



**LUND**  
UNIVERSITY

Faculty of Science

## **BIOS15, Biology: Processing and Analysis of Biological Data, 7.5 credits**

*Biologi: Bearbetning och analys av biologiska data, 7,5 högskolepoäng*  
**Second Cycle / Avancerad nivå**

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### **Details of approval**

The syllabus was approved by Study programmes board, Faculty of Science on 2024-04-05. The syllabus comes into effect 2024-04-05 and is valid from the autumn semester 2025.

### **General information**

The course is an optional course for a degree of Master of Science in Biology and Molecular Biology and a compulsory course for a degree of Master in Bioinformatics or Applied Computational Science with specialisation Biology.

*Language of instruction:* English

<i>Main field of study</i>	<i>Specialisation</i>
Bioinformatics	A1F, Second cycle, has second-cycle course/s as entry requirements
Applied Computational Science	A1F, Second cycle, has second-cycle course/s as entry requirements
Biology	A1F, Second cycle, has second-cycle course/s as entry requirements
Molecular Biology	A1F, Second cycle, has second-cycle course/s as entry requirements

### **Learning outcomes**

The overall learning outcome for the course is that the student shall gain practical experience in handling and analysis of biological data, with focus on measurement theory, parameter estimation and quantitative interpretation.

### **Knowledge and understanding**

On completion of the course, the student shall be able to:

- account for basic measurement theory
- explain the relationship between experimental design and statistical analysis in biology
- explain the distinction between biological and statistical significance
- describe basic assumptions of (generalized) linear (mixed) models and their applications

### **Competence and skills**

On completion of the course, the student shall be able to:

- handle and structure quantitative biological data
- design appropriate analytical methods for biological data and questions
- master common statistical-analysis methods and be able to carry out these in R
- derive relevant measures of effect size for common biological data types
- formulate biological results based on the output of statistical analyses
- produce reproducible, publishable R code

### **Judgement and approach**

On completion of the course, the student shall be able to:

- assess the relevance and reliability of a biological dataset
- evaluate published studies in terms of quantitative methods
- from a biological perspective evaluate quantitative results of published studies

### **Course content**

The course addresses:

- principles of measurement theory, measurement and biological relevance
- scientific programming in R, reproducibility, and version control
- quantitative analysis methods including linear models (regression, analysis of variance, analysis of covariance), generalized linear models, mixed models, multivariate methods
- Bayesian methods

### **Course design**

The course consists of lectures, seminars and computer exercises. Participation in computer exercises and associated elements is compulsory.

### **Assessment**

Assessment takes the form of a written examination at the end of the course as well as through computer exercises during the course. Students who do not pass a regular assessment will be offered another opportunity for assessment soon thereafter.

The examiner, in consultation with Disability Support Services, may deviate from the regular form of examination in order to provide a permanently disabled student with a form of examination equivalent to that of a student without a disability.

## **Grades**

Grading scale includes the grades: Fail, Pass, Pass with distinction

To pass the entire course, approved computer exercises and approved examination are required. The final grade is based on the result on the written examination.

The grading scale for Computer exercises is Fail, Pass, whereas Examination is graded according to the scale Fail, Pass, Pass with Distinction.

## **Entry requirements**

For admission to the course, a degree including at least 180 credits, and 15 additional credits at second-cycle level in Biology, Molecular Biology or Bioinformatics, including 7.5 credits statistics or programming, are required. English 6/B.

## **Further information**

The course may not be included in a degree together with BIOS14 Processing and Analysis of Biological Data 7.5 credits.

The course is given by the Department of Biology, Lund University.