

Subject group and course title:

Group 3/4 (Interdisciplinary): Environmental Systems and Societies SL

Course purpose:

Environmental Systems and Societies (ESS) is a Standard-level course of interdisciplinary nature, meaning that students may choose this subject as a group 3 or a group 4 option. On the one hand, the course focuses on the scientific exploration of environmental systems through the methodology used in sciences (group 4). On the other hand, it explores the interaction of the environmental systems with human societies using approaches and methods of group 3 subjects. The interaction between the ecological and social systems is explored through economic, political and social contexts, while the ethical dimension of human interactions is always in focus.

The course aims to equip the students with the skills required to explore the structure and functions of natural ecosystems and assess and evaluate the impact of human societies on the natural world. These skills include performing hands-on practicals, conducting literature research, and communicating their ideas through presentations or debates.

As a result of studying this course, students will become equipped with the ability to recognize and evaluate the impact of our complex societal systems on the natural world. The systems approach employed throughout the course leads to more holistic thinking about environmental issues, promoting problem-solving initiatives that propose suitable management solutions.

The ESS course aims to enable students to:

1. acquire the knowledge and understandings of environmental systems at a variety of scales
2. apply the knowledge, methodologies and skills to analyze environmental systems and issues at a variety of scales
3. appreciate the dynamic interconnectedness between environmental systems and societies
4. value the combination of personal, local and global perspectives in making informed decisions and taking responsible actions on environmental issues
5. be critically aware that resources are finite, and that these could be inequitably distributed and exploited, and that management of these inequities is the key to sustainability
6. develop an awareness of the diversity of environmental value systems
7. develop critical awareness that environmental problems are caused and solved by decisions made by individuals and societies that are based on different areas of knowledge

8. engage with the controversies that surround a variety of environmental issues
9. create innovative solutions to environmental issues by engaging actively in local and global contexts

Topics covered

Environmental Systems and Societies is taught through a series of topics organized individually or collectively in unit plans

Year 1

Unit 1: Foundations of Environmental Systems

Topic 1.2 Systems and Models

Topic 1.1 Environmental value systems

Topic 1.3 Energy and Equilibria

Topic 1.4 Sustainability

Topic 1.5 Humans and Pollution

Unit 2: Ecosystems and Ecology

Topic 2.1 Species and populations

Topic 2.2 Communities and Ecosystems

Topic 2.3 Flows of energy and matter

Topic 1.4 Biomes, zonation and succession

Topic 1.5 Investigating ecosystems – practical work

Unit 3: Biodiversity and Conservation

Topic 3.1 An introduction to biodiversity

Topic 3.2 Origins of biodiversity

Topic 3.3 Threats to biodiversity

Topic 3.4 Conservation of biodiversity

Unit 4: Water and Aquatic Food production systems

Topic 4.1 Introduction to water systems

Topic 4.2 Access to freshwater

Topic 4.3 Aquatic food production systems

Topic 4.4 Water pollution

Year 2

Unit 5: Soil and Terrestrial Food Production Systems and Societies

- 5.1 Introduction to soil systems
- 5.2 Terrestrial food production systems and food choices
- 5.3 Soil degradation and conservation

Unit 6: Atmospheric systems and Societies

- 6.1 Introduction to the atmosphere
- 6.2 Stratospheric ozone
- 6.3 Photochemical smog
- 6.4 Acid deposition

Topic 7: Climate change and energy production

- 7.1 Energy choices and security
- 7.2 Climate change causes and impacts
- 7.3 Climate change - mitigation and adaptation

Topic 8: Human systems and resource use

- 8.1 Human population dynamics
- 8.2 Resource use in society
- 8.3 Solid domestic waste
- 8.4 Human population carrying capacity

Assessment model

The course has both an **internal** and an **external** assessment component. The **external** assessment consists of two papers, paper 1 and paper 2, worth 75% of the final mark. In Paper 1 (25% of final assessment), an unseen case study is presented to the students through diagrams, charts, and maps. Students should answer short questions by analyzing and evaluating data presented in the case study. In paper 2 (50% of the final assessment), in section A, students are asked to answer short-answer and data-based questions, while in section B, they need to answer two structured essay questions from a choice of four.

The **internal** assessment involves completing an individual investigation of a research question that the student has developed. The investigation is submitted as a written report of 2,250 words maximum and is marked against specific assessment criteria by the teacher. For example, students could investigate the effect of human activities on plant diversity or create questionnaires to explore the views and attitudes of people towards marine pollution. The internal assessment has an overall weighing of 25% to the final assessment. It is internally marked by the teacher and externally moderated by the IB.

In-class assessment is both formative and summative. Formative assessment aims to help students

develop skills essential for the course, while summative assessment checks the level of student achievement. Formative assessment includes in-class presentations in topics selected by students, group work on inquiry projects, timed essay writing, debates, practical work in the lab and the field, and reflection sessions. Summative assessment includes in-class tests, mock exams and assessed pieces of homework.

Concepts in ESS

The course establishes strong connections with key concepts discussed in the MYP, such as Identity, Change, Creativity, Culture and Form. The course itself has its central ideas, including sustainability, equilibrium, strategy, biodiversity and environmental value systems. These concepts are introduced to the students at the beginning of each unit, making connections during teaching. Students are challenged to revisit these concepts through a series of open-end questions called big questions, which are either used as a revision exercise at the end of each topic or are introduced during class time as discussion topics. The open-ended nature of the questions allows the students to draw links between the unit content and the related concepts. Examples of “big questions” are the following:

A. Which strengths and weaknesses of the systems approach and of the use of models have been revealed through this topic?

B. To what extent have the solutions emerging from this topic been directed at preventing environmental impacts, limiting the extent of the environmental impacts or restoring systems in which environmental impacts have already occurred?

Conceptual understanding is also enhanced through the system’s approach employed throughout the subject. Students are introduced to the system’s approach at the beginning of the subject. They gradually build the skill to see any entity as a system with inflows, outflows and processes. The systems approach allows students to approach ecosystems at different scales and to see ideas from other subjects as possible inflows or outflows from the studied system, strengthening interdisciplinary learning.

ESS and international mindedness

The course draws examples and case studies at a local and global scale. Students are encouraged to see local environmental issues on a global scale and assess their impact. Pollution, for example, is an environmental issue that students visit at a local scale, in some instances through hands-on practicals. However, they soon realize that most forms of pollution have a global over-reaching character. Through

this process, students are asked to propose solutions that will impact both local and global scale. Students are also introduced to global political organizations (UNEP) and scientific fora (IPCC), which promote international cooperation to implement policies and suggest solutions at a global scale. Finally, the overarching theme of scientific exploration and international scientific cooperation is introduced to the students, who are then asked to reflect on their own cases studies and examples.

ESS and the IB Learner profile

As with all other DP subjects, the development of the IB learner profile is a central aim of the subject. Students become more knowledgeable, better thinkers and communicators through the taught classes, practical work, and the internal assessment project. Through inquiry-based projects, they acquire a deeper understanding of the material, which they are able to apply in their practical work and internal assessment and communicate using appropriate written and oral means of communication. By drawing international links, they develop a sense of empathy for those in need, and they seek to suggest solutions. They also understand that culture plays an important role in shaping societies' environmental value systems and gradually develop a sense of open-mindedness. By designing their Internal assessment projects, they take calculated risks and review the ethical side of scientific research.

Env. Sys. Soc and Approaches to Learning

“Approaches to teaching and learning (ATL) across the Diploma Programme refers to deliberate strategies, skills and attitudes that permeate the teaching and learning environments”. (IB ESS guide)

These approaches and strategies are tightly woven into the teaching of the subject through a series of formative and summative tasks. Students are challenged to develop their communication and social skills through projects based on teamwork and peer assessment. They also develop their presentation skills through a series of in-class presentations and presentations to the school community (development of TED events). Time management is essential for planning homework and works in the lab, and thus students are constantly challenged to be aware of their time constraints in each task. The open-ended nature of the subject allows the student to carry out extensive research and collect data to build their case studies. Through this process, they are challenged to think over the validity of their resources and see how they can combine the new strains of knowledge to unveil solutions to global environmental challenges. Finally, they are asked to constantly reflect on their assessed tasks and the knowledge they acquire, a metacognitive process essential for their growth as learners.

Env. Sys. Soc and CAS

CAS enables students to embody the attributes of the IB learner profile in real and practical ways, to grow as unique individuals and to recognize their role in relation to others". (ESS guide) Environmental Systems and Societies has strong links with CAS as students engage with local and global environmental issues. This interaction allows students to carry these experiences beyond the class to promote awareness in the school environment and beyond. Most instances of field sampling are supplemented with beach clean-up activities. Students also develop questionnaires to inquire on the views and attitudes of groups of people towards pressing environmental issues or even take care of beautifying their school cafeteria and rest area by growing plants.

Env. Sys. Soc and TOK

"The TOK course engages students in reflection on the nature of knowledge and how we know what we claim to know" (ESS guide). Environmental Systems and Societies allows the students to draw rich links between the course and TOK. Being an interdisciplinary course combining Humanities and Natural sciences, ESS allows students to develop questions on the nature of the knowledge acquired through methods of two different disciplines and how these combine. Working at different scales and contexts, ESS emphasizes diverse perspectives and addresses how culture and societal status may shape the view of the knowers regarding the environment.

Recommended resources

Rutherford Jill, Williams Gillian (2015) Oxford IB Diploma Programme: Environmental Systems and Societies Course Companion, Oxford University Press.

Rutherford Jill, Williams Gillian (2016) Oxford IB Diploma Programme: Environmental Systems and Societies: Skills and Practice, Oxford University Press.

Instructor's name

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