Module 3

Spatial Modelling in Ecology

Jafet Belmont

1 Overview

This module provides an overview of widely-used contemporary methods for analysing spatial data in ecology and environmental sciences. We begin by developing spatial modelling techniques for **disease risk assessment** as a critical interface between environmental hazards and public health. From there, we move to **modern computational tools for spatial prediction and inference** that integrate hierarchical structures, latent processes, and scalable inference frameworks suited to complex spatial data.

The module balances **methodological principles** with **hands-on application**, focusing on fitting interpretable spatial models that account for spatial dependence and produce robust predictions for conservation planning, environmental management, and ecosystem assessment.

2 Course Structure

This course provides an appreciation of the application of statistical methods and concepts to problems in *Environmental and Ecological Sciences*.

The course consists of 3 modules divided into weeks - this is primarily to help you find the relevant material easily.

Module	Week	Topic
Environmental Monitoring & Data processing	1	Introduction to Environmental Statistics
	2	Understanding our Data
	3	Sampling and Monitoring Networks
Measuring Environmental Change	4	Assessing Change Over Time
	5	Temporal Correlation and Changepoints
	6	Modelling Environmental Extremes
Spatial Modelling in Ecology	7	Modelling Areal Data
	8	Modelling Geostatistical Data
	9	Methods for Point referrenced Data

2.1 Lectures

There will be two - 1 hr lectures per week at 42 Bute Gardens:916

> **Note**
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> *Lectures will be recorded if the room's technology allows them to be.*

2.2 Tutorials

In addition, there will be **four** tutorials for this course. There are two tutorial groups - please check on MyCampus which one you are in.

3 Tutorial Group 1 - Monday 10am

Tutorial groups:

- STATS 4009 - TU01 (23738)
- STATS 5031 - TU01 (24174)

Venue:

Adam Smith: 281

Tutorial dates:

1. 26-Jan-2026
2. 09-Feb-2026
3. 23-Feb-2026
4. 09-Mar-2026

4 Tutorial Group 2- Wednesday 12 noon

Tutorial groups:

- STATS 4009 - TU02 (23739)
- STATS 5031 - TU02 (24175)

Venue:

Joseph Black Building:C407 Agricultm

Tutorial dates:

1. 28 -Jan-2026
2. 11-Feb-2026
3. 25-Feb-2026
4. 11-Mar-2026

> **Important**
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> *You are expected to have attempted the exercise sheets before the tutorial - they will be available in advance.*

4.1 Labs

There will be three labs taking place in Boyd Orr Building:418 Lab from **15:00-17:00pm** on the following dates (clicking on the date will direct you to the lab material):

1. Lab session 1 - Jan 30th
2. Lab session 2 - Feb 27th
3. Lab session 3 - March 13th

5 Assessments

Assessment in this course includes continuous assessment and a final exam. The exam will take place in April/May.

- *Level H* students will have a **Group Report** worth 25% and a final exam worth 75%.
- *Level M* students will have a **Group Report** worth 25%, a **critique** worth 10% and a final exam worth 65%.