



Cranedale Centre  
Supporting the 2015 OCR B Biology Syllabus



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 B 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 3 *Cell division, development and disease control* have highly relevant content covered in Cranedale field studies.

Equally at A Level, numerous aspects of modules 4 *Energy, reproduction and populations* and 5 *Genetics, control and homeostasis* will be covered through our fieldwork investigations.

In a full field trip, teachers have the option of also undertaking 6 out of the 12 required 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!



### *Overview*

Our fieldwork topics are tailored to coach students through the much of the content of AS/A Level Modules 1 & 3 and A-Level Modules 4 & 5 examined in Papers 1, 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 consideration 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 Activities*

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



### *Use of Apparatus and Techniques – 1.2.2*

Depending on time and topics chosen a Cranedale Centre fieldtrip offer 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 will be included 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<sup>2</sup>, 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



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

*Syllabus Links Common to most Fieldwork Days*

- 3.1.3 (h) The definition and measurement of biodiversity
- 4.3.1 (m ii) Practical investigations of differences in biodiversity using techniques such as random and systematic sampling
- 4.3.2 (c) The ecological, economic and scientific importance of species biodiversity

*Rocky Shore Ecology*

- 3.1.3 (a) The concepts of biological classification and species
- 3.1.3 (e i) behavioural, physical and anatomical adaptations to the environment
- 4.3.1 (m ii) Random and systematic sampling

*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

*Biodiversity in Freshwater*

- 3.1.3 (e) behavioural, physical and anatomical adaptations to the environment
- 3.1.3 (h) The definition and measurement of biodiversity
- 4.3.1 (f) the dependency of respiration in plants and animals upon the products of photosynthesis

*Chalkland Succession*

- 3.1.3 (e ii) practical investigation into adaptations of plants to environmental factors
- 4.3.1 (m i) how land management can result in deflected succession
- 4.3.1 (m ii) Random sampling

*Sand Dune Succession*

- 3.1.3 (e ii) practical investigation into adaptations of plants to environmental factors
- 4.3.1 (m i) how land management can result in deflected succession
- 4.3.1 (m ii) Random sampling

*Wetland Succession*

- 3.1.3 (e ii) practical investigation into adaptations of plants to environmental factors
- 4.3.1 (m i) how land management can result in deflected succession
- 4.3.1 (m ii) Random sampling



### *Impact of Farming*

- 4.3.1 (g i) The biological significance of the compensation point for crop production
- 4.3.1 (g ii) An interpretation of data and graphs relating to the biological significance of the compensation point for crop production
- 4.3.1 (h i) The importance of microorganisms in maintaining ecosystems, with reference to the nitrogen cycle
- 4.3.1 (h iii) Investigating the appearance of root nodules in legumes
- 4.3.1 (k) The role of ruminants in the human food chain
- 4.3.1 (l i) Farms as ecosystems
- 4.3.1 (ii) The potential for conflict between agriculture and conservation
- 4.3.2 (b) The impact of the rise in human population on ecosystems and biodiversity

### *Agricultural Energetics*

- 3.1.3 (i) Calculation of genetic diversity within populations
- 4.3.1 (i) The transfer of biomass through a food chain in food production
- 4.3.1 (j) A consideration of the efficiency of biomass transfers in the food chain with reference to their comparative ability to provide resources in a sustainable fashion
- 4.3.1 (l i) Farms as ecosystems
- 4.3.1 (l ii) The potential for conflict between agriculture and conservation
- 4.3.2 (b) The impact of the rise in human population on ecosystems and biodiversity
- 4.3.2 (d) The global food security agenda concerning sustainable food production and consumption
- 5.1.1 (a) Patterns of monogenic inheritance

### *Population Studies*

- 3.1.3 (g) Adaptation and selection as components of evolution
- 3.1.3 (i) Calculation of genetic diversity within populations
- 5.1.1 (a) Patterns of monogenic inheritance
- 5.1.2 (a) The role of natural selection in changing allele frequencies within populations
- 5.1.2 (c) The use of Hardy-Weinberg equations to analyse changes in allele frequencies in populations
- 5.1.2 (d) Factors other than selection that contribute to genetic biodiversity