



# **P000158, Introduction to point cloud processing for forest sciences, 4.5 Hp**

## **Syllabus**

Valid from: HT2025

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

Third cycle

### **Grading scale:**

Pass / Failed

### **Course language:**

Swedish

### **Entry requirements:**

Admitted to doctoral studies. Basic knowledge of R, Matlab, Python or programming languages such as C/C++

### **Objectives:**

*On completion of the course, the student will be able to:*

- *Use algorithms for filtering and classification of point clouds*
- *Use algorithms for derivation of surface models from point clouds*
- *Use algorithms for segmentation of objects from point clouds*
- *Use algorithms for classification and interpretation of objects segmented from point clouds*

## **Content:**

*The course includes lectures, exercises, and student projects.*

*The course introduces and teaches algorithms for automated point cloud processing. **The processing can be applied to point clouds from airborne and ground-based platforms.** An important part of the course consists of exercises where the students apply the algorithms to real data from forest sciences.*

*The algorithms include filtering and classification of point clouds based on properties of the points or the local surrounding, calculation of surface normals from point clouds, derivation of surface models from height data of point clouds, derivation of high-resolution raster from various properties of point clouds, conditional Euclidean clustering of point clouds, and segmentation of objects from point clouds using classical methods and AI tools, in particular tree crowns and tree stems. The algorithms are using 3D coordinates, 3D voxels, and 2D pixels.*

*The course also presents systems and processes to register point clouds, visualization of point clouds, data structures such as Quadtree and k-d-tree, and applications of point cloud processing in forest sciences.*

## **Modes of assessment:**

*Passed written exercises. Passed student project.* - 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- If this syllabus is withdrawn, SLU may introduce transitional provisions for examining students admitted based on this syllabus and who have not yet passed the course.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 Forest Resource Management

## 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.