MONTGOMERY COUNTY PUBLIC SCHOOLS

Biology II (Ecology) Curriculum Pacing Guide

Time	Learning Intentions	Success Criteria	Vocabulary
90 Minute Class: 3 Weeks **45 Minute Class:** 6 Weeks	**INTRODUCTION** • Define environmental science, and compare environmental science with ecology. • List the 5 major fields of study that contribute to environmental science. • Describe and map the geography and hydrology and the NRV and of the State of Virginia. • Describe the major environmental effects of hunter-gathers, the agricultural revolution, and the industrial revolution. • Distinguish between renewable and nonrenewable resources. • Classify environmental problems into 3 major categories. • Describe the tragedy of the commons. • Explain the law of supply and demand. • List 3 differences between developed and developing countries. • Explain what sustainability is, and describe why it is a goal of environmental science.	**I will use my textbook and class discussions to distinguish between environmental science as the study of the interactions between humans and the environment and ecology as the way biotic and abiotic factors relate within the environment.** **I will be able to identify the five major fields of study that contribute to environmental science as geology, chemistry, biology, economics, and sociology.** **I will draw an accurate map of the geography and hydrology of the NRV and of VA.** **I will describe the major environmental effects of hunter gatherers, the agricultural revolution, and the industrial revolution, specifying loss of biodiversity, pollution of air and water, habitat destruction, and climate change.** **I will distinguish between renewable and nonrenewable resources by explaining that renewable resources replenish themselves at a human timescale, while nonrenewable resources are exhaustible.** **I will describe the tragedy of the commons as the degradation of common resources for which no single party is specifically accountable.** **I will explain the relationship between supply**	

		and demand by graphing one as the other changes. **I will distinguish between developing and developed countries by explaining economic and social differences, particularly the high vs. low fertility and mortality rates.** **I will explain that sustainability is the ability for a society to persist indefinitely without exhausting resources, degrading habitats, or displacing other organisms.**	
90 Minute Class: 2 Weeks **45 Minute Class:** 4 Weeks	**<u>HUMAN POPULATION</u>** • Describe the 3 main properties of a population. • Describe exponential growth. • Describe population pyramids. • Describe TFR and fertility rates. • Describe the impact of human population growth in terms of natural resource acquisition, pollution (land, air, water) disease, poverty, food production, and climate change. • Report on the demographics of one of the world's country in terms of fetrtility rates, average educational attainment, literacy rates (male and female), and per capita income.	**I will be able to draw a population growth curve that shows exponential growth.** **I will be able to use a population pyramid to describe a population as growing, stable, or declining.** **I will describe the varying effects of human population growth on natural resource acquisition, pollution, disease, poverty, food production, and climate change.**	

90 Minute Class: 1 Week **45 Minute Class:** 2 Weeks	**FOOD RESOURCES** • Worldwide food production availability • Wealth Gap	**I will discuss agriculture techniques that conserve land and produce food to feed an exponentially growing population.** **I will explain how food availability is linked to the wealth gap.** **I will analyze and compare the food availability issues present in different countries.**	
90 Minute Class: 2 Weeks **45 Minute Class:** 4 Weeks	**WATER RESOURCES** • Describe water sources world-wide, and scarcity and availability. • Study water use in the Columbia River basin and above the Ogallala Aquifer. • Describe water diversion projects and their impacts. • Compare ground water to surface water, salt to fresh. • Describe dams and their impacts to aquatic environments. • Describe water treatment, both drinking and waste. • Trace and discuss the flow of water in both the New River and Crab Creek.	**I will discuss the availability of water and the issues with drinking water in developing countries.** **I will compare the environmental impacts of hydroelectric dams, water treatment facilities, and issues specific to surface and ground water.**	
90 Minute Class: 1 Week **45 Minute Class:** 2 Weeks	**WATER POLLUTION** • Distinguish between point-source pollution and non-point Source pollution. • dentify 10 sources of each locally. • Describe water pollution from mining, agriculture, and industry and water remediation efforts associated with each. • Experience first-hand a meaningful watershed experience on Crab Creek in Christiansburg and with-in one-half mile of joining the New River.	**I will be able to identify pollutants as point source or non-point source.** **I will discuss local sources of water pollution including those from mining, agriculture, and industry.**	

90 Minute Class: 3 Weeks **45 Minute Class:** 6 Weeks	**ENERGY RESOURCES / NONRENEWABLE** **Fossil Fuels:** • List 5 factors that influence the value of a fuel. • Explain how fuels are used to generate electricity. • Identify patterns of energy consumption and production in the USA. • Explain how fossil fuels form and how they are used. • Compare the advantages and disadvantages of fossil-fuel use. • List 3 factors that influence predictions of fossil-fuel production. • Describe nuclear fission. • Describe how a nuclear power plant works. • List 3 advantages and 3 disadvantages of nuclear power.	**I will discuss the factors that influence the value of a fuel.** **I will explain and diagram how different fossil fuels are used to generate electricity.** **I will describe the process of nuclear fission and explain how it is utilized in nuclear power plants.**	
90 Minute Class: 2 Weeks **45 Minute Class:** 4 Weeks	**ENERGY RESOURCES / RENEWABLE** **Alternative Energies:** • List 6 forms of renewable energy, and compare their advantages and disadvantages. • Describe the differences between passive, active and photovoltaic solar energy. • Describe the current state of wind energy technology. • Explain the differences in biomass fuel use between developed and developing countries. • Describe how hydroelectric energy, geothermal and heat pumps work. • Describe 3 alternative energy technologies. • Identify 2 ways that H could be used as a fuel source in the future. • Explain the difference between energy efficient and energy conservation. • Describe 2 forms of energy efficient transportation. • Identify 3 ways that you can conserve energy.	**I will identify and compare the advantages and disadvantages of various forms of renewable energy.** **I will describe alternative energy sources of the future.** **I will discuss ways that energy can be conserved and transported throughout the world.**	

90 Minute Class: 1 Weeks **45 Minute Class:** 2 Weeks	**RECYCLING AND WASTE** • Recycling centers trip, material processing Energy savings • Production capacity/pollution, landfill field trip	**I will discuss the advantages and limitations involved in recycling nonrenewable materials.** **I will describe the process of disposal in solid-waste landfills.**	
90 Minute Class: 2 Weeks **45 Minute Class:** 4 Weeks	**CLIMATE CHANGE** • Describe how energy is transferred from the sun to producers and then to consumers food chain. • Explain how energy is stored in fossil fuels. • Describe the long and short term process of the carbon cycle. • Identify ways that humans are affecting the carbon cycle. • Explain the difference between weather and climate. • Identify 4 major factors that determine climate. • Explain how the ozone layer shields the Earth from much of the sun's harmful rays. • Explain how CFC's damage the ozone layer. • Explain why Earth's atmosphere is like the glass in a greenhouse. • Explain why carbon dioxide in the atmosphere is increasing and the historical connection between FF and climate change. • Explain why many scientists think that the Earth's climate is becoming increasingly warmer. • Examine and explain the IPCC report on climate change. • Describe what a warmer Earth might be like. Describe 15 steps that humanity can take to alleviate the adverse effects of global warming (Socalow and Pacala).	**I will explain how CFCs damage the ozone layer** **I will discuss regulations, both federal and international, that apply to climate and ozone** **I will differentiate between weather and climate** **I will discuss how carbon emissions have led to an enhanced greenhouse effect and how that has led to global climate change.**	