Introduction to Ecological Field Skills

Course overview, delivery, assessment, feedback

Dr. John L. Godlee

THE UNIVERSITY of EDINBURGH
School of GeoSciences

Syllabus summary

Field methods:
Taxonomy (plants, invert.)
Quadrats, plots, transects
Abundance, richness
Mapping
Environmental measurement
Site description

Research Design:
Sampling strategies
Project planning
Theory-based enquiry

Communication:
Data visualisation
Summary statistics
Hypotheses

Practice:
Eco-acoustic monitoring and habitat description.

Group research planning scenarios

Lightning presentation of data visualisation story

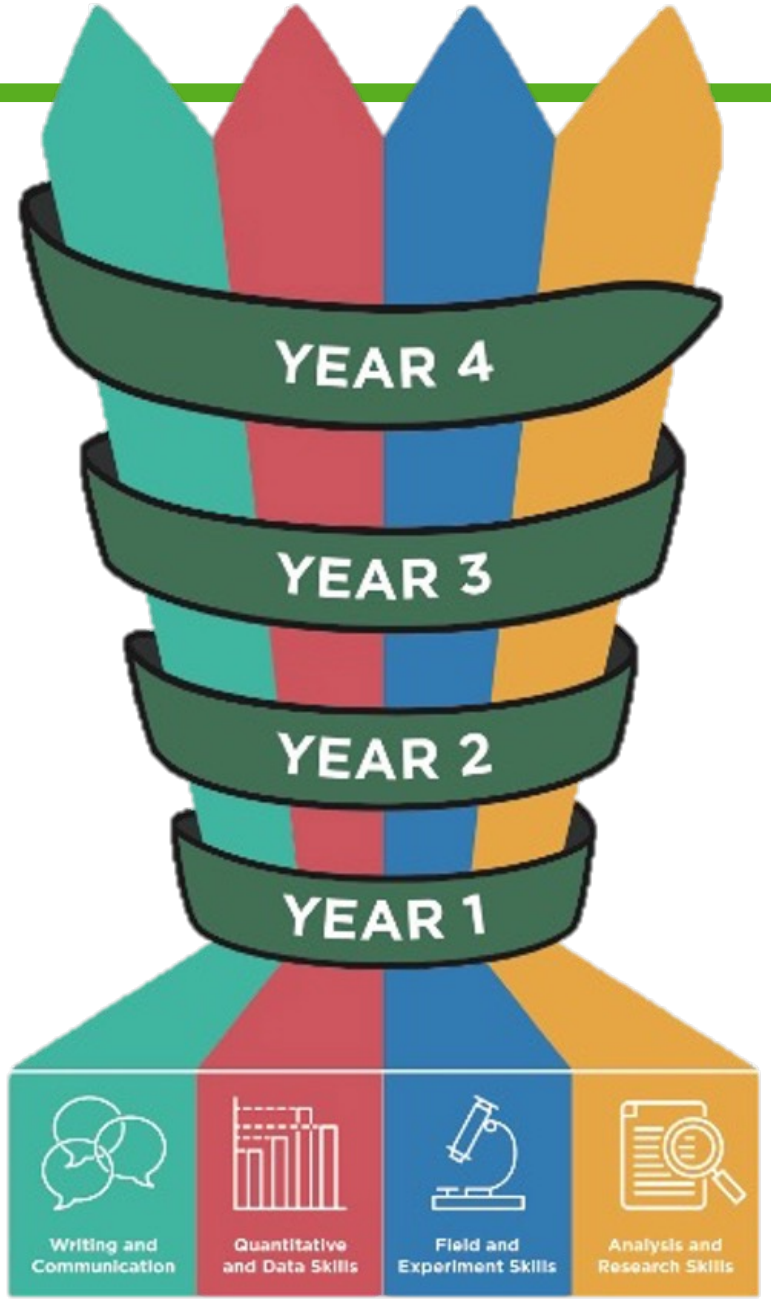
Photographic plant ID guides

Compositional change of plants with upland management

Comparison of woodland structure and biomass.

Assessment:
1. Habitat mapping and description of species
2. Data summary and visualisation exercise
3. Research design proposal
4. Autonomous research project with written report

Learning objectives



Learning objectives

By the end of the course students should be able to:

1. Describe diagnostic features of plants and invertebrates; using appropriate tools to make informed taxonomic assessments.

2. Formulate hypotheses relating biodiversity to environmental measurements.

3. Critically assess the suitability of field methods based on a particular research agenda.

4. Process ecological data to create visualisations and summary statistics which address hypotheses.

Core skills in Spiral of Learning

Writing and communication

Quantitative and data

Field and experimental

Analysis and research

Learning objectives

By the end of the course students should be able to:

1. Describe diagnostic features of plants and invertebrates; using appropriate tools to make informed taxonomic assessments. **(C1, C2)**

2. Formulate hypotheses relating biodiversity to environmental measurements. **(C3, C5)**

3. Critically assess the suitability of field methods based on a particular research agenda. **(C2, C5)**

4. Process ecological data to create visualisations and summary statistics which address hypotheses. **(C3, C4)**

SCQF Descriptors:

L8C1: Knowledge of core concepts and terminology. **Awareness of major specialisms in professional field.**

L8C2: **Experience using a range of professional skills,** carrying out enquiries.

L8C3: **Critical analysis and synthesis of ideas**. Use a range of approaches to formulate evidence-based solutions.

L8C4: **Convey complex information,** using a range of standard ICT applications to process data.

L8C5: Exercise autonomy and initiative in a subject. **Take the lead on planning in defined contexts.**

Links with:

Previous learning

Intro to EES:

- Practice skills gained in Excel/R to organise, summarise and visualise ecological data.
- Strengthen basic knowledge of professional ecologist attributes.

Biology 1A - Variation:

- Practice data recording and field observation skills.
- Extend understanding of animal and plant diversity in field context.

Future learning

Principles of Ecology:

- Managing group-led field projects.
- Understanding environmental adaptation.
- Understanding uncertainty in real-world ecological data.
- Visualisation of data (categorical, continuous, interactions)

Future field courses:

- Under-pinning skills for conducting ecological field studies in a range of habitats.

Day 3: Sampling and research design

King's Buildings and Hermitage of Braid

Morning

Field methods:
Choosing appropriate quadrat sizes
Replication and stratification
Plant ID: trees, herbs, cryptogams

Practice:
Comparing species richness across functional groups using nested quadrats of multiple sizes.

Afternoon

Formative assessment:
Scenarios with research question, budget, location, timeframe.

In small groups (~6), devise research proposal and expected results.

Paired group presentations and discussion with demonstrator

Understand:
- How to balance constraints of time and budget with research scope
- There are a variety of sampling methods suited to different functional groups

Day 4: Forest mensuration and digital technologies

Currie Wood: 15 miles from King's

Two groups: ~32 students each, subgroups of 5-6

Group 1

Field methods:
Site description, Digital tech., Eco-acoustics

Practice:
Eco-acoustics and site description across multiple habitats.

Understand:
- Spatial variation in habitats
- Effective site description
- Replication in sampling design
- Digital data collection techniques

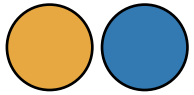
Group 2

Field methods:
Forest structure, Biomass estimation, Tree ID

Practice:
Comparison of forest structure in plantation and unmanaged broadleaf forest

Understand:
- Common forest measurements
- Successional variation
- Common tree species in Scotland

Formative assessment

1. **Data visualisation and communication:** Lightning presentation (3 minutes) of one data visualisation to peer group (4-5 students) explaining results collected in the field. Students feedback. Demonstrator provides group feedback and questions. 
2. **Field identification:** Student partners swap photo plant ID guide based on diagnostic features. Students provide peer feedback. Demonstrators provide group feedback. 
3. **Research design:** Group activity (5-8 students) to plan research activities based on scenarios. Paired group presentations with demonstrator and peer feedback, whole cohort feedback and discussion. 
4. **Research design:** Paired quick pitches of plans for summer project. 

- Daily 20 minute wrap-up discussions led by demonstrators on challenges encountered during the day.

Writing and communication

Quantitative and data

Field and experimental

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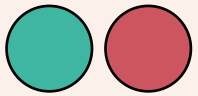
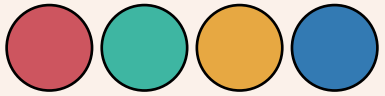
Summative assessment

1. **Data visualisation and communication:** create three data visualisations using data collected during the field course. Provide extended figure captions describing and explaining the data, with reference to one hypothesis per figure. (20%) (LO2, LO4) 
2. **Field recording, identification and environmental measurement:** Produce a habitat map. Include descriptions of the diversity and abundance of plant and invertebrate species, and the environmental context. (30%) (LO1, LO4) 
3. **Research design:** Produce an A4 side which posits a simple hypothesis, justifies a particular sampling design, and includes reproducible instructions for how to carry out the field data collection. (Possibly video presentation?) (10%) (LO2, LO3) 
4. **Summer research project:** Design, execute and report on a field investigation of your choice, choosing from a list of themes. (40%) (LO1, LO2, LO3, LO4) 

Writing and communication

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Feedback is linked to student performance

Feedback should:

- Always result in recommendations for student action.
- Confirm good practice as well as suggest improvements.
- Be provided when it is timely for learning progression.
- Be explicitly linked to learning outcomes.
- Provide scope for students to excel.

Feedback comes from multiple sources:

- Peer feedback, e.g. group discussions and paired exercises
- Demonstrator oversight in group activities
- Inclusive group feedback on formative assessments
- Written individual feedback on summative assessments

Template for actionable feedback:

1. **What?** – identify the issue, explain in direct terms
2. **Why?** – explain the effect of this issue on the work
3. **How?** – tangible steps to long term improvement