Practical Skills in Biology

1 or 2 Day Option – April to November
Please contact us to discuss the investigations that you would like to undertake.

- Introduction to ecology and sampling techniques.

Investigation 1

- Investigating the size of freshwater shrimp in riffles and pools in a stream (kick sampling), measuring a range of abiotic factors.
- Collect quantitative data in the field with appropriate risk management using a range of equipment.
- Present and analyse data collected by calculating chi-squared statistical test.
- Evaluate data collection methods, assessing the limitations and suggesting improvements.
- Optional: temperature measurements can be collected to calculate standard deviation and standard error.

Investigation 2

- Investigating the feeding relationships in two contrasting pond habitats (sweep sampling), measuring a range of abiotic factors and using a dichotomous key to identify species.
- Collect quantitative data in the field with appropriate risk management using a range of equipment.
- Present and analyse data collected by calculating chi-squared statistical test (and/or Simpson's Index of Diversity), and constructing pyramids of biomass.
- Evaluate data collection methods, assessing the limitations and suggesting improvements.
- Optional: temperature measurements can be collected to calculate standard deviation and standard error.

Investigation 3

- Investigate grassland through to woodland succession measuring number of plant species (and canopy cover) and a range of abiotic variables (light, soil and air temperature and soil pH) along a belt transect.
- Present and analyse data collected by calculating Spearman rank correlation.
- Evaluate data collection methods, assessing the limitations and suggesting improvements.

Investigation 4

- Investigate the height of thistles in a managed and unmanaged area using random sampling.
- Present, analyse and evaluate data by calculating standard deviation and standard error.
- Evaluate data collection methods, assessing the limitations and suggesting improvements.

Investigation 5 (2 day option only)

- Investigating a mobile terrestrial species (woodlouse) population size using mark-release-recapture.
- Present, analyse and evaluate data by calculating the Lincoln Index.
- Evaluate data collection methods, assessing the limitations and suggesting improvements.

This course would prepare students with the skills needed to carry out Unit F216 (Practical Skills in Biology). It would also cover many aspects of Unit F215 (Ecosystems and Sustainability).

Key concepts covered

Definitions of keywords in Ecology
Sampling Strategies – Random, Systematic and Stratified
Feeding Relationships
Mark-release-recapture and Lincoln Index
Succession
Collecting data using line transects and/or belt transects
Collecting data using quadrats and/or point quadrats
Pyramids of number and biomass
Standard error and 95% confidence limits
Spearman rank correlation
Chi-squared statistical test

Specification Links

3.4 BIOL4 Populations and Environment
- Populations and Ecosystems
- Investigating Populations
- Variation in population size
3.4.5 Energy is transferred through ecosystems and the efficiency of transfer can be measured.
- Energy transfer
3.4.7 Ecosystems are dynamic systems, usually moving from colonisation to climax communities in the process of succession.

3.6 Unit 6 Investigative and practical skills in A2 Biology
3.6.1 Investigating biological problems involves changing a specific factor, the independent variable, and measuring the changes in the dependent variable that result.
3.6.2 Implementing involves the ability to work methodically and safely, demonstrating competence in the required manipulative skills and efficiency in managing time. Raw data should be methodically collected and recorded during the course of the investigation.
3.6.3 Data should be analysed by means of an appropriate statistical test. This allows calculation of the probability of an event being due to chance. Appropriate conclusions should be drawn and scientific knowledge from the A Level specification should be used to explain these conclusions.
3.6.4 Limitations are inherent in the material and apparatus used and procedures adopted. These limitations should be identified, evaluated and methods of overcoming them suggested.

3.7 How Science Works
C Use appropriate methodology, including ICT, to answer scientific questions and solve scientific problems
D Carry out experimental and investigative activities, including appropriate risk management, in a range of contexts
E Analyse and interpret data to provide evidence, recognising correlations and causal relationships
F Evaluate methodology, evidence and data, and resolve conflicting evidence
H Communicate information and ideas in appropriate ways using appropriate terminology
J Consider ethical issues in the treatment of humans, other organisms and the environment