

FOLSOM CORDOVA UNIFIED SCHOOL DISTRICT



IB DP Environmental Systems and Societies SL

Board Approval Date: May 15, 2025	Course Length: 2 Semesters
Grading: A-F	.;Credits: 5 Credits per Semester
Proposed Grade Level(s): 11, 12	Subject Area: Elective, Other Science Elective Area (if applicable): Science
Prerequisite(s): Successful completion of Biology of the Living Earth, Successful completion of Chemistry of the Earth System or Physics in the Universe. Completion of concurrent enrollment in Integrated Math 3.	Corequisite(s):
CTE Sector/Pathway: N/A	
Intent to Pursue ‘A-G’ College Prep Status: Yes	
A-G Course Identifier: (d) Laboratory Science, (g) College-preparatory elective	
Graduation Requirement: No	
Course Intent: Site Specific Program (if applicable): IB	
Folsom Cordova Unified School District 2024-2025 Nondiscrimination Statement The Folsom Cordova Unified School District prohibits discrimination, intimidation, harassment (including sexual harassment) or bullying based on a person’s actual or perceived ancestry, color, disability, gender, gender identity, gender expression, immigration status, nationality, race or ethnicity, religion, sex, sexual orientation, or association with a person or a group with one or more of these actual or perceived characteristics. For questions or complaints, contact: Jim Huber, Ed.D., Assistant Superintendent, Educational Services Compliance Officer, Section 504 Coordinator, ADA Coordinator (students) jhuber@fcusd.org 916-294-9000 x 104580	

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The Folsom Cordova Unified School District does not discriminate on the basis of sex and prohibits sex discrimination in any education program or activity that it operates, as required by Title IX and its regulations, including in admission and employment.

Inquiries about Title IX may be referred to the Folsom Cordova Unified School District's Title IX Coordinator, the U.S. Department of Education's Office for Civil Rights, or both. The District Title IX Coordinator is:

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The District's nondiscrimination policy can be located at:

<https://www.fcusd.org/district/about-us/nondiscrimination-statementpolicy>

The District's nondiscrimination complaint procedures can be located at:

Students: <https://www.fcusd.org/departments/compliance/complaints/uniform-complaints>

Staff: <https://www.fcusd.org/departments/compliance/complaints/nondiscrimination-in-employment>

To report information about conduct that may constitute sex discrimination or sex-based harassment, or make a complaint of sex discrimination or sex-based harassment under Title IX, please refer to:

Students: <https://www.fcusd.org/district/about-us/title-ix-notificationsexual-harassment>

Staff: <https://www.fcusd.org/departments/compliance/complaints/sexual-harrassment-title-ix>

COURSE DESCRIPTION:

Environmental systems and societies (ESS) is a dynamic interdisciplinary subject that takes 21st-century challenges and socio-environmental real-world issues and looks at them through the lens of human societies and the interrelationships of the natural world: biosphere, atmosphere, hydrosphere and lithosphere. Students explore how these relationships change over time and space, consider the potential adaptations and mitigations that human societies and the natural world may currently be undergoing, and how these could impact the future and our place in it.

DETAILED UNITS OF INSTRUCTION:

Unit Number/Title	Unit Essential Questions	Examples of Formative Assessments	Examples of Summative Assessment
1. Foundation	How do different perspectives develop? How do perspectives affect the decisions we make concerning environmental issues? How can the systems approach be used to model environmental issues at different levels of complexity and scale? What is sustainability and how can it be measured? To what extent are challenges of sustainable development also ones of environmental justice?	*Developing an Environmental Values System continuum to understand perspectives in how environmental issues are addressed *Assessing environmental systems to determine sustainability *Developing Environmental impact statements	*Exams *Lab experiments *Projects
1.1.4 The values that underpin our perspectives can be seen in our communication and actions with the wider community. The values held by organizations can be seen through advertisements, media, policies and actions. 1.1.10 The development of the environmental movement has been influenced by individuals, literature, the media, major environmental disasters, international agreements, new technologies and scientific discoveries. 1.2.2 A systems approach is a holistic way of visualizing a complex set of interactions, and it can be applied to ecological or societal situations. 1.2.13 A model is a simplified representation of reality; it can be used to understand how a system works and to predict how it will respond to change. 1.3.6 Sustainable development meets the needs of the present without compromising the ability of future generations to meet their own needs. Sustainable development applies the concept of sustainability to our social and economic development. 1.3.9 Environmental justice refers to the right of all people to live in a pollution-free environment, and to have equitable access to natural resources, regardless of issues such as race, gender, socio- economic status, nationality. 1.3.20 The doughnut economics model is a framework for creating a regenerative and distributive economy in order to meet the needs of all people within the means of the planet.			
2. Ecology	How can natural systems be modelled, and can these models be used to predict the effects of human disturbance? How can flows of energy and matter through ecosystems be modelled?	*Modelling an open system of a pond *Developing a poster of a system that shows storages and flows, and identifies transfers or transformations of the flows *Modelling the flow of	*Exams *Lab experiments *Projects

	How do human actions affect the flow of energy and matter, and what is the impact on ecosystems? How do human activities affect nutrient cycling, and what impact does this have on the sustainability of environmental systems? How does climate determine the distribution of natural systems? How are changes in Earth systems affecting the distribution of biomes? How do ecological systems change over time and over space?	energy through an ecosystem *Case studies of human impact on environmental systems *Measuring impact of CO₂ levels on photosynthesis rates of plants *Measuring populations Case studies of focus species in their realized niches	
Essential Standards: 2.1.1 The biosphere is an ecological system composed of individuals, populations, communities, ecosystems. 2.1.22 Human activity can lead to tipping points in ecosystem stability. 2.2.1 Ecosystems are sustained by supplies of energy and matter. 2.3.1 Biogeochemical cycles ensure chemical elements continue to be available to living organisms. 2.3.11 Measures are required to alleviate the effects of human activities on the carbon cycle. 2.4.3 Abiotic factors are the determinants of terrestrial biome distribution. 2.4.7 Global warming is leading to changing climates and shifts in biomes. 2.5.8 An ecosystem's capacity to tolerate disturbances and maintain equilibrium depends on its diversity and resilience. 3.1.9 Knowledge of global and regional biodiversity is needed for the development of effective management strategies to conserve biodiversity.			
3. Water	How do water systems support life on Earth, and how do they interact with other systems, such as the Carbon cycle? What issues of water equity exist, and how can they be addressed? How do human populations affect the water cycle, and how does this impact water security? How are our diets impacted by our values and	*Modeling the impact of ocean currents impacts on climate *Diagram of water cycles. Investigating the specific heat of water as a temperature control *Measuring water quality standards *Discussions of water availability issues around the world *Case study on water quality issues	*Exams *Lab experiments *Projects

	perspectives? To what extent are aquatic food systems sustainable? How does pollution affect the sustainability of environmental systems? How do different perspectives affect how pollution is managed?		
Essential Standards: 4.1.2 The global hydrological cycle operates as a system with stores and flows. 4.1.5 Human activities, such as agriculture, deforestation and urbanization, can alter these flows and stores. 4.2.2 Social, cultural, economic and political factors all have an impact on the availability of, and equitable access to the freshwater required for human well-being. 4.3.4 The increasing global demand for seafood has encouraged use of unsustainable harvesting practices and overexploitation. 4.4.3 Water quality is the measurement of chemical, physical and biological characteristics of water. Water quality is variable and is often measured using a water quality index. Monitoring water quality can inform management strategies for reducing water pollution.			
4. Land	How do soils play a role in sustaining natural systems? How are human activities affecting the stability of soil systems? To what extent can the production of food be considered sustainable?	*Determining soil types. Modeling impacts of soil quality on plant productivity *Diagramming soil systems and how soil is produced *Case study of human impacts on soil quality *Investigating sustainable farming practices	*Exams *Lab experiments *Projects
5.1.1 Soil is a dynamic system within the larger ecosystem that has its own inputs, outputs, storages and flows. 5.2.5 Agricultural systems are varied, with different factors influencing the farmers' choices. These differences and factors have implications for economic, social and environmental sustainability. 5.2.7 The Green Revolution (also known as the Third Agricultural Revolution in the 1950s and 1960s) used breeding of high-yielding crop plants—combined with increased and improved irrigation systems, synthetic fertilizer and application of pesticides—to increase food security. It has been criticized for its sociocultural, economic and environmental consequences.			
5. Atmosphere and climate change	How do atmospheric systems contribute to the stability of life on Earth? To what extent has climate change occurred due to anthropogenic causes?	**Diagraming atmospheric systems and interactions with other systems *Case study of climate and CO₂ levels throughout Earth's history	*Exams *Lab experiments *Projects

	How do differing perspectives play a role in responding to the challenges of climate change? How can human societies address the causes and consequences of climate change? How does the ozone layer maintain equilibrium? How does human activity change this equilibrium?	*Modelling the ozone layer and function *Investigating how humans impact atmospheric composition	
6.1.1 The atmosphere forms the boundary between Earth and space. It is the outer limit of the biosphere and its composition and processes support life on Earth. 6.2.3 Analysis of ice cores, tree rings and deposited sediments provide data that indicates a positive correlation between the concentration of carbon dioxide in the atmosphere and global temperatures. 3.1.19 Human impacts are having a planetary effect, which will be detectable in the geological record. 6.3.3 A variety of mitigation strategies aim to address climate change. 6.4.3 Stratospheric ozone absorbs UV radiation from the Sun, reducing the amount that reaches the Earth's surface and, therefore, protecting living organisms from its harmful effects.			
6. Natural resources	How does the renewability of natural capital have implications for its sustainable use? How might societies reconcile competing perspectives on natural resource use? To what extent can human societies use natural resources sustainably? To what extent can energy consumption be equitable across the world? How can energy production be sustainable? How can societies sustainably manage waste?	*Developing natural capital models *Case study on Energy Production *Case study of waste management solutions of different countries	*Exams *Lab experiments *Projects

7.1.5 Ecosystems provide life-supporting ecosystem services.
7.1.9 The use of natural capital needs to be managed in order to ensure sustainability.
7.2.1 Energy sources are both renewable and non-renewable.
7.3.1 Use of natural resources generates waste that can be classified by source or type.

7. Human populations and urban systems	How can the dynamics of human populations be measured and compared? To what extent can the future growth of the human population be accurately predicted? To what extent are urban systems similar to natural ecosystems? How can reimagining urban systems create a more sustainable future? How can urban air pollution be effectively managed?	*Modelling growth curves *Case studies of human population distribution graphs *Modelling impacts of changing land use and urbanization *Urbanization environmental impact mitigation techniques	*Exams *Lab experiments *Projects
8.1.4 The global human population has followed a rapid growth curve. Models are used to predict the growth of the future global human population. 8.2.10 Ecological urban planning is a more holistic approach that treats the urban system as an ecosystem, understanding the complex relationships between its biotic and abiotic components. 8.3.4 A range of different management and intervention strategies can be used to reduce urban air pollution.			

RELEVANT STANDARDS AND FRAMEWORKS, CONTENT/PROGRAM SPECIFIC STANDARDS:

Link to Common Core Standards (if applicable):

Educational standards describe what students should know and be able to do in each subject in each grade. In California, the State Board of Education decides on the standards for all students, from kindergarten through high school.

[http://www.corestandards.org/ELA-Literacy/RST/11-](http://www.corestandards.org/ELA-Literacy/RST/11-12/)

[12/https://www.cde.ca.gov/be/st/ss/documents/ccssmathstandardaug2013.pdf](https://www.cde.ca.gov/be/st/ss/documents/ccssmathstandardaug2013.pdf)

Link to Framework (if applicable):

Curriculum frameworks provide guidance for implementing the content standards adopted by the State Board of Education (SBE). Frameworks are developed by the Instructional Quality Commission, formerly known as the Curriculum Development and Supplemental Materials Commission, which also reviews and recommends textbooks and other instructional materials to be adopted by the SBE.

<https://www.cde.ca.gov/ci/sc/cf/documents/scifwchapter7.pdf>

Link to Subject Area Content Standards (if applicable):

Content standards were designed to encourage the highest achievement of every student, by defining the knowledge, concepts, and skills that students should acquire at each grade level.

https://www.nextgenscience.org/search-standards?keys=&tid%5B%5D=107&tid_3%5B%5D=96&tid_3%5B%5D=94

Link to Program Content Area Standards (if applicable):

Program Content Area Standards apply to programs such as International Baccalaureate, Advanced Placement, Career and Technical Education, etc.

https://drive.google.com/file/d/18qkov2qXq4FjMK-jd4b9HB4hzkzSQjVM/view?usp=drive_link

TEXTBOOKS AND RESOURCE MATERIALS:

Textbooks

Board Approved	Pilot Completion Date (If applicable)	Textbook Title	Author(s)	Publisher	Edition	Date
<i>This material will be adopted with the approval of this outline.</i>		<i>Environmental Systems and Societies for the IB Diploma Programme</i>	Andrew Davis Garrett Nagle	Pearson	3rd	1/1/2024