

Reformed GCSE and A level subject content consultation

Environmental Science A level

Background

The Institution of Environmental Sciences (IES) is a membership organisation that represents professionals from fields as diverse as air quality, land contamination and education - wherever you find environmental work underpinned by science. A visionary organisation leading debate, dissemination and promotion of environmental science and sustainability, the IES promotes an evidence-based approach to decision and policy making.

The Committee of Heads of Environmental Sciences (CHES) is the collective voice of the environmental sciences and related programmes in higher and further education. CHES plays a leading role in the Higher and Further Education Environmental Science community and advocates for environmental science within education. After working closely together for over a decade in 2013 CHES merged with the IES and now serves as its education committee. Together the IES and CHES now accredit over 75 degree programmes in the UK and abroad, including more than 20 Master's courses.

CHES has led the production of each of the three iterations of the QAA Subject Benchmark Statement for Earth Sciences, Environmental Sciences and Environmental Studies (ES3), last updated in October 2014.

Is the revised AS and A level content in this subject appropriate?

The IES and CHES welcome the introduction of an A-Level in Environmental Science and is pleased to see a number of important themes reflected in the subject content document. When considering the coverage of the proposed syllabus and its appropriateness in preparing students for undergraduate study, we would stress the importance of aligning the A level curriculum with the ES3 subject benchmark statement¹. In particular, we would like to draw your attention to paragraph 2.7 of this statement, which outlines 'Subject knowledge for degree programmes broadly concerned with environmental science', and will be very helpful in aligning this syllabus with undergraduate course contents.

Certain key topics and concepts which are lacking from the subject content are highlighted explicitly in this submission. Furthermore, we believe that changes are needed in the practical skills section to ensure that the importance of field work, and associated skills are reflected in this document and the resulting syllabus.

¹ <http://www.qaa.ac.uk/en/Publications/Documents/SBS-earth-sciences-14.pdf>

Aims and objectives

The need to achieve sustainability should be more explicit in this section, specifically within the context of the final bullet point which refers to decision making by society.

Subject principles

The IES and CHES support the subject principles currently outlined in the draft content document, but would also recommend the inclusion of two further points in this section:

- The complexity of environmental systems requires understanding of issues related to scale (especially how environmental systems, pressures on them, and management approaches play out at different spatial and temporal scales). In paragraph 8 a further principle should be added such that students develop an appreciation of the significance of scale in the understanding of natural systems.
- Given the importance of human-environment interactions, as recognised elsewhere in this consultation document, the subject principles could usefully emphasise the need for a greater focus on interdisciplinary science in the study of many socio-environmental systems. We recommend that under paragraph 9 a point is added to the effect that where appropriate students develop an appreciation of the contributions of other subject areas (including natural sciences, economics, ethics and social sciences) to current understanding and research on a topic and engage with these ideas appropriately.

Subject content and areas of study

Water

Given the fundamental primacy of water to all life on earth, and the death tolls globally associated with droughts, floods and poor water quality, it is surprising that water is rarely mentioned in this document. Furthermore, 'water and water management' comprise 40-45% of the world market for the practical (and money earning) environmental markets wherever you are in the world, so the current limited emphasis on this topic seems inappropriate. In an environmental science syllabus water should be given much greater prominence, both as a resource essential for life and as a hazard to life and health. The 'water cycle' should also be covered in the syllabus, potentially as one of the biogeochemical cycles.

Waste

Waste management is another topic which receives limited attention in this draft document. Again, another 40-45% of world environmental markets are made up of 'wastes and wastes management' and although this figure does overlap with other sectors, this importance is not reflected in the syllabus in its current form.

Energy

The 'Energy Resources' section (paragraph 19) needs to be expanded in detail and weight, to reflect the importance of this topic in meeting the environmental challenges of the future. Content focusing on the de-carbonisation of power generation should be included in this section. The challenging question of decoupling economic growth from carbon consumption is currently not mentioned, but could also be introduced in this section through the analysis of real world challenges.

Conserving biodiversity

The content on habitat conservation would benefit from a critical awareness of the conservation methods suggested. Such methods can be seen, and indeed are presented in some cases, as ways by which habitat loss can be mitigated. However, they come with challenges and the student should be aware of this.

Soils

The processes by which soils are produced, and basic characteristics of common types of soils should be included. This would provide a solid basis for understanding the threats and management strategies currently referred to in section 18 of the content. Currently this section does not appear to include any information on the underlying science.

Built environment

Many of the areas of study included in this draft syllabus are covering topics which could be nested under the title 'Natural Environment'. Although we would not necessarily encourage the use of this distinction, it is our view that an additional section to cover issues in the 'Built environment' would be beneficial. The inclusion of an area of study on this theme could in fact address some of the deficiencies already identified, such as those regarding waste or water management.

Sustainability

Section 22 needs to encourage not only an understanding of sustainability, but also promote a debate about what it actually means, by exploring the various definitions used and balancing their respective positives and negatives.

We also suggest that 'carbon footprints and sustainable development', which is currently included in paragraph 18 on 'The physical environment', could be more appropriately included under 'Sustainability'.

Legislation

Given that much of what can be done in and/or to the environment is regulated by a large body of environmental legislation, this should be at least mentioned in the syllabus. Key national protections should be included, along with the major EU Directives on Water, Waste, Floods, Soils, Habitats and Birds etc. A basic understanding of environmental legislation is vital to progression in the sector, both academically to undergraduate study and professionally.

Practical skills

Although reference is made to practical skills, the vital need for students to have some sort of field experience is not emphasised. Field work would prepare the student for degree level study where it, and the health and safety associated with it, is an integral part of Environmental Science courses.

Field work is important to develop an understanding of how many concepts taught in the classroom operate in the real world. However, field work also aids students in the development of various skills important for further study. Observation and recording skills can be developed in the field, but can also be taught independently where field work is not possible. These points should be included in Appendix 1 on practical skills.



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For further information please contact:

Robert Ashcroft

Publications and Policy Officer

The Institution of Environmental Sciences

Tel: 0207 601 1920

Email: robert@the-ies.org

www.the-ies.org