	Implementation schedule	Physically/ Remotely	Workload (hours)	Learning outcomes
Activity 1 Field site and sampling design in alley cropping	Introduction to temperate alley-cropping in Northern Germany; expected nutrient gradients; overview of field site; transect planning on GPS-base layout; field sampling	Physically	15	Understanding of alley-cropping structure and gradient logic. Organization and execution of transect-oriented GPS-supported sampling.
Activity 2 Research workflow tools	Literature search strategy and reference management (Zotero); data structure and reproducible workflow basics in R/RStudio	Physically	10	Knowledge on the Zotero software and R/ RStudio
Activity 3 Soil lab	Sample preparation and laboratory work: quantification of different soil P pools (water, double lactate, total), selected enzymes, and pH in soil	Physically	25	Perform and interpret laboratory approaches for nutrient (P) pools and enzyme indicators

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Activity 4 Root lab	Root sample preparation and laboratory work: root measurements by scanning and interpretation in the context of nutrient acquisition	Physically	15	Apply basic methods to analyze roots in situ and relate root patterns to nutrient gradients
Activity 5 Data analysis, visualization & synthesis with literature	Data cleaning; gradient visualization, basic statistical interpretation; integrate findings with targeted literature evidence	Physically	15	Confident use of R/RStudio + Zotero to analyze and contextualize results
Activity 6 Scientific writing & presentation	Short scientific report; oral presentation	Physically	20	Improved scientific writing plus oral presentation/ communication skills

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