Internal assessment

Purpose of internal assessment

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. The internal assessment should, as far as possible, be woven into normal classroom teaching and not be a separate activity conducted after a course has been taught.

The internal assessment task involves the completion of an individual investigation of an ESS research question that has been designed and implemented by the student. The investigation is submitted as a written report.

Note: Any investigation that is to be used for internal assessment should be specifically designed by the student to address the assessment criteria. Students must therefore be provided with a copy of the assessment criteria when the requirements of the investigation are explained to them.

If a student undertakes an extended essay, it must not be based on the research question of the ESS internal assessment.

Time allocation

The time allocation for the internal assessment activity is 10 hours.

Internal assessment is an integral part of the ESS course, contributing 25% to the final assessment. This weighting should be reflected in the time that is allocated to teaching the knowledge, skills and understanding required to undertake the work, as well as the total time allocated to carry out the investigation itself.

It is recommended that a total of approximately 10 hours of teaching time should be allocated to the task. This should include:

- time for the teacher to explain to students the requirements of the internal assessment
- time to refer to the *IB animal experimentation policy* if appropriate
- time for students to work on the internal assessment component and ask questions
- time for consultation between the teacher and each student
- time to review and monitor progress, and to check authenticity.

Guidance and authenticity

The report submitted for internal assessment must be the student's own work. However, it is not the intention that students should decide upon a title or topic and be left to work on the internal assessment component without any further support from the teacher. The teacher should play an important role during both the planning stage and the period when the student is working on the internally assessed work. It is the responsibility of the teacher to ensure that students are familiar with:

- the requirements of the type of work to be internally assessed
- the *IB animal experimentation policy* document
- the assessment criteria; students must understand that the work submitted for assessment must address these criteria effectively.

Teachers and students must discuss the internally assessed work. Students should be encouraged to initiate discussions with the teacher to obtain advice and information, and students must not be penalized for seeking guidance. As part of the learning process, teachers should read and give advice to students on one draft of the work. The teacher should provide oral or written advice on how the work could be improved, but not edit the draft. The next version handed to the teacher must be the final version for submission.

It is the responsibility of teachers to ensure that all students understand the basic meaning and significance of concepts that relate to academic honesty, especially authenticity and intellectual property. Teachers must ensure that all student work for assessment is prepared according to the requirements and must explain clearly to students that the internally assessed work must be entirely their own.

All work submitted to the IB for moderation or assessment must be authenticated by a teacher, and must not include any known instances of suspected or confirmed academic misconduct. Each student must confirm that the work is his or her authentic work and constitutes the final version of that work. Once a student has officially submitted the final version of the work it cannot be retracted. The requirement to confirm the authenticity of work applies to the work of all students, not just the sample work that will be submitted to the IB for the purpose of moderation. For further details refer to the IB publications *Academic honesty*, *The Diploma Programme: From principles into practice* and the relevant articles in *General regulations: Diploma Programme*.

Authenticity may be checked by discussion with the student on the content of the work, and scrutiny of one or more of the following:

- the student's initial proposal
- the first draft of the written work
- the references cited
- the style of writing compared with work known to be that of the student
- the analysis of the work by a web-based plagiarism detection service.

The same piece of work cannot be submitted to meet the requirements of both the internal assessment and the extended essay.

Using assessment criteria for internal assessment

For internal assessment, a number of assessment criteria have been identified. Each assessment criterion has level descriptors describing specific achievement levels, together with an appropriate range of marks. The level descriptors concentrate on positive achievement, although for the lower levels failure to achieve may be included in the description.

Teachers must judge the internally assessed work against the criteria using the level descriptors.

- The aim is to find, for each criterion, the descriptor that conveys most accurately the level attained by the student, using the best-fit model. A best-fit approach means that compensation should be made when a piece of work matches different aspects of a criterion at different levels. The mark awarded should be one that most fairly reflects the balance of achievement against the criterion. It is not necessary for every single aspect of a level descriptor to be met for that mark to be awarded.
- When assessing a student's work, teachers should read the level descriptors for each criterion until they reach a descriptor that most appropriately describes the level of the work being assessed. If a piece of work seems to fall between two descriptors, both descriptors should be read again and the one that more appropriately describes the student's work should be chosen.
- Where there are two or more marks available within a level, teachers should award the upper marks if the student's work demonstrates the qualities described to a great extent; the work may be close to achieving marks in the level above. Teachers should award the lower marks if the student's work demonstrates the qualities described to a lesser extent; the work may be close to achieving marks in the level below.
- Only whole numbers should be recorded; partial marks, (fractions and decimals) are not acceptable.
- Teachers should not think in terms of a pass or fail boundary, but should concentrate on identifying the appropriate descriptor for each assessment criterion.
- The highest level descriptors do not imply faultless performance but should be achievable by a student. Teachers should not hesitate to use the extremes if they are appropriate descriptions of the work being assessed.
- A student who attains a high achievement level in relation to one criterion will not necessarily attain high achievement levels in relation to the other criteria. Similarly, a student who attains a low achievement level for one criterion will not necessarily attain low achievement levels for the other criteria. Teachers should not assume that the overall assessment of the students will produce any particular distribution of marks.
- It is recommended that the assessment criteria be made available to students.

Internal assessment details

Duration: 10 hours
Weighting: 25%

- Individual investigation
- The investigation covers assessment objectives 1, 2, 3 and 4.

The individual investigation will be a single task taking about 10 hours. This time allocation includes time for consultation with the teacher to discuss the research question before the investigation is implemented, as well as time spent developing methodology and collecting data. It should be noted that during the consultation stage, the teacher provides advice to support the student but does not tell the student what to investigate or how to carry it out. Before the final submission, teachers should also provide feedback to the student on one draft of the written report.

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 analysed 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.

It is important to stress that the focused research question should arise from a broader area of environmental interest (the context), so that in conjunction with evaluating the research process and findings of their study, students will be able to discuss the extent to which their study applies to the environmental issue that interests them at a local, regional or global level (the application). This broader discussion does not have to be in direct relation to their findings, because the quality of data collected is not always good enough to use for this application, and this should not be an expectation. However, it is intended that this discussion will lead students to develop creative thinking and novel solutions, or to inform current political and management decisions relating to the issue. For example, if a student carries out a study on the impact of wind turbines that have been erected in the vicinity of their school, he or she may suggest solutions for the erection of wind turbines in other areas based on their findings.

This style of investigation reflects the interdisciplinary nature of the task.

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.

Methodologies

- Values and attitude surveys or questionnaires
- Interviews
- Issues-based inquiries to inform decision-making
- Observational fieldwork (natural experiments)
- Field manipulation experiments
- Ecosystem modelling (including mesocosms or bottle experiments)
- Laboratory work
- Models of sustainability
- Use of systems diagrams or other valid holistic modelling approaches
- Elements of environmental impact assessments
- Secondary demographic, development and environmental data
- Collection of both qualitative and quantitative data

Analytical techniques

- Estimations of NPP/GPP or NSP/GSP
- Application of descriptive statistics (measures of spread and average)
- Application of inferential statistics (testing of null hypotheses)
- Other complex calculations
- Cartographic analysis
- Use of spreadsheets or databases
- Detailed calculations of footprints (including ecological, carbon, water footprints)

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. Exemplars to further assist teachers are presented in the *Environmental systems and societies teacher support material*.

Internal assessment criteria

For internal assessment, the following assessment criteria will be used.

Identifying the context (CXT)	Planning (PLA)	Results, analysis and conclusion (RAC)	Discussion and evaluation (DEV)	Applications (APP)	Communication (COM)	Total
6 (20%)	6 (20%)	6 (20%)	6 (20%)	3 (10%)	3 (10%)	30 (100%)

Levels of performance are described using multiple indicators per level. In many cases the indicators occur together in a specific level, but not always. Also, not all indicators are always present. This means that a candidate can demonstrate performances that fit into different levels. To accommodate this, the IB assessment models use markbands and advise examiners and teachers to use a **best-fit approach** in deciding the appropriate mark for a particular criterion.

Teachers should read the guidance on using markbands shown above in the section called "Using assessment criteria for internal assessment" before starting to mark. It is also essential to be fully acquainted with the marking of the exemplars in the teacher support material. The precise meaning of the command terms used in the criteria can be found in the glossary of this subject guide.

Identifying the context (CXT) (6)

This criterion assesses the extent to which the student establishes and explores an environmental issue (either local or global) for an investigation and develops this to state a relevant and focused research question.

Achievement level	Descriptor
0	The student's report does not reach a standard described by any of the descriptors given below.
1–2	The student's report: • **states** a research question, but there is a lack of focus • **outlines** an environmental issue (either local or global) that is linked to the research question • **lists** connections between the environmental issue (either local or global) and the research question but there are significant omissions.
3–4	The student's report: • **states** a relevant research question • **outlines** an environmental issue (either local or global) that provides the context to the research question • **describes** connections between the environmental issue (either local or global) and the research question, but there are omissions.
5–6	The student's report: • **states** a relevant, coherent and focused research question • **discusses** a relevant environmental issue (either local or global) that provides the context for the research question • **explains** the connections between the environmental issue (either local or global) and the research question.

Planning (PLA) (6)

This criterion assesses the extent to which the student has developed appropriate methods to gather data that is relevant to the research question. This data could be primary or secondary, qualitative or quantitative, and may utilize techniques associated with both experimental or social science methods of inquiry. There is an assessment of safety, environmental and ethical considerations where applicable.

Achievement level	Descriptor
0	The student's report does not reach a standard described by any of the descriptors given below.
1–2	The student's report: • **designs** a method that is inappropriate because it will not allow for the collection of relevant data • **outlines** the choice of sampling strategy but with some errors and omissions • **lists** some risks and ethical considerations where applicable.
3–4	The student's report: • **designs** a repeatable* method appropriate to the research question but the method does not allow for the collection of sufficient relevant data • **describes** the choice of sampling strategy • **outlines** the risk assessment and ethical considerations where applicable.
5–6	The student's report: • **designs** a repeatable* method appropriate to the research question that allows for the collection of sufficient relevant data • **justifies** the choice of sampling strategy used • **describes** the risk assessment and ethical considerations where applicable.

*Repeatable, in this context, means that sufficient detail is provided for the reader to be able to replicate the data collection for another environment or society. It does **not** necessarily mean repeatable in the sense of replicating it under laboratory conditions to obtain a number of runs or repeats in which all the control variables are exactly the same.

Results, analysis and conclusion (RAC) (6)

This criterion assesses the extent to which the student has collected, recorded, processed and interpreted the data in ways that are relevant to the research question. The patterns in the data are correctly interpreted to reach a valid conclusion.

Achievement level	Descriptor
0	The student's report does not reach a standard described by any of the descriptors given below.
1–2	The student's report: • **constructs** some diagrams, charts or graphs of quantitative and/or qualitative data, but there are significant errors or omissions • **analyses** some of the data but there are significant errors and/or omissions • **states** a conclusion that is not supported by the data.
3–4	The student's report: • **constructs** diagrams, charts or graphs of quantitative and/or qualitative data that are appropriate but there are some omissions • **analyses** the data correctly but the analysis is incomplete • **interprets** some trends, patterns or relationships in the data so that a conclusion with some validity is deduced.
5–6	The student's report: • **constructs** diagrams, charts or graphs of all relevant quantitative and/or qualitative data appropriately • **analyses** the data correctly and completely so that all relevant patterns are displayed • **interprets** trends, patterns or relationships in the data, so that a valid conclusion to the research question is deduced.

Discussion and evaluation (DEV) (6)

This criterion assesses the extent to which the student discusses the conclusion in the context of the environmental issue, and carries out an evaluation of the investigation.

Achievement level	Descriptor
0	The student's report does not reach a standard described by any of the descriptors given below.
1–2	The student's report: • **describes** how some aspects of the conclusion are related to the environmental issue • **identifies** some strengths and weaknesses and limitations of the method • **suggests** superficial modifications and/or further areas of research.
3–4	The student's report: • **evaluates** the conclusion in the context of the environmental issue but there are omissions • **describes** some strengths, weaknesses and limitations within the method used • **suggests** modifications and further areas of research.
5–6	The student's report: • **evaluates** the conclusion in the context of the environmental issue • **discusses** strengths, weaknesses and limitations within the method used • **suggests** modifications addressing one or more significant weaknesses with large effect and further areas of research.

Applications (APP) (3)

This criterion assesses the extent to which the student identifies and evaluates one way to apply the outcomes of the investigation in relation to the broader environmental issue that was identified at the start of the project.

Achievement level	Descriptor
0	The student's report does not reach a standard described by any of the descriptors given below.
1	The student's report: • **states** one potential application and/or solution to the environmental issue that has been discussed in the context • **describes** some strengths, weaknesses and limitations of this solution.
2	The student's report: • **describes** one potential application and/or solution to the environmental issue that has been discussed in the context, based on the findings of the study, but the justification is weak or missing • **evaluates** some relevant strengths, weaknesses and limitations of this solution.
3	The student's report: • **justifies** one potential application and/or solution to the environmental issue that has been discussed in the context, based on the findings of the study • **evaluates** relevant strengths, weaknesses and limitations of this solution.

Communication (COM) (3)

This criterion assesses whether the report has been presented in a way that supports effective communication in terms of structure, coherence and clarity. The focus, process and outcomes of the report are all well presented.

Achievement level	Descriptor
0	The student's report does not reach a standard described by any of the descriptors given below.
1	• The investigation has limited structure and organization. • The report makes limited use of appropriate terminology and it is not concise. • The presentation of the report limits the reader's understanding.
2	• The report has structure and organization but this is not sustained throughout the report. • The report either makes use of appropriate terminology or is concise. • The report is mainly logical and coherent, but is difficult to follow in parts.
3	• The report is well structured and well organized. • The report makes consistent use of appropriate terminology and is concise. • The report is logical and coherent.

Please note that while the report would be expected to be correctly referenced, students will not be penalized under this criterion for a lack of bibliography or other means of citation. It is likely that such an omission would be treated under the IB Diploma Programme academic honesty policy.

Rationale for practical work

Although the requirements for internal assessment are centred on the investigation, students are required to take part in a practical programme of work that accounts for 20 hours of lesson time in addition to the 10 hours prescribed for the internal assessment task. The different types of practical activities that a student may engage in serve a variety of purposes, including:

- illustrating, teaching and reinforcing theoretical concepts
- developing an appreciation of the essential hands-on nature of laboratory and fieldwork
- developing an appreciation of the use of secondary data from databases
- developing an appreciation of the use of modelling
- developing an appreciation of the benefits and limitations of a range of investigative methodology.

Practical scheme of work

The practical scheme of work (PSOW) is the practical course planned by the teacher and acts as a summary of all the investigative activities carried out by a class.

Syllabus coverage

The range of practical work carried out should reflect the breadth and depth of the subject syllabus, but it is not necessary to carry out an investigation for every syllabus topic. However, all students must participate in the internal assessment investigation.

Planning the practical scheme of work

Teachers are free to formulate their own practical schemes of work by choosing practical activities according to the requirements outlined. Their choices should be based on:

- the needs of their students
- available resources
- teaching styles.

Each scheme must include some complex tasks that make greater conceptual demands on students. Given the aims and objectives of this course, students should be provided with the opportunity to carry out investigations that demonstrate the interrelationships between environmental and social systems. A scheme made up entirely of simple experiments, such as ticking boxes or exercises involving filling in tables, will not provide an adequate range of experience for students.

Teachers are encouraged to use the OCC to share ideas about possible practical activities by joining in the discussion forums and adding resources in the subject home page.

Flexibility

The practical programme is flexible enough to allow a wide variety of practical activities to be carried out. These could include:

- short labs or projects extending over several weeks
- computer simulations
- using databases for secondary data

- developing and using models
- data-gathering exercises such as questionnaires, user trials and surveys
- data-analysis exercises
- fieldwork.

It is vital, however, that the range of tasks undertaken reflects the interdisciplinary nature of this course. Through a balanced and varied practical scheme of work, students should be able to experience tasks that focus on laboratory or fieldwork, as well as more value-based investigations.

Practical work documentation

The *4/PSOW* form is a record of all practical activities carried out by a class. The form is not required to moderate the individual investigations, so it is not necessary to submit this form. However, the *4/PSOW* is an essential planning and recording document for teachers to ensure that a suitable range of practical activities is carried out and that the appropriate hours are allocated to practical work. Teachers should continue to maintain this form (or their own version of it including all the same information) to record the practical activities carried out by the class. The form should be retained in the school and made available to the IB, for example, during the five-year school evaluation process.

Time allocation for practical work

The recommended teaching time for all Diploma Programme courses is 150 hours at SL. Students of ESS are required to spend a minimum of 30 hours on practical activities (excluding time spent writing up work). This time includes 10 hours for the internal assessment investigation. (Only 2–3 hours of investigative work can be carried out after the deadline for submitting work to the moderator and still be counted in the total number of hours for the practical scheme of work.)