



FSC Outdoor Classroom for Scotland  
Advanced Higher Programmes

*Our standard courses are fixed length with clearly stated outcomes and links with  
SQA Arrangements.*

Environmental Biology

5 days

Please visit  
<http://www.field-studies-council.org/outdoorclassroom/scotland/advancedhigherbiology.aspx>  
for alternative Advanced Higher programmes

## OVERVIEW

This five day programme is designed to meet the needs of the Advanced Higher *Environmental Biology* unit, and will cover many of the fieldwork techniques that students will need to master for their examination, and can contribute to the *Biological Investigation* unit.

Students will leave with a greater understanding of fieldwork and the skills needed to complete a biological investigation. Students will develop core skills of independent and co-operative learning and working, critical thinking and the ability to communicate clearly and confidently

During the course all students will benefit from expert tuition in a beautiful highland setting while experiencing *real* biological situations first hand.

## PROGRAMME LENGTH

5 Days (4 nights with 12 teaching sessions)

*Monday-Friday, Wednesday-Sunday*

Groups would normally arrive in time to be taught in the afternoon of the first day and would then be taught on that evening and for three full days subsequently. Groups depart immediately after the morning session on the day of departure.

Day 1	Day 2	Day 3	Day 4	Day 5
Arrive Afternoon & evening sessions	Morning, afternoon & evening sessions	Morning, afternoon & evening sessions	Morning, afternoon & evening sessions	Morning session Depart after Lunch

## PROGRAMME CONTENT

Investigations will include:

- Biological sampling methods
- Data collection using a range of observation, measurement and recording fieldwork techniques
- Analysis, presentation and interpretation of data – including statistical tests

All the techniques will be presented within the context of investigating local habitats, species and issues, including:

- Soil ecosystems
- Succession in a hydrosere,
- Grassland and grazing ecology
- Freshwater ecosystems – species identification, abiotic/biotic effects, pollution
- Exotic species – introductions, biodiversity and conservation
- Local organic farm, biodiversity and conservation

### **ARRANGEMENT LINKS:**

During this programme students will cover the following aspects of the *Environmental Biology* Unit:

#### **Circulation in ecosystems**

- (1) Energy
  - (i) Energy fixation
  - (ii) Energy flow- roles of producers, consumers and decomposers
- (2) Circulation of nutrients
  - (i) Decomposition
  - (ii) Nutrient Cycling including the nitrogen cycle and phosphorous cycle

#### **Interactions in ecosystems**

- (1) Biotic Interactions
  - (i) Predation- predator/prey population cycles and roles within ecosystems
  - (ii) Grazing- impacts on species diversity
  - (iii) Competition- exploitation competition and interference competition
- (2) Symbiotic Relationships
  - (iii) Mutualism
- (3) The costs, benefits and consequences of interactions
  - (i) Interaction between species – positive, negative and neutral interspecific interactions
  - (ii) Interactions with the environment- responses to variants in environmental conditions

#### **Human impact on the environment**

##### Changes to ecosystems

- (i) Changes in complexity- autogenic succession and effecting external factors
- (ii) Effects of intensive food production-impacts on species diversity
- (iv) Pollution- biodegradable and toxic pollutants and the use of indicators in pollution monitoring

## TIMETABLE

DAY	MORNING	AFTERNOON	EVENING
1	<p><b>Arrival</b> (approx. 12 - 1pm)</p> <p><b>Welcome and outline the challenges ahead</b></p> <p>Tour of centre Settle into rooms Allocate kit (i.e. waterproofs)</p> <p><b>Introduction to Fieldwork</b> Introductory discussion to explore:</p> <ul style="list-style-type: none"> <li>• The importance of fieldwork</li> <li>• Biological sampling methods and techniques- including random, systematic and stratified sampling</li> <li>• Aims of the five day course</li> </ul>	<p><b>Grassland grazing study</b> Students will undertake a grassland fieldwork investigation to:</p> <ul style="list-style-type: none"> <li>• Discuss the factors affecting grassland systems; grazing and competition and symbiotic relationships within some species</li> <li>• Collect biotic data – plant, grass, sedge and rush identification in grazed and fallow grassland</li> <li>• Collect abiotic data – nitrate, potassium, pH, soil moisture, light intensity, wind, speed, relative humidity, sward height and aspect</li> </ul>	<p><b>Follow up session</b> Students will use data collected in the previous session to:</p> <ul style="list-style-type: none"> <li>• Collate group data</li> <li>• Graphically analyse results</li> <li>• Use Simpson’s Diversity Index for each area</li> <li>• Discuss methodology and limitations</li> </ul>
2	<p><b>Freshwater Pollution Study</b> Students will undertake a freshwater investigation to:</p> <ul style="list-style-type: none"> <li>• Discuss the factors contributing to freshwater pollution</li> <li>• Collect biotic data – identify and collect biological indicator species at and below a point pollution source</li> <li>• Collect abiotic data – measure nitrate, conductivity, pH and dissolved oxygen levels at and below a point pollution source</li> </ul>	<p><b>Follow up session</b> Students will use data collected in the previous session to:</p> <ul style="list-style-type: none"> <li>• Pool group data</li> <li>• Calculate Trent Biotic Index</li> <li>• Use Simpson’s Diversity Index and Jacards Similarity Index</li> <li>• Present findings in graphs, mirror bar-graphs and tables and discuss the limitations</li> </ul>	<p><b>Small mammal identification</b> Students will set Longworth humane traps in grazed and fallow grassland to:</p> <ul style="list-style-type: none"> <li>• Catch and identify nocturnal mammals on day three of the course</li> </ul> <p>Students will also set pitfall traps in birch woodland and <i>Rhododendrum ponticum</i> in preparation for day three exotic species study</p>
3	<p><b>Exotic Species study</b> Students will undertake an exotic species study focusing on <i>Rhododendrum ponticum</i> and invertebrate communities in Kindrogan wood to:</p> <ul style="list-style-type: none"> <li>• Discuss the effect of exotic species and conservation</li> <li>• Identify invertebrates in pitfall traps</li> <li>• Measure soil pH. Soil moisture, light intensity and relative humidity</li> <li>• Sample leaf litter and tree beating</li> <li>• Discussion of energy flow, nutrient cycling and decomposition</li> </ul>	<p><b>Follow up session</b> Students will use data collected in the previous session to:</p> <ul style="list-style-type: none"> <li>• Collate group results</li> <li>• Analyse data using graph</li> <li>• Use Simpson’s Diversity Index for each area</li> </ul>	<p><b>Follow up session 2</b> Students will use data collected and the statistical analysis in the previous two sessions to:</p> <ul style="list-style-type: none"> <li>• Discuss the groups results</li> <li>• Review fieldwork methods used and their limitations</li> </ul>
4	<p><b>Succession of a Hydrosere</b> Students will undertake a fieldwork study to:</p> <ul style="list-style-type: none"> <li>• Introduce the concept of autogenic (primary and secondary) succession</li> <li>• Identify biotic and abiotic factors and how these change from water to dry land, with indicator species</li> <li>• Collect data along a line transect using systematic, interrupted sampling</li> <li>• Measure abiotic factors- take soil samples to analyse for moisture content and measure gradient.</li> <li>• Discussion of nutrient cycling (succession)</li> </ul>	<p><b>Follow up session</b> Students will use data collected in the previous session to:</p> <ul style="list-style-type: none"> <li>• Calculate the moisture percentage in the soil samples taken</li> <li>• Produce kit diagrams showing the abundance of species and associated abiotic data</li> <li>• Calculate diversity using Simpson-Yule method</li> </ul>	<p><b>Follow up session 2</b> Students will use data collected and the statistical analysis in the previous two sessions to:</p> <ul style="list-style-type: none"> <li>• Discuss fieldwork methodologies used and their limitations</li> </ul>

5	<p><b>Organic Farming and Conservation</b>                  Students will undertake a fieldwork visit to the SEER centre organic farm to:</p> <ul style="list-style-type: none"> <li>• Discuss conservation, agriculture and associated conflicts, including the use of pesticides, fertilizers and the problems associated with different types of pollution</li> </ul>	<p><b>Lunch and depart</b></p>	
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**Please note:** to ensure safe and quality learning experiences for students the timetable may alter depending on weather conditions and local factors at centres.

### **FSC KINDROGAN**

Located in rural Perthshire, at the edge of the Cairngorms National Park FSC Kindrogan is 11 miles from Pitlochry's mainline train station and close to the A9. The Centre itself is set in wooded grounds on the banks of the River Ardle and lies within easy reach of some of the most inspiring landforms in the Scottish Highlands and a rich range of wildlife habitats.



KD

Kindrogan

Tel: 01250 870150

### **TO BOOK THIS PROGRAMME, SIMPLY:**

1. Choose the time of the year you would like to attend
2. Check availability online or contact FSC Kindrogan

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**The FSC prides itself on being flexible. If you can't find a programme to meet your exact requirements a course specifically tailored to meet your needs can be developed. To discuss this, contact the centre of your choice. Fees will depend on what time of year you would like to visit and your length of stay but will be more expensive than FSC programmes at peak periods.**