



# **P000154, Hands-on Machine Learning in Life Science with R, 5.0 Hp**

## **Syllabus**

Finalized by: Finalized by: Galia Zamaratskaia and Ali Moazzami, 2025-10-21, 2025-10-21

Valid from: 2025H

### **Level within study regulation:**

Third cycle

### **Grading scale:**

Pass / Failed

### **Course language:**

Swedish

### **Entry requirements:**

- Undergraduate degree in agronomy, biology, chemistry, or related area
- Basic familiarity with R and introductory statistics

### **Objectives:**

## **Course Objectives**

This course provides a hands-on approach to machine learning in life sciences, focusing on the practical application of key algorithms using R. Students will gain basic knowledge of supervised and unsupervised models and learn how to apply, evaluate, and interpret these models in real-world biological datasets.

## Learning Outcomes

By the end of this course, students will be able to:

- Explain the workflow of supervised and unsupervised machine learning for life-science data
- Implement decision trees, random forests, SVMs, clustering, PCA, and simple ANNs in **R**
- Evaluate and tune models (resampling, hyperparameters, performance metrics)
- Interpret results for scientific reporting in agricultural, biological, and medical contexts
- Communicate findings via a short, structured project presentation

**Content:**

## Teaching & Assessment Strategy

- **Synchronous sessions: 2 per week** (Lecture/Discussion and Lab), ~1.5–2 h each
- **Assessment:** One **combined assignment** (supervised + unsupervised) and one **final project presentation**
- Short pre-class video/readings for theory; live time is used for Q&A and hands-on labs

**Delivery:** Online (Zoom)

## Modes of assessment:

**Pass criteria:** Submission quality, code correctness/reproducibility, methodological justification, and clarity of interpretation. - If a student has failed an examination, the examiner has the right to issue supplementary assignments. This applies if it is possible and there are grounds to do so.

- The examiner can provide an adapted assessment to students entitled to study support for students with disabilities following a decision by the university. Examiners may

also issue an adapted examination or provide an alternative way for the students to take the exam.

- If this syllabus is withdrawn, SLU may introduce transitional provisions for examining students admitted based on this syllabus and who have not yet passed the course.
- For the assessment of an independent project (degree project), the examiner may also allow a student to add supplemental information after the deadline for submission. Read more in the Education Planning and Administration Handbook.

## **Organisation:**

Department of Molecular Sciences

## **Supplementary information**

### **Other information:**

- The right to participate in teaching and/or supervision only applies for the course instance the student was admitted to and registered on.
- If there are special reasons, students are entitled to participate in components with compulsory attendance when the course is given again. Read more in the Education Planning and Administration Handbook.