



Stony Point High School  
IB Diploma Programme  
Course Syllabus  
**Environmental Systems and Societies  
(ESS)**

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**Tutorials: Before School Tues/Thurs**

- I. **Course Description:** ESS is an interdisciplinary group 3 and 4 course that is offered only at standard level (SL). As an interdisciplinary course, ESS is designed to combine the methodology, techniques and knowledge associated with group 4 (sciences) with those associated with group 3 (individuals and societies). Because it is an interdisciplinary course, students can study ESS and have it count as either a group 3 or a group 4 course, or as both. If students choose the latter option, this leaves the opportunity to study an additional subject from any other group, including an additional group 3 or group 4 subject. ESS is a complex course, requiring a diverse set of skills from its students. It is firmly grounded in both a scientific exploration of environmental systems in their structure and function and in the exploration of cultural, economic, ethical, political, and social interactions of societies with the environment. As a result of studying this course, students will become equipped with the ability to recognize and evaluate the impact of our complex system of societies on the natural world. The interdisciplinary nature of the course requires a broad skill set from students and includes the ability to perform research and investigations and to participate in philosophical discussion. The course requires a systems approach to environmental understanding and problem-solving, and promotes holistic thinking about environmental issues. It is recognized that to understand the environmental issues of the 21st century and suggest suitable management solutions, both the human and environmental aspects must be understood. Students should be encouraged to develop solutions from a personal to a community and to a global scale. Through the exploration of cause and effect, the course investigates how values interact with choices and actions, resulting in a range of environmental impacts. Students develop an understanding that the connections between environmental systems and societies are diverse, varied and dynamic. The complexity of these interactions challenges those working towards understanding the actions required for effective guardianship of the planet and sustainable and equitable use of shared resources. (Environmental Systems and Societies Course Guide, IBO, 2015)
- II. **Prior Learning for Course** Past experience shows that students will be able to study ESS successfully with no background in, or previous knowledge of, environmental studies. Their approach to learning, characterized by the IB learner profile attributes, will be significant here. (Environmental Systems and Societies Course Guide, IBO, 2015) However, completion of Biology, Chemistry and Algebra 1 is required.
- III. **Course Aims & Objectives:** The systems approach provides the core methodology of the ESS course. It is complemented by other influences, such as economic, historical, cultural, sociopolitical and scientific factors, to provide a holistic perspective on environmental issues. During the course, students will look at examples on a variety of scales, from local to global, and in an international context. The aims of the ESS course are 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 analyse 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 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.

These objectives reflect how the aims of the ESS course will be assessed. It is the intention of this course that students, in the context of environmental systems and related issues, are able to fulfill the following assessment objectives.

1. Demonstrate knowledge and understanding of relevant:
  - facts and concepts
  - methodologies and techniques
  - values and attitudes.
2. Apply this knowledge and understanding in the analysis of:
  - explanations, concepts and theories
  - data and models
  - case studies in unfamiliar contexts
  - arguments and value systems.
3. Evaluate, justify and synthesize, as appropriate:
  - explanations, theories and models
  - arguments and proposed solutions
  - methods of fieldwork and investigation
  - cultural viewpoints and value systems.
4. Engage with investigations of environmental and societal issues at the local and global level through:
  - evaluating the political, economic and social contexts of issues
  - selecting and applying the appropriate research and practical skills necessary to carry out investigations
  - suggesting collaborative and innovative solutions that demonstrate awareness and respect for the cultural differences and value systems of others.

(Environmental Systems and Societies Course Guide, IBO, 2015)

- IV. **How the course will address TOK:** TOK lessons can support students in their study of ESS, just as the study of ESS can support students in their TOK studies. TOK provides a space for students to engage in stimulating, wider discussions about questions such as what it means for a discipline to be a natural science or a human science, or whether there should be ethical constraints on the pursuit of this knowledge. It also provides an opportunity for students to reflect on the methodologies of ESS as an interdisciplinary subject, and how these compare to the methodologies of other areas of knowledge. It is now widely accepted that researchers utilize not only scientific methods, but a variety of approaches, in order to enhance understanding of the interaction between environmental systems and societies. Scientific disciplines share a common focus on utilizing inductive and deductive reasoning, on the importance of evidence, and so on; but in the ESS course students are also required to use other methods traditionally associated with the human sciences (Environmental Systems and Societies

Course Guide, IBO, 2015). In ESS we will focus on discussion of open-ended questions about knowledge, and how our experience in the world affects the way in which we interact with the environment.

- V. **How the course will address CAS:** In ESS students actively engage with environmental issues and create innovative solutions where possible. Students could extend their classroom activities into CAS experiences using their learning in purposeful and meaningful ways. All three strands of CAS can be incorporated into experiences that relate to ESS within local, national and global communities.

Examples include:

- creating a campaign to support an initiative within the school that addresses an environmental issue such as reduction of food waste
- taking part in voluntary work that engages with an environmental initiative such as a project to preserve the environment of an endangered species
- working alongside a community organization to tackle the problem of air pollution by promoting and supporting the use of bicycles and access to public transport.

(Environmental Systems and Societies Course Guide, IBO, 2015)

- VI. **How the course will address Approaches to Learning skills:**

1. Thinking skills - Students will explore the environment from multiple vantage points, perspectives and cultures and apply their knowledge to a variety of applications.
2. Communications skills - Students will communicate their ideas both verbally and through written form. Emphasis will be put on writing styles that will help students be successful on papers 1 and 2.
3. Social skills - Students will interact with each other every class period through discussion, group projects, collaborative work, and peer review.
4. Self-management skills - Students will take charge of their own learning. They will be responsible for covering material outside of class, asking questions to expand their understanding, and making connections between the ideas within and outside of the curriculum.
5. Research skills - Students will participate in a variety of scientific investigations, building their inquiry skills. Students will use these skills in order to complete the IA for ESS as well as other inquiry labs and research projects.

- VII. **The approach to teaching the course.**

We will teach the course using the approaches to teaching as defined by the IB. This means that the course will be: based on inquiry, focused on conceptual understanding, developed in local and global contexts, focused on effective teamwork and collaboration, differentiated to meet the needs of all learners, and informed by formative and summative assessment.

Students can expect a mixture of lecture, readings and discussions, with several labs completed throughout the year. ESS requires that students learn certain field work skills, so we will be emulating those in the classroom as well. Almost all assessments will be written, and in the style of the IB test.

- VIII. **How the course will address the Learner Profile.**

The ESS course contributes to the development of the IB learner profile. By following the course, students will have engaged with the attributes of the IB learner profile. For example, the requirements of the internal assessment provide students with opportunities to develop every aspect of the IB learner profile. For each attribute of the learner profile, a number of references from the course are given below.

## Learner Profile Attributes

<b>Inquirers</b>	Aims 1, 2, 5 and 6- Practical work and internal assessment
<b>Knowledgeable</b>	Aims 1, 2, 3, 5 and 6—international-mindedness links Practical work and internal assessment
<b>Thinkers</b>	Aims 3, 5, 7 and 8—theory of knowledge links Practical work and internal assessment
<b>Communicators</b>	Aims 2, 8 and 9—external assessment Practical work and internal assessment
<b>Principled</b>	Aims 4, 7, 8 and 9 —Practical work and internal assessment. Ethical behaviour/practice , academic honesty
<b>Open-Minded</b>	Aims 3, 4, 6, 7 and 8—international-mindedness links Practical work and internal assessment, the group 4 project
<b>Caring</b>	Aims 4, 8 and 9—Practical work and internal assessment, the group 4 project, ethical behaviour/ practice
<b>Risk-Takers</b>	Aims 4, 8 and 9—Practical work and internal assessment, the group 4 project
<b>Balanced</b>	Aims 4, 5, 6 and 7—Practical work and internal assessment
<b>Reflective</b>	Aims 5 and 9--Practical work and internal assessment, the group 4 project

## IX. Assessment details for Internal and External Requirements

Assessment component	Weighting (%)	Approximate weighting of objectives in each component (%)		Duration (hours)
		1 and 2	3	
Paper 1 (case study)	25	50	50	1
Paper 2 (short answers and structured essays)	50	50	50	2
Internal assessment (individual investigation)	25	Covers objectives 1, 2, 3 and 4		10

**Internal Assessment (IA): 25%**- Internal assessment is an integral part of the course and is compulsory for all students. It enables students to demonstrate the application of their skills and knowledge, and to pursue their personal interests, without the time limitations and other constraints that are associated with written examinations.

2wza

The purpose of the internal assessment investigation is to focus on a particular aspect of an ESS issue and to apply the results to a broader environmental and/or societal context. The investigation is recorded as a written report. The report should be 1,500 to 2,250 words long. Students should be made aware that external moderators will not read beyond 2,250 words and teachers should only mark up to this limit.

The internal assessment investigation consists of:

- identifying an ESS issue and focusing on one of its specific aspects

- developing methodologies to generate data that are analyzed to produce knowledge and understanding of this focused aspect
- applying the outcomes of the focused investigation to provide understanding or solutions in the broader ESS context.

The investigation produced should be commensurate with the level of the course and may draw on methodologies and analytical techniques used in either experimental or human science studies. Investigations may consist of appropriate qualitative work or quantitative work. In some cases these are descriptive approaches and may involve the collection of considerable qualitative data. In others, establishing cause and effect through inferential statistical analysis (a scientific approach) may be used.

The preparation of the Internal Assessment will be an in class grade, but the final version will be externally marked by IB as well as by the teacher. It will be assessed under the following criteria: Context (20%), Planning (20%), Results, Analysis and Conclusion (20%), Discussion and Evaluation (20%), Applications (10%), Communication (10%).

Labs and Practicals completed throughout the year will prepare students for the IA, and will be graded using the same mark scheme so that students become comfortable with the expectations.

### **External Assessment (AKA The Test): (75%)**

The external assessment consists of two written papers and is worth 75% of the final assessment. A calculator is required for both papers. Graphic display calculators (GDCs) are permitted

#### **Paper 1**

Duration: 1 hour

Weighting: 25%

Marks: 35

- Students will be provided with a range of data in a variety of forms relating to a specific, previously unseen case study.
- Questions will be based on the analysis and evaluation of the data in the case study.
- All of the questions are compulsory.
- The questions test assessment objectives 1, 2 and 3.

#### **Paper 2**

Duration: 2 hours

Weighting 50%

Marks: 65

- Paper 2 consists of two sections, A and B.
- Section A (25 marks) is made up of short-answer and data-based questions.
- Section B (40 marks) requires students to answer two structured essay questions from a choice of four. Each question is worth 20 marks.
- The questions test assessment objectives 1, 2 and 3.

### **X. Grading Policy & Scale:**

Major Grades (Summative): 40% (at least 2 per 9 week period)

ex: Tests and Quizzes, Major Projects, Lab Reports

Minor Grades(Formative): 60%

ex. Daily work, Worksheets, Homework, Lab Prep

### Homework:

You will be given a variety of homework assignments (textbook reading, online presentations, videos, packets, case studies). It is your responsibility to complete these assignments, ensuring that you understand the material. The best way to accomplish this is through note taking.

If you need help understanding any of the homework, come in for tutorials or contact me with any questions. I am here to help you understand the material and work on ways to improve your note taking.

### Lab Assignments:

These assignments **must be turned in on time** (*i.e. at the beginning of your class on the due date*). Late labs will be deducted 10 points per day.

Participation in a lab also requires proper attire and your lab notebook. Lack of either of these will result in your inability to participate in the lab.

Some lab activities cannot be made up, but you are still responsible for completing the lab questions or write up. If you are absent on a lab day, you are expected to come see me so I can direct you where to get the lab data from in order to complete the lab and turn it in on the assigned day.

### Tests:

It is important that you keep up with your assignments and work on studying a little bit each day. There is too much information for you to try to “cram” all of your studying into a few hours before a test. You will be more likely to retain information if you review and study your notes and textbook a little every day!

Tests are composed of IB exam questions and IB style exam questions.

Tests will be time limited just as it is on the IB exam.

**Tests will be graded using an IB markscheme (1-7), and gradebook grades will be scaled according to the equivalent passing score (4=passing)**

Test questions will be based on class notes, assignments, labs, and your textbook. We may or may not directly cover every single item on a test. It is your responsibility to carefully complete assignments, assigned readings and video notes.

After a test is graded and discussed in class, students are welcome to make arrangements to look at their test mistakes in greater detail. Tests will not be released to students.

If you are absent on the day of a test, you are expected to see me about a make-up date, the day you return to class.

XI. **Course Sequence:** The following is a brief overview of what will be taught in IB ESS:

<b>Topic 1: Foundations of environmental systems and societies</b>	1.1 Environmental value systems 1.2 Systems and models 1.3 Energy and equilibria 1.4 Sustainability 1.5 Humans and pollution
<b>Topic 2: Ecosystems and ecology</b>	2.1 Species and populations 2.2 Communities and ecosystems 2.3 Flows of energy and matter 2.4 Biomes, zonation and succession 2.5 Investigating ecosystems
<b>Topic 3: Biodiversity and conservation</b>	3.1 An introduction to biodiversity 3.2 Origins of

	biodiversity 3.3 Threats to biodiversity 3.4 Conservation of biodiversity
<b>Topic 4: Water and aquatic food production systems and societies</b>	4.1 Introduction to water systems 4.2 Access to fresh water 4.3 Aquatic food production systems 4.4 Water pollution
<b>Topic 5: Soil systems and terrestrial food production systems and societies</b>	5.1 Introduction to soil systems 5.2 Terrestrial food production systems and food choices 5.3 Soil degradation and conservation
<b>Topic 6: Atmospheric systems and societies</b>	6.1 Introduction to the atmosphere 6.2 Stratospheric ozone 6.3 Photochemical smog 6.4 Acid deposition
<b>Topic 7: Climate change and energy production</b>	7.1 Energy choices and security 7.2 Climate change—causes and impacts 7.3 Climate change—mitigation and adaptation
<b>Topic 8: Human systems and resource use</b>	8.1 Human population dynamics 8.2 Resource use in society 8.3 Solid domestic waste 8.4 Human population carrying capacity

## XII. IA Checkpoint dates and final IA Deadlines

All students will complete the independent research project, regardless of intention to test. Failure to meet checkpoints will be communicated with the IB coordinator. All checkpoint submissions will be turned in electronically on the \*estimated dates listed below, regardless of A/B schedule. Rough draft and final submission dates are recorded on the SPHS IA Calendar. (**Note:** These dates are subject for amendment, but NOT the final submission)

Students will also have 1 meeting per semester with the teacher to discuss: Results and Analysis (Fall) and Rough Draft (Spring). **Checkpoints will be graded assignments available in Schoology-** They may be Major or Minor grades depending on the content.

<b>Checkpoint</b>	<b>Due Date (May be subject to change)</b>
#1- Topic & Research Question	Aug 31
#2- Background Information/Environmental Context	Sept 15
# 3- Methodology	Sept 21
#4- Data Collection	Oct 30
#5- 50% Draft	Nov 16
#6- Descriptive Analysis	Jan 8th
#7- Data Presentation	Jan 23
#8- Data Analysis	Jan 31
#9- Conclusion	Feb 6

#10- Full Rough Draft	Feb 16th
Final Submission	Mar 7

XIII. **Sample exam questions -**

**Paper 1:** Students will be given a resource booklet with readings, figures and tables.

**Figure 3(a): Fact file on biodiversity in Brazil**

Answer **all** questions. Answers must be written within the answer boxes provided.

The resource booklet provides information on Brazil. Use the resource booklet and your own studies to answer the following.

and Cerrado (Savanna).

- The Atlantic Rainforest originally covered about 15% of Brazil mainly along the Brazilian coast as well as extending into neighbouring countries of Paraguay and Argentina. The region comprises of various ecosystems including tropical and subtropical forests.
- The Cerrado region covers about 20% of the land area in central Brazil and extends into the neighbouring countries of Paraguay and Bolivia. It comprises a range of ecosystems including grasslands, savanna regions and forests.

[Sources: www.conservation.org and www.nature.org]

**Figure 3(b): Estimated number of species found within the Atlantic Rainforest and the Cerrado region**

	Atlantic Rainforest	Cerrado
<b>Plants</b>	20 000 (8000 endemic)	10 000 (4400 endemic)
<b>Birds</b>	934 (144 endemic)	607 (17 endemic)
<b>Mammals</b>	264 (72 endemic)	195 (14 endemic)
<b>Amphibians</b>	456 (282 endemic)	186 (28 endemic)
<b>Reptiles</b>	311 (94 endemic)	225 (33 endemic)

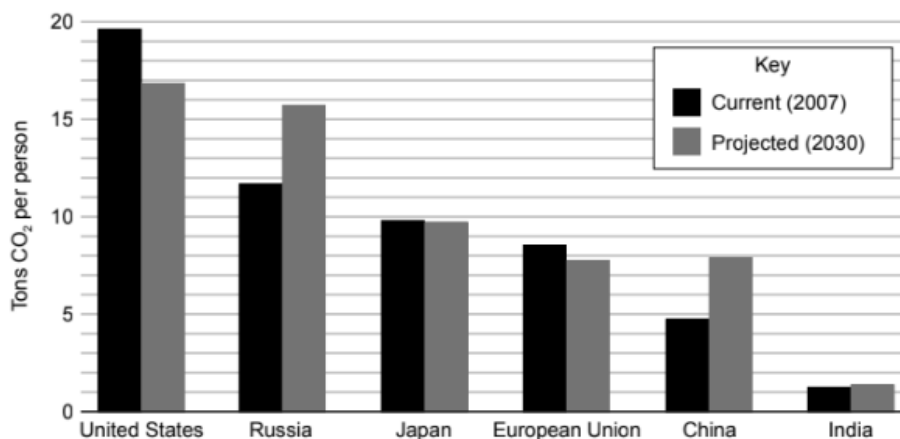
[Source: www.cepf.net]

**Paper 2:**

**Part A: Short answer questions**

3. There are concerns that increased carbon dioxide (CO<sub>2</sub>) emissions are leading to changes in the global climate.

**Figure 3: CO<sub>2</sub> emissions for select countries in 2007 and 2030 (Projected)**



[Source: adapted from www.wri.org]



- (a) Calculate the projected percentage increase from 2007 to 2030 in CO<sub>2</sub> emissions for Russia. [1]
- (b) Outline how CO<sub>2</sub> emissions may cause a change in the global climate. [2]
- (c) Identify two possible reasons for the projected change in CO<sub>2</sub> emissions for China. [2]
- (d) Identify one reduction strategy that the United States might use to achieve its projected change in CO<sub>2</sub> emissions. [1]
- (e) Identify one adaptation strategy that could be used to reduce the impacts of climate change. [1]
- (f) Explain how the ability to implement mitigation and adaptation strategies may vary from one country to another. [4]

**Part B: Extended Response:** Students will be given 4 question sets, and must answer **two** full sets of questions. (Ex: You may choose to answer Question 4a-4c, and Question 7a-7c. You may NOT mix and match between sets)

- 4. (a) Identify four ways in which solar energy reaching vegetation may be lost from an ecosystem before it contributes to the biomass of herbivores. [4]
- (b) Suggest a series of procedures that could be used to estimate the net productivity of an insect population in kgm<sup>-2</sup> yr<sup>-1</sup> [7]
- (c) To what extent are the concepts of net productivity and natural income useful in managing the sustainable harvesting of named resources from natural ecosystems? [9]

**(This is one question SET and would be answered in its entirety)**

XIV. **Stony Point Academic Honesty Policy:** All students are expected to abide by the SPHS Academic Honesty Policy. This policy is available on the SPHS IB website at [www.stonypointib.com](http://www.stonypointib.com) under Handbooks. The password is Tiger2021.

***academic integrity in any way, however small, is a choice that you make.***

Students will be expected to follow the Stony Point High School Academic Honesty Policy as well as other agreed upon guidelines. In addition to the official policy, here are some guidelines to help students define cheating and plagiarism. **Students should report any suspected violations to these policies immediately.**

#### **Cheating**

Looking off another person's exam for answers

Collaborating with others on work that is supposed to be completed independently

**Copying another student's homework, written assignments, examination answers, electronic media, or other data.**

Assisting or allowing someone else to cheat.

Willfully copying or allowing class assignments to be copied and falsely presenting them as your own work and effort.

Using unauthorized materials such as books, notes, or "cheat" sheets to answer examination questions

Using or consulting electronic equipment including cell phones, PDA's, IPODS, etc. during a testing situation.

Being informed or informing, verbally or otherwise, of test questions or answers either during or prior to the testing situation.

#### **Plagiarism**

Representing the ideas, expressions, or materials of another without due credit.

Paraphrasing or condensing ideas from another person's work without proper citation.

- Failing to document direct quotations and paraphrases with proper citation.
- Submitting a paper purchased from a research or term paper service, including the Internet.
- Undocumented Web source usage.

### **Intervention Policy**

Test Scores: **Students will be expected to maintain 70 on tests given in class.** If the student scores below this level on any two assessments in the same semester, they will be required to complete tutoring as laid out by an intervention plan developed by some or all of the following: student, teacher, counselor, IB coordinator, and parents/guardians.

**XV. Writing an Extended Essay in** The extended essay is an in-depth study of a focused topic chosen from the list of available Diploma Programme subjects for the session in question. It is intended to promote academic research and writing skills, providing students with an opportunity to engage in personal research in a topic of their own choice, under the guidance of a supervisor (an appropriately qualified member of staff within the school). This leads to a major piece of formally presented, structured writing, in which ideas and findings are communicated in a reasoned and coherent manner, appropriate to the subject chosen. It is mandatory that all students undertake three reflection sessions with their supervisor, which includes a short, concluding interview, or viva voce, with their supervisor following the completion of the extended essay. Biology is the science that deals with living organisms and life processes. An ESS EE should incorporate biological theory and emphasize the essential nature of this subject. For more information regarding topic choice and requirements for an EE in biology please visit your teacher's website.

### **XVI. Classroom Policy & Procedure**

#### **Supplies Needed:**

1. Binder & lined paper- Used for organizing handouts and homework assignments
2. Internet access (You must let me know as soon as possible if this is an issue, if not it will be assumed that you have access)
3. A pen and a pencil for each class
4. Class Supplies \_\_\_\_\_

**Phone Policy:** We will be following the campus-wide cell phone policy

#### **Where to find your assignments:**

Agendas, curriculum guides, and class materials can be found on Schoology.

This information will be updated frequently, so make sure to check it often. You are responsible for all assignments given in class or on schoology.

#### **Absence Policy:**

***If you know about your absence ahead of time*** (i.e school trips, college visits, planned trips with family)

You are expected to keep up with the agenda. This means that you will need to talk with me before your absence to discuss the work you are going to miss. Work will be due the day you return, including homework due the day of your return.

If you will be missing a test or quiz, you are expected to make arrangements with me for a makeup time **BEFORE you leave**. You will not necessarily be required to take the assessment before you leave, but you need to set a time/date for the test.

***If you are sick or miss class unexpectedly because of an emergency,***

I expect you to turn your work in that was assigned for the day you were absent **ON THE DAY YOU RETURN** unless you have contacted me ahead of time and made alternate arrangements.

Any work assigned during your absence is your responsibility to get and complete within the one block per day absent policy at Stony Point High School.

Missing the class before a test **DOES NOT** excuse you from taking the test, unless there are extenuating circumstances that you notify me about AHEAD OF TIME. Not kidding.

If you are absent on the day of the test, it is your responsibility to see me the next block that you are in school to schedule a make-up day. The test must be made up **within one week** of the absence.

Labs are a crucial part of this course. It is very important to not miss lab days. If you miss a lab you are not guaranteed to be able to make up the lab due to restrictions on the quantity of supplies. It is possible that you may be able to complete the lab with another class or during a make-up session. If this is not the case, you will earn an "excused" grade for the lab.

### **Retake/Missing Assignment Policy**

*"Science, my boy, is made up of mistakes, but they are mistakes which it is useful to make, because they lead little by little to the truth." -J. Verne, Journey to the Center of the Earth*

Students are allowed to retake **one** assignment up to a 70 throughout a six week period. Please come see me about scheduling this retake.