Cranedale Centre
Supporting the 2015 OCR A Biology Syllabus

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Centre

Our objective is to make our A Level field courses a richly rewarding experience for students; stimulating their ecological awareness, developing enquiring minds and inspiring students to widen their ecological experience both during and after the course.

The 2015 OCR A Biology specification offers many exciting new opportunities and challenges for biology students. To meet this challenge the Cranedale Centre has developed many new field studies units for students working towards a new course.

At AS/A Level, modules 1 *Development of practical skills in biology* and 4 *Biodiversity, evolution and disease* have highly relevant content covered in Cranedale field studies.

Equally at A Level, numerous aspects of module 6 *Genetics, evolution and ecosystems* will be covered through our fieldwork investigations.

Teachers also have the option of also undertaking 6 out of the 12 compulsory practicals whilst at the Centre.

Furthermore, we hope that by the end of the fieldtrip, students will have come across 8 of the 12 apparatus and techniques skills and are able to show progression in the mastery of the practical competencies outlined in the Common Practical Assessment Criteria (CPAC).

Finally, a special feature of a course at the Cranedale Centre is that we are able to shape a course to your specific needs, choices and course duration. Inevitably the key decision will not be what to include, but what to leave out!

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Fieldwork Opportunities at the Cranedale Centre
OCR A Biology 2015

Overview

Our fieldwork topics are tailored to coach students through the much of the content of AS/A Level Module 1 and 4 and A-Level Module 6 examined in Papers 2 and 3. Each fieldwork topic is planned with a lab-based introduction in the morning and a full day of studies in the field (often with a wide range of field equipment). With the aid of iPads student data can be collated, producing means, statistical calculations and graphs which allow instant interpretation of their results in the field. This data can also be emailed back to school. Evening sessions more often take the format of practical outdoor experiences that cover unique and exciting aspects of the syllabus. Students are also able to practice and develop the practical competencies required for the A-Level practical endorsement.

Practical Skills

Practical skills are embedded throughout all the content of this specification and can be tested in all written papers, in addition to the Practical Endorsement. We endeavour to foster the practical skills necessary for students to demonstrate their competency in all aspects of scientific enquiry. This includes a critical appreciation of methods, application of skills, the processing and interpretation of results, evaluating their studies and considerations of margins of error, precision and accuracy.

Practical Endorsement

As part of a wider field course at the Centre, students could complete practicals fulfilling the requirements of Practical Activity Groups 3 (Sampling Techniques) and 12 (Research Skills) although PAGs 1, 2, 5, 9, 10 and 11 will also be included depending on time and topics chosen.

Required Practical Activites

Out of the 12 'Required Practicals' each student must accomplish for AQA A-Level, Practicals 2, 3, 4, 6, 10 and 12 can be completed as part of a field course at the Centre should you want to include them.

Required Practical 2: Dissection

Required Practical 3: Sampling techniques

Required Practical 4: Rates of an enzyme controlled reaction

Required Practical 6: Chromatography

Required Practical 10: Investigation using a data logger

Required Practical 11: Investigation into the measurement of plant or animal responses

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Use of Apparatus and Techniques – 1.2.2

In addition, courses at the Cranedale Centre provide opportunities for students to develop many of the skills associated with apparatus and techniques; required by all A-level Biology specifications. Of the skills required by OCR the following 8 can be encountered in your tailor made field course:-

a) use appropriate apparatus to record a range of quantitative measurements (to include mass, time, volume, temperature, length and pH)

b) use appropriate instrumentation to record quantitative measurements, such as a colorimeter or photometer

d) use of a light microscope at high power and low power, including use of a graticule

e) production of scientific drawings from observations, with annotations

h) safely and ethically use organisms to measure: plant or animal responses, physiological functions

j) safely use instruments for dissection of an animal organ, plant organ

k) use sampling techniques in fieldwork

l) use ICT such as computer modelling, or data logger to collect data, or use software to process data

Mathematical Requirements (MS)

At least 10% of the marks assessing either AS or A-level Biology will assess mathematical skills. Depending on the time and topics chosen, a Cranedale fieldtrip offers practical experience of the following mathematical skills at AS and A-level:

MS 0.1 Recognise and make use of appropriate units in calculations
MS 0.3 Use of ratios and calculations of percentages
MS 0.4 Estimate results
MS 1.1 Use appropriate number of significant figures
MS 1.10 Standard deviation & standard error
MS 1.11 Calculating percentage error
MS 1.2 & 1.6 Mean, median and mode
MS 1.3 & MS 1.7 Constructing and interpretation of graphs, scattergraphs, bar charts, histograms
MS 1.4 Understand the principles of sampling as applied to scientific data
MS 1.4 Use words probability and chance
MS 1.9 Selecting and using a statistical test (including Chi^2, SRCC & T-test)
MS 2.2 Change the subject of an equation (including NPP = GPP – R)
MS 2.3 & 2.4 Substitute numerical values into algebraic equations (including Simpsons Index)
MS 4.1 Calculate the circumferences, surface areas and volumes of regular shapes

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Syllabus Links covered by the Cranedale Centre OCR A 2015

The following document provides the syllabus links which the Cranedale Centre will cover for each fieldwork topic.

Syllabus Links Common to most Fieldwork Days
4.2.1. (a) Biodiversity at different levels
4.2.1 (b) Sampling to measure biodiversity, importance of sampling, Practical investigations collecting random and non-random samples in the field
4.2.1 (f) Factors affecting Biodiversity
5.2.1 (g) Factors affecting Photosynthesis
6.3.1 (a) Biotic & abiotic factors
6.3.1 (e) Distribution and abundance of organisms
6.3.2 (b) Interspecific and intraspecific competition

Rocky Shore Ecology
4.2.1 (b) Random sampling and systematic sampling
4.2.2. (a) Biological classification of species
4.2.2. (b) Binomial System
4.2.2 (g) Intraspecific and interspecific variation – standard deviation, Students T-test, Spearman's Rank Correlation Coefficient
4.2.2. (g) Adaptations of organisms to their environment

Marine Conservation
3.1.3 (e i) behavioural, physical and anatomical adaptations to the environment
4.3.2 (b) The impact of the rise in human population on ecosystems and biodiversity
4.3.2 (c) The ecological, economic and scientific importance of species biodiversity

Marine Energetics
4.2.1 (b) Random sampling
4.2.2 (a) Biological classification of species
4.2.2 (c) Features used to classify the 5 kingdoms
5.2.1 (a) Interrelationship between photosynthesis & respiration
6.3.1 (b) Measuring biomass transfer between trophic levels, efficiency of transfer, human manipulation of biomass transfer

Biodiversity in Freshwater
3.1.1 (f) Mechanisms of ventilation and gas exchange in bony fish and insects
4.2.1 (b) Stratified sampling
4.2.1 (c) Species richness & evenness
4.2.1 (d) Simpson's Index of diversity
4.2.1 (g) Ecological, Economic and Aesthetic reasons for maintaining biodiversity
4.2.1 (g) Protecting keystone species
4.2.2 (g) Adaptations of organisms to their environment
5.2.1 (a) Interrelationship between photosynthesis & respiration

Freshwater Energetics
3.1.1 (f) Mechanisms of ventilation and gas exchange in bony fish and insects
4.2.1 (b) Stratified sampling
4.2.1 (c) Species richness & evenness
4.2.1 (d) Simpson's Index of diversity
4.2.2 (g) Adaptations of organisms to their environment
5.2.1 (a) Interrelationship between photosynthesis & respiration
6.3.1 (b) Measuring biomass transfer between trophic levels, efficiency of transfer, human manipulation of biomass transfer

Freshwater Pollution
3.1.1 (f) Mechanisms of ventilation and gas exchange in bony fish and insects
4.2.1 (b) Stratified sampling
4.2.1 (c) Species richness & evenness
4.2.1 (d) Simpson's Index of diversity
4.2.2 (g) Adaptations of organisms to their environment
5.2.1 (a) Interrelationship between photosynthesis & respiration

Chalkland Succession
4.2.1 (b) Random sampling
4.2.1. (h) *In situ* methods of maintaining biodiversity
6.3.1 (d) Primary succession from pioneer to climax, deflected succession
6.3.2. (c) Conservation and preservation

Sand Dune Succession
3.1.3 (e) Xerophytic adaptations
4.2.1 (b) Systematic sampling
6.3.1 (d) Primary succession from pioneer to climax, deflected succession

Wetland Succession
3.1.3 (e) Hydrophytic adaptations
4.2.1 (b) Random sampling
4.2.1 (h) *In situ* methods of maintaining biodiversity
6.3.1 (d) Primary succession from pioneer to climax, deflected succession
6.3.2 (c) Conservation and preservation

Moorland Environments
4.2.1 (b) Random sampling
4.2.1 (h) *In situ* methods of maintaining biodiversity
4.2.1 (g) Ecological, Economic & aesthetic reasons for maintaining biodiversity
6.3.1 (d) Primary succession from pioneer to climax, deflected succession
6.3.1 (c) Carbon cycle – role of organisms (decomposition, respiration and photosynthesis) and physical and chemical effects in the cycling of carbon in ecosystems
6.3.2 (d) Management of an ecosystem providing sustainable resources
6.3.2 (e) Management of environmental resources and effects of human activities
6.3.2 (c) Conservation and preservation

Impact of Farming
4.2.1 (e) Rare breeds and pedigree animals
4.2.1 (g) Ecological, Economic & aesthetic reasons for maintaining biodiversity
4.2.1. (h) *In situ* and *Ex situ* methods of maintaining biodiversity, including seed banks
4.2.1 (i) Countryside Stewardship Scheme
4.2.2 (i) Evolution of pesticide resistance in insects
6.1.2 (h) Principles of artificial selection and its uses, ethical considerations surrounding use of artificial selection
6.1.3 (g) Ethical issues relating to genetic manipulation
6.3.1 (c) Role of decomposers and microorganisms in recycling nitrogen

Agricultural Energetics
4.1.1 b Means of transmission of animal and plant communicable pathogens
4.2.1. (e) Calculating genetic biodiversity
4.2.1 (g) Ecological, Economic & aesthetic reasons for maintaining biodiversity
6.1.2 (b) Genetic diagrams to show patterns of inheritance
6.1.2 (h) Principles of artificial selection and its uses
6.3.1 (b) Measuring biomass transfer between trophic levels, efficiency of transfer, human manipulation of biomass transfer

Sustainable Woodland Ecosystems
4.2.1 (g) Ecological, Economic and Aesthetic reasons for maintaining biodiversity
6.3.1 (c) Carbon cycle – role of organisms (decomposition, respiration and photosynthesis) and physical and chemical effects in the cycling of carbon within ecosystems
6.3.2 (d) Management of an ecosystem providing sustainable resources
6.3.2 (e) Management of environmental resources and effects of human activities

Population Studies
4.2.2 (e) Theory of Evolution by natural selection
6.1.2 (b) Genetic Diagrams to show patterns of inheritance
6.1.2 (e) Factors affecting the evolution of a species
6.1.2 (f) Hardy-Weinberg principle
6.3.2 (a) Factors that determine the size of a population