El Monte Union High School District

Sept. 2015

Course Outline

High School District

Title: AP Environmental Science

Transitional*_____(Eng. Dept. Only)

Sheltered (SDAIE)*____Bilingual*___

AP**__X____Honors**_____

Department:___Science_____

Grade Level (s):_____11-12_____

Semester_____Year__X____

Year of State Framework Adoption_2009____

This course meets graduation requirements:

( ) English
( ) Fine Arts
( ) Foreign Language
( ) Health & Safety
( ) Math
( ) Physical Education
(X) Science
( ) Social Science
( ) Elective

Department/Cluster Approval	Date
	9-22-2015
	9/22/15
	9/22/15
	9/22/15
	9/22/15
	9-22-15
	9-22-15
	9/22/15
	9/22/15
	9-22-15

*Instructional materials appropriate for English Language Learners are required.

**For AP/Honors course attach a page describing how this course is above and beyond a regular course. Also, explain why this course is the equivalent of a college level class (see attached).

1. Prerequisite(s):
Successful completion of one year of Biology and one year of Chemistry with a grade of a B or better or at the recommendation of the previous science teacher. One year of Algebra I or Integrated Mathematics I.

2. Short description of course which may also be used in the registration manual:
This is an interdisciplinary course, which will involve the fields of, but not be limited to ecology, biology, ocean and atmospheric science, climatology, chemistry, geology, toxicology, geography, statistics, economics, politics and ethics. This course is designed to be the equivalent of a college introductory environmental science course. The goals of the AP Environmental Science course are to provide students with the scientific principles, concepts and methodologies required to understand the interrelationships in the natural world and to identify and analyze environmental problems or challenges (both natural and manmade). This course will also teach students how to evaluate the relative risks associated with these problems and to examine the alternative solutions for resolving and/or preventing them.
While this course explores many different topics, the following **themes** serve as a foundation for the course. They

include the following: Interconnectedness - Earth is one interconnected system, Sustainability - The environment functioning indefinitely without decline due to overuse, Energy Conversions - Underlie all ecological processes, Environmental Challenges - Problems often have a social and cultural context, Human Beings Affect/Alter Natural Systems, and Environmental Science as a Process – Experimental Design.

This course follows the AP College Board course outline and is a college equivalent course. Students will be *required* to take the AP exam in Environmental Science.

3. Describe how this course integrates the schools ESLRs (Expected School-wide Learning Results):
    - Academic achievers
        - Students will conduct research and report about issues related to environmental science.
        - Students will participate in classroom discussions and on classroom projects about environmental science.
        - Students will complete classroom and homework assignments about environmental science.
        - Students will conduct lab investigations about environmental science.

    - Critical thinkers:
        - Students will apply what they learn about environmental science to social issues in a culturally-conscious way.
        - Students will understand the process of goal setting and develop a personal plan for high school and beyond, including a plan about how to be a good environmental steward.
        - Students will conduct lab investigations that present problems to solve about the environment and use critical thinking skills in understanding environmental issues.
        - Students will design experiments.
        - Students will apply theoretical and practical knowledge acquired to everyday situations, especially those pertaining to environmental science.

    - Competent users of technology:
        - Students will use word processing and presentation programs to present their work on environmental themes.
        - Students will use computers for research and development of projects, including but not limited to the use of Excel and online databases.
        - Students will receive supervised Internet instruction and utilize the net as a tool to assist them in their class work.

    - Ethical and respectful individuals:
        - Students will be made aware of ethical behavior and the consequences for unethical behavior (cheating, copying, and plagiarizing, polluting the environment, destroying or degrading habitats, overexploiting resources, lying about or remaining ignorant of environmental issues) as students and as citizens of a global society.
        - Students will work cooperatively in diverse groups to understand and solve environmental problems.
        - Students will always be expected to assume personal responsibility for their actions and spoken words.
        - Students will be encouraged to respect diverse cultures at all times, with special emphasis on viewpoints about the environment. (Moved this last statement up from "Active community participants")

- Active community participants:
  - Students will be given opportunities to participate in school clubs and activities that respect cultural diversity.
  - Student will learn to work cooperatively with each other in groups when doing labs, projects and other activities.
  - Students will develop working relationships across gender and cultural groups.
  - Students will present to the class and answer questions (volunteering and when called upon) in various formats.
  - Students will develop service learning projects related to environmental science.
  - Students will write letters to political representatives about current environmental issues.

4. Describe the additional efforts/teaching techniques/methodology to be used to meet the needs of English Language Learners:
   - SDAIE (Specially Designed Academic Instruction in English) strategies will be incorporated into lessons
   - Vocabulary development will be emphasized
   - Visuals/manipulatives will be used

5. Describe the interdepartmental articulation process for this course:
   When applicable, the science department works with other departments to coordinate student work on course projects. Individual departments will build computer skills though assigning various projects requiring Power Point presentation, word processing, spreadsheet, and graphing.
   Students in Environmental Science AP at Rosemead HS will be required to link their work in this class with their work in other classes at various points throughout the year through personal journal writings. There may be other opportunities for interdepartmental articulation which will depend on whether and to what degree the teacher has prepared proper scaffolds for such opportunities (essay projects, videos, lab and experimental studies) and coordinated with other teachers of other disciplines.
   The Environmental AP teacher will attempt to work together with teachers from other departments and the instructional coach to share and develop common rubrics and give feedback with regards to assignments and where there are connections across disciplines. The Environmental AP teacher will attempt to develop assignments with teachers from other courses that integrate learning across subject matter disciplines.
   Here are some possible examples of interdepartmental projects:
   - Analysis of art or music that makes an environmental statement which later is performed in music class or inspires student-generated artwork or music (Art/Music/Enviro Sci).
   - Analysis or creation of political cartoons studied in US History regarding an important environmental issue (Art/History/Enviro Sci).
   - Compare and contrast of environmental writer with works read in American Literature (American Lit/Enviro Sci).
   - Analyze how Romanticism relates to environmental writing (English Lit/Enviro Sci).
   - Using statistical analysis, algebra, trigonometry or calculus to understand or solve an environmental issue (Math/Enviro Sci).
   - Analyze the impact of the Industrial Revolution, wars, or other historical events on the environment (History/Enviro Sci).
   - Analyze how political and economic systems impact attempts at solving environmental issues (US Gov't/Econ/Enviro Sci).

6. Describe how this course will integrate academic and vocational concepts, possibly through connecting activities and will address work-based learning/school to career concepts:
   Students will be exposed to a variety of career pathways by attending field trips, having guest speakers

present information to the students and evaluating current topics by analyzing case studies.
The work that students do in the class will be the work that various types of environmental scientists actually do. Concrete connections will be made between what we do and what experts of environmental science do. For example, students will analyze daily air pollution data in different seasons and analyze different water samples around campus, using techniques used by environmental scientists. Students will propose solutions to problems like overuse of water and destruction of habitat, which is what environmental scientists have to do. Students will design conservation plans for threatened or endangered species, just as real environmental scientists do.

7. Materials of Instruction (Note: Materials of instruction for English Language Learners are required and should be listed below.)

A. Textbook(s) and Core Reading(s):
- Living in the Environment, 16th Edition, Tyler Miller & Scott E. Spoolman

B. Supplemental Materials and Resources:
- Supplementary materials provided by the publisher of the text.
- A standard supply of testing kits and lab materials, as necessary.

C. Tools, Equipment, Technology, Manipulatives, Audio-Visual:
Visual presentations will be made using demonstrations, videos, models and/or presentations with an LCD projector. A variety of lab equipment will be utilized, such as water & soil sample kits, microscopes, and air pollution testers.

8. Objectives of Course

- Unit detail including projects and activities including duration of units (pacing plan):

- Indicate references to state framework(s)/standards (If state standard is not applicable then national standard should be used):

1. The College Board Standards are addressed and implemented within the curriculum.
2. National Education Standards: A. Science as inquiry; B. Physical Science. Interactions of energy and matter; C. Life Science. Molecular basis of heredity, Biological evolution, Interdependence of organisms, Matter, energy, and organization in living systems, Behavior of organisms; D. Earth and Space Science. Energy in the earth system, Geochemical cycles; E. Science and technology; F. Science in personal and social perspectives. Personal and community health, Population growth, Natural resources, Environmental quality, Natural and human-induced hazards, Science and technology in local, national, and global challenges; G. History and nature of science.
3. CA State Standards: Investigation & Experimentation; Earth Science (ES) 3. Plate Tectonics; ES4. Energy in the Earth System (Solar Energy Enters, Heat Escapes); ES5. Energy in the Earth System (Ocean and Atmospheric Convection); ES 6. Energy in the Earth System (Climate and Weather); ES7. Biogeochemical Cycles; ES8. Structure and Composition of the Atmosphere; ES9. California Geology; Biology (B) 2. Genetics (Meiosis and Fertilization); B6. Ecology; B7. Evolution (Population Genetics); B8. Evolution (Speciation); Chemistry (C) 5. Acids and Bases; C6. Solutions

4. Next-Generation Science Standards: High School Life Science (HS-LS) 2. Ecosystems: Interactions, Energy, and Dynamics; HS-Earth and Space Science (ESS) 2. Earth's Systems; HS-ESS3. Earth and Human Activity; HS-Engineering, Technology and Applications of Science (ETS) 1. Engineering Design; HS-Physical Science (PS) 4. Waves and Their Applications in Technologies for Information Transfer.
5. Common Core CA State Standards:
   English Language Arts and Literacy in History/Social Studies, Science, and Technical Subjects
   Reading for Informational Text (RI). Key Ideas and Details, Craft and Structure, Integration of Knowledge and Ideas, Range of Reading and Level of Text Complexity; Writing Standards (W). Text Types and Purposes, Research to Build and Present Knowledge, Range of Writing; Speaking and Listening (SL). Comprehension and Collaboration, Presentation of Knowledge and Ideas; Language (L). Vocabulary Acquisition and Use, Knowledge of Language, Conventions of Standard English; Reading for Literacy in Science and Technical Subjects (RST). Key Ideas and Details, Craft and Structure, Integration of Knowledge and Ideas, Range of Reading and Level of Complexity; Writing for Literacy in History/Social Studies, Science, and Technical Subjects (WHST). Text Types and Purposes, Production and Distribution of Writing, Research to Build and Present Knowledge, Range of Writing
   Mathematics
   Number and Quantity. Quantities (N-Q) 1-3. Reason quantitatively and use units to solve problems;
   Algebra. Seeing Structure in Expressions (A-SSE) 1-2. Interpret the structure of expressions. 3. Write expressions in equivalent forms to solve problems; Creating Equations (A-CED) 1-4. Create equations that describe numbers or relationships; Reasoning with Equations and Inequalities (A-REI) 1. Understand solving equations as a process of reasoning and explain the reasoning. 3, 3.1, 4. Solve equations and inequalities in one variable. 10-12. Represent and solve equations and inequalities graphically;
   Functions. Interpreting Functions (F-IF) 1-3. Understand the concept of a function and use function notation. 4-6. Interpret functions that arise in applications in terms of the content; Building Functions (F-BF) 1-2. Build a function that models a relationship between two quantities. 3-4. Build new functions from existing functions; Linear, Quadratic, and Exponential Models (F-LE) 1-3. Construct and compare linear, quadratic and exponential models and solve problems. 5-6. Interpret expressions for functions in terms of the situation they model;
   Statistics and Probability. Interpreting Categorical and Quantitative Data (S-ID) 1-3. Summarize, represent, and interpret data on a single count or measurement variable. 5-6. Summarize, represent, and interpret data on two categorical and quantitative variables. 7-9. Interpret linear models; Conditional Probability and the Rules of Probability (S-CP) 1-5. Understand independence and conditional probability and use them to interpret data. 6-9. Use the rules of probability to compute probabilities of compound events in a uniform probability model; Using Probability to Make Decisions (S-MD) 6-7. Use probability to evaluate outcomes of decisions.
   Geometry. Similarity, Right Triangles, and Trigonometry (G-SRT) 6-8, 8.1. Define trigonometric rations and solve problems involving right triangles. Circles (G-C) 1-4. Understand and apply theorems about circles. Geometric Measurement and Dimension (G-GMD) 1, 3. Explain volume formulas and use them to solve problems. 4-6. Visualize relationships between two-dimensional and three-dimensional objects. Modeling with Geometry (G-MG) 1-3. Apply geometric concepts to modeling situations.

Pacing Plan

1st Semester

1st 6 weeks

- **Earth Systems & Resources**
  Earth Science Concepts, Atmosphere, Global Water Resources, Soil
- **The Living World**
  Ecosystem Structure, Energy Flow

2nd 6 weeks
- **The Living World**
  Ecosystem Diversity, Natural Ecosystem Change, Natural Biogeochemical Cycles
- **Population**
  Population Biology Concepts, Human Population

3rd 6 weeks
- **Land & Water Use**
  Agriculture, Forestry, Rangelands, Other Land Use, Mining, Fishing, Global Economics
- **Energy Resources & Consumption**
  Energy Concepts, Energy Consumption, Fossil Fuel Resources, Nuclear Energy

2nd Semester

4th 6 weeks
- **Energy Resources & Consumption**
  Hydroelectric Power, Energy Conservation, Renewable Energy
- **Global Change**
  Stratospheric Ozone, Global Warming, Loss of Biodiversity

5th 6 weeks
- **Pollution**
  Pollution Types

6th 6 weeks
- **Pollution**
  Impacts on the Environment and Human Health, Economic Impacts

Outline of Topics

Course Outline

Unit I: Introduction to Environmental Science

Topic	Labs & Activities	Duration
Introduction to Environmental Issues	Reading , discussing, writing: Why environmental science? Cultural perspectives on environmental science Media: *CNN Planet in Peril* *Earth From Space* *Blue Planet*	1 week

	The Lorax	
Environmental History	Activities: Tragedy of the Commons Timeline of Environmental Science (Major Figures & Impact; Laws) Mini-Project: Experimental Design	1 week

Unit II: Earth's Systems and Resources

Topic	Labs & Activities	Duration
Earth as a System The Solid Earth	Lab: Testing Soils Activity: Reading Geological Maps	1-2 weeks
Global Water Resources & Use	Lab: Watershed Model Activity: Water Conservation Project	1 week
Atmosphere	Lab: Measuring Air Pollution Activities: Climate Zones Poster Isobars and Isotherms Drawings Analyzing Weather Charts	1 week

Unit III: The Living World

Topic	Labs & Activities	Duration
Ecosystem Structure	Activity: Biome Posters Media: *Planet Earth*	1 week
Energy Flow	Lab: Nitrogen Fixation	1 week
Ecosystem Diversity	Lab: Investigating Bird Beak Adaptations Media: *Cane Toads—An Unnatural History* Activites: Coevolution Examples	1-2 weeks

	Environmental Impact of Keystone Species Benefits of Biodiversity	
Natural Ecosystem Change	Media: *Earth From Space* Activity: Bio Bottles	1 week

Unit IV: Populations

Topic	Labs & Activities	Duration
Population Concepts	Activity: Survivorship Curves Lab: Capture & Release	1 week
Human Population	Case Study: What if? Lab: Modeling Exponential Growth Activity: Graphing Population Curves	1 week

Unit V: Land & Water Use

Topic	Labs & Activities	Duration
Agriculture	Demonstration: Organic Alternatives	1 week
Forestry/Rangelands	Lab: Habitat Islands	1 week
Mining/ Fishing/ Overexploitation	Media: Race to Save the Planet In the Name of Progress Labs: Black Lung Disease Fish-hook Designs to Reduce Bycatch	2 weeks
Global Economics	Project: Service Learning Introduction (ongoing) Media: Race to Save the Planet It Needs Political Decision and Now or Never	2 weeks

Unit VI: Energy Resources & Consumption

Topic	Labs & Activities	Duration

Energy Concepts/Consumption	Audit: Personal Energy Media: *Race to Save the Planet More for Less* *No Impact Man* Lab: Cookie Mining	2 weeks
Energy Resources	Discussion & Debate: Energy Alternatives Media: Nuclear Power	2 weeks

Unit VII: Global Change

Topic	Labs & Activities	Duration
Climate Change & Ozone Loss	Media: *An Inconvenient Truth* Project: Negotiating for a Cooler Planet	2 weeks
Loss of Biodiversity	Project: Endangered Species Reading: *The Future of Life* by E. O. Wilson	2 weeks

Unit VIII: Pollution

Topic	Labs & Activities	Duration
Pollution Types	Lab: Water Quality Lab: Particulates in the Home Media: Race to Save the Planet Do We Really Want to Live this Way?	4 weeks
Environmental/Economic Impacts	Lab: The LD 50 of Household Substances Lab: Ozone Media: Black Tide: A History of Oil Spills Discussion/Debate: Solutions to the Problem—Pro and Con	4 weeks

Evaluation/assessment/rubrics

"A" –level of work (90-100 %)
"B" –level work (80-89%)
"C" – level work (70-79%)
"D" – level work (60-69%)
"F" – level work (50-59%)

The grade is weighted using the following percentages:
Tests/Quizzes – 50%
*Labs, Activities, Projects – 30%
Homework – 10%
Final Exam – 10%

*Approximately two class periods per week/chapter will be devoted to laboratory/field experimentation. Labs will provide opportunities for students to solve problems, to form hypotheses, make observations, quantify/record data, interpret and analyze data and results, draw conclusions, think critically and apply what is explored in the course of their daily lives and future careers.