

COURSE OUTLINE ENVIRONMENTAL SYSTEMS AND SOCIETIES

SESSION – 2014-16



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Course outline ESS

COURSE DESCRIPTION:

The Environmental Systems & Societies (ESS) course is a transdisciplinary course (Experimental Science - Group 4, and Individuals and Societies - Group 3). Choosing this as one of their subject, students are able to fulfill the requirements for both groups 3 and 4 of hexagon, thus permit them to choose another subject from any hexagon group (including another group 3 or 4 subject). Transdisciplinary subjects therefore establishes more mouldability to the IB diploma programme. The subject is offered at standard level (SL) only.

The motives of this course is it to reveal students to the interrelationships of the environment and societies, and the nature of their interactions, so that they can make an informed personal response to a wide range of burning global issues.

This is a lab-based, career-focused course covering a broad range of subjects including ecosystems and their structure, conservation and biodiversity, pollution management and the issues of global warming . The subject helps to build in various scientific skills like skills to measure and monitor various aspects of the environment and will reinforce a good understanding of scientific methods and rigor.

The courseteaches the students the inter-relationship between biotic and abiotic factors. Students enrich themselves by studying the various environmental problems from many angles like scientific, ethical, historical, economic, cultural and socio-political. Local contexts will be utilized for understanding various concepts, incorporating lots of field work and laboratory practical work as possible, and the theory applied in a series of case studies.

This course introduces to many issues related to our habitat and ignites a spark among the young blood to help all in making this world a wonderful place to live in.

For further details see

http://www.greenschoolsalliance.org/files/SUBJECT_GUIDE_FE_2010.pdf

AIMS AND OBJECTIVES:

AIMS:

The systems approach provides the core methodology of this course. It is amplified by other

sources, such as economic, historical, cultural, socio-political and scientific, to provide a holistic perspective on environmental issues.

The aims of the **environmental systems and societies** course are to:

1. promote understanding of environmental processes at a variety of scales, from local to global
2. provide a body of knowledge, methodologies and skills that can be used in the analysis of environmental issues at local and global levels
3. enable students to apply the knowledge, methodologies and skills gained
4. promote critical awareness of a diversity of cultural perspectives
5. recognize the extent to which technology plays a role in both causing and solving environmental problems
6. appreciate the value of local as well as international collaboration in resolving environmental problems
7. appreciate that environmental issues may be controversial, and may provoke a variety of responses
8. appreciate that human society is both directly and indirectly linked to the environment at a number of levels and at a variety of scales.

Objectives:

The objectives reflect those parts of the aims that will be assessed. It is the intention of the **environmentalsystems and societies** course that students should achieve the following objectives.

1. Demonstrate an understanding of information, terminology, concepts, methodologies and skills with regard to environmental issues.
2. Apply and use information, terminology, concepts, methodologies and skills with regard to environmental issues.
3. Synthesize, analyse and evaluate research questions, hypotheses, methods and scientific explanations with regard to environmental issues.
4. Using a holistic approach, make reasoned and balanced judgments using appropriate economic, historical, cultural, socio-political and scientific sources.
5. Articulate and justify a personal viewpoint on environmental issues with reasoned argument while appreciating alternative viewpoints, including the perceptions of different cultures.

6. Demonstrate the personal skills of cooperation and responsibility appropriate for effective investigation and problem solving.
7. Select and demonstrate the appropriate practical and research skills necessary to carry out investigations with due regard to precision.

Command terms with definitions

These command terms indicate the depth of treatment required for a given assessment statement and relate to the course objectives in the “Assessment objectives” section. Objectives 1 and 2 are lower-order skills and objectives 3, 4 and 5 relate to higher-order skills. These terms will be used in examination questions, and so it is important that students are familiar with the following definitions.

Objective 1

- Define** Give the precise meaning of a word, phrase, concept or physical quantity.
- Draw** Represent by means of a labelled, accurate diagram or graph, using a pencil. A ruler (straight edge) should be used for straight lines. Diagrams should be drawn to scale. Graphs should have points correctly plotted (if appropriate) and joined in a straight line or smooth curve.
- Label** Add labels to a diagram.
- List** Give a sequence of brief answers with no explanation.
- Measure** Obtain a value for a quantity.
- State** Give a specific name, value or other brief answer without explanation or calculation.

Objective 2

- Annotate** Add brief notes to a diagram or graph.
- Apply** Use an idea, equation, principle, theory or law in relation to a given problem or issue.
- Calculate** Obtain a numerical answer showing the relevant stages of working.
- Describe** Give a detailed account.
- Distinguish** Make clear the differences between two or more concepts or items.
- Estimate** Obtain an approximate value.

- Identify** Provide an answer from a number of possibilities.
- Outline** Give a brief account or summary.

Objectives 3, 4 and 5

- Analyse** Break down in order to bring out the essential elements or structure.
- Comment** Give a judgment based on a given statement or result of a calculation.
- Compare and contrast** Give an account of similarities and differences between two (or more) items or situations, referring to both (all) of them throughout.
- Construct** Display information in a diagrammatic or logical form.
- Deduce** Reach a conclusion from the information given.
- Derive** Manipulate a mathematical relationship to give a new equation or relationship.
- Design** Produce a plan, simulation or model.
- Determine** Obtain the only possible answer.
- Discuss** Offer a considered and balanced review that includes a range of arguments, factors or hypotheses. Opinions or conclusions should be presented clearly and supported by appropriate evidence.
- Evaluate** Make an appraisal by weighing up the strengths and limitations.
- Explain** Give a detailed account, including reasons or causes.
- Justify** Give valid reasons or evidence to support an answer or conclusion.
- Predict** Give an expected result.
- Solve** Obtain the answer(s) using algebraic and/or numerical methods and/or graphical methods.
- Suggest** Propose a solution, hypothesis or other possible answer.

HOW THE COURSE ADDRESSES:

INTERNATIONALMINDEDNESS:

This course will focus on global environmental change from a social science viewpoint . Human activities are transfiguring the Earth System, resulting in change in climate, loss of biodiversity , depletion of ozone layer, changes in land covers, and changes to the global water system. Most

of these changes have been framed, surveyed, and labeled as environmental issues related to the biogeophysical sciences, with contributions from the social sciences on issues such as population and economic trends, costs and benefits, and

livelihood analyses. From past experiences, its observed

that global environmental change is socially-driven, and closely allied to issues of equity, justice, power and politics. Understanding how societal structures and transfigurations influence and interact with environmental changes is critical to efforts to respond to them. Approaches linked to political ecology, the sociology of scientific knowledge, incorporated with human-environment system, ecological economics, and environmental politics will be studied.

TOK: This course has plenty of TOK approaches.

The systems approach itself, , raises some interesting points of comparison and contrast with conventional models of the scientific method. It is essentially aggregated rather than reductionist. The collected data includes quantitative as well as qualitative . There are many checks and guidelines to ensure objectivity in data handling and interpretation but the standards of objectivity may not always be so rigorously controlled as they are in the purely physical sciences. Furthermore, as a transdisciplinary subject, the material addressed frequently lies astride the interface of what are perceived as clear subject boundaries. In exploring and understanding an environmental issue, one must be able to integrate the hard, scientific, quantitative “facts” with the qualitative value judgments of politics, sociology and ethics. All this makes particularly fertile ground for discussions related to theory of knowledge (TOK).

Extended Essay:

Is an in-depth study of a focused topic, normally from one of the student’s six chosen subjects for the IB Diploma. It is intended to promote high-level research and writing skills, intellectual discovery and creativity leading to a major piece of formally presented, structured writing of 3500-4000 words.

In order to write a good EE in ESS you need to first of all be interested in and passionate about the environment; and secondly be prepared to do hard work.

IB LEARNER PROFILE

LP ATTRIBUTES	IB CRITERIA	TEACHERS RESPONSIBILITY
Inquirers	We nurture our curiosity, developing skills for inquiry and research. We know how to learn independently and with others. We learn with enthusiasm and sustain our	ESS is taught in a “hook” style ,where the teacher delivers the topic in such a that students become curious & then we provide tools to find out the answers themselves. Thus inculcating the habit of

	love of learning throughout life.	becoming an inquirer.
Knowledgable	We develop and use conceptual understandings, exploring knowledge across a range of disciplines. We engage with issues and ideas that have local and global significance.	IBDP guide instruct not to teach ESS in a factual recall manner only. It must be understandable, skill based & should be applicable in daily life.
Thinkers	We use critical and creative thinking skills to analyze and take responsible action on complex problems. We exercise initiative in making reasoned, ethical decisions.	In ESS, students are able to evaluate data & experimental methods using analytical skills learned during the course hence learning through reasoning is ingrained.
Communicators	We express ourselves confidently and creatively in more than one language and in many ways. We collaborate effectively, listening carefully to the perspectives of other individuals and groups.	Communication is one of the most prominent listed 21 st century skill. In ESS, students gets enough opportunities to communicate their learning through group discussions, presentations, debates & during labs.
Principled	We act with integrity and honesty, with a strong sense of fairness and justice, and with respect for the dignity and rights of people everywhere. We take responsibility for our actions and their consequences.	Students are encouraged to show academic honesty & integrity during researching, experimenting and report findings. Students will consider ethics and morals in all scientific ventures.
Open---minded	We critically appreciate our own cultures and personal histories, as well as the values and traditions of others. We seek and evaluate a range of points of view, and we are willing to grow from the experience.	This profile is nurtured in students during activities on ethical decisions and on applications of ESS in society.

Caring	We show empathy, compassion and respect. We have a commitment to service, and we act to make a positive difference in the lives of others and in the world around us.	Students will learn to have concern for every one including environment as returning pond samples to ponds after examining, disposing off chemical solutions in an appropriate way, helping patients in hospitals, giving due concern to biodiversity.
Risk---takers	We approach uncertainty with forethought and determination; we work independently and cooperatively to explore new ideas and innovative strategies. We are resourceful and resilient in the face of challenges and change.	Students should incorporate new ideas and challenges. In Biology class, this imbibe in students unknowingly during designing experiments, making presentations, raising questions from each others. But during laboratory work, risk-taking is minimized for the safety of everyone in the lab.
Balanced	We understand the importance of balancing different aspects of our lives —intellectual, physical, and emotional— to achieve well-being for ourselves and others. We recognize our interdependence with other people and with the world in which we live.	Students must learn to manage time well, organize thoughts & plan well before commencement of any work. Students implant this attribute by meeting out their deadlines during their work submissions.
Reflective	We thoughtfully consider the world and our own ideas and experience. We work to understand our strengths and weaknesses in order to support our learning and personal development.	Assessing their own progress is the ultimate goal of this profile. In Biology class, students are asked to do corrections of wrong answers in tests of various topics and also review their strengths and weaknesses as a learner during the topic.

Syllabus Content

Syllabus Component	
Topic 1: Systems and models	5
<p data-bbox="342 432 634 464">Topic 2: The ecosystem</p> <p data-bbox="342 527 516 558">2.1 Structure</p> <p data-bbox="342 604 967 636">2.2 Measuring abiotic components of the system</p> <p data-bbox="342 682 954 714">2.3 Measuring biotic components of the system</p> <p data-bbox="342 760 496 791">2.4 Biomes</p> <p data-bbox="342 840 513 871">2.5 Function</p> <p data-bbox="342 917 509 949">2.6 Changes</p> <p data-bbox="342 995 821 1026">2.7 Measuring changes in the system</p>	<p data-bbox="1300 432 1333 464">31</p> <p data-bbox="1308 527 1325 558">4</p> <p data-bbox="1308 604 1325 636">1</p> <p data-bbox="1308 682 1325 714">4</p> <p data-bbox="1308 760 1325 791">3</p> <p data-bbox="1308 840 1325 871">7</p> <p data-bbox="1308 917 1325 949">7</p> <p data-bbox="1308 995 1325 1026">5</p>
<p data-bbox="342 1115 1138 1146">Topic 3: Human population, carrying capacity and resource use</p> <p data-bbox="342 1209 667 1241">3.1 Population dynamics</p> <p data-bbox="342 1287 740 1318">3.2 Resources—natural capital</p> <p data-bbox="342 1365 618 1396">3.3 Energy resources</p> <p data-bbox="342 1442 597 1474">3.4 The soil system</p> <p data-bbox="342 1520 591 1551">3.5 Food resources</p> <p data-bbox="342 1598 602 1629">3.6 Water resources</p> <p data-bbox="342 1675 613 1707">3.7 Limits to growth</p> <p data-bbox="342 1753 992 1785">3.8 Environmental demands of human populations</p>	<p data-bbox="1300 1115 1333 1146">39</p> <p data-bbox="1308 1209 1325 1241">5</p> <p data-bbox="1308 1287 1325 1318">8</p> <p data-bbox="1308 1365 1325 1396">4</p> <p data-bbox="1308 1442 1325 1474">4</p> <p data-bbox="1308 1520 1325 1551">6</p> <p data-bbox="1308 1598 1325 1629">3</p> <p data-bbox="1300 1675 1333 1707">2.5</p> <p data-bbox="1260 1753 1300 1785">6.5</p>
Topic 4: Conservation and biodiversity	15

4.1 Biodiversity in ecosystems	3
4.2 Evaluating biodiversity and vulnerability	6
4.3 Conservation of biodiversity	6
Topic 5: Pollution management	18
5.1 Nature of pollution	1
5.2 Detection and monitoring of pollution	3
5.3 Approaches to pollution management	2
5.4 Eutrophication	3
5.5 Solid domestic waste	2
5.6 Depletion of stratospheric ozone	3
5.7 Urban air pollution	2
5.8 Acid deposition	2
Topic 6: The issue of global warming	6
Topic 7: Environmental value systems	6
Total teaching hours	120

TWO YEAR SYLLABUS BREAK-UP

Syllabus Break up (IB DP 1st year)

Sr. No.	Month	Contents	Teaching Hrs
1	July ,14	Topic 1: SYSTEMS AND MODELS & orientation of internal assessment.	12.75

2	August,14	Topic 2: THE ECOSYSTEMS	9
3	September,14	Topic 2: THE ECOSYSTEMS	9
4	October,14	Topic 2: THE ECOSYSTEMS Term 1 st Exams	5
5	November,14	Topic 2: THE ECOSYSTEMS	7
6	December,14	Topic 2: THE ECOSYSTEMS & 1st draft of internal assessment	9
7	January,15	Topic 3: HUMAN POPULATIONS , CARRYING CAPACITIES AND RESOURCE USE	3
8	February,15	Topic 3: HUMAN POPULATIONS , CARRYING CAPACITIES AND RESOURCE USE Term 2 nd Exams	12
9	March,15	Topic 3: HUMAN POPULATIONS , CARRYING CAPACITIES AND RESOURCE USE	11.25
10	April,15	Topic 3: HUMAN POPULATIONS , CARRYING CAPACITIES AND RESOURCE USE	10
11	June,15	Topic 4: CONSERVATION AND BIODIVERSITY	6
		TOTAL	94

May remains the month of Final Examinations and remains a summer break for Students of 1st year.

The school splits for a Summer break for teachers by 25th May and reopens on 16th June.

Syllabus Break up (IB DP 2nd year)

Sr. No.	Month	Contents	Teaching Hrs
1	July ,15		12.75

		Topic 4: CONSERVATION AND BIODIVERSITY & 2 nd Draft of 1st internal assessment	
2	August,15	Topic 4: CONSERVATION AND BIODIVERSITY & final draft of 1st internal assessment	9
3	September,15	Topic 5: POLLUTION AND BIODIVERSITY	9
4	October,15	Topic 5: POLLUTION AND BIODIVERSITY Term Exams 3rd	5
5	November,15	Topic 5: POLLUTION AND BIODIVERSITY & 2 nd draft of internal assessment	7
6	December,15	Topic-6 THE ISSUE OF GLOBAL WARMING & final draft of 2nd internal assessment	9
7	January,16	Topic-7 Environmental value systems	3
8	February,16	Topic-7 Environmental value systems & Revision	12
9	March,16	Revision	11.25
10	April,16	Revision	10
		TOTAL	88

Assessment Component Description

Assessment is by means of examination and practicals.

4. Assessment Component

Assessment Component	Weighting
External Assessment (written papers, 3 hrs.)	
Paper1-1 hr.	80%
45 marks	30%
Paper 2-2 hrs.	
65 marks	50%
Internal Assessment 30 hrs.	
42 marks	20%

5. Practical (Internal) Assessment

Criterion	Marks available	Marks
Design	Two grades out of 6 are to be presented	12 marks
Data collection & processing	Two grades out of 6 are to be presented	12 marks
Conclusion & evaluation	Two grades out of 6 are to be presented	12 marks
Personal skills	Onegrade out of 6 will be presented	6 marks
	TOTAL	42 marks

Final grades

The final grade awarded for an IB subject is from 1-7. The schools receive a breakdown of the grade achieved in each part of the exam.

The requirements to achieve the IB diploma are fairly complex and may be found here: [IB diploma award requirements](#).

Internal Assessment criteria

There are four assessment criteria that are used to assess the work of students.

- Planning—PI
- Data collection and processing—DCP
- Discussion, evaluation and conclusion—DEC
- Personal skills—PS

The first three criteria—planning (PI), data collection and processing (DCP), and discussion, evaluation and conclusion (DEC)—are each assessed at least twice.

Personal skills (PS) is assessed **summatively**, once only, at the end of the course. It should not be the average achieved over the whole practical scheme of work but should reflect any sustained improvement in performance.

Each of the assessment criteria can be separated into three **aspects** as shown in the following sections. Descriptions are provided to indicate what is expected in order to meet the requirements of a given aspect **completely (c)** and **partially (p)**. A description is also given for circumstances in which the requirements are not satisfied, **not at all (n)**.

A “**complete**” is awarded 2 marks, a “**partial**” 1 mark and a “**not at all**” 0 marks.

The maximum mark for each criterion is 6 (representing three “completes”).

PI × 2 = 12

DCP × 2 = 12

DEC × 2 = 12

PS × 1 = 6

This makes a total mark out of 42.

The marks for each of the criteria are added together to determine the final mark out of 42 for the internal assessment component. This is then

Planning

Levels/marks	Aspect 1	Aspect 2	Aspect 3
	Defining the problem and selecting variables	Controlling variables	Developing a method for collection of data
Complete/2	States a focused problem/research question and identifies the relevant variables.	Designs a method for the effective control of variables.	Describes a method that allows for the collection of sufficient relevant data.
Partial/1	States a problem/ research question that is incomplete or identifies only some relevant variables.	Designs a method that makes some attempt to control the variables.	Describes a method that does not allow for the collection of sufficient relevant data.
Not at all/0	Does not state a	Designs a method	Describes a method

	problem/research question and does not identify any relevant variables.	that does not allow for the control of the variables.	that does not allow for the collection of any relevant data.
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Data collection and processing

Levels/marks	Aspect 1	Aspect 2	Aspect 3
	Recording data	Processing data	Presenting processed data
Complete/2	Systematically records appropriate quantitative and/or qualitative data*, including units.	Processes primary and/or secondary data correctly.	Presents processed data appropriately and effectively to assist analysis.
Partial/1	Records appropriate quantitative and/or qualitative data but with some mistakes and/or omissions.	Processes primary and/or secondary data but with some mistakes and/or omissions.	Presents processed data appropriately but lacks clarity or with some mistakes and/or omissions.
Not at all/0	Data is not recorded or is recorded incomprehensibly.	No processing of data is carried out or major mistakes are made in processing.	Presents processed data inappropriately or incomprehensibly.

*This can be raw primary or secondary data

Discussion, evaluation and conclusion

	Aspect 1	Aspect 2	Aspect 3
Levels/marks	Discussing and reviewing	Evaluating procedure(s) and suggesting improvements	Concluding
Complete/2	Discussion is clear and well reasoned, showing a broad understanding of context and the implications of results.	Identifies weaknesses and limitations and suggests realistic improvements.	States a reasonable conclusion, with a correct explanation, based on the data.
Partial/1	Discussion is adequate, showing some understanding of context and implications of results.	Identifies weaknesses and limitations but misses some obvious faults. Suggests only superficial improvements.	States a reasonable conclusion or gives a correct explanation, based on the data.
Not at all/0	Discussion is inadequate, showing little understanding of context and implications of results.	The weaknesses and limitations are irrelevant or missing. Suggests unrealistic improvements.	States an unreasonable conclusion or no conclusion at all.

Personal skills (assessed summatively)

	Aspect 1	Aspect 2	Aspect 3
Levels/marks	Carrying out techniques	Working in a team	Working safely and ethically
Complete/2	Fully competent and methodical in the use of a range of techniques and equipment.	Consistently collaborates and communicates in a group situation and integrates the views of others.	Always pays attention to safety issues and shows due regard for the environmental consequences of his or her actions and academic integrity.
Partial/1	Usually competent and methodical in the use of a range of techniques and equipment.	Occasionally collaborates and communicates in a group situation.	Usually pays attention to safety issues and shows some regard for the environmental consequences of his or her actions and academic integrity.
Not at all/0	Rarely competent and methodical in the use of a range of techniques and equipment.	Makes little or no attempt to collaborate in a group situation.	Pays little attention to safety issues and shows little regard for the environmental consequences of his or her actions and

			academicintegrity.
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The assessment can be assisted by the use of a student self-evaluation form, but the use of such a form is not a requirement

References:

Reading List:

1. Environmental systems and societies by Andrew Davis and Garrett Nagle (Pearson Baccalaureate)
2. Environmental systems and societies ,Course companion, oxford
3. Environmental Systems and Societies for the IB Diploma by Paul Guinness and Brenda Walpole
4. Breakfast for Biodiversity, by John Vandermeer and Ivette Perfecto
5. Song for the Blue Ocean, by Carl Safina
6. A Sand County Almanac, by Aldo Leopold
7. Walden Pond, by Henry Thoreau
8. A Civil Action, by Jonathan Hair
8. Earth in Balance, by Al Gore
9. Deception Point, by Dan Brown
10. A Silent Spring, by Rachael Carson

Useful links:

<http://earthguide.ucsd.edu/earthguide/diagrams/watercycle/>

<https://sites.google.com/a/gm.sbac.edu/the-everett-beaver-dam/ib-environmental-systems-and-societies>

<http://occ.ibo.org/ibis/occ/guest/home.cfm>

<http://sciencebitz.com/>

<http://www.bend.k12.or.us/education/components/docmgr/default.php?sectiondetailid=4474>