Department of Accelerated Programs

IB Environmental Systems and Society SL Curriculum

10.0 Credits
<table>
<thead>
<tr>
<th>IB LEARNER PROFILE</th>
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</thead>
<tbody>
<tr>
<td>IB Programs aim to develop internationally minded people who are striving to become:</td>
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<tr>
<td><strong>Inquirers</strong></td>
</tr>
<tr>
<td><strong>Knowledgeable</strong></td>
</tr>
<tr>
<td><strong>Critical thinkers</strong></td>
</tr>
<tr>
<td><strong>Communicators</strong></td>
</tr>
<tr>
<td><strong>Risk-takers</strong></td>
</tr>
<tr>
<td><strong>Principled</strong></td>
</tr>
<tr>
<td><strong>Caring</strong></td>
</tr>
<tr>
<td><strong>Open-minded</strong></td>
</tr>
<tr>
<td><strong>Well-balanced</strong></td>
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<tr>
<td><strong>Reflective</strong></td>
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Year One - Unit Two

IB Environmental Systems and Societies SL

Course Description

As an interdisciplinary subject, environmental systems and societies is designed to combine the techniques and knowledge associated with group 4 (the experimental sciences) with those associated with group 3 (individuals and societies). The prime intent of this course is to provide students with a coherent perspective of the interrelationships between environmental systems and societies; one that enables them to adopt an informed personal response to the wide range of pressing environmental issues that they will inevitably come to face. Students’ attention can be constantly drawn to their own relationship with their environment and the significance of choices and decisions that they make in their own lives. It is intended that students develop a sound understanding of the interrelationships between environmental systems and societies, rather than a purely journalistic appreciation of environmental issues.
# IB Environmental Systems and Societies SL

## Pacing Guide

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<thead>
<tr>
<th>Unit</th>
<th>Topic</th>
<th>Suggested Timing</th>
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<tbody>
<tr>
<td>Unit 1</td>
<td>Foundations of environmental systems and societies</td>
<td>4 Weeks</td>
</tr>
<tr>
<td>Unit 2</td>
<td>Ecosystems and Ecology</td>
<td>12 Weeks</td>
</tr>
<tr>
<td>Unit 3</td>
<td>Humans and Society</td>
<td>10 Weeks</td>
</tr>
<tr>
<td>Unit 4</td>
<td>Food Production Systems</td>
<td>10 Weeks</td>
</tr>
</tbody>
</table>
Educational Technology Standards


- **Technology Operations and Concepts**
  - Create a personal digital portfolio which reflects personal and academic interests, achievements, and career aspirations by using a variety of digital tools and resources
  - Produce and edit a multi-page digital document for a commercial or professional audience and present it to peers and/or professionals in that related area for review.

- **Creativity and Innovation**
  - Apply previous content knowledge by creating and piloting a digital learning game or tutorial.

- **Communication and Collaboration**
  - Develop an innovative solution to a real world problem or issue in collaboration with peers and experts, and present ideas for feedback through social media or in an online community.

- **Digital Citizenship**
  - Demonstrate appropriate application of copyright, fair use and/or Creative Commons to an original work.
  - Evaluate consequences of unauthorized electronic access and disclosure, and on dissemination of personal information.
  - Compare and contrast policies on filtering and censorship both locally and globally.

- **Research and Information Literacy**
  - Produce a position statement about a real world problem by developing a systematic plan of investigation with peers and experts synthesizing information from multiple sources.

- **Critical Thinking, Problem Solving, Decision Making**
  - Evaluate the strengths and limitations of emerging technologies and their impact on educational, career, personal and or social needs.
Career Ready Practices

Career Ready Practices describe the career-ready skills that all educators in all content areas should seek to develop in their students. They are practices that have been linked to increase college, career, and life success. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

CRP1. Act as a responsible and contributing citizen and employee
Career-ready individuals understand the obligations and responsibilities of being a member of a community, and they demonstrate this understanding every day through their interactions with others. They are conscientious of the impacts of their decisions on others and the environment around them. They think about the near-term and long-term consequences of their actions and seek to act in ways that contribute to the betterment of their teams, families, community and workplace. They are reliable and consistent in going beyond the minimum expectation and in participating in activities that serve the greater good.

CRP2. Apply appropriate academic and technical skills.
Career-ready individuals readily access and use the knowledge and skills acquired through experience and education to be more productive. They make connections between abstract concepts with real-world applications, and they make correct insights about when it is appropriate to apply the use of an academic skill in a workplace situation.

CRP3. Attend to personal health and financial well-being.
Career-ready individuals understand the relationship between personal health, workplace performance and personal well-being; they act on that understanding to regularly practice healthy diet, exercise and mental health activities. Career-ready individuals also take regular action to contribute to their personal financial wellbeing, understanding that personal financial security provides the peace of mind required to contribute more fully to their own career success.
Career Ready Practices

CRP4. Communicate clearly and effectively and with reason.
Career-ready individuals communicate thoughts, ideas, and action plans with clarity, whether using written, verbal, and/or visual methods. They communicate in the workplace with clarity and purpose to make maximum use of their own and others’ time. They are excellent writers; they master conventions, word choice, and organization, and use effective tone and presentation skills to articulate ideas. They are skilled at interacting with others; they are active listeners and speak clearly and with purpose. Career-ready individuals think about the audience for their communication and prepare accordingly to ensure the desired outcome.

CRP5. Consider the environmental, social and economic impacts of decisions.
Career-ready individuals understand the interrelated nature of their actions and regularly make decisions that positively impact and/or mitigate negative impact on other people, organization, and the environment. They are aware of and utilize new technologies, understandings, procedures, materials, and regulations affecting the nature of their work as it relates to the impact on the social condition, the environment and the profitability of the organization.

CRP6. Demonstrate creativity and innovation.
Career-ready individuals regularly think of ideas that solve problems in new and different ways, and they contribute those ideas in a useful and productive manner to improve their organization. They can consider unconventional ideas and suggestions as solutions to issues, tasks or problems, and they discern which ideas and suggestions will add greatest value. They seek new methods, practices, and ideas from a variety of sources and seek to apply those ideas to their own workplace. They take action on their ideas and understand how to bring innovation to an organization.

CRP7. Employ valid and reliable research strategies.
Career-ready individuals are discerning in accepting and using new information to make decisions, change practices or inform strategies. They use reliable research process to search for new information. They evaluate the validity of sources when considering the use and adoption of external information or practices in their workplace situation.
Career Ready Practices

CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.
Career-ready individuals readily recognize problems in the workplace, understand the nature of the problem, and devise effective plans to solve the problem. They are aware of problems when they occur and take action quickly to address the problem; they thoughtfully investigate the root cause of the problem prior to introducing solutions. They carefully consider the options to solve the problem. Once a solution is agreed upon, they follow through to ensure the problem is solved, whether through their own actions or the actions of others.

CRP9. Model integrity, ethical leadership and effective management.
Career-ready individuals consistently act in ways that align personal and community-held ideals and principles while employing strategies to positively influence others in the workplace. They have a clear understanding of integrity and act on this understanding in every decision. They use a variety of means to positively impact the directions and actions of a team or organization, and they apply insights into human behavior to change others’ action, attitudes and/or beliefs. They recognize the near-term and long-term effects that management’s actions and attitudes can have on productivity, morals and organizational culture.

CRP10. Plan education and career paths aligned to personal goals.
Career-ready individuals take personal ownership of their own education and career goals, and they regularly act on a plan to attain these goals. They understand their own career interests, preferences, goals, and requirements. They have perspective regarding the pathways available to them and the time, effort, experience and other requirements to pursue each, including a path of entrepreneurship. They recognize the value of each step in the education and experiential process, and they recognize that nearly all career paths require ongoing education and experience. They seek counselors, mentors, and other experts to assist in the planning and execution of career and personal goals.

CRP11. Use technology to enhance productivity.
Career-ready individuals find and maximize the productive value of existing and new technology to accomplish workplace tasks and solve workplace problems. They are flexible and adaptive in acquiring new technology. They are proficient with ubiquitous technology applications. They understand the inherent risks-personal and organizational-of technology applications, and they take actions to prevent or mitigate these risks.
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<tr>
<td><strong>CRP12. Work productively in teams while using cultural global competence.</strong> Career-ready individuals positively contribute to every team, whether formal or informal. They apply an awareness of cultural difference to avoid barriers to productive and positive interaction. They find ways to increase the engagement and contribution of all team members. They plan and facilitate effective team meetings.</td>
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</table>
## Differentiated Instruction

### Strategies to Accommodate Students Based on Individual Needs

<table>
<thead>
<tr>
<th>Time/General</th>
<th>Processing</th>
<th>Comprehension</th>
<th>Recall</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Extra time for assigned tasks</td>
<td>• Extra Response time</td>
<td>• Precise step-by-step directions</td>
<td>• Teacher-made checklist</td>
</tr>
<tr>
<td>• Adjust length of assignment</td>
<td>• Have students verbalize steps</td>
<td>• Short manageable tasks</td>
<td>• Use visual graphic organizers</td>
</tr>
<tr>
<td>• Timeline with due dates for reports and projects</td>
<td>• Repeat, clarify or reword directions</td>
<td>• Brief and concrete directions</td>
<td>• Reference resources to promote independence</td>
</tr>
<tr>
<td>• Communication system between home and school</td>
<td>• Mini-breaks between tasks</td>
<td>• Provide immediate feedback</td>
<td>• Visual and verbal reminders</td>
</tr>
<tr>
<td>• Provide lecture notes/outline</td>
<td>• Provide a warning for transitions</td>
<td>• Small group instruction</td>
<td>• Graphic organizers</td>
</tr>
<tr>
<td></td>
<td>• Reading partners</td>
<td>• Emphasize multi-sensory learning</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Assistive Technology</th>
<th>Tests/Quizzes/Grading</th>
<th>Behavior/Attention</th>
<th>Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Computer/whiteboard</td>
<td>• Extended time</td>
<td>• Consistent daily structured routine</td>
<td>• Individual daily planner</td>
</tr>
<tr>
<td>• Tape recorder</td>
<td>• Study guides</td>
<td>• Simple and clear classroom rules</td>
<td>• Display a written agenda</td>
</tr>
<tr>
<td>• Spell-checker</td>
<td>• Shortened tests</td>
<td>• Frequent feedback</td>
<td>• Note-taking assistance</td>
</tr>
<tr>
<td>• Audio-taped books</td>
<td>• Read directions aloud</td>
<td></td>
<td>• Color code materials</td>
</tr>
</tbody>
</table>

- Tests/Quizzes/Grading
- Behavior/Attention
- Organization
## Enrichment

**Strategies Used to Accommodate Based on Students Individual Needs:**

- Adaption of Material and Requirements
- Evaluate Vocabulary
- Elevated Text Complexity
- Additional Projects
- Independent Student Options
- Projects completed individual or with Partners
- Self Selection of Research
- Tiered/Multilevel Activities
- Learning Centers
- Individual Response Board
- Independent Book Studies
- Open-ended activities
- Community/Subject expert mentorships
## Assessments

### Suggested Formative/Summative Classroom Assessments

- Timelines, Maps, Charts, Graphic Organizers
- Teacher-created Unit Assessments, Chapter Assessments, Quizzes
- Teacher-created DBQs, Essays, Short Answer
- Accountable Talk, Debate, Oral Report, Role Playing, Think Pair, and Share
- Projects, Portfolio, Presentations, Prezi, Gallery Walks
- Homework
- Concept Mapping
- Primary and Secondary Source analysis
- Photo, Video, Political Cartoon, Radio, Song Analysis
- Create an Original Song, Film, or Poem
- Glogster to make Electronic Posters
- Internal and External IB Assessments
# Interdisciplinary Connections

<table>
<thead>
<tr>
<th><strong>English Language Arts</strong></th>
<th><strong>Math</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Journal writing</td>
<td>• Research industry salaries for a geographic area and juxtapose against local cost of living</td>
</tr>
<tr>
<td>• Close reading of industry-related content</td>
<td>• Go on a geometry scavenger hunt</td>
</tr>
<tr>
<td>• Create a brochure for a specific industry</td>
<td>• Track and track various data, such as industry’s impact on the GDP, career opportunities or among of individuals currently occupying careers</td>
</tr>
<tr>
<td>• Keep a running word wall of industry vocabulary</td>
<td><strong>Fine &amp; Performing Arts</strong></td>
</tr>
<tr>
<td></td>
<td>• Create a poster recruiting young people to focus their studies on a specific career or industry</td>
</tr>
<tr>
<td></td>
<td>• Design a flag or logo to represent a given career field</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Social Studies</strong></th>
<th><strong>Science</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Research the history of a given industry/profession</td>
<td>• Research the environmental impact of a given career or industry</td>
</tr>
<tr>
<td>• Research prominent historical individuals in a given industry/profession</td>
<td>• Research latest developments in industry technology</td>
</tr>
<tr>
<td>• Use historical references to solve problems</td>
<td>• Investigate applicable-careers in STEM fields</td>
</tr>
</tbody>
</table>

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<thead>
<tr>
<th><strong>World Language</strong></th>
<th><strong>Math</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Translate industry-content</td>
<td>• Research industry salaries for a geographic area and juxtapose against local cost of living</td>
</tr>
<tr>
<td>• Create a translated index of industry vocabulary</td>
<td>• Go on a geometry scavenger hunt</td>
</tr>
<tr>
<td>• Generate a translated list of words and phrases related to workplace safety</td>
<td>• Track and track various data, such as industry’s impact on the GDP, career opportunities or among of individuals currently occupying careers</td>
</tr>
</tbody>
</table>

**Science** |
• Research the environmental impact of a given career or industry
• Research latest developments in industry technology
• Investigate applicable-careers in STEM fields
Next Generation Science Standards (NGSS):

HS-ESS2-1. Develop a model to illustrate how Earth’s internal and surface processes operate at different spatial and temporal scales to form continental and ocean-floor features.

HS-ESS2-2. Analyze geoscience data to make the claim that one change to Earth's surface can create feedbacks that cause changes to other Earth systems.

HS-ESS2-3. Develop a model based on evidence of Earth’s interior to describe the cycling of matter by thermal convection.

HS-ESS2-4. Use a model to describe how variations in the flow of energy into and out of Earth’s systems result in changes in climate.

HS-ESS2-5. Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes.

HS-ESS2-6. Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere.

HS-ESS2-7. Construct an argument based on evidence about the simultaneous coevolution of Earth’s systems and life on Earth.

HS-LS2-1. Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.

HS-LS2-2. Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.

HS-LS2-6. Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.
HS-LS2-7. Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.*

HS-LS2-8. Evaluate the evidence for the role of group behavior on individual and species’ chances to survive and reproduce.

HS-LS4-4. Construct an explanation based on evidence for how natural selection leads to adaptation of populations.

HS-LS4-6. Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.*
**Course:** ESS  
**Unit:** 2  
**Grade Level:** 11-12  

**Unit Overview:** This unit explores the natural laws that govern the function of systems in the environment.

**Next Generation Science Standards (NGSS):** HS-LS2-1 HS-LS2-2, HS-LS2-8, HS-LS2-6

<table>
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<tr>
<th>Student Learning Objectives (SLOs)</th>
<th>Essential Questions</th>
<th>Content</th>
<th>Activities and Assessments</th>
<th>Resources</th>
</tr>
</thead>
</table>
| Explore the use of maps in describing the effect of altitude and latitude on weather and climate. | What is the relationship between latitude, altitude and climate?  
How can ocean current influence climate? | ➢ Identify regions given latitude and altitude.  
➢ Predict the effects latitude and altitude have on biomes.  
➢ Explain how variation in climate within latitudes is influence by wind and ocean currents. | Turning Point Response System  
Paper 1 style questions  
Debates  
Simulations  
Open Form Writing  
On-line quizzes  
Lab/Simulation Report  
Extended Essay Style question response  
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| Define the term biome and explain the distribution, structure and relative productivity of tropical rainforest, deserts, tundra and any other biome. | Why are some biomes more productive than others? What influence does latitude and altitude have on the productivity of a given biome? | ➢ Compare the productivity of different biomes. ➢ Explore how their latitude and altitude limits or enhances their productivity. Predict how climate change may alter the known distribution of biomes. | Turning Point Response System  
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| Distinguish between biotic and abiotic (physical) components of an ecosystem. | How can living and non-living components of an ecosystem be classified? Why is an accurate method of organism identification of such importance? Explain the relationship that exists between living and non-living things? | ➢ Identify the relationship between abiotic and biotic components of an ecosystem. ➢ Explain the complete dependence on the abiotic on the part of the biotic. ➢ Explain the use of keys in the identification and organization of organisms ➢ Model techniques used for measuring the biotic components of an ecosystem. ➢ Determine practices for measuring the abundance of a species. ➢ Outline how abiotic parts of an ecosystem are quantified. | Turning Point Response System  
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| Explore and model the flow of energy through trophic levels of an ecosystem. **NGSS: HS-LS2-2** | How can we illustrate the flow of energy through the trophic levels of an ecosystem? Compare the accuracy and reliability of field techniques? | ➢ Create visual representations of energy flow using pyramid diagrams.  
➢ Estimate biomass and energy at different trophic levels.  
➢ Estimate diversity using the Simpson diversity index.  
➢ Explore the reliability and accuracy of varied field techniques. | Turning Point Response System  
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| Identify and explain the principles of pyramids of numbers, pyramids of biomass and pyramids of productivity and construct such pyramids from given data. **NGSS: HS-LS2-2** | How do Pyramids of number, pyramids of biomass, and pyramids of productivity work together to illustrate the movement of energy in an ecosystem? Why would one pyramid structure be chosen over another? | ➢ Utilize pyramid diagrams to represent information other than energy, such as biomass, productivity or numbers. | Turning Point Response System  
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| Define the terms species, population, habitat niche, community and ecosystem regarding local examples. **NGSS**: HS-LS2-6 | How can the terms species, population, habitat, niche, community and ecosystem help us classify the world around us? Why is diversity such an important issue in biodiversity preservation? | ➢ Apply terms learned to describe surrounding.  
➢ Outline and explain the importance of diversity in an ecosystem.  
➢ Differentiate between species and genetic diversity.  
➢ Explain the importance of preserving Biodiversity hotspots. | Turning Point Response System  
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| Describe and explain population interactions using examples of named species. **NGSS:** HS-LS2-6 | How do populations interact with one another in nature? How do new species develop from existing organisms? | ➢ Explain how populations interact with one another. ➢ Relate species interactions to their role in natural selection. ➢ Identify processes that can lead to new species. -**Case Study:** Evidence from fossils – evolution of the horse -**Case Study:** Competition on a Rocky Shore -**Case Study:** Exponential growth of a rabbit population | Turning Point Response System  
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## Unit 2 Vocabulary

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<tr>
<td>Heterotrophic</td>
</tr>
<tr>
<td>Autotrophic</td>
</tr>
<tr>
<td>Herbivore</td>
</tr>
<tr>
<td>Carnivore</td>
</tr>
<tr>
<td>Omnivore</td>
</tr>
<tr>
<td>Producer</td>
</tr>
<tr>
<td>Consumer</td>
</tr>
<tr>
<td>Decomposer</td>
</tr>
<tr>
<td>Food Chain</td>
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<tr>
<td>Food Web</td>
</tr>
<tr>
<td>Number Pyramid</td>
</tr>
<tr>
<td>Biomass Pyramid</td>
</tr>
<tr>
<td>Productivity Pyramid</td>
</tr>
<tr>
<td>Trophic levels</td>
</tr>
</tbody>
</table>
### TOK Connections

Ecosystems are studied by measuring biotic and abiotic factors—how can you know in advance which of these factors are significant to the study?

### Contribution to the Development of Students’ Approached to Learning Skills

This course enhances student thinking skills as they approach topics relevant to their lives in the 21st century. They cultivate self-management as they research and explore solutions to the global environmental problems facing society today. Their social and communication skills are honed as they strive to effect change.

### Contributions to the Development of the Attribute(s) of the Learner Profile

Environmental issues are a concern for every person living on this planet. This course encourages students to become open-minded inquirers and thinkers so that they may become knowledgeable. It fosters a desire to communicate these important issues to others. It promotes caring as it encourages them to reflect and focus concern on others. As risk takers students are encouraged to seek and employ solutions to the problems facing our society in the 21st century.

### Contribution to the Development of International Mindedness

Zonation occurs on different scales that can be both local and global.