



SHORT INTENSIVE COURSES

Before and during the internship students will be trained on the specific topics / methodologies related to the internship programme by “short intensive courses” organised by the hosting institution and online courses provided by the TAURUS consortium.

Course title: Unmanned Aerial Vehicle (UAV)-based monitoring of forest biomass features utilizing photogrammetry, GIS and R language

Linked to the Internship programme: Smart technologies in environmental and agroecological monitoring

Edition: 2021

Academic coordinator: Prof. Ivan Vasenev

Duration: 14 days

GENERAL OBJECTIVES

The internship is focused on smart technology application skills development of environmental and agroecological monitoring from field and lab investigation till GIS, RS, IoT and/or DSS implementation in the LAMP monitoring sites

COURSE STRUCTURE

General introduction:

Module 1: *UAV based photogrammetry utilizing Agisoft Metashape Pro*

Lecturer: Alex Yaroslavtsev (Data analysis in ecology and soil science, ecosystem production modelling, statistics, geostatistics)

Module 2: *Introduction to R language*

Lecturer: Alex Yaroslavtsev (Data analysis in ecology and soil science, ecosystem production modelling, statistics, geostatistics)

Module 3: *Exploring techniques of raster data analysis in QGIS*

Lecturer: Alex Yaroslavtsev (Data analysis in ecology and soil science, ecosystem production modelling, statistics, geostatistics)

Module 4: *Assessing forest biomass features utilising photogrammetry results and R language*

Lecturer: Alex Yaroslavtsev (Data analysis in ecology and soil science, ecosystem production modelling, statistics, geostatistics)

Module 5. *Extrapolating individual tree real time monitoring data from TreeTalker devices to remotely assessed spatial data*

Lecturer: Alex Yaroslavtsev (Data analysis in ecology and soil science, ecosystem production modelling, statistics, geostatistics)

EXPECTED LEARNING OUTCOMES

A graduate of this program will be able to utilise UAVs high resolution data for producing ecologically meaningful maps of forest biomass features



Practical and technical skills

Basic knowledge of R language and Agisoft Metashape Pro software, advanced experience raster data analysis in QGIS

Professional skills

Producing of DEM, DSM, CHM, individual tree detection , counting, height, LAI and biomass assessment from UAV high resolution data.

TEACHING METHOD

The course is structured on a total of (n.) 6 class hours per day on the program topics,. Additional 2 hours will be devoted to the demonstration of software tools, for a total of 12 hours

ASSESSMENT

The assessment will be based on the evaluation of practical task including writing R codes for calculating biomass and building it maps with GIS software

Suggested literature

1. R for Data Science, Garrett Grolemund, Hadley Wickham
2. An Introduction to Statistical Learning: with Applications in R (Springer Texts in Statistics), Gareth James , Daniela Witten, Trevor Hastie, Robert Tibshirani, Springer; 1st ed. 2013, Corr. 7th printing 2017 edition (September 1, 2017)
3. Metashape Pro: Step by Step Guide, Jim Crume, Amazon.com Services LLC