	use a wide variety of additional course apparatuses, equipment, techniques, materials, and procedures as appropriate such as air quality testing devices, cameras, flow meters, Global Positioning System (GPS) units, Geographic Information System (GIS) software, computer models, densiometers, clinometers, and field journals	The Water We Use
(I).	organize, analyze, evaluate, build models, make inferences, and predict trends from data	Collecting and Organizing Data Analyzing Data and Drawing Conclusions
(J).	perform calculations using dimensional analysis, significant digits, and scientific notation	Analyzing Data and Drawing Conclusions
(K).	communicate valid conclusions supported by the data through methods such as lab reports, labeled drawings, graphic organizers, journals, summaries, oral reports, and technology-based reports	Analyzing Data and Drawing Conclusions Science-Based Communication
(3).	Scientific processes. The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions within and outside the classroom. The student is expected to:	
(A).	in all fields of science, analyze, evaluate, and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing, including examining all sides of scientific evidence of those scientific explanations, so as to encourage critical thinking by the student	Assessing Claims and Evidence
(B).	communicate and apply scientific information extracted from various sources such as current events, news reports, published journal articles, and marketing materials	Assessing Claims and Evidence
(C).	draw inferences based on data related to promotional materials for products and services	Assessing Claims and Evidence
(D).	evaluate the impact of research on scientific thought, society, and the environment	Science and Society
(E).	describe the connection between environmental science and future careers	Careers in Environmental Science
(F).	research and describe the history of environmental science and contributions of scientists	A History of Global Climate Change Informed Policy Impact of Policy Milestones and Turning Points

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(4).	Science concepts. The student knows the relationships of biotic and abiotic factors within habitats, ecosystems, and biomes. The student is expected to:	
(A).	identify native plants and animals using a dichotomous key	Identifying Unknown Organisms
(B).	assess the role of native plants and animals within a local ecosystem and compare them to plants and animals in ecosystems within four other biomes	Ecology 101 Desert and Desert-Scrub Biomes The Chaparral Alpine and Taiga Biomes The Tundra Savanna and Grassland Biomes Deciduous Forests The Rainforest Freshwater and Marine Biomes
(C).	diagram abiotic cycles, including the rock, hydrologic, carbon, and nitrogen cycles	The Cycles of Matter Rocks and the Rock Cycle
(D).	make observations and compile data about fluctuations in abiotic cycles and evaluate the effects of abiotic factors on local ecosystems and local biomes	Effects of Cycles on Ecosystems
(E).	measure the concentration of solute, solvent, and solubility of dissolved substances such as dissolved oxygen, chlorides, and nitrates and describe their impact on an ecosystem	
(F).	predict how the introduction or removal of an invasive species may alter the food chain and affect existing populations in an ecosystem	Biodiversity Trophic Levels and Food Webs Population Size Nonnative Species In Aquatic Ecosystems
(G).	predict how species extinction may alter the food chain and affect existing populations in an ecosystem	Trophic Levels and Food Webs
(H).	research and explain the causes of species diversity and predict changes that may occur in an ecosystem if species and genetic diversity is increased or reduced	Biodiversity Adaptation

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(5).	Science concepts. The student knows the interrelationships among the resources within the local environmental system. The student is expected to:	
(A).	summarize methods of land use and management and describe its effects on land fertility	Human Use of Land Minerals and Mining Urban Growth Land Management and Planning Impact of Policy
(B).	identify source, use, quality, management, and conservation of water	The Water We Use Groundwater Water Pollution
(C).	document the use and conservation of both renewable and non-renewable resources as they pertain to sustainability	What Are Natural Resources? Resource Conservation Sustainability
(D).	identify renewable and non-renewable resources that must come from outside an ecosystem such as food, water, lumber, and energy	Ecology 102 Modern Forestry The Water We Use What Are Natural Resources?
(E).	analyze and evaluate the economic significance and interdependence of resources within the environmental system	Trophic Levels and Food Webs The Cycles of Matter What Are Natural Resources? The Social Costs of Resource Use
(F).	evaluate the impact of waste management methods such as reduction, reuse, recycling, and composting on resource availability	Resource Conservation Human Impact on the Environment

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(6).	Science concepts. The student knows the sources and flow of energy through an environmental system. The student is expected to:	
(A).	define and identify the components of the geosphere, hydrosphere, cryosphere, atmosphere, and biosphere and the interactions among them	Systems of the Biosphere
(B).	describe and compare renewable and non-renewable energy derived from natural and alternative sources such as oil, natural gas, coal, nuclear, solar, geothermal, hydroelectric, and wind	What Are Natural Resources? Nuclear Power
(C).	explain the flow of energy in an ecosystem, including conduction, convection, and radiation	Energy Transformation Energy in the Atmosphere
(D).	investigate and explain the effects of energy transformations in terms of the laws of thermodynamics within an ecosystem	Energy Transformation
(E).	investigate and identify energy interactions in an ecosystem	Energy Transformation Trophic Levels and Food Webs
(7).	Science concepts. The student knows the relationship between carrying capacity and changes in populations and ecosystems. The student is expected to:	
(A).	relate carrying capacity to population dynamics	Ecology 102 Population Size
(B).	calculate birth rates and exponential growth of populations	Population Size Determining Population Size
(C).	analyze and predict the effects of non-renewable resource depletion	The Social Costs of Resource Use Resource Conservation
(D).	analyze and make predictions about the impact on populations of geographic locales due to diseases, birth and death rates, urbanization, and natural events such as migration and seasonal changes	Biodiversity Population Size Urban Growth

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(8).	Science concepts. The student knows that environments change naturally. The student is expected to:	
(A).	analyze and describe the effects on areas impacted by natural events such as tectonic movement, volcanic events, fires, tornadoes, hurricanes, flooding, tsunamis, and population growth	Natural Events and the Environment
(B).	explain how regional changes in the environment may have a global effect	Succession Climate and Change in Ecosystems A History of Global Climate Change Natural Events and the Environment
(C).	examine how natural processes such as succession and feedback loops restore habitats and ecosystems	Succession
(D).	describe how temperature inversions impact weather conditions, including El Nino and La Nina oscillations	Ocean Circulation
(E).	analyze the impact of temperature inversions on global warming, ice cap and glacial melting, and changes in ocean currents and surface temperatures	Ocean Circulation Factors That Affect Climate Global Change
(9).	Science concepts. The student knows the impact of human activities on the environment. The student is expected to:	
(A).	identify causes of air, soil, and water pollution, including point and nonpoint sources	Atmospheric Pollution Air Quality Minerals and Mining Soil and Agriculture Groundwater Water Pollution
(B).	investigate the types of air, soil, and water pollution such as chlorofluorocarbons, carbon dioxide, pH, pesticide runoff, thermal variations, metallic ions, heavy metals, and nuclear waste	Atmospheric Pollution Soil and Agriculture Water Pollution
(C).	examine the concentrations of air, soil, and water pollutants using appropriate units	

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(D).	describe the effect of pollution on global warming, glacial and ice cap melting, greenhouse effect, ozone layer, and aquatic viability	Global Change A History of Global Climate Change Water Pollution
(E).	evaluate the effect of human activities, including habitat restoration projects, species preservation efforts, nature conservancy groups, hunting, fishing, ecotourism, all terrain vehicles, and small personal watercraft, on the environment	Human Events and the Environment Success Stories
(F).	evaluate cost-benefit trade-offs of commercial activities such as municipal development, farming, deforestation, over-harvesting, and mining	Human Use of Land Minerals and Mining Soil and Agriculture Land Management and Planning
(G).	analyze how ethical beliefs can be used to influence scientific practices such as methods for increasing food production	Informed Policy
(H).	analyze and evaluate different views on the existence of global warming	Global Change A History of Global Climate Change
(I).	discuss the impact of research and technology on social ethics and legal practices in situations such as the design of new buildings, recycling, or emission standards	Impact of Policy
(J).	research the advantages and disadvantages of "going green" such as organic gardening and farming, natural methods of pest control, hydroponics, xeriscaping, energy-efficient homes and appliances, and hybrid cars	Human Use of Land Governments and Business
(K).	analyze past and present local, state, and national legislation, including Texas automobile emissions regulations, the National Park Service Act, the Clean Air Act, the Clean Water Act, the Soil and Water Resources Conservation Act, and the Endangered Species Act	Water Policy Governments and Business Milestones and Turning Points
(L).	analyze past and present international treaties and protocols such as the environmental Antarctic Treaty System, Montreal Protocol, and Kyoto Protocol	Milestones and Turning Points