

# COASTAL AND MARINE BIOLOGY AND ECOLOGY (LM51)

(Lecce - Università degli Studi)

## Teaching MATHEMATICAL MODELLING IN ECOLOGY

GenCod A006033

Owner professor SERENA ARIMA

**Teaching in italian** MATHEMATICAL MODELLING IN ECOLOGY

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**SSD code** SECS-S/02

**Reference course** COASTAL AND MARINE BIOLOGY AND ECOLOGY

**Course type** Laurea Magistrale

**Credits** 6.0

**Teaching hours** Front activity hours: 48.0

**For enrolled in** 2024/2025

**Taught in** 2024/2025

**Course year** 1

**Language** ENGLISH

**Curriculum** Curriculum E-Biodiversity and Ecosystem Sciences

**Location** Lecce

**Semester** Second Semester

**Exam type** Oral

**Assessment** Final grade

**Course timetable**  
<https://easyroom.unisalento.it/Orario>

### BRIEF COURSE DESCRIPTION

The main goal of the course is to provide basic tools for analyzing ecological data with focus on probabilistic and mathematical modeling issues. In particular the course deals with:

- 1) Introduction to statistics and probability;
- 2) Association and entropy measures;
- 3) Probability and statistical inference for Normal and not Normal populations;
- 4) Linear models and non linear models.

During the course, the statistical software R will be illustrated and the students will be able to elaborate their data using it.

### REQUIREMENTS

Basic concepts of mathematics and statistics.

### COURSE AIMS

The course aims at providing basic methodologies for analyzing ecological data and modeling their intrinsic variability.

### TEACHING METHODOLOGY

Slides, exercises provided on the web page. Practical exercises with the statistical software R.

### ASSESSMENT TYPE

Written exam with R.

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## FULL SYLLABUS

1. Introduction: why analyzing data in ecology?
2. Exploratory data analysis and graphics
3. Deterministic functions for ecological modelling
4. Probability and stochastic distribution of ecological modeling
5. Stochastic simulation and power analysis
6. Statistical inference
7. Linear regression model and generalized linear models
8. Non linear models
9. Modelling variance
10. Dynamic models

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## REFERENCE TEXT BOOKS

B. Bolker (2007) Ecological models and Data with R, PRINCETON UNIVERSITY PRESS.

A. Zuur, E.N. Ieno, G.M. Smith (2007) Analyzing ecological data, Springer Ed.

Interesting web book: <http://web.stanford.edu/class/bios221/book/introduction.html>