Information for Course Syllabus

Name of Course: Environmental and Applied Sciences

Grade Level: 9

School: ORHS

Major Assignments: Barbie Bungee PBL

Field Trips: None

How can parents access instructional materials? Canvas

Environmental and Applied Sciences
2021-2022

Term 1

Data Dive: Introduction to Methods	**SCRE.ETS3.10** Create a scientific journal and/or lab notebook for recording qualitative and quantitative data.
	SCRE.ETS3.13 Select and use appropriate data tables, graphs, and diagrams to represent data. Use mathematic and computational thinking to look for patterns in data.
	SCRE.ETS3.14 Develop a conclusion based on data analysis and cite evidence to support the conclusion.

Road Trip	**PSCI.PS2.1** Use mathematical representation to show how various factors (e.g. position, time, direction of force) affect one-dimensional kinematics parameters (distance, ~~displacement,~~ speed, velocity, acceleration). Determine graphically the relationships among those one-dimensional kinematics parameters.
	PSCI.PS2.5 Use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system.
	PWC.PS2.1 Investigate, measure, calculate, and analyze the relationship among position, displacement, velocity, acceleration, and time.
	PWC.PS2.2 Explore characteristics of rectilinear motion and create distance-time graphs and velocity-time graphs.
	SCRE.ETS3.10 Create a scientific journal and/or lab notebook for recording qualitative and quantitative data.
	SCRE.ETS3.13 Select and use appropriate data tables, graphs, and diagrams to represent data. Use mathematic and computational thinking to look for patterns in data.
	SCRE.ETS3.14 Develop a conclusion based on data analysis and cite evidence to support the conclusion.

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Exploring the Brain: Memory and Study Skills	**HAP.LS1.37** Model the major parts of the brain and spinal cord, relating each part to its source of sensory information and/or its primary target of regulation.
	SCRE.ETS3.10 Create a scientific journal and/or lab notebook for recording qualitative and quantitative data.
	SCRE.ETS3.13 Select and use appropriate data tables, graphs, and diagrams to represent data. Use mathematic and computational thinking to look for patterns in data.
	SCRE.ETS3.14 Develop a conclusion based on data analysis and cite evidence to support the conclusion.

Dimensional Analysis of Food Processes	**SEP** - Developing and Using Models: Develop explanations for phenomena, to go beyond the observable and make predications or test designs
	SEP - Using Mathematics and computational thinking: Use tools to represent variables and their relationships and models, simulations, and data analysis in order to make an test predictions
	SCRE.ETS3.10 Create a scientific journal and/or lab notebook for recording qualitative and quantitative data.
	SCRE.ETS3.13 Select and use appropriate data tables, graphs, and diagrams to represent data. Use mathematic and computational thinking to look for patterns in data.
	SCRE.ETS3.14 Develop a conclusion based on data analysis and cite evidence to support the conclusion.

Exploring Electricity w/ Snap Circuits	**PSCI.PS2.7** Plan and conduct an investigation to provide evidence that an electric current can produce a magnetic field.
	PWC.PS3.5 Demonstrate how or explain that energy is conserved in an isolated system even if transformations occur within the system (i.e. chemical to electrical, electrical to mechanical).

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Is that for Real? Evaluation of Sources	**SCRE.ETS3.5** Use online search engines to find sources of scientific information. Develop, share, and revise criteria for evaluating reliability of sources.
	SCRE.ETS3.7 Obtain and present information on research protocols including citation formats (APA, MLA, etc.), plagiarism, and copyright and patent laws.
	SCRE.ETS3.8 Engage in the peer review process by giving and receiving detailed feedback throughout the process of planning and carrying out investigations.
	SCRE.ETS3.10 Create a scientific journal and/or lab notebook for recording qualitative and quantitative data.
	SCRE.ETS3.14 Develop a conclusion based on data analysis and cite evidence to support the conclusion.
	SCRE.ETS3.15 Use data to develop a model. Evaluate the effectiveness of the model by making and testing predictions.
	SCRE.ETS3.16 Evaluate experimental results and identify possible sources of error or bias in scientific investigations (published research, original research, research of peers).

Learning to Code: Ozobots	**SEP** – Developing and Using Models: Develop explanations for phenomena, to go beyond the observable and make predications or test designs
	SEP – Planning and Carrying Out Controlled Investigations: To collect data that is used to test existing theories and explanations, revise and develop new theories and explanations, or assess the effectiveness, efficiency, and durability of design under various conditions.
	SEP – Using Mathematics and Computational Thinking: Use tools to represent variables and their relationships and models, simulations, and data analysis in order to make and test predictions

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Term 2

Our Planet, Our Home: Analysis of Demography	
	BIO1.LS2.1 Analyze mathematical and/or computational representations of population data that support explanations of factors that affect population size and carrying capacities of populations within an ecosystem. Examine a representative ecosystem and, based on interdependent relationships present, predict population size effects due to a given disturbance.
	BIO1.LS2.2 Create a model tracking carbon atoms between inorganic and organic molecules in an ecosystem. Explain human impacts on climate based on this model.
	BIO1.LS3.3 Identify ecosystem services and assess the role of biodiversity in support of these services. Analyze the role human activities have on disruption of these services.
	ESS.ESS2.10 Construct a model that shows the interactions between processes of the hydrologic cycle and the greenhouse effect.
	ESS.ESS2.11 Obtain, evaluate, and communicate information about human or natural threats to Tennessee.
	ESS.ESS3.1 Identify a geographical region or small area where energy and mineral resources are scarce and evaluate competing design solutions for developing, managing, and utilizing these energy and mineral resources based on a cost-benefit analysis.
	ESS.ESS3.2 Obtain, evaluate, and communicate information on how natural resource availability, natural hazard occurrences, and climate changes impact individuals and society.
	ESS.ESS3.3 Design, evaluate, or refine a technological solution that reduces impacts of human activities on natural systems.
	ECO.LS2.12 Use mathematical models to construct an explanation for population growth patterns and rates observed in ecosystems. Account for both density-dependent and density-independent factors in your explanation.
	ECO.LS2.13 Analyze data regarding exponential and logistic population growth patterns. Use the data to create mathematical models to make predictions regarding carrying capacity.
	ECO.LS4.7 Research and evaluate the effectiveness of strategies for maintenance of biodiversity.
	ECO.ESS3.1 Research and evaluate the effectiveness of public lands (state parks, national parks, wildlife refuges, wilderness areas) in sustaining biodiversity.
	ECO.ESS3.2 Engage in argument from evidence regarding the impacts of human activity on climate change. Design solutions to address these impacts.

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Our Planet, Our Home: Analysis of Demography cont.	
	EVSC.LS2.3 Using mathematical models, support arguments regarding the effects of biotic and abiotic factors on carrying capacity for population within an ecosystem.
	EVSC.LS4.3 Evaluate the impact of habitat fragmentation and destruction, invasive species, overharvesting, pollution, and climate change on biodiversity (genetic, species, and ecosystem).
	EVSC.ESS3.2 Interpret graphical data representing global human population growth over time. Look for patterns within this data and construct possible explanations for the patterns. Revise the explanation as needed based on research.
	EVSC.ESS3.3 Obtain and evaluate information regarding demographics for a variety of countries. Construct an explanation for varying fertility rates and life expectancies between countries and throughout human history. Taking into account demographic transition, predict what trends are likely to occur in various countries over time.
	EVSC.ESS3.4 Gather, organize, analyze, and present data on current land use trends by humans. Based on analysis, predict future trends.
	EVSC.ESS3.5 Plan and carryout an investigation examining best management practices in water usage, agriculture, forestry, urban/suburban development, ~~mining~~, or fishing and communicate findings.
	EVSC.ESS3.9 Evaluate ecosystem services provided by forests ecosystems. Construct an explanation for human impact on these services.
	EVSC.ESS3.11 Define problems and suggest solutions associated with using, conserving, and recycling energy and mineral resources taking into account economic, social, and environmental costs and benefits.
	EVSC.ESS3.13 Analyze and interpret data on the effects of land, water, and air pollution on the environment and on human health. Propose solutions for minimizing pollution from specific sources.
	EVSC.ESS3.15 Evaluate current methods of waste management and reduction and design possible improvements.
	EVSC.ESS3.17 Using mathematics and computational thinking, analyze data linking human activity to climate change. Design solutions to address human impacts on climate change.
	EVSC.ESS3.18 Use mathematics to calculate ecological footprints. Develop a personal plan for reducing your impact on the environment.
	EVSC.ETS2.1 Engage in argument from evidence on the role engineering and technology play in a sustainable human society.
	EVSC.ETS3.1 Plan and carry out an investigation of a local ecosystem to assess human impacts. Based on your findings, design and evaluate a solution to minimize impacts.
	SCRE.ETS3.10 Create a scientific journal and/or lab notebook for recording qualitative and quantitative data.
	SCRE.ETS3.13 Select and use appropriate data tables, graphs, and diagrams to represent data. Use mathematic and computational thinking to look for patterns in data.
	SCRE.ETS3.14 Develop a conclusion based on data analysis and cite evidence to support the conclusion.

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Barbie Bungee	**PSCI.PS2.1** Use mathematical representation to show how various factors (e.g. position, time, direction of force) affect one-dimensional kinematics parameters (distance, ~~displacement,~~ speed, velocity, acceleration). Determine graphically the relationships among those one-dimensional kinematics parameters.
	PSCI.PS3.1 Identify and give examples of the various forms of energy (kinetic, gravitational potential, elastic potential) ~~and solve mathematical problems regarding the work-energy theorem and power~~.
	PSCI.PS3.5 Investigate the relationships among kinetic, potential, and total energy within a closed system (the law of conservation of energy).
	PWC.PS2.1 Investigate, measure, calculate, and analyze the relationship among position, displacement, velocity, acceleration, and time.
	PWC.PS2.2 Explore characteristics of rectilinear motion and create distance-time graphs and velocity-time graphs.
	PHYS.PS2.2 Algebraically solve problems involving constant velocity and constant acceleration in one-dimension.
	SCRE.ETS3.10 Create a scientific journal and/or lab notebook for recording qualitative and quantitative data.
	SCRE.ETS3.13 Select and use appropriate data tables, graphs, and diagrams to represent data. Use mathematic and computational thinking to look for patterns in data.
	SCRE.ETS3.14 Develop a conclusion based on data analysis and cite evidence to support the conclusion.

Exploring the Brain: Science of Concussions	**HAP.LS1.37** Model the major parts of the brain and spinal cord, relating each part to its source of sensory information and/or its primary target of regulation.
	SCRE.ETS3.10 Create a scientific journal and/or lab notebook for recording qualitative and quantitative data.
	SCRE.ETS3.15 Use data to develop a model. Evaluate the effectiveness of the model by making and testing predictions.
	SCRE.ETS3.16 Evaluate experimental results and identify possible sources of error or bias in scientific investigations (published research, original research, research of peers).

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Gas Laws through Hot Air Balloons	**CHEM1.PS1.5** Conduct investigations to explore and characterize the behavior of gases (pressure, volume, temperature), develop models to represent this behavior, and construct arguments to explain this behavior. Evaluate the relationship (qualitatively and quantitatively) at STP between pressure and volume (Boyle's Law), temperature and volume (Charles' Law), temperature and pressure (Gay-Lussac Law) ~~and moles and volume (Avogadro's Law),~~ and evaluate and explain these relationships with respect to kinetic-molecular theory. Be able to understand, establish, and predict the relationships between volume, temperature, and pressure using the combined gas law both qualitatively and quantitatively.
	PSCI.PS1.2 Graphically represent and discuss the results of an investigation involving pressure, volume, and temperature of a gas.
	PWC.PS2.1 Investigate, measure, calculate, and analyze the relationship among position, ~~displacement~~, velocity, acceleration, and time.
	PWC.PS2.2 Explore characteristics of rectilinear motion and create distance-time graphs and velocity-time graphs.
	PWC.PS2.15 Experimentally investigate the buoyant force exerted on floating and submerged objects.
	SCRE.ETS3.10 Create a scientific journal and/or lab notebook for recording qualitative and quantitative data.
	SCRE.ETS3.13 Select and use appropriate data tables, graphs, and diagrams to represent data. Use mathematic and computational thinking to look for patterns in data.
	SCRE.ETS3.14 Develop a conclusion based on data analysis and cite evidence to support the conclusion.

Exploring the Brain: Science of Sleep	**HAP.LS1.37** Model the major parts of the brain and spinal cord, relating each part to its source of sensory information and/or its primary target of regulation.
	SCRE.ETS3.10 Create a scientific journal and/or lab notebook for recording qualitative and quantitative data.
	SCRE.ETS3.13 Select and use appropriate data tables, graphs, and diagrams to represent data. Use mathematic and computational thinking to look for patterns in data.
	SCRE.ETS3.14 Develop a conclusion based on data analysis and cite evidence to support the conclusion.

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Our Planet, Our Home: Exploration of Sustainability	
	BIO1.LS2.3 Analyze data demonstrating the cycling of matter in our biosphere and explain how biogeochemical cycles are critical for ecosystem function.
	CHEM1.PS1.8 Identify acids and bases as a special class of compounds with a specific set of properties.
	ESS.ESS2.10 Construct a model that shows the interactions between processes of the hydrologic cycle and the greenhouse effect.
	ECO.LS2.7 Use models to explain relationships among biochemical cycles (water, ~~carbon, nitrogen, phosphorus~~).
	EVSC.LS2.6 Evaluate the interdependence among major biochemical cycles (water, ~~carbon, nitrogen, phosphorus~~) in an ecosystem and recognize the importance each cycle has in maintaining ecosystem stability.
	EVSC.ESS2.5 Plan and carry out an investigation examining the chemical and physical properties of water ~~and the impact of water on Earth's topography~~. Analyze data and share findings.
	EVSC.ESS3.5 Plan and carryout an investigation examining best management practices in water usage, agriculture, forestry, urban/suburban development, ~~mining~~, or fishing and communicate findings.
	EVSC.ESS3.13 Analyze and interpret data on the effects of land, water, and air pollution on the environment and on human health. Propose solutions for minimizing pollution from specific sources.
	GEO.ESS3.3 Evaluate the evidence and reasoning supporting claims about the impact of human activities on ground water quality. The evaluation should include data related to multiple factors (e.g., precipitation, topography, porosity, and runoff).
	GEO.ESS3.4 Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources in areas where they are scarce. Compare solutions in terms of environmental impact, sustainability and cost.
	GEO.ETS2.3 Plan and carry out an investigation using a computer-based geographical information tool such as Google Earth, ArcGIS, or My NASA Data to examine the impact of human activities on Earth's surface features.
	PSCI.PS1.12 Classify a substance as acidic, basic, or neutral by using pH tools and appropriate indicators.
	PWC.PS1.1 Using the Bohr Model of an atom, describe the following features and components of an atom: protons, neutrons, electrons, mass, number and types of particles, structure, and organization.

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Computer Logic: Turning Tumbles	**SEP** – Developing and Using Models: Develop explanations for phenomena, to go beyond the observable and make predications or test designs
	SEP – Planning and Carrying Out Controlled Investigations: To collect data that is used to test existing theories and explanations, revise and develop new theories and explanations, or asses the effectiveness, efficiency, and durability of design under various conditions.
	SEP – Using Mathematics and Computational Thinking: Use tools to represent variables and their relationships and models, simulations, and data analysis in order to make and test predictions
	SEP – Engaging in Arguments from Evidence: Identify strengths and weaknesses in a line of reasoning, to identify best explanations, to resolve problems, and identify best solutions.