

# Course overview

Analysis of Ecological and Environmental Data

QERM 514

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Who am I?

# My role as course instructor

- Help you learn the material
- Help you learn how to ask for help
- Be a future resource

Who are you?

# Introduce yourself

Tell us via Zoom chat:

1. Your degree program (MS, PhD)
2. Your school/department
3. Your area of study (a phrase or short sentence)

What is this course about?

# Two major goals in ecology:

1. Infer process from pattern

Process  $\overset{?}{\Rightarrow}$  Pattern

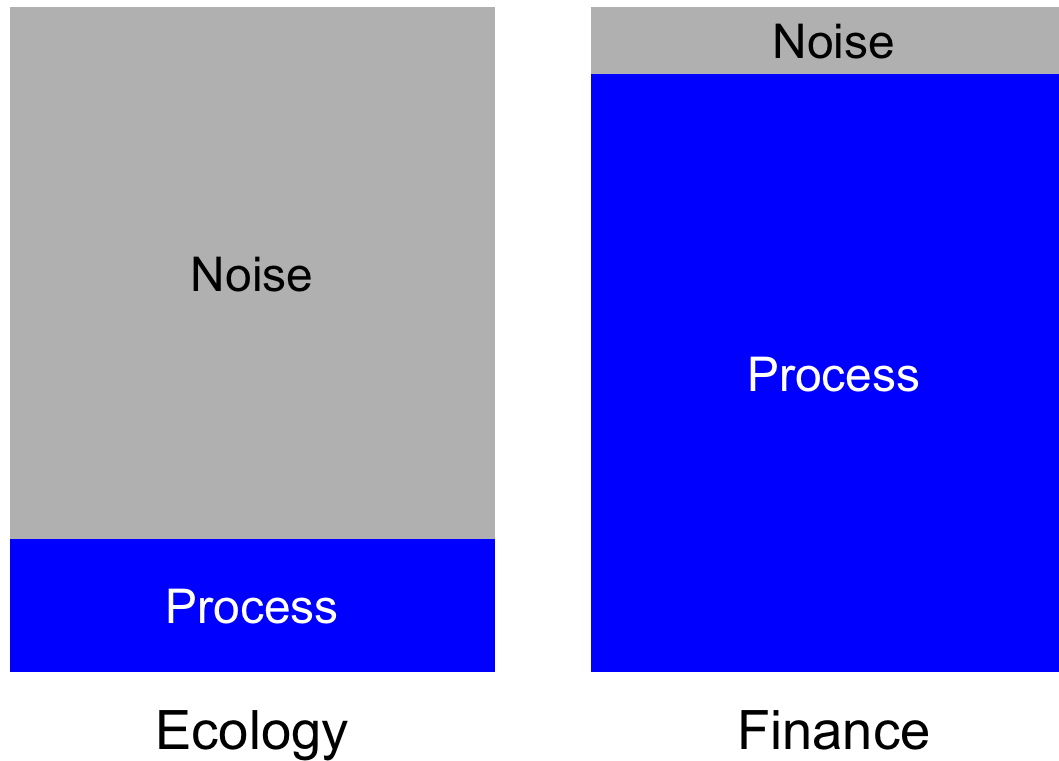


$$\text{Pattern} = f(\text{Process})$$

$$\text{Data} = f(\text{Process})$$

Data = Process + Noise

# Ecological data often have lots of noise



Our challenge is to separate  
the signal from the noise

# Two major goals in ecology:

1. Infer process from pattern
2. **Make predictions**

# Ecological forecasting

How will [some future scenario] affect [some ecosystem service]?

# General approach

Question → Data → Model → Inference → Prediction



# Forms of linear models

Errors

Single random process

Multiple random processes

Normal

Linear Model (LM)

Linear Mixed Model (LMM)

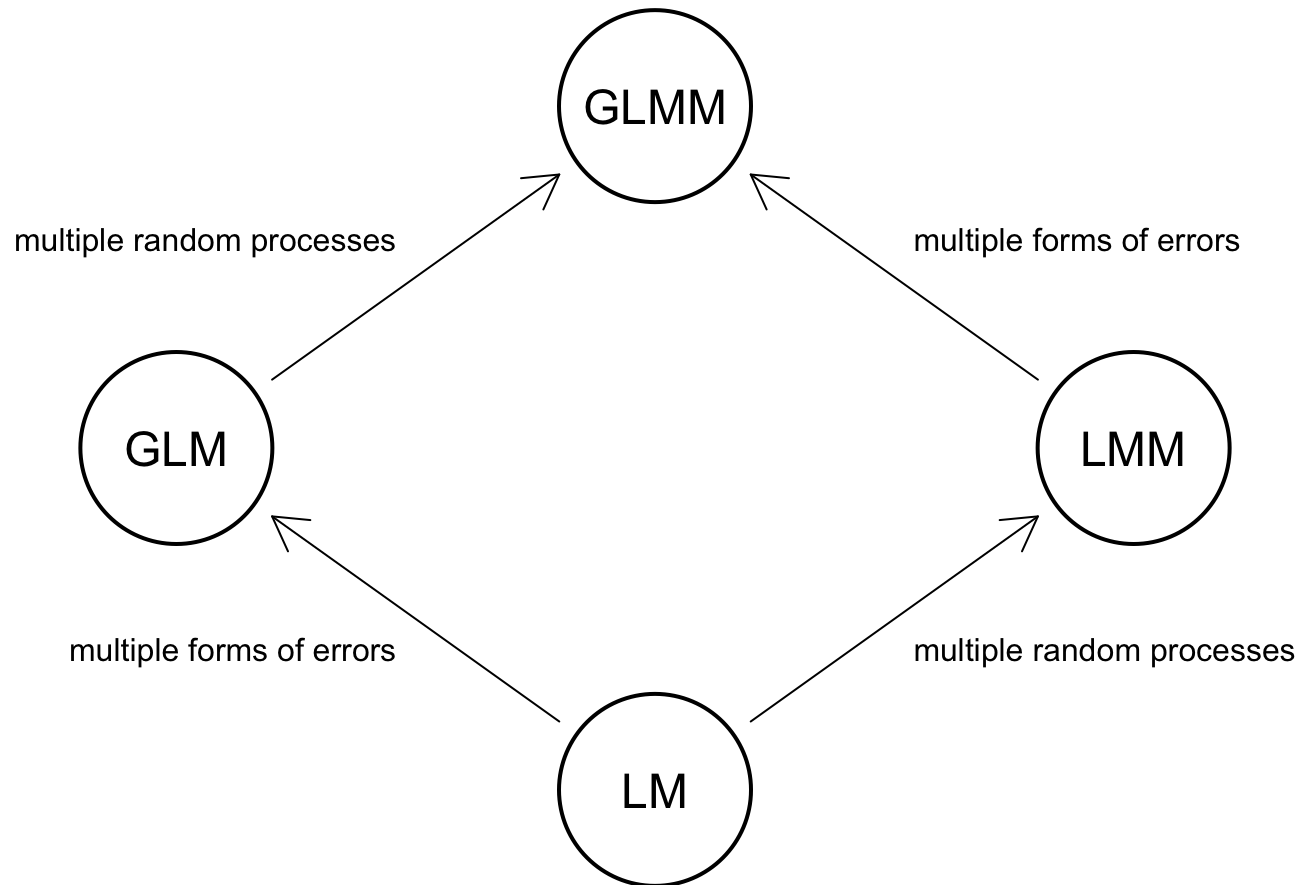
Non-normal

Generalized Linear Model (GLM)

Generalized Linear Mixed Model (GLMM)

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# Forms of linear models



# Learning objectives for the course

By the end of the quarter, students should be able to:

- Identify an appropriate statistical model based on the data and specific question
- Understand the assumptions behind a chosen statistical model
- Use **R** to fit a variety of linear models to data
- Evaluate data support for various models and select the most parsimonious model among them
- Use **R Markdown** to combine text, equations, code, tables, and figures into reports

# Course information