Cambridge Assessment International Education

Syllabus

Cambridge International AS Level Environmental Management 8291

Use this syllabus for exams in 2022, 2023 and 2024.
Exams are available in the June and November series.

Version 3

Cambridge Pathway

Why choose Cambridge International?

Cambridge International prepares school students for life, helping them develop an informed curiosity and a lasting passion for learning. We are part of the University of Cambridge.

Our Cambridge Pathway gives students a clear path for educational success from age 5 to 19. Schools can shape the curriculum around how they want students to learn – with a wide range of subjects and flexible ways to offer them. It helps students discover new abilities and a wider world, and gives them the skills they need for life, so they can achieve at school, university and work.

Our programmes and qualifications set the global standard for international education. They are created by subject experts, rooted in academic rigour and reflect the latest educational research. They provide a strong platform for students to progress from one stage to the next, and are well supported by teaching and learning resources.

We review all our syllabuses regularly, so they reflect the latest research evidence and professional teaching practice – and take account of the different national contexts in which they are taught.

We consult with teachers to help us design each syllabus around the needs of their learners. Consulting with leading universities has helped us make sure our syllabuses encourage students to master the key concepts in the subject and develop the skills necessary for success in higher education.

Our mission is to provide educational benefit through provision of international programmes and qualifications for school education and to be the world leader in this field. Together with schools, we develop Cambridge learners who are confident, responsible, reflective, innovative and engaged – equipped for success in the modern world.

Every year, nearly a million Cambridge students from 10 000 schools in 160 countries prepare for their future with the Cambridge Pathway.

'We think the Cambridge curriculum is superb preparation for university.'

Christoph Guttentag, Dean of Undergraduate Admissions, Duke University, USA

Quality management

Cambridge International is committed to providing exceptional quality. In line with this commitment, our quality management system for the provision of international qualifications and education programmes for students aged 5 to 19 is independently certified as meeting the internationally recognised standard, ISO 9001:2015. Learn more at **www.cambridgeinternational.org/ISO9001**

Contents

Changes to this syllabus

For information about changes to this syllabus for 2022, 2023 and 2024, go to page 45.

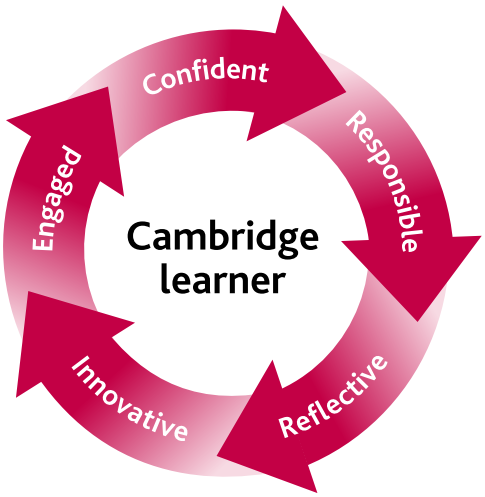
This syllabus is version 3, published March 2023.

Any textbooks endorsed to support the syllabus for examination from 2022 are suitable for use with this syllabus.

1 Why choose this syllabus?

Key benefits

The best motivation for a student is a real passion for the subject they're learning. By offering students a variety of Cambridge International AS & A Levels, you can give them the greatest chance of finding the path of education they most want to follow. With over 50 subjects to choose from, students can select the ones they love and that they're best at, which helps motivate them throughout their studies.



Following a Cambridge International AS & A Level programme helps students develop abilities which universities value highly, including:

- a deep understanding of their subjects
- higher order thinking skills – analysis, critical thinking, problem solving
- presenting ordered and coherent arguments
- independent learning and research.

Cambridge International AS Level Environmental Management develops a set of transferable skills including handling data, practical problem-solving, and applying the scientific method. Learners develop relevant attitudes, such as concern for accuracy and precision, objectivity, integrity, enquiry, initiative and inventiveness. They acquire the essential scientific skills required for progression to further studies or employment.

Our approach in Cambridge International AS Level Environmental Management encourages learners to be:

confident, secure in their knowledge, and keen to explore the application of scientific approaches to manage the environment

responsible, developing efficient and safe scientific practices, recognising the human impact on the environment and working collaboratively to manage this impact

reflective, able to evaluate evidence to draw informed and appropriate conclusions and recognising that the applications of environmental management have the potential to be both helpful and harmful to the individual, the community and the environment

innovative, applying problem-solving skills to novel situations and engaging with tools and techniques, including information technology, to develop successful approaches

engaged, developing an enquiring mind, and conscious of the social impacts of environmental management.

'Cambridge students develop a deep understanding of subjects and independent thinking skills.'

Principal, Rockledge High School, USA

Key concepts

Key concepts are essential ideas that help students develop a deep understanding of their subject and make links between different aspects. Key concepts may open up new ways of thinking about, understanding or interpreting the important things to be learned.

Good teaching and learning will incorporate and reinforce a subject's key concepts to help students gain:

- a greater depth as well as breadth of subject knowledge
- confidence, especially in applying knowledge and skills in new situations
- the vocabulary to discuss their subject conceptually and show how different aspects link together
- a level of mastery of their subject to help them enter higher education.

The key concepts identified below, carefully introduced and developed, will help to underpin the course you will teach. You may identify additional key concepts which will also enrich teaching and learning.

The key concepts for Cambridge International AS Level Environmental Management are:

- Sustainability
  The use and management of resources to meet the needs of the present global population without compromising the ability of future generations to meet their own needs is a goal underlying all environmental management strategies.
- Interactions
  The interactions within and between the living and physical environments shape all environments on Earth. Environmental management strategies aim to protect and maintain this balance.
- Pressure on the environment
  Human activities create challenges and put pressure on the local and global environment. Diverse influences may be environmental, economic, social, political or historical and need to be managed to protect the environment.
- Global dimensions
  Actions taken at a local level may have local, regional and global environmental impacts which must be considered. Consequences may be positive or negative, may not take effect immediately, and may not be easily detected.
- Research methodology
  Scientific investigations and research are fundamental to understanding an environment and developing environmental management strategies. Using the appropriate methodology to answer a specific question means the results are more likely to be reliable.

International recognition and acceptance

Our expertise in curriculum, teaching and learning, and assessment is the basis for the recognition of our programmes and qualifications around the world. Every year thousands of students with Cambridge International AS & A Levels gain places at leading universities worldwide. They are valued by top universities around the world including those in the UK, US (including Ivy League universities), Europe, Australia, Canada and New Zealand.

UK NARIC, the national agency in the UK for the recognition and comparison of international qualifications and skills, has carried out an independent benchmarking study of Cambridge International AS & A Level and found it to be comparable to the standard of AS & A Level in the UK. This means students can be confident that their Cambridge International AS & A Level qualifications are accepted as equivalent, grade for grade, to UK AS & A Levels by leading universities worldwide.

Cambridge International AS Level Environmental Management provides knowledge and transferable skills that support further subject specific study. Depending on local university entrance requirements, students may be able to use it to progress directly to university courses in Environmental Management or related subjects. It is also suitable as part of a course of general education.

We recommend learners check the Cambridge recognitions database and the university websites to find the most up-to-date entry requirements for courses they wish to study.

Learn more at **www.cambridgeinternational.org/recognition**

Cambridge Assessment International Education is an education organisation and politically neutral. The content of this syllabus, examination papers and associated materials do not endorse any political view. We endeavour to treat all aspects of the exam process neutrally.

'The depth of knowledge displayed by the best A Level students makes them prime targets for America's Ivy League universities'

Yale University, USA

Supporting teachers

We provide a wide range of practical resources, detailed guidance, and innovative training and professional development so that you can give your students the best possible preparation for Cambridge International AS & A Level.

Support for Cambridge International AS & A Level

Teaching resources

- School Support Hub
  www.cambridgeinternational.org/support
- Syllabuses
- Schemes of work
- Learner guides
- Discussion forums
- Endorsed resources

Exam preparation resources

- Question papers
- Mark schemes
- Example candidate responses to understand what examiners are looking for at key grades
- Examiner reports to improve future teaching

Training

- Introductory – face-to-face or online
- Extension – face-to-face or online
- Enrichment – face-to-face or online
- Coursework – online
- Cambridge Professional Development Qualifications

Find out more at
www.cambridgeinternational.org/profdev

Community

You can find useful information, as well as share your ideas and experiences with other teachers, on our social media channels and community forums.

Find out more at
www.cambridgeinternational.org/social-media

'Cambridge International AS & A Levels prepare students well for university because they've learnt to go into a subject in considerable depth. There's that ability to really understand the depth and richness and the detail of a subject. It's a wonderful preparation for what they are going to face at university.'

US Higher Education Advisory Council

2 Syllabus overview

Aims

The aims describe the purposes of a course based on this syllabus.

The aims are to enable students to develop:

- knowledge of natural systems which make life possible on Earth
- an understanding that humans are part of these systems and depend on them
- an appreciation of the diverse influences of human activity on natural systems
- an awareness of the need to manage natural systems
- an understanding of sustainable development to meet the needs of the present, without compromising the ability of future generations to meet their own needs
- a sense of responsibility and concern for the welfare of the environment and all organisms
- an awareness of their own values concerning environmental issues
- an awareness of the values of others
- a willingness to review their own attitudes in the light of new knowledge and experiences
- a sound basis for further study, personal development and participation in local and global environmental concerns.

Content overview

Candidates for Cambridge International AS Level Environmental Management study the following topics:

1 Introduction to environmental management
2 Environmental research and data collection
3 Managing human population
4 Managing ecosystems and biodiversity
5 Managing resources
6 Managing water supplies
7 Managing the atmosphere
8 Managing climate change

AS Level candidates also study investigative skills.

Support for Cambridge International AS Level Environmental Management

The School Support Hub is our secure online site for Cambridge teachers where you can find the resources you need to deliver our programmes, including schemes of work, past papers, mark schemes and examiner reports. You can also keep up to date with your subject and the global Cambridge community through our online discussion forums.

www.cambridgeinternational.org/support

Assessment overview

Paper 1	Paper 2
Principles of Environmental Management 1 hour 45 minutes 80 marks Section A: between four and six structured questions, with a range of task types. (60 marks) Section B: one essay from a choice of two questions. (20 marks) Externally assessed 50% of the AS Level	Management in Context 1 hour 45 minutes 80 marks Between four and six structured questions, with a range of task types. Externally assessed 50% of the AS Level

Information on availability is in the **Before you start** section.

There is one route for the Cambridge International AS Level Environmental Management:

Route	Paper 1	Paper 2
AS Level only (Candidates take all AS components in the same exam series)	✓	✓

Assessment objectives

The assessment objectives (AOs) are:

AO1 Knowledge and understanding

Candidates should be able to demonstrate knowledge and understanding, in familiar and unfamiliar contexts, of:

- phenomena, facts, definitions, concepts and theories
- vocabulary, terminology and conventions
- policies, strategies and technological applications for managing the environment at local, regional and global levels.

AO2 Information handling and analysis

Candidates should be able, in words or using other forms of presentation (e.g. graphical or numerical), in familiar and unfamiliar contexts, to:

- locate, select, organise and present information from a variety of sources
- translate information and evidence from one form to another
- manipulate numerical data
- interpret and evaluate data, report trends and draw inferences.
- give reasoned explanations for phenomena, patterns and relationships.

AO3 Investigation skills and making judgements

Candidates should be able, in familiar and unfamiliar contexts, to:

- plan investigations
- identify limitations of methods and suggest possible improvements
- make reasoned judgements and reach conclusions based on qualitative and quantitative information.

Weighting for assessment objectives

The approximate weightings allocated to each of the assessment objectives (AOs) are summarised below.

Assessment objectives as a percentage of each qualification

Assessment objective	Weighting in AS Level %
AO1 Knowledge and understanding	40
AO2 Information handling and analysis	40
AO3 Investigation skills and making judgements	20
Total	100

Assessment objectives as a percentage of each component

Assessment objective	Weighting in components %	
	Paper 1	**Paper 2**
AO1 Knowledge and understanding	45	35
AO2 Information handling and analysis	40	40
AO3 Investigation skills and making judgements	15	25
Total	100	100

3 Subject content

Candidates for Cambridge International AS Level Environmental Management should study all topics.

At the end of topics 2 to 8 there is a case study. This is intended to illustrate the content and help students to understand and engage with it. For each case study, teachers should choose their own examples to investigate. In the assessment, candidates are expected to refer to relevant examples and/or case studies in Section B of Paper 1 and where indicated in other questions.

Candidates are expected to carry out investigative work. Candidates will be expected to apply the investigation skills in section 2 to any investigative work throughout this course. Paper 2 assesses the skills of planning investigations and identifying the limitations of methods.

This syllabus gives you the flexibility to design a course that will interest, challenge and engage your learners. Where appropriate you are responsible for selecting suitable subject contexts, resources and examples to support your learners' study. These should be appropriate for the learners' age, cultural background and learning context as well as complying with your school policies and local legal requirements.

1 Introduction to environmental management

Environmental management is concerned with the impacts of human activity on the environment. Having a basic understanding of the structure of the earth and the science of key natural phenomena is essential to the study of environmental management. This section introduces these foundations and they are used as a starting point for other sections in this syllabus. Some candidates may have previously studied the knowledge in this section as part of a Level 2 course (GCSE, IGCSE, O Level).

1.1 Continents and oceans

Learning outcomes Candidates should be able to:	Further guidance:
identify and name the world's continents and major oceans	• continents (Africa, Antarctica, Asia, Europe, North America, South America and Oceania) • oceans (Atlantic Ocean, Pacific Ocean, Indian Ocean, Arctic Ocean and Southern Ocean)

1.2 Country classification by income level

Learning outcomes Candidates should be able to:	Further guidance:
describe the income groups the World Bank uses to classify countries	limited to countries with: • low-income economies (LICs) • middle-income economies (MICs) • high-income economies (HICs)

1.3 Sustainability

Learning outcomes Candidates should be able to:	Further guidance:
1 define the term sustainability as the ability to meet the needs of the present without compromising the ability of future generations to meet their own needs	
2 understand the need for the sustainable management of resources	

1.4 The water cycle

Learning outcomes Candidates should be able to:	Further guidance:
1 describe the water cycle	limited to: • condensation • precipitation • interception • infiltration • surface run-off • through-flow • ground water flow • transpiration • evaporation
2 interpret and draw diagrams representing the water cycle	

1.5 The structure and composition of the atmosphere

Learning outcomes Candidates should be able to:	Further guidance:
1 state the major components of the Earth's atmosphere	limited to: • nitrogen • oxygen • carbon dioxide • argon • water vapour

1.5 The structure and composition of the atmosphere (continued)

Learning outcomes Candidates should be able to:	Further guidance:
2 describe the structure of the Earth's atmosphere as divided into four primary layers	• troposphere • stratosphere • mesosphere • thermosphere
3 state that the ozone layer is located within the stratosphere	
4 describe the ozone layer and outline its role in absorbing ultraviolet radiation	
5 outline the natural greenhouse effect that maintains the Earth's ambient temperature	• ultraviolet radiation (shortwave radiation) passes through the Earth's atmosphere and is absorbed by the Earth's surface • some energy is re-emitted back into the atmosphere as infrared radiation (longwave radiation) • greenhouse gases absorb some of this infrared radiation and prevent it from leaving the atmosphere

1.6 Ecosystems

Learning outcomes Candidates should be able to:	Further guidance:
1 define the terms biome, ecosystem, population, community, habitat and niche	
2 state the biotic and abiotic components of an ecosystem	• biotic components: – producers, consumers (primary, secondary and tertiary) and decomposers • abiotic components: – temperature, humidity, water, oxygen, salinity, light, pH
3 describe how biotic factors affect the number and the diversity of organisms found within an ecosystem	
4 outline examples of biotic interactions	limited to: • competition (inter-specific and intra-specific) • grazing • predation
5 define photosynthesis as the process by which plants synthesise glucose using carbon dioxide, water and energy from sunlight	

1.6 Ecosystems (continued)

Learning outcomes Candidates should be able to:	Further guidance:
6 state the word and chemical equations for photosynthesis	• carbon dioxide + water → glucose + oxygen • $6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$
7 state that chlorophyll captures light energy for photosynthesis	
8 explain that the availability of water, concentration of carbon dioxide and the availability of light are limiting factors in the rate of photosynthesis	
9 explain how photosynthesis on land and in the oceans is a vital part of the carbon cycle and has an important effect on carbon dioxide concentrations in the atmosphere by forming carbon stores	
10 define the terms producer, primary consumer, secondary consumer, tertiary consumer and decomposer	
11 define trophic levels as feeding levels within food chains	
12 identify organisms at different feeding levels in a food chain or food web	
13 state that energy is transferred between organisms in a food chain, starting with a producer	
14 explain how energy is lost in food chains	including: loss by respiration and waste products
15 construct simple food chains and food webs	
16 define aerobic respiration as the chemical reactions in cells that break down glucose molecules and release energy, carbon dioxide and water	
17 state the word and chemical equation for aerobic respiration	• glucose + oxygen → carbon dioxide + water • $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$
18 describe the carbon cycle	limited to the stages: • photosynthesis • respiration • feeding • decomposition • fossilisation • combustion
19 interpret and draw diagrams representing the carbon cycle	

2 Environmental research and data collection

Scientific environmental studies are essential to understand environments and develop management strategies. The design of environmental studies to collect and analyse reliable data is described in this section. Using the context of climate change, the importance of the integrity of data and the influence of groups and organisations will be discussed. As more environmental data are available now than ever before, the use and impacts of a wide variety of data sources are explored.

Candidates will be expected to carry out investigative work. Candidates will be expected to apply the investigation skills in this section to any investigative work throughout this course. The planning of investigations and identification of limitations of methods and evaluation are limited to Paper 2.

2.1 The scientific method

Learning outcomes Candidates should be able to:	Further guidance:
1 describe how the scientific method involves the interplay between observations and the formation, testing and evaluation of hypotheses 2 formulate hypotheses based on observations or experimental data 3 design investigations in which variables are controlled and quantitative results are collected 4 explain the terms dependent and independent variable and identify each type in a given experiment 5 interpret data to determine whether they support or refute the hypothesis being tested 6 explain how limitations in the measurement of data lead to uncertainty in the results 7 demonstrate an understanding that a hypothesis that is consistently supported by investigation and observation can become a theory	candidates should be able to apply the scientific method to the collection of reliable data and the design of environmental investigations

2.2 Environmental research in the context of climate change

Learning outcomes Candidates should be able to:	Further guidance:
1 define the terms reliable and bias and explain their significance to environmental investigations 2 using examples related to climate change, outline how historical data have developed	• limited amount of historical data • development of scientific theory • advances in technology

2.2 Environmental research in the context of climate change (continued)

Learning outcomes Candidates should be able to:	Further guidance:
3 using examples related to climate change, outline how bias has led to the misuse of scientific data	
4 using examples related to climate change, outline how unreliable data has led to false reporting of scientific conclusions	• limited amount of data • lack of public and media knowledge • uncertainty in climate models

2.3 Collection of environmental data

Learning outcomes Candidates should be able to:	Further guidance:
1 state that sampling strategies are used to collect representative data	
2 explain how random sampling and systematic sampling strategies aim to ensure samples are well distributed with a low risk of bias	
3 describe and explain factors influencing the suitability of random sampling or systematic sampling strategies for different studies	including: • size • ease of access • knowledge of the environment
4 evaluate the choice of random and systematic sampling strategies in familiar and unfamiliar contexts	including: precision, bias and efficiency of strategies

2.4 Data collection techniques and data analysis

Learning outcomes Candidates should be able to:	Further guidance:
1 describe techniques used to collect sample data	limited to: • quadrats (open frame, grid and point), pitfall traps, sweep nets, beating trays, kick sampling, light traps, capture-mark-recapture • water turbidity • questionnaires, interviews
2 describe benefits and limitations of each sampling technique listed	
3 select and use a suitable sampling technique to collect environmental data	

2.4 Data collection techniques and data analysis (continued)

Learning outcomes Candidates should be able to:	Further guidance:
4 use data to:	
(a) calculate estimated population size using the Lincoln index	• Lincoln index $N = \frac{n_1 \times n_2}{m_2}$ N = estimate of population size n_1 = number of individuals captured in first sample n_2 = number of individuals (both marked and unmarked) captured in second sample m_2 = number of marked individuals recaptured in second sample This formula will be given in the question papers
(b) calculate estimated biodiversity using the Simpson's index of diversity	• Simpson's index of diversity (D) $D = 1 - \left(\sum\left(\frac{n}{N}\right)^2\right)$ $\sum$ = sum of (total) n = the number of individuals of each type present in the sample (types may be species and/or higher taxa such as genera, families, etc.) N = the total number of all individuals of all types present in the sample This formula will be given in the question papers
(c) estimate percentage cover and frequency using quadrat data	
(d) estimate abundance using quadrat data	• use of a suitable abundance scale, such as ACFOR

2.5 The use of technology in data collection and analysis

Learning outcomes Candidates should be able to:	Further guidance:
1 state that there are methods of data collection that include the use of technology	including: • geospatial systems • satellite sensors • radio tracking • computer modelling • crowd sourcing

2.5 The use of technology in data collection and analysis (continued)

Learning outcomes Candidates should be able to:	Further guidance:
2 describe what is meant by the term 'big data'	
3 outline the benefits and limitations of the analysis of big data	including benefits and limitations of: • amount and type of data stored • speed at which new data is generated • trustworthiness of the data • ways the data can be used

Case study: Plan an environmental management investigation of your choosing. The investigation should include a research aim, methodology, how the data would be collected and how this data could be processed.

3 Managing human population

Changes to the size, composition and distribution of populations have fundamental impacts on natural resources. These changes and their impacts are different for countries with differing economies. This section outlines how human population change is measured, the impacts of population changes, and strategies for managing population expansion and ageing populations.

3.1 Human population dynamics and structure

Learning outcomes Candidates should be able to:	Further guidance:
1 calculate population density from given data	
2 describe and explain factors influencing population density and distribution	including: environmental, economic, social, political and historical factors
3 describe populations in terms of their size and the composition of different age groups	
4 explain how changes in birth rates, death rates and migration rates may affect population size and composition	
5 define and calculate dependency ratio	• dependency ratio = $\frac{[\text{young population (0 to 14)} + \text{old population (65+)}] \times 100}{\text{population aged 15 to 64}}$
6 suggest reasons for differences between the population structures of HICs and LICs	

3.2 Impacts of human population change

Learning outcomes Candidates should be able to:	Further guidance:
describe the impacts of ageing populations on countries	including: • lower tax revenues • higher pension spending • pressure on health care • pressure to raise retirement age

3.3 Managing human population change

Learning outcomes Candidates should be able to:	Further guidance:
describe and evaluate strategies for managing a changing population	including: • improved availability of contraception • improved education about contraception • improved education and opportunities for women • improved health care • local, national and global policies: pronatalist and antinatalist polices, United Nations (UN) Agenda 21, The Club of Rome. (Detailed knowledge of these policies is not required.)

Case study: Compare and contrast the population dynamics of a HIC and a LIC.

4 Managing ecosystems and biodiversity

The world's ecosystems are essential for the survival and well-being of people everywhere in the world. The emphasis in this section is on understanding the energy transfers that sustain the biodiversity of the world's ecosystems and how we can best manage these ecosystems to conserve that biodiversity.

4.1 Ecosystems

Learning outcomes Candidates should be able to:	Further guidance:
1 describe the world's major terrestrial biomes in terms of their climate, soil type and vegetation	limited to: desert, forest, grassland and tundra
2 outline the characteristics of primary and secondary succession from pioneer species through intermediate stages to a climax community	limited to: relative timescale, starting point, soil, pioneer species
3 define the terms gross primary productivity and net primary productivity	
4 define ecosystem productivity as the rate of production of biomass for an ecosystem	
5 discuss the efficiency of energy transfer between trophic levels	
6 interpret and draw ecological pyramids based on numbers, biomass and energy	
7 explain the shapes of ecological pyramids	

4.2 Managing the conservation of biodiversity

Learning outcomes Candidates should be able to:	Further guidance:
1 define the terms native species and invasive species	
2 explain the impacts of invasive species on biodiversity	
3 describe and explain the benefits of conserving biodiversity	including: • resources of potential medicines • food, wood, fibres, oils and fuels • diversity in genes • ecological services • cultural and recreational value

4.2 Managing the conservation of biodiversity (continued)

Learning outcomes Candidates should be able to:	Further guidance:
4 describe and evaluate legislation and protocols as methods of conserving biodiversity	limited to: • protection of species • regulation of sustainable harvesting • international trade in endangered species (CITES) • International Whaling Commission (IWC) • European Union Common Fisheries Policy (EU CFP) • International Tropical Timber Organisation (ITTO) • International Union for Conservation of Nature (IUCN) Red List detailed knowledge of international agreements is not required
5 describe and explain the role of the Evolutionarily Distinct and Globally Endangered species (EDGE) programme in the conservation of biodiversity	
6 describe and evaluate captive breeding and release as a method of conserving biodiversity	
7 describe and evaluate habitat conservation and creation as methods of conserving biodiversity	including: • rewilding and management and conservation of habitats: – extracted reserves – protection of habitats – nature reserves – protected areas – conservation zones – national parks

4.3 Impacts of human activity on ecosystems

Learning outcomes Candidates should be able to:	Further guidance:
1 describe and explain the impacts of human activity on tropical rainforests	including: • deforestation leading to fragmentation • fuel wood and timber collection • agricultural expansion • mineral extraction • hydroelectric and reservoir projects • climate change • exploitation of individual species
2 describe and evaluate strategies for managing the impacts of human activity on tropical rainforests	including: • legislation and international agreement • sustainable harvesting • debt for nature swaps • creation of protected areas detailed knowledge of international agreements is not required
3 describe and explain the impacts of human activity on Antarctica	including: • climate change • ozone depletion • tourism • overfishing • future mineral and oil extraction • scientific research
4 describe and evaluate strategies for managing the impacts of human activity on Antarctica	including: • legislation and international agreement (the Antarctic Treaty 1959) • protected areas • fisheries regulation • prohibited activities such as mineral extraction • protection from non-native animals or plants • waste management • tourism control and permits for travel detailed knowledge of international agreements is not required

Case study: Evaluate the strategies in place to conserve the biodiversity of a named ecosystem.

5 Managing resources

Greater stresses on food and energy resources present environmental management challenges. The causes and impacts of food insecurity and energy insecurity need to be understood in order to design management strategies that strive for food and energy security

5.1 Food security

Learning outcomes Candidates should be able to:	Further guidance:
1 define food security as when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life	
2 describe and explain causes of food insecurity and threats to food security	limited to: • population growth • unsustainable production, increase in homogeneity in global food supply • price setting • land degradation • agricultural disease • diverting crops for biofuels • climate change • water shortages • poverty
3 outline the impacts of food insecurity	limited to: • regional food scarcity • nutritional deficiency and malnutrition • poverty • forced migration • conflict • famine • death

5.1 Food security (continued)

Learning outcomes Candidates should be able to:	Further guidance:
4 describe and evaluate strategies for managing food security	including: • subsistence agriculture • increase food production by intensification and extensification • improved agricultural techniques and efficiency – aquaculture and hydroponics – use of selective breeding and genetically modified (GM) crops to developing pest-resistant crops and crops with a higher yield – controlling limiting factors, e.g. use of fertilisers in areas short of nutrients – increasing productivity by removing competition from weeds by the use of herbicides, reducing fungal disease by use of fungicides, reducing pest species by use of biological control • reduction in livestock and increase in growing crops • reduce food waste • large-scale food stockpiling • improve transportation of food • protecting pollinating insects • the World Food Programme and food aid • rationing

5.2 Energy resources

Learning outcomes Candidates should be able to:	Further guidance:
1 classify energy resources as renewable or non-renewable	• renewable resources: – biofuels (biomass including wood, bioethanol and biogas), geothermal energy, hydroelectric dams, tidal energy, wave energy, solar energy, wind energy • non-renewable resources: – fossil fuel (oil, natural gas, coal), nuclear energy using uranium as a fuel

5.2 Energy resources (continued)

Learning outcomes Candidates should be able to:	Further guidance:
2 define energy security as the reliable availability of energy sources at an affordable price with a consideration of the environmental impacts	• long-term energy security: – supply of energy that is in line with economic developments and environmental needs • short-term energy security: – systems that react promptly to sudden changes in the supply-demand balance
3 describe and explain the causes of energy insecurity	including: • fossil fuel depletion • inequality in global energy resources • population growth • differing energy needs of countries in different income groups • climate change • supply disruption – natural disasters, piracy, terrorism
4 outline the impacts of energy insecurity	including: • disrupted electricity supply to homes and industry • increasing prices for energy resources • increasing costs for industry • job losses, economic recession • increased levels of poverty and low standards of living • reliance on imported sources of energy • civil disruption and conflict
5 describe and evaluate strategies for managing energy security	including: • increasing energy efficiency • increasing energy production • reducing reliance on fossil fuels • investing in renewable resources and carbon neutral fuels • development of alternative energy technologies • investment in local energy projects • rationing

5.3 Waste management

Learning outcomes Candidates should be able to:	Further guidance:
1 describe methods of waste disposal and treatment	limited to: • landfill sites • incineration • storage • disposal at sea • recycling • exporting waste
2 explain the impacts of waste disposal methods	including: • contamination of soil leading to leaching and contamination of ground water • build-up and release of the greenhouse gas methane (CH_4) with a danger of explosions • visual and noise pollution and unpleasant odour • risk of spread of disease • release of toxic substances • bioaccumulation and biomagnification • plastics and microplastics in oceans
3 describe and evaluate strategies to reduce the impacts of waste disposal	including: • reduce, reuse and recycle • biodegradable plastics • food waste for animal feed • composting • fermentation • use of waste to generate energy • education • financial incentives and legislation

Case study: Compare and contrast the impacts of future energy insecurity on a HIC and a LIC.

6 Managing water supplies

Managing the supply of water is one of the greatest environmental management challenges. The causes and impacts of water insecurity need to be understood in order to design effective water security management strategies.

6.1 Global water distribution

Learning outcomes Candidates should be able to:	Further guidance:
1 describe the distribution of the Earth's water	• salt water in oceans • surface fresh water – ice sheets, glaciers, lakes, rivers, swamps, marshes, permafrost • sub-surface fresh water – soil moisture, ground water, permafrost • atmospheric water
2 define the term water security as the ability to access sufficient quantities of clean water to maintain adequate standards of food and manufacturing of goods, adequate sanitation and sustainable health care	
3 explain the causes of water insecurity	including: • climate change, including changes in rainfall • natural disasters, including drought and flooding • pollution events • inadequate sanitation • population growth, changes in land usage including deforestation and urbanisation • competing demands from agricultural, industrial, energy and domestic sectors • mismanagement of irrigation, including salinisation • international competition over water sources • inequality of availability between water-rich and water-poor regions • differing access to safe drinking water in urban and rural areas
4 explain the impacts of water insecurity	including: • reduced crop yield and crop failure • livestock death • food shortages, malnutrition and famine • illness caused by contaminated drinking water, limited to diarrhoea and cholera

6.1 Global water distribution (continued)

Learning outcomes Candidates should be able to:	Further guidance:
5 describe and evaluate strategies for managing water security	including: • sustainable water extraction and improved supply (piped supply, aquifers and artesian wells, boreholes, gravity-fed schemes, reservoirs and dams) • reduction in water usage (improved irrigation techniques, growing crops less dependent on high water supply, recycling and rain water catchment) • education on sustainable water use • poverty reduction • international agreement and water-related aid (detailed knowledge of international agreements is not required) • rationing

Case study: Study the impacts that the lack of water security has had on a region and evaluate the strategies in place to improve the water security of that region.

7 Managing the atmosphere

The management of the atmosphere requires understanding of the causes and impacts of air pollution. This section examines these through the study of acid deposition, photochemical smog and ozone depletion.

7.1 Acid deposition

Learning outcomes Candidates should be able to:	Further guidance:
1 define acid deposition as a mix of air pollutants that deposit from the atmosphere as acidic wet deposition (with a pH <5.6) or acidic dry deposition	
2 describe the two types of acid deposition	• wet deposition – snow, rain, hail, fog • dry deposition – dust and gases
3 outline the formation of acid deposition	• fossil fuels contain sulfur compounds • combustion of fossil fuels releases sulfur dioxide gas • sulfur dioxide gas reacts with water and oxygen in the atmosphere to form sulfuric acid • nitrogen from the atmosphere reacts with oxygen in the high temperatures of vehicle engines to form nitrogen monoxide gas • nitrogen monoxide gas is released into the atmosphere in vehicle emissions • nitrogen monoxide gas reacts with oxygen and water in the atmosphere to form nitric acid
4 outline the impacts of acid deposition on: • aquatic environments • vegetation and crops • stone and brick buildings	limited to: • the effects on fish gills and fish populations • defoliation and reduced crop yield • enhanced chemical weathering

7.2 Photochemical smog

Learning outcomes Candidates should be able to:	Further guidance:
1 define photochemical smog as a mixture of air pollutants and particulates, including ground level ozone, that is formed when oxides of nitrogen and volatile organic compounds (VOCs) react in the presence of sunlight	
2 describe the impacts of photochemical smog	including: • eye and respiratory irritation • decreased crop yields • deterioration of plastics and rubber

7.3 Managing air pollution

Learning outcomes Candidates should be able to:	Further guidance:
describe strategies for managing air pollution	including: • reduced use of fossil fuels • reducing emissions of: – sulfur dioxide by flue gas desulfurisation and fuel desulfurisation – oxides of nitrogen by catalytic converters – particulates using electrostatic precipitators – volatile organic compounds (VOCs) ○ safe usage, storage and disposal of household products • restricting vehicle use in urban areas • legislation – local, national and international legislation (detailed knowledge of specific legislation and agreements is not required) – polluter pays principle

7.4 Ozone depletion

Learning outcomes Candidates should be able to:	Further guidance:
1 outline how ozone depletion occurs	• chlorofluorocarbons (CFCs) from aerosols and refrigerants are unreactive compounds and are not broken down in the troposphere • CFCs move into the stratosphere and break down in the presence of ultraviolet light to release a chlorine atom • rapid reactions between chlorine atoms and ozone breaks down ozone (O_3) to oxygen (O_2), causing ozone depletion • chlorine atoms remain in the stratosphere and can continue to destroy ozone detailed chemical mechanisms are not required
2 state that ozone concentration is measured using the Dobson Unit	
3 define the term ozone hole as an area where the average concentration of ozone is below 100 Dobson Units	
4 explain why ozone depletion has been greatest over Antarctica	including: temperature, polar vortex, polar stratospheric clouds (PSCs)
5 describe the impacts of ozone depletion due to the increased amounts of ultraviolet radiation	including: • human health (cataracts, skin cancer) • decreased crop yields • biodiversity of terrestrial and aquatic ecosystems • degradation of materials used in clothing and construction
6 evaluate the international agreements used to reduce and phase out the use of ozone depleting substances	detailed knowledge of specific international agreements is not required
7 outline the impacts associated with the use of some alternatives to ozone depleting substances	including: • hydrochlorofluorocarbons (HCFCs) • fluorinated gases (F-gases)
8 outline the importance of experimental evidence to support a hypothesis, using the ozone destruction hypothesis suggested by Rowland-Molina as an example	• initially the main hypothesis was not accepted • some of the auxiliary hypotheses were not backed up by experimental evidence • the hypothesis led to further research and data collection by other scientists, which confirmed that CFCs are ozone depleting

Case study: Study the causes and impacts of a named atmospheric pollution event and evaluate the management of the pollution event.

8 Managing climate change

The difficulties of monitoring and predicting climate change lead to significant challenges in the management of climate change. To be able to evaluate strategies for managing climate change, the causes of climate change need to be understood, as well as the impacts on human populations and the environment.

8.1 Climate change

Learning outcomes Candidates should be able to:	Further guidance:
1 define greenhouse gases as gases in the atmosphere that absorb infrared radiation and identify some common greenhouse gases	limited to: the greenhouse gases carbon dioxide, water vapour and methane
2 state the major sources of greenhouse gas emissions from human activities	including: • combustion of fossil fuels (carbon dioxide and water vapour) • rice fields and livestock (methane) • landfill sites (methane)
3 explain how increased concentrations of greenhouse gases in the atmosphere cause the enhanced greenhouse effect leading to global warming	
4 outline the difficulties of monitoring and predicting climate change	including: • limited historical data used to reconstruct past climate conditions (ice cores, tree rings, historical accounts) • future climate predictions are made using computer climate models which use different variables • climate feedback mechanisms are not fully understood • time delay between cause and effect • uncertainty over the use of some data in drawing conclusions has resulted in differences in scientific and political opinion

8.2 The impacts of climate change

Learning outcomes Candidates should be able to:	Further guidance:
1 state the impacts of climate change on the environment	including changes in: • temperature and precipitation • sea level • ocean and wind circulation • melting of sea ice, ice sheets, glaciers and permafrost • species distribution and biodiversity
2 describe the impacts of climate change on human populations	including: • increased frequency and severity of extreme weather events leading to flooding and loss of land, drought and wild fires • damage to property and loss of life during extreme weather events • forced migration • impacts on crop yields and increased pest outbreaks • impacts on food, energy and water security

8.3 Managing climate change

Learning outcomes Candidates should be able to:	Further guidance:
1 describe strategies for managing climate change through the reduction of greenhouse gas emissions	including: • reduction of global and individual carbon footprint (fewer children per woman, eating a plant-based diet, adopt an energy-efficient lifestyle) • switching to low-carbon fuels • reducing the use of fossil fuels • using alternative forms of energy • transport policies • use of carbon capture and storage • reducing deforestation, increasing reforestation and afforestation • energy efficient buildings and infrastructure • adaptation to climate change • national and international agreements such as Kyoto Protocol 1992, Paris Agreement 2016 (detailed knowledge of international agreements is not required)
2 outline geo-engineering strategies to counteract climate change	including: • solar radiation management (SRM) – albedo enhancement, space reflectors, stratospheric aerosols
3 evaluate strategies for managing climate change	

Case study: Evaluate the impacts climate change may have on a named country or location.

4 Details of the assessment

Paper 1 – Principles of Environmental Management

Written paper, 1 hour 45 minutes, 80 marks

Paper 1 contains two sections:

- Section A has between four and six structured questions (60 marks)
- Section B has two essay questions (20 marks each)

Candidates should answer all the questions in Section A, and choose one question from two in Section B.

Section A

Questions examine candidates' knowledge and understanding of syllabus content and their ability to apply this knowledge by handling and analysing information in familiar and unfamiliar contexts.

There is a range of question types including:

- structured short-answer questions
- extended response
- data manipulation and calculation
- identification of features and patterns
- graph, table and diagram drawing, labelling and interpretation

Candidates should demonstrate AO1 and AO2 skills.

Section B

The essay examines the environmental management perspective of a topic from the syllabus content. Candidates are expected to refer to relevant examples and/or case studies, using any relevant quantitative or qualitative information to support their answers. They will be expected to present reasoned explanations, make reasoned judgements and reach conclusions.

Candidates should demonstrate AO2 and AO3 skills.

Paper 2 – Management in Context

Written paper, 1 hour 45 minutes, 80 marks

Paper 2 has between four and six structured questions.

Questions examine the investigation skills obtained by candidates through class and field-based practical activities. Questions will examine the application of environmental management in familiar and unfamiliar contexts. Questions require candidates to handle information, analyse sources, plan investigations, identify limitations of methods and suggest improvements.

There is a range of question types, including:

- structured short-answer questions
- extended response
- data manipulation and calculation questions
- identification of features and patterns
- graph, table and diagram drawing, labelling and interpretation and source interpretation and practical questions

Candidates should demonstrate AO1, AO2 and AO3 skills.

Command words

Command words and their meanings help candidates know what is expected from them in the exam. The table below includes command words used in the assessment for this syllabus. The use of the command word will relate to the subject context.

Command word	What it means
Analyse	examine in detail to show meaning, identify elements and the relationship between them
Assess	make an informed judgement
Calculate	work out from given facts, figures or information
Comment	give an informed opinion
Compare	identify/comment on similarities and/or differences
Consider	review and respond to given information
Contrast	identify/comment on differences
Define	give precise meaning
Demonstrate	show how or give an example
Describe	state the points of a topic / give characteristics and main features
Discuss	write about issue(s) or topic(s) in depth in a structured way
Evaluate	judge or calculate the quality, importance, amount, or value of something
Examine	investigate closely, in detail
Explain	set out purposes or reasons / make the relationships between things evident / provide why and/or how and support with relevant evidence
Give	produce an answer from a given source or recall/memory
Identify	name/select/recognise
Justify	support a case with evidence/argument
Outline	set out main points
Predict	suggest what may happen based on available information
Sketch	make a simple freehand drawing showing the key features, taking care over proportions
State	express in clear terms
Suggest	apply knowledge and understanding to situations where there are a range of valid responses in order to make proposals / put forward considerations
Summarise	select and present the main points, without detail

Additional guidance

Phrases such as 'To what extent do you agree…?', 'How significant…?' and 'How far do you agree…?' may also be seen in the assessment for this syllabus.

5 Additional information

We expect candidates to be able to use the following mathematical skills and knowledge in the assessment. Teaching the mathematical requirements should be included in the AS Level Environmental Management course.

Mathematical requirements

Candidates should be able to:

- use a calculator for addition, subtraction, multiplication and division, and to calculate squares (x^2), square roots ($\sqrt{x}$), reciprocals ($\frac{1}{x}$) and use of fractions
- recognise and use numbers in decimal and standard form
- interpret negative numbers in calculations
- understand and use the prefixes: giga (G), mega (M), kilo (k), milli (m), micro (μ)
- understand and use the symbols: <, >, ⩽, ⩾, /, and ∝
- take account of significant figures in calculations (the correct number of significant figures for calculated quantities is the same as, or one more than, the smallest number of significant figures in the data used in the calculation)
- understand the use of decimal places and rounding to the nearest quoted decimal place
- calculate percentages and percentage changes
- calculate magnifications and actual sizes
- calculate areas of triangles, rectangles and circles
- calculate perimeters of rectangles and circumferences of circles
- calculate the mean, median, mode and range of a set of values (a range is a calculated value of the difference between the lowest and highest values)
- calculate gradients
- recognise and use ratios
- make estimations of the results of calculations
- select and use the most appropriate units for recording data and the results of calculations
- record data in a suitable table, with appropriate units in the row or column headings
- record data from experiments to an appropriate and consistent precision
- translate information between graphical, numerical, and algebraic forms
- use a sharp pencil to construct and interpret diagrammatic representations of data, including line graphs, scatter graphs, pie charts, bar charts, divided bar charts, histograms and population pyramids
- recognise and use the most appropriate form of diagrammatic representation of data
- record and interpret tally charts, and transform information into other forms of data presentation
- understand map scale and the use of the scale line
- understand the importance of probability when interpreting data
- describe correlations as either positive, negative or having no correlation
- understand the difference between correlation and causation and that a correlation does not necessarily imply a causative relationship
- understand the principles of sampling as applied to environmental management situations.

Gathering of data

Candidates should be able to:

- formulate aims and hypotheses
- identify the independent and dependent variables
- decide a suitable range to use for an independent variable and decide how to change its values
- decide the number of values at which measurements are recorded (a minimum of 5 measurements, replicates or more measurements around a specific value)
- identify and apply suitable controls
- design questionnaires to gain information from an individual or a group of individuals (consideration should be given to factors influencing the successful design of questionnaires, e.g. layout, format of questions, the appropriate wording of questions and the number of questions. The practical considerations of conducting a questionnaire, e.g. the sampling methods, pilot survey and location of survey should also be discussed)
- decide an appropriate number of significant figures for measurements or give clear descriptions of observations
- understand and evaluate random and systematic sampling techniques, including identification of the limitations of these methods.

Presentation of data

The solidus (/) is to be used for separating the quantity and the unit in tables, graphs and charts, e.g. time / s for time in seconds.

(a) Tables

- Each column of a table should be headed with the physical quantity and the appropriate unit, e.g. time / s.
- The column headings of the table can then be directly transferred to the axes of a constructed graph.

(b) Graphs

- Unless instructed otherwise, the independent variable should be plotted on the *x*-axis (horizontal axis) and the dependent variable plotted on the *y*-axis (vertical axis).
- Each axis should be labelled with the physical quantity and the appropriate unit, e.g. time / s.
- The scales for the axes should allow more than half of the graph grid to be used in both directions, allow the graph to be read easily to half a 2 mm square and be based on sensible ratios, e.g. 2 cm on the graph grid representing 1, 2 or 5 units of the variable.
- The graph is the whole diagrammatic presentation, including the best-fit line when appropriate. It may have one or more sets of data plotted on it.
- Points on the graph should be clearly marked as crosses (×) or encircled dots (⊙).
- A best-fit line (trend line) should be a single, thin, smooth straight-line or curve. The line does not need to coincide exactly with any of the points; where there is scatter evident in the data. A roughly even distribution of points either side of the line over its entire length. Points that are clearly anomalous should be ignored when drawing the best-fit line.
- The gradient of a straight line should be taken using a triangle whose hypotenuse extends over at least half of the length of the best-fit line, and this triangle should be marked on the graph.

(c) Pie charts

- These should be drawn with the sectors in rank order, largest first, beginning at 'noon' and proceeding clockwise. Pie charts should preferably contain no more than six sectors.

(d) Bar charts

- These should be drawn when one of the variables is not numerical. They should be made up of narrow blocks of equal width that do **not** touch.

(e) Histograms

- These are drawn when plotting frequency graphs with continuous data. The blocks should be drawn in order of increasing or decreasing magnitude and they **should** touch.

6 What else you need to know

This section is an overview of other information you need to know about this syllabus. It will help to share the administrative information with your exams officer so they know when you will need their support. Find more information about our administrative processes at **www.cambridgeinternational.org/eoguide**

Before you start

Previous study

We recommend that learners starting this course should have completed a course in Environmental Management, Science and/or Geography equivalent to Cambridge IGCSE™ or Cambridge O Level, or equivalent.

Guided learning hours

We design Cambridge International AS Level syllabuses based on learners having about 180 guided learning hours for each Cambridge International AS Level. The number of hours a learner needs to achieve the qualification may vary according to local practice and their previous experience of the subject.

Availability and timetables

All Cambridge schools are allocated to one of six administrative zones. Each zone has a specific timetable.

You can view the timetable for your administrative zone at **www.cambridgeinternational.org/timetables**

You can enter candidates in the June and November exam series.

Check you are using the syllabus for the year the candidate is taking the exam.

Private candidates can enter for this syllabus.

Combining with other syllabuses

Candidates can take this syllabus alongside other Cambridge International syllabuses in a single exam series. The only exceptions are:

- syllabuses with the same title at the same level.

Group awards: Cambridge AICE

Cambridge AICE (Advanced International Certificate of Education) is a group award for Cambridge International AS & A Level. It allows schools to offer a broad and balanced curriculum by recognising the achievements of learners who pass examinations in a range of different subjects.

Learn more about Cambridge AICE at **www.cambridgeinternational.org/aice**

Making entries

Exams officers are responsible for submitting entries to Cambridge International. We encourage them to work closely with you to make sure they enter the right number of candidates for the right combination of syllabus components. Entry option codes and instructions for submitting entries are in the *Cambridge Guide to Making Entries*. Your exams officer has a copy of this guide.

Exam administration

To keep our exams secure, we produce question papers for different areas of the world, known as administrative zones. We allocate all Cambridge schools to one administrative zone determined by their location. Each zone has a specific timetable. Some of our syllabuses offer candidates different assessment options. An entry option code is used to identify the components the candidate will take relevant to the administrative zone and the available assessment options.

Support for exams officers

We know how important exams officers are to the successful running of exams. We provide them with the support they need to make your entries on time. Your exams officer will find this support, and guidance for all other phases of the Cambridge Exams Cycle, at **www.cambridgeinternational.org/eoguide**

Retakes

Candidates can retake Cambridge International AS Level and Cambridge International A Level as many times as they want to. To confirm what entry options are available for this syllabus, refer to the *Cambridge Guide to Making Entries* for the relevant series.

Equality and inclusion

We have taken great care to avoid bias of any kind in the preparation of this syllabus and related assessment materials. In compliance with the UK Equality Act (2010) we have designed this qualification to avoid any direct and indirect discrimination.

The standard assessment arrangements may present unnecessary barriers for candidates with disabilities or learning difficulties. We can put arrangements in place for these candidates to enable them to access the assessments and receive recognition of their attainment. We do not agree access arrangements if they give candidates an unfair advantage over others or if they compromise the standards being assessed.

Candidates who cannot access the assessment of any component may be able to receive an award based on the parts of the assessment they have completed.

Information on access arrangements is in the *Cambridge Handbook* at **www.cambridgeinternational.org/eoguide**

Language

This syllabus and the related assessment materials are available in English only.

After the exam

Grading and reporting

Grades a, b, c, d or e indicate the standard a candidate achieved at Cambridge International AS Level.

'a' is the highest and 'e' is the lowest grade.

'Ungraded' means that the candidate's performance did not meet the standard required for the lowest grade (e). 'Ungraded' is reported on the statement of results but not on the certificate. In specific circumstances your candidates may see one of the following letters on their statement of results:

- Q (pending)
- X (no result)
- Y (to be issued).

These letters do not appear on the certificate.

On the statement of results and certificates, Cambridge International AS Level is shown as General Certificate of Education, GCE Advanced Subsidiary Level (GCE AS Level).

'Cambridge International A Levels are the 'gold standard' qualification. They are based on rigorous, academic syllabuses that are accessible to students from a wide range of abilities yet have the capacity to stretch our most able.'

Director of Studies, Auckland Grammar School, New Zealand

How students, teachers and higher education can use the grades

Cambridge International AS Level

Assessment at Cambridge International AS Level has two purposes:

- to measure learning and achievement
  The assessment:
  - confirms achievement and performance in relation to the knowledge, understanding and skills specified in the syllabus.

- to show likely future success
  The outcomes:
  - help predict which students are well prepared for a particular course or career and/or which students are more likely to be successful
  - help students choose the most suitable course or career
  - help decide whether students part way through a Cambridge International A Level course are making enough progress to continue
  - guide teaching and learning in the next stages of the Cambridge International A Level course.

Grade descriptions

Grade descriptions are provided to give an indication of the standards of achievement candidates awarded particular grades are likely to show. Weakness in one aspect of the examination may be balanced by a better performance in some other aspect.

Grade descriptions for Cambridge International AS Level Environmental Management will be published after the first assessment of the AS Level in 2022. Find more information at **www.cambridgeinternational.org/alevel**

Changes to this syllabus for 2022, 2023 and 2024

The syllabus has been reviewed and revised for first examination in 2022.

This syllabus is version 3, published March 2023.

You are strongly advised to read the whole syllabus before planning your teaching programme.

Changes to version 3, published March 2023

Publishers' ensorsed resources	• Any textbooks endorsed to support this syllabus for examination from 2022 are suitable for use with this syllabus.

Changes to version 2, published April 2021

Other changes	• Information on page 44 regarding grade descriptions has been updated to reflect this is an AS Level syllabus.

Changes to version 1, published September 2021

Changes to syllabus content	• The content has been restructured. The new structure is based around eight topics. • The content has been updated and rewritten, with clear learning objectives, exemplification and a case study for each topic. Some topics have been removed and others added. • The aims and assessment objectives have been updated. • The learner attributes have been updated.
Changes to assessment (including changes to specimen papers)	• Component 3 Coursework has been discontinued. Candidates are still expected to carry out investigative work. Investigation skills will be assessed through Paper 2. • The assessment now consists of two externally examined papers, each weighted at 50% of the AS Level. • The papers have been renamed to reflect the changes in syllabus structure: – Paper 1 Principles of Environmental Management (80 marks) – Paper 2 Management in Context (80 marks) • Duration of the papers has been increased by 15 minutes. The duration of each paper is now 1 hour 45 minutes. • The specimen papers have been updated to reflect changes to the subject content. There are now essay questions in Paper 1 only. All the questions in Paper 2 are structured questions. • Essay questions in Paper 1 Section B are no longer based on source material or data printed in the papers. Candidates now choose one essay question from a choice of two, and are expected to refer to examples and/or case studies. • There will no longer be a separate answer booklet for Section B. Candidates will now write all of their answers on the question paper. • The mark schemes have been updated to reflect changes to the question papers. There is a new levels of response mark scheme for Section B in Paper 1.

Other changes	• The syllabus aims have been updated, for consistency with IGCSE Environmental Management. • Overarching key concepts for AS Level Environmental Management have been introduced. • The mathematical requirements have been updated and expanded, and sections on the Gathering of data and Presentation of data have been added. • The glossary of terms has been replaced by our standard Command words list.

In addition to reading the syllabus, you should refer to the updated specimen papers. The specimen papers will help your students become familiar with exam requirements and command words in questions. The specimen mark schemes explain how students should answer questions to meet the assessment objectives.

Any textbooks endorsed to support the syllabus for examination from 2022 are still suitable for use with this syllabus.

‘While studying Cambridge IGCSE and Cambridge International A Levels, students broaden their horizons through a global perspective and develop a lasting passion for learning.’

Zhai Xiaoning, Deputy Principal, The High School Affiliated to Renmin University of China

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