Perris Union High School District
Course of Study

A. COURSE INFORMATION

Course Title:
(limited to 34 characters with spaces in Infinite Campus)

Environmental Science Essentials

- [x] New
- [ ] Revised

If revised, the previous course name if there was a change

Transcript Course Code/Number:

(To be assigned by Educational Services if it's a new course)

CREDIT TYPE EARNED:	CALPADS CODE:
Science	9339

Subject Area:

- [ ] Social Science
- [ ] English
- [ ] Mathematics
- [x] Laboratory Science
- [ ] World Languages
- [ ] Visual or Performing Arts
- [ ] College Prep Elective
- [ ] Other

Is this classified as a Career Technical Education course?

- [ ] Yes
- [x] No

If yes, which pathway does this course align to?
Pathway Name:

CTE CDE Code:

Grade Level(s)

- [ ] MS
- [x] HS
- [ ] 5
- [ ] 6
- [ ] 7
- [ ] 8
- [ ] 9
- [ ] 10
- [ ] 11
- [ ] 12

Was this course *previously approved by UC* for PUHSD?

- [ ] Yes
- [x] No

(Will be verified by Ed Services)

Which A-G Requirement does/will this course meet?

- [ ] Pending

Credential Required to teach this course:
To be completed by Human Resources only.

Single Subject: Science: Biological Sciences; Science: Chemistry; Science: Geosciences; Science: Physics

4/15/2024

Signature **Date**

Submitted by: Amanda Snider, Maria Schmidt
Site: Paloma Valley High School
Date: 04/12/24
Email: amanda.snider@puhsd.org
maria.schmidt@puhsd.org

Unit Value/Length of Course:

- [ ] 0.5 (half-year or semester equivalent)
- [x] 1.0 (one-year equivalent)
- [ ] 2.0 (two-year equivalent)
- [ ] Other:

Approvals	Name/Signature	Date
Director of Curriculum & Instruction		04/18/24
Asst. Superintendent of Educational Services	Kristy Lee Machamer	4/18/24
Governing Board		

Prerequisite(s) (REQUIRED):
None
Corequisite(s) (REQUIRED):
None
Brief Course Description (REQUIRED):
Environmental Science provides students with the scientific principles, concepts, and methodologies required to understand the interrelationships of the natural world, identify and analyze environmental problems both natural and human-made, evaluate the relative risks associated with these problems, and examine alternative solutions for resolving or preventing them. Environmental science is interdisciplinary, embracing topics from geology, biology, environmental studies, environmental engineering, chemistry, demography, economics, ethics, political science and geography. This course will be project based, including strong laboratory and field investigation components. Experiences both in the laboratory and in the field provide students with opportunities to test concepts and principles that are introduced in the classroom. In this class, students gain a broad awareness of environmental science, related career opportunities and become better global citizens.

B. COURSE CONTENT
Course Purpose (REQUIRED): *What is the purpose of this course? Please provide a brief description of the goals and expected outcomes. Note: More specificity than a simple recitation of the State Standards is needed.*
Environmental Science is a multidisciplinary course that draws from all other sciences, including but not limited to, chemistry, biology, ecology, geography and Earth sciences, to help achieve practical goals. Such goals include the conservation and protection of natural resources on local, state and global levels through environmental education and research. Environmental science helps us to understand the connection between humans and the world in which we live. This course will allow students to identify and analyze environmental problems both natural and man‑made, identify threats associated with these problems, and develop valid solutions to prevent these problems from reoccurring. Laboratory investigation and analysis as well as projects are an integral part of this course.

Course Outline (REQUIRED):
Detailed description of topics covered. All historical knowledge is expected to be empirically based, give examples. Show examples of how the text is incorporated into the topics covered.

Unit 1: Studying the Environment

- Explore the tools of how environmental science is studied.
- Use graphs, charts, maps, and concept maps to model environmental concepts.
- Apply specific results and data to formulate valid conclusions.
- Understand how experimentation can help give clever insights into what is happening in the environment.
- Apply different areas of science (example Chemistry,Biology, Geosciences etc.) to study the environment.
- Students will learn the history of environmental science, how it connects with other disciplines, and sustainability.

Assignments and Labs:

- **Observation Lab:** Students will use different measuring tools and their senses to observe a sunflower seed. After they record their sunflower seed observations they will mix all the sunflower seeds together and try to find their original sunflower seeds based on their observations.

- **Lorax movie:** Students will watch the classic being who "speaks for the trees."

- **Lab Safety Posters:** Students will create posters in class to solidify their understanding of the lab safety guidelines presented in lecture. Students will learn to synthesize information and expand on their marketing and presentation skills. These posters will also serve as ongoing reminders of the safety guidelines as they will be hung in the classroom. In addition, safety agreements will be signed and taped in the reference pages in the SNB.

Unit 2: Ecology and the Natural World

- Students will review biogeochemical cycles and geological systems. They will then study soil and its foundation, degradation and conservation.
- Students will understand how different forms of life affect the environment.
- Students will characterize the organization of life in the environment.
- Identify how organisms interact with each other.
- Students will show how energy and matter flow throughout an ecosystem.
- Understand that different areas of the world form biomes and the characteristics of biomes are shaped by the biotic and abiotic factors of that biome.
- Characterize the world's biomes and the forms of life that reside there.
- Understand biodiversity and why it is important.

- Recognize the threats to biodiversity and formulate solutions for habitat conservation.
- Define Population and understand what drives population increases and population decreases (births, deaths, emigration, and immigration).
- Recognize trends on population graphs.
- Identify factors that can affect population trends.

Assignments and Labs:

- **Owl Pellet Lab:** Students will dissect the owl pellets assigned to them. Using the forceps and skeletal charts, students will identify the contents of the pellet, sort bones into groups and finally record the types of animals found into a data table.

- **Ecological Services Presentation:** Students will research and design a presentation on ecological services using the Millennium Ecosystem Assessment (an assessment of the environmental impact of mankind conducted in 2005). In this investigation students will use an online mapping service to locate and identify different ecosystems in their area. Students will then gather information for each ecosystem identifying the ecological services being provided.

- **Could You Beat Natural Selection?:** Students will locate fish (represented by chips) in the natural environment of the classroom. Students will predict the survivability of two sets of organisms by simulating predator and prey relationships. Students will complete the data tables and graph results.

- **Investigate Habitat Size and Species Diversity:** Students will analyze data from a teacher-chosen field site and infer patterns in data. Students will predict if habitat size and species diversity will change over time at your test site.

- **Construct A Food Web:** Students will construct a food web when given organisms in a specific habitat and descriptions of organisms.

- **Population Sampling:** Perform a Capture-Mark-Recapture study. Students will estimate a population size by marking and recapturing beans.

- **Edge Effects:** Students will determine population density of a plant species for three different locations on campus within the edge of habitats. Students will observe how organisms are affected by the edge effect and give reasons why there are differences in sample populations as you move from one habitat into the next.

- **Investigate Disturbance and Succession:** Students will infer how other types of disturbances affect ecological succession and compare those inferences to the information you learned about wildfires.

Unit 3: Resources from the Air, Water, and Land

- Students learn about the atmosphere, outdoor air pollution and indoor air pollution. They then learn about global climate change and how it connects with all the other topics we have studied this year.

- Students learn about nonrenewable fossil fuels (coal, oil, natural gas, tar sands, etc), their impacts (environmental, political and economical) and energy conservation. They will then move to alternatives (nuclear, biomass & hydrothermal) and how they compare with fossil fuels. They will then end by learning about renewable energy alternatives (solar, wind, geothermal, ocean and hydrogen) and how they compare to fossil fuels and our energy alternatives.
- Students learn about freshwater resources, human impact, pollution and its control, wastewater and its treatment, and freshwater conservation. They will then turn their focus to saltwater and learn about oceans, marine and coastal ecosystems, human use and impact, emptying the oceans and marine conservation.
- Students will learn about resource management, forestry, agricultural land use, parks and reserves. They will then learn about urbanization, sprawl, creating livable cities and urban sustainability.

Assignments and Labs:

- **Weather and Climate:** Students will test, observe, and record temperature data over time for three containers filled with light sand, dark sand, and water. Students will use the data collected to explain how Earth's surface affects weather and climate.

- **Acid Deposition:** Students will observe how organic and inorganic matter react to an acidic solution. Students will observe the acidification of a water source and make inferences about how living organisms are impacted by acid deposition.

- **Investigate Air and Water Pollution:** Students will plan and conduct investigations to determine how air pollution affects water pollution. Students will collect and organize data on the effects of air and water pollution and infer the impact of water and air pollution on the ability to maintain a healthy ecosystem.

- **Wasting Water:** Students will make accurate observations and calculations about small leaks and their overall effect to assist in understanding how seemingly insignificant issues can have much larger consequences if left without rectification. Students will identify ways in which water resources can be conserved.

- **Eutrophication:** Students will compare and contrast tap water, pond water, and pond water with added nutrients to understand how eutrophication occurs. Students will then apply their observations to describe ways human action can influence natural phenomena (inferring negative consequences of cultural eutrophication)

- **Ocean Acidification:** Students will explore the effects of ocean acidification on shells by submerging them in solutions with different pH values. Students will apply their new knowledge to make inferences about the consequences of ocean acidification.

- **Investigate Your Environment Project:** Students will research a local park, determining the

organisms found in the local park and any past disturbances. Students will write to a local agency about the state of your park.

- **Tragedy Of The Commons Activity:** Students will be given the opportunity to pick candy from a candy bowl. This will simulate the tragedy of the commons, shared resources are available without restrictions. Students will have a discussion about how to make resources sustainable.

Unit 4: Sustainability and Environmental Policy

- Students learn about environmental health and toxicology by studying the different effects of different toxins, risk assessment and management and ways to approach these risks.
- Students learn about waste management with approaches to it focusing on municipal, industrial and hazardous waste.
- Identify and explain social, biological , and chemical hazards in the environment.
- Identify sources and formulate solutions for toxins and hazardous chemicals in the environment.
- Students will learn about Biomagnification in terms of its effects on organisms including humans.

Assignments and Labs:

- **Investigate Plastic Pollution:** Students will plan and conduct investigations to determine which types of plastics affect life in different marine zones.Students will collect and organize data on the behavior different types of plastic have in the water.

- **Toxicity Of Pesticides Lab:** Students will identify how to use an herbicide in the most effective manner. Students will identify environmental hazards, as well as hazards to humans, associated with this herbicide.

- **LD50 Salinity Lab:** Students will grow mung beans in varying concentrations of salt water for two weeks to determine the LD50 of salt on mung bean growth. Students will graph their results to produce an LD50 graph.

- **Leachate Composition Demonstration**: Students will observe, and record investigation data accurately and assist in a class demonstration of leachate composition. Students will discuss how leachates form and explain the dangers of not mitigating leachates.

- **Building An Energy-Efficient Building Project:** A cumulative project research project in which the students will investigate what materials are used in the construction of energy-efficient buildings. Students will then design a building that is energy efficient and construct a building model. Students will determine the heat efficiency of the building by comparing it to a control building and interpret the data that you collect to determine your success in developing an energy-efficient building.

Writing Assignments (REQUIRED):

Give examples of the writing assignments and the use of critical analysis within the writing assignments.
• **Ecological Services Presentation:** Students will research and design a presentation on ecological services using the Millennium Ecosystem Assessment (an assessment of the environmental impact of mankind conducted in 2005). In this investigation students will use an online mapping service to locate and identify different ecosystems in their area. Students will then gather information for each ecosystem identifying the ecological services being provided. • **Investigate Habitat Size and Species Diversity:** Students will analyze data from a teacher-chosen field site and infer patterns in data. Students will predict if habitat size and species diversity will change over time at your test site. • **Edge Effects:** Students will determine population density of a plant species for three different locations on campus within the edge of habitats. Students will observe how organisms are affected by the edge effect and give reasons why there are differences in sample populations as you move from one habitat into the next. • **Investigate Disturbance and Succession:** Students will infer how other types of disturbances affect ecological succession and compare those inferences to the information you learned about wildfires.

INSTRUCTIONAL MATERIALS (REQUIRED)	
Textbook #1	
Title: Principles of Environmental Science	Edition:
Author:William & Mary Ann Cunningham	ISBN: MHID: 0077037480 | ISBN 13: 9780077037482
Publisher: McGraw-Hill	Publication Date: 2023
Usage: ☑ Primary Text ☐ Read in entirety or near	
Textbook #2	
Title:	Edition:
Author:	ISBN:
Publisher:	Publication Date:
Usage: ☐ Primary Text ☐ Read in entirety or near	

Supplemental Instructional Materials *Please include online, and open source resources if any.*	
CK12 Biology-Ecology Unit HHMI BioInteractive Environmental Inquiry Learn Genetics- Ecology Education and the Environment Initiative Biogeochemical Cycles Genetically Modified Food Electronic Waste Recycle Tragedy of Commons Simulation	
Estimated costs for classroom materials and supplies (REQUIRED). *Please describe in detail.* If more space is needed than what is provided, please attach a backup as applicable.	
Cost for a class set of textbooks: $	Description of Additional Costs:
Additional costs:$	
Total cost per class set of instructional materials:	$

Key Assignments (REQUIRED):
Please provide a detailed description of the Key Assignments including tests, and quizzes, which should incorporate not only short answers but essay questions also. How do assignments incorporate topics? Include all major assessments that students will be required to complete

- **Lab Safety Posters:** Students will create posters in class to solidify their understanding of the lab safety guidelines presented in lecture. Students will learn to synthesize information and expand on their marketing and presentation skills. These posters will also serve as ongoing reminders of the safety guidelines as they will be hung in the classroom. In addition, safety agreements will be signed and taped in the reference pages in the SNB.
- **Ecological Services Presentation:** Students will research and design a presentation on ecological services using the Millennium Ecosystem Assessment (an assessment of the environmental impact of mankind conducted in 2005). In this investigation students will use an online mapping service to locate and identify different ecosystems in their area. Students will then gather information for each ecosystem identifying the ecological services being provided.
- **Could You Beat Natural Selection?:** Students will locate fish (represented by chips) in the natural environment of the classroom. Students will predict the survivability of two sets of organisms by simulating predator and prey relationships. Students will complete the data tables and graph results.
- **Investigate Your Environment Project:** Students will research a local park, determining the organisms found in the local park and any past disturbances. Students will write to a local agency about the state of your park.
- **Investigate Plastic Pollution:** Students will plan and conduct investigations to determine which types of plastics affect life in different marine zones.Students will collect and organize data on the

behavior different types of plastic have in the water.

- **Building An Energy-Efficient Building Project:** A cumulative project research project in which the students will investigate what materials are used in the construction of energy-efficient buildings. Students will then design a building that is energy efficient and construct a building model. Students will determine the heat efficiency of the building by comparing it to a control building and interpret the data that you collect to determine your success in developing an energy-efficient building.

Instructional Methods and/or Strategies (REQUIRED):

Please list specific instructional methods that will be used.

The following methods and strategies for teaching the curriculum will be used during the course of instruction as appropriate for the each lesson: Project-based learning, field studies and lab investigations, collaborative learning opportunities, hands-on experience, student presentations, group and individual projects, peer coaching and student mentoring, use of community resources including guest speakers and field trips. Use of technology-based resources such as probe ware, water testing kits, and soil testing kits. Use of internet resources such as Phet Simulations, Learn Genetics, and Habitable Planet Simulations, among others will be utilized by students throughout the year.

Assessment Methods and/or Tools (REQUIRED):

Please list different methods of assessments that will be used.

During the course of the instructional year, assessment of student performance will include but will not be limited to:

1. Embedded assessments
2. Skill mastery and quality of work
3. Completion of assignments in a science journal
4. Data collection and maintenance of lab notebook with field notes
5. Individual projects/group projects/Group Presentations