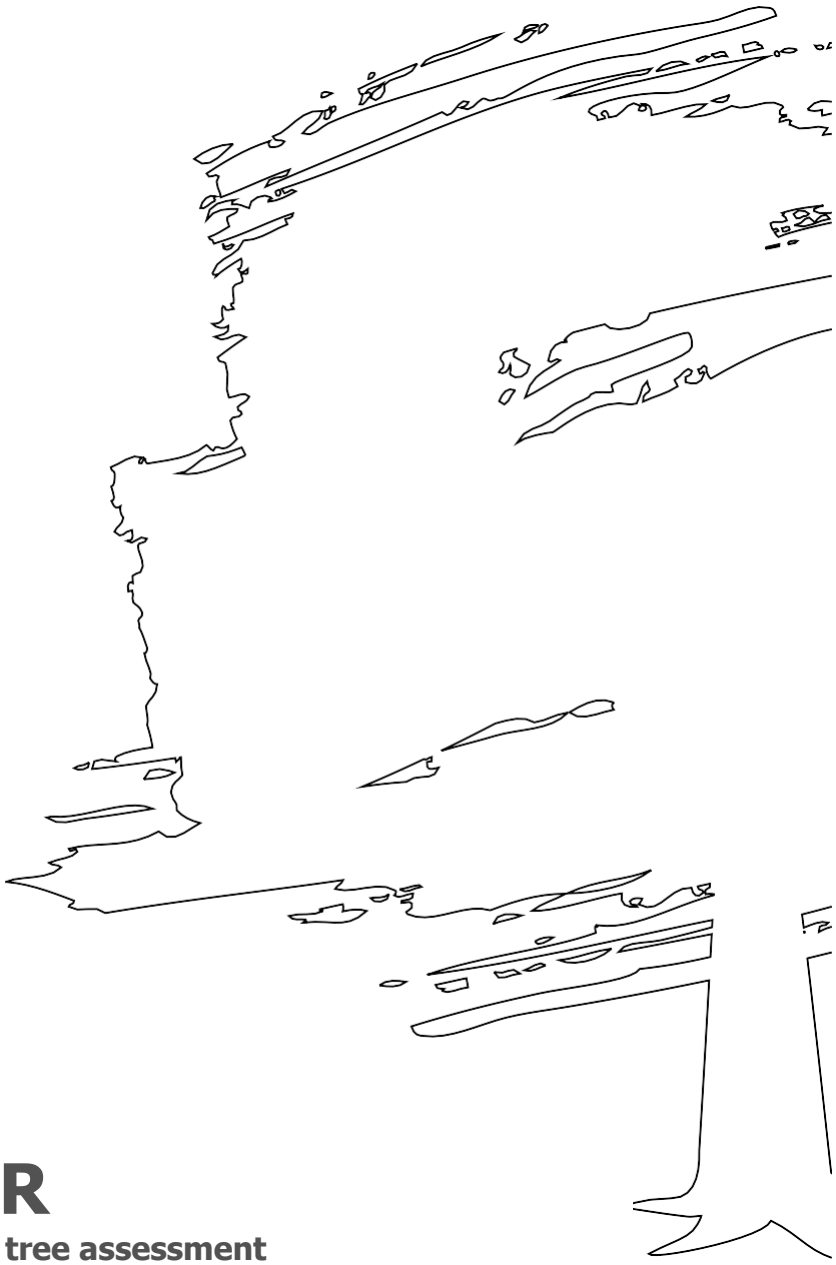
Project: Partnership for the development of training standards for tree assessors in Central and Eastern Europe
PROJECT NUMBER – 2019-1-PL01-KA202-065670



TREE
ASSESSOR

Basic and advanced tree assessment
– guidelines for training professionals

Appendix - SYLLABUSES

InformatIon about the Project:

Project name and number: Partnership for the development of training standards for tree assessors in Central and Eastern Europe. 2019-1-PL01-KA202-065670

Project implementation time:1.09.2019 – 31.12.2021

Leader of the Project: Dobre Kadry Centrum badawczo-szkoleniowe Sp. z o.o. (Wrocław, Polska)

Partners of the Project :Instytut Drzewa sp. z o.o. (PL, replaced Firma Ekorozwoju sp. z o.o.), Latvian Arboriculture Society (LV), FAKOPP Enterprise Bt. (HU).

This is a appendix to the main publication. “TREE ASSESSOR. Basic and advanced tree assessment – guidelines for training professionals” (eds.) Pachnowska B. & Witkoś- Gnach.K.

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Strategic partnerships in the field of education and vocational training

Basic tree data

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Strategic partnerships in the field of education and vocational training

Syllabus

Training: 0. Basic tree data

Subject: 0.1. Tree measurement

Short description of the training subject

The training is designed to check level of competence, structure and further develop knowledge and skills necessary for proper dendrometric measurements during the inventory of trees. Indicates the use of appropriate measuring equipment.

Educational objective:

O.0.1. – Check, structure and develop knowledge and skills necessary for the course participant to perform dendrometric measurements

Educational outcome:

Knowledge Student knows about:	**Skills** Student is able to:
K.0.1. Main methods, tools and their application in tree measurement.	**S.0.1.** Conduct proper measurement of trees and shrubs
K.0.2. Standard measurement procedures and legal requirements.	**S.0.2.** Use correct measurement tools

Duration: 1 hours

Topics (issues) and planned duration for each

1. Tree measurement tools and procedures

Form of classes (including teaching methods and tools)

Lecture

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Required equipment and teaching aids – specific for this teaching area
Diameter caliper Measuring tapes Hypsometer/ clinometer Folding ruler DBH tape
Author: **Mariusz Krynicki**

Key terms:

dendrometry, hypsometer, caliper, DBH, tree height, crown height, crown diameter, crown base height

Key issues:

tree measurement parameters, tree measurement tools, tree measurement procedures

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Syllabus

Training: 0. Basic tree data

Subject: 0.2. Rules for tree ID

Short description of the training subject

The training is designed to provide knowledge necessary for the proper recognition of trees/ shrubs (their species, varieties, forms, cultivars) in both foliage and non-foliage.

Indicates the use of appropriate auxiliary literature.

Educational objective:

O.0.2. – Provide knowledge necessary for the course participant to correctly recognize trees/ shrubs

Educational outcome:

Knowledge Student knows about:	**Skills** Student is able to:
K.0.3. Tree features in relation to species identification by leaves and leafless **K.0.4.** Characteristics that allow recognition of the species (varieties, forms, cultivar)	**S.0.3.** Recognise and name (using common and scientific name) common tree species both in leafless and leafy form

Duration: 2 hours

Topics (issues) and planned duration for each

1. Rules for identification of coniferous and deciduous trees

Form of classes (including teaching methods and tools)

Lecture

This project has been founded with support from the European Commission under the Erasmus+ Programme
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Required equipment and teaching aids – specific for this teaching area
Visuals of tree features for species identification Tree ID keys
Author: **Mariusz Krynicki**

Key terms:

dendrology, recognition of trees / shrubs, type / species / variety / form / cultivar, twig, bark, leaf, buds, flowers

Key issues:

part of of trees for tree ID, use of tree ID key and manuals, differences in tree ID in leaf and leafless period

Syllabus

Training: 0. Basic tree data

Subject: 0.3. Mapping and marking trees

Short description of the training subject

The training is designed to check level of competence, structure and further develop knowledge and skills necessary for mapping trees and locating them in the field.

Educational objective:

O.0.3. – Check, structure and develop knowledge and skills necessary for mapping and marking trees.

Educational outcome:

Knowledge Student knows about:	**Skills** Student is able to:
K.0.4. Types of maps, their releavance, applicabuility, maps, acquisition and use	**S.0.4.** Select and use appropriate maps
K.0.5. Methods and tools for marking trees	**S.0.5**. Indicate trees on mapping layer
S.0.6. Locate trees in the field based on inventory data	**S.0.6**. Locate trees in the field based on inventory data

Duration: 2 hours

Topics (issues) and planned duration for each

1. Maps in locating trees - 1 h
2. Marking trees - 1 h

Form of classes (including teaching methods and tools)

Lecture

Indoor workshop

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Required equipment and teaching aids – specific for this teaching area	
Compass Maps Digital mapping device Tree tagging systems GPS devices	
Author:	**Mariusz Krynicki**

Key terms:

tree tag, map layer, mapping software, GPS

Key issues:

mapping trees, marking trees, locating trees in the field

Syllabus

Training: 0. Basic tree data

Subject: 0.4. Legal basis of tree inventories

Short description of the training subject

The training is designed to provide knowledge about the legal basis for identifying trees that may be subject to inventory depending on the type of intervention; provisions related to performing dendrometric measurements during the inventory of trees; forms of nature protection and historic preservation relevant to trees and ways of identifying them.

Educational objective:

O.0.4. – Check, structure and develop knowledge on regulations related to tree inventory and their practical implications.

Educational outcome:

Knowledge	**Skills**
Student knows about: **K.0.7.** Basic regulations related to the inventory of trees including measurement of trees, tree ID, mapping and marking trees	Student is able to: **S.0.7.** Find and apply appropriate regulations.

Duration: 1 hours

Topics (issues) and planned duration for each

1. Scope of legal regulations related to tree inventory - 0,5h
2. Selected legal regulations - 0,5h

Form of classes (including teaching methods and tools)

Lecture

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Required equipment and teaching aids – specific for this teaching area	
Author:	**Mariusz Krynicki**

Key terms:

nature monument, legal definition of tree and shrub, green area, tree protection types

Key issues:

basic regulations in the field of nature protection, geodetic measurements and cartography, construction law covering issues related to inventory of trees

Syllabus

Training: 0. Basic tree data

Subject: 0.5. Gathering basic tree data – field session

Short description of the training subject

The training is designed to consolidate the knowledge on tree inventory and apply in practice. It involves indoor and outdoor workshop.

Educational objective:

O.0.5. – Apply knowledge and skills of tree inventory in practice

Educational outcome:

Knowledge Student knows about:	**Skills** Student is able to:
K.0.9. Methods and tools for tree inventory	**S.0.8.** Gather, review and prepare documentation for tree inventory
K.0.10. Types and methods of data gathering and presentation	**S.0.9.** Perform tree inventory

Duration: 7 hours

Topics (issues) and planned duration for each

1. Case analysis for tree inventory and preparation of field work - 2h
2. Field tree inventory - 4h
3. Prepraration of documentation from gathered information - 1h

Form of classes (including teaching methods and tools)

Indoor workshop

Outdoor workshop

Required equipment and teaching aids – specific for this teaching area

Digital camera

Measuring tape (DBH tape) and/or caliper

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Hypsometer / clinometer Maps Digital mapping device Tree tagging systems GPS devices Compass Tree ID key Tasks description
Author: **Mariusz Krynicki**

Key terms:

geodesy , cartography, dendrometry, recognition of trees/shrubs

Key issues:

field orientation, tree measurement, tree ID, inventory documentation

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Basic tree assessment – tree inspection

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Syllabus

Training: 1. Tree inspection

Subject: 1.1. Tree biology and biomechanics - basics

Short description of the training subject

The training is an introduction to the course and covers basic knowledge about functioning of trees as organisms and elements of the ecosystem. The lecture includes basic knowledge in tree anatomy and physiology, associations with other members of the community, as well as mechanisms of growth, adaptation to changes in environment, and defences against damage and fungal decay. Foundations of biomechanics include strength of wood in diverse species and parts of a tree, compensatory growth and reaction wood.

Educational objective:

O.1.1. – Provide basic knowledge in tree biology, ecology, and biomechanics and develop skills to use this knowledge in tree assessment.

Educational outcome:

Knowledge Student knows about:	**Skills** Student is able to:
K.1.1. Foundations of anatomy, physiology, ecology, and architecture of tree	**S.1.1.** Explain basic biological and ecological processes influencing tree stability and vitality
K.1.2. Tree's developmental phases	**S.1.2.** Recognize and explain basic disturbances of tree biomechanics
K.1.3. Foundations of tree biomechanics	**S.1.3.** Apply the acquired knowledge in tree biology, ecology, and biomechanics in tree assessment

Duration: 3 hours

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Topics (issues) and planned duration for each 1. Basic knowledge in tree biology and ecology – 2 h 2. Basic knowledge in biomechanics – 1 h
Form of classes (including teaching methods and tools) Lecture
Required equipment and teaching aids – specific for this teaching area Specimens illustrating physiological and biomechanical processes in trees
Author: **Piotr Tyszko-Chmielowiec, Ph.D.**

Key terms:

tree architecture, CODIT, reaction wood, tree vitality, respiration, photosynthesis, heartwood, sapwood, pith, phloem, xylem, cambium, transpiration, ring-porous, diffuse-porous, wood rays, mycorrhizae

Key issues:

tree anatomy, wood anatomy, reaction to damage, tree architecture, physiology, growth and development, and ecology

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Syllabus

Training: 1. Tree inspection

Subject: 1.2. Analysing tree's history in tree assessment

Short description of the training subject

The training is designed to provide knowledge enabling identification of historical changes in the tree environment (as well as work done on the tree) and their possible impact on the stability of the tree (or part of it) and its condition.

Educational objective:

O.1.2. – Provide knowledge and develop skills related to indentification of historical changes in the tree's environment, works and other events and their influence on it's condition and stability.

Educational outcome:

Knowledge Student knows about:	**Skills** Student is able to:
K.1.4. Biotic and abiotic factors that influence tree's functioning	**S.1.4.** Identify in the field historical changes that influence tree's development
K.1.5. Importance of historical events to tree's wellbeing	**S.1.5.** Recognise and analyse importnance of these changes.
K.1.6. Mechanisms and responses of trees to past changes	**S.1.6.** Assess tree's responce to past changes

Duration: 3 hours

Topics (issues) and planned duration for each

1. Historical changes in the tree environment - 1 h
2. Historical tree works and their significance - 2 h

Form of classes (including teaching methods and tools)

Lecture

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Outdoor workshop	
Required equipment and teaching aids – specific for this teaching area Samples showing historical pruning cuts	
Author:	**Mariusz Krynicki**

Key terms:

wound reaction, site conditions

Key issues:

historical changes in the tree's environment, historical work on the tree

Syllabus

Training: 1. Tree inspection

Subject: 1.3. Identification of threats to trees

Short description of the training subject

The training is desinged to provide participants with knowledge about the main biotic and abiotic threats that affect the functioning of trees.

Educational objective:

O.1.3. – Provide knowledge about the main factors affecting functioning of a tree.

O.1.4. – Learn basic skills to collect data and samples for further analysis.

Educational outcome:

Knowledge Student knows about:	**Skills** Student is able to:
K.1.7. Characteristics of the most common factors affecting the threat to the functioning of trees, including diseases, pests , and habitat factors **K.1.8.** Basics of diagnostic methods in this regard, including the principles and methods of collecting evidence and sam ples	**S.1.7.** Identify and assess the significance of the feature **S.1.8.** Collect materials and prepare samples for further a nalysis

Duration: 2 hours

Topics (issues) and planned duration for each

1. Impact of the habitat on tree health - 1 h
2. Characteristics of the main diseases and other pathogens - 1 h

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Form of classes (including teaching methods and tools) Lecture
Required equipment and teaching aids – specific for this teaching area Pictures and samples of diseases and pathogens Microscope / binocular
Author: **Kamil Witkoś-Gnach**

Key terms:

biosecurity, tree diseases, pathogens, habitat conditions

Key issues:

the impact of habitat on the condition of a tree, the impact of tree diseases on trees, the impact of work in the vicinity of trees on their condition

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Syllabus

Training: 1. Tree inspection

Subject: 1.4. Biodiversity survey of trees - protected species

Short description of the training subject

The training is designed to provide knowledge necessary for conducting inventory of valuable and protected species and assessment of habitat values of a tree.

Educational objective:

O.1.5. – Introduction to bionomy of selected protected species associated with trees.

O.1.6. – Provide knowledge on how to perform inventory of trees for protected species.

O.1.7. – Indicate methods of nature compensation.

Educational outcome:

Knowledge Student knows about:	**Skills** Student is able to:
K.1.9. Basic legal provisions in the field of nature protection regulations	**S.1.9.** Assess the habitat value of tree habitat for protected species
K.1.10. Biology and ecology of selected obligatorily/ optionally protected species associated with trees	**S.1.10.** Recognize signs of protected species on trees
K.1.11. Inventory methods for protected species associated with trees	**S.1.11.** Document symptoms of protected species on trees
K.1.12. Methods to minimize/ compensate for adverse effects on protected species	**S.1.12.** Indicate methods of minimization/ environmental compensation in the event that it is necessary to destroy the habitat of protected species

Duration: 2 hours

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Topics (issues) and planned duration for each 1. Basics of inventory of protected species, biology and ecology of selected protected taxa - 1h 2. Methods of minimization/ compensation of nature, legal procedure in the absence of alternative solutions assuring full preservation of habitats of protected species - 1h
Form of classes (including teaching methods and tools) Lecture Indoor workshop
Required equipment and teaching aids – specific for this teaching area Entomological display cases Inventory form for protected species GPS receiver Binoculars Blade / knife
Author: **Eng. Marcin Kadej PhD hab.**

Key terms:

biodiversity, protected species, compenstation

Key issues:

protected species on trees, biodiversity inventory, minimalisation and conservation compensation of tree work

Syllabus

Training: 1. Tree inspection

Subject: 1.5. Introduction to wood-decaying fungi

Short description of the training subject

The training is intended to provide basic knowledge about fungi and skills to identify most important wood-decaying fungi and to assess their influence on tree stability.

Educational objective:

O.1.8. – Provide knowledge necessary for course participant to assess influence of relevant wood-decaying fungi on tree stability

Educational outcome:

Knowledge Student knows about:	**Skills** Student is able to:
K.1.13. Biology of fungi and identification criteria	**S.1.13.** Identify species/ genera most relevant to tree stability
K.1.14. Relationship between wood-decaying fungi and their hosts	**S.1.14.** Assess influence of fungi on stability of trees accounting for their species and condition
K.1.15. Influence of relevant species on tree stability	

Duration: 4 hours

Topics (issues) and planned duration for each

1. Biology of fungi, relationships between wood-decaying fungi and their hosts, influence on fungi on tree stability (lecture) – 1 h.
2. Identification of relevant wood-decaying fungi (workshop) – 3 h

Form of classes (including teaching methods and tools)

Lecture

Indoor workshop

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Required equipment and teaching aids – specific for this teaching area
Specimens of perennial fruiting bodies of relevant species and genera
Author: **Piotr Tyszko-Chmielowiec PhD**

Key terms:

fungi, fruiting body, white and brown decay, CODIT, saprotroph, parasite

Key issues:

biology and identification of fungi, relationships between wood-decaying fungi and their hosts, influence on fungi on tree stability

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Syllabus

Training: 1. Tree inspection

Subject: 1.6. Valuation of trees

Short description of the training subject

The training is designed to provide knowledge necessary for proper valuation of trees. The most important conditions and factors for the monetary value of a tree are reviewed. Applications for tree valuation are also presented.

Educational objective:

O.1.9. – Provide knowledge necessary for the course participant to perform valuation of trees.

Educational outcome:

Knowledge Student knows about:	**Skills** Student is able to:
K.1.16. Main factors of the tree valuation.	**S.1.15.** Conduct proper valuation of trees.
K.1.17. Tree value calculation methods.	**S.1.16.** Use calculation apps and other software

Duration: 2 hours

Topics (issues) and planned duration for each

1. Tree valaation from different points of view (lecture) - 1 h
2. Tree valuation calculators – 1 h

Form of classes (including teaching methods and tools)

Lecture

Indoor workshop

Outdoor workshop

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Required equipment and teaching aids – specific for this teaching area
Smartphone/tablet
Author: Fakopp team

Key terms:

tree valuation, monetary value

Key issues:

tree valuation theory, tree valuation apps

Syllabus

Training: 1. Tree inspection

Subject: 1.7. Identification of hazard trees in tree assessment and categorisation of trees

Short description of the training subject

The training is designed to provide knowledge necessary for proper performance of tree inspections. Instructs on the use of appropriate equipment and inspection methodology. Presents ways to collect, store and manage tree inspection data.

Educational objective:

O.1.10. – Provide knowledge about identification of tree diagnostic features.

O.1.11. – Provide knowledge about identification of problem trees based on established diagnostic feature.

Educational outcome:

Knowledge Student knows about:	**Skills** Student is able to:
K.1.18. Typical diagnostic features and their importance in tree health evaluation	**S.1.17.** Recognise common diagnostic features
K.1.19. Methods to identify and assess main diagnostic features	**S.1.18.** Indicate the obvious diagnostic feature on the tree
K.1.20. Relations between the diagnostic feature and health problems of trees	**S.1.19**. Assess the relevance of the given diagnostic feature
K.1.21. Effects of the observed diagnostic feature on tree safety	**S.1.20**. Determine the impact of a given diagnostic feature on tree stability

Duration: 7 hours

Topics (issues) and planned duration for each

1. Overview of diagnostic features – 1.5 h
2. Impact of observed diagnostic features on tree statics – 2 h

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3. Recognising diagnostic features and problems of trees in the field – 3.5 h
Form of classes (including teaching methods and tools) Lecture Outdoor workshop
Required equipment and teaching aids – specific for this teaching area Specimens with diagnostic features Inspection forms PAPI / tablets with data collection application Binoculars Real trees (different species, age, state) – for practicing
Author: **Mariusz Krynicki**

Key terms:

tree inspection

Key issues:

diagnostic feature, obvious diagnostic feature, tree statics, problem tree

Syllabus

Training: 1. Tree inspection

Subject: 1.8. Simple tools in tree assessment

Short description of the training subject

The training is designed to provide knowledge necessary for the proper use of simple tree assessment tools. Instructs when and how to use them when assessing trees.

Educational objective:

O.1.12. – Provide knowledge about the use of simple tools in tree assessment.

O.1.13. – Provide knowledge needed to interpret information provided by simple tools when assessing trees.

Educational outcome:

Knowledge Student knows about:	**Skills** Student is able to:
K.1.22. What is a simple tool for assessing trees and what information do they provide **K.1.23.** What limitations do individual simple tools have in assessing trees **K.1.24.** How to interpret the results provided by simple tools during the assessment of trees	**S.1.20.** Evaluate trees using simple tools

Duration: 1 hours

Topics (issues) and planned duration for each

1. Presentation of simple tools for assessing trees and how to use them - 1h

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Form of classes (including teaching methods and tools) Outdoor workshop
Required equipment and teaching aids – specific for this teaching area Simple tools for assessing trees: diagnostic mallet, diagnostic probe
Author: **Mariusz Krynicki**

Key terms:

mallet, probe, decay

Key issues:

using diagnostic mallet, diagnostic probe

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Syllabus

Training: 1. Tree inspection

Subject: 1.9. Tree assessment by taxon

Short description of the training subject

The training is designed to provide knowledge and skills needed to assess trees of most common genera and species.

Educational objective:

O.1.14. – Provide knowledge and skills needed to assess trees of most common genera and species.

Educational outcome:

Knowledge Student knows about:	**Skills** Student is able to:
K.1.25. Biology and life strategies of most common tree genera and species	**S.1.20.** Assess trees with regard to genera and species
K.1.26. Biomechanic characteristics of most common tree genera and species	**S.1.21.** Formulate tree care and risk management recommendations with regard to genera and species
K.1.27. Resistance of most common tree genera and species to factors affecting tree stability and condition	

Duration: 5 hours

Topics (issues) and planned duration for each

1. Tree assessment of trees with regard to taxons (lecture) – 3 h
2. Practical tree assessment of trees of diverse taxons (field exercise) – 2 h

Form of classes (including teaching methods and tools)

Lecture

Outdoor workshop

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Required equipment and teaching aids – specific for this teaching area
Specimens illustrating reaction of trees to factors affecting stability (lecture) Real trees (different species, age, state) – for practicing Tree assessment forms Probe, mallet, and binocular
Author: **Piotr Tyszko-Chmielowiec PhD**

Key terms:

diagnostic features, CODIT

Key issues:

biology and biomechanics of trees of diverse genera and species

Syllabus

<table>
<tr><td colspan="2">Training: 1. Tree inspection

Subject: 1.10. Assessment of trees at various development stages</td></tr>
<tr><td colspan="2">Short description of the training subject

The training is designed to provide knowledge necessary for proper assessment of trees at various stages of development.</td></tr>
<tr><td colspan="2">Educational objective:

O.1.15. – Provide knowledge and develop skills for assessing trees in various life stages.</td></tr>
<tr><td colspan="2">Educational outcome:</td></tr>
<tr><td>Knowledge
Student knows about:

K.1.28. Transition periods between different life stages

K.1.29. Common care practices in relation to the life stage of a tree</td><td>Skills
Student is able to:

S.1.22. Assess trees with regard to their life stage</td></tr>
<tr><td colspan="2">Duration: 2 hours</td></tr>
<tr><td colspan="2">Topics (issues) and planned duration for each

1. Trees throughout their lifespan - 2 h</td></tr>
<tr><td colspan="2">Form of classes (including teaching methods and tools)

Lecture</td></tr>
<tr><td colspan="2">Required equipment and teaching aids – specific for this teaching area</td></tr>
</table>

Author:	Marzena Suchocka PhD

Key terms:

young tree, mature tree, veteran tree, ancient tree, transision period, morphology, tree architecture

Key issues:

life stages of trees, tree maturing

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Syllabus

<table>
<tr><td colspan="2">Training: 1. Tree inspection

Subject: 1.11. Tree risk management</td></tr>
<tr><td colspan="2">Short description of the training subject

The training is designed to provide knowledge necessary to correctly identify treatments and tools to minimize the risk of tree failure. Shows how to select the proper method of minimizing risk, and to effectively communicate the recommendations to the owner/ manager of trees.</td></tr>
<tr><td colspan="2">Educational objective:

O.1.16. – Provide knowledge and develop skills necessary to perform basic tree risk assessment.</td></tr>
<tr><td colspan="2">Educational outcome:</td></tr>
<tr><td>Knowledge

Student knows about:

K.1.30. Definition and factors influencing risk

K.1.31. Methods of tree risk management</td><td>Skills
Student is able to:

S.1.23. Perform basic assessment of risk related to tree and its surroundings</td></tr>
<tr><td colspan="2">Duration: 2 hours</td></tr>
<tr><td colspan="2">Topics (issues) and planned duration for each

1. Tree risk management - 2h</td></tr>
<tr><td colspan="2">Form of classes (including teaching methods and tools)

Lecture</td></tr>
<tr><td colspan="2">Required equipment and teaching aids – specific for this teaching area</td></tr>
<tr><td>Author:</td><td>Marzena Suchocka PhD</td></tr>
</table>

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Key terms:

improvement of habitat conditions, risk minimization, danger zone, veteran tree

Key issues:

tree inventory, landscape architecture, risk minimization, valuation, dendrology, care treatments

Syllabus

Training: 1. Tree inspection

Subject: 1.12. Review of instrumental tree assessment

Short description of the training subject

The training is designed to provide knowledge about the most popular methods of instrumental diagnostic of trees, equipping them with the ability to recommend at the inspection stage the most appropriate method for an in-depth tree assessment. As part of the training, participants also gain knowledge about selected calculators used in assessing tree stability.

Educational objective:

O.1.17. – Provide knowledge about the methodology and tools of selected methods of instrumental diagnostics of trees and calculators and the relevance of their results.

O.1.18. – Provide the ability to determine the purpose of instrumental diagnostics and the selection of a method suitable for an in-depth assessment of the tree, based on problems identified in tree inspection.

Educational outcome:

Knowledge Student knows about:	**Skills** Student is able to:
K.1.32. Specificity of the most popular instrumental diagnostic methods of trees - their applications, limitations, extensions	**S.1.23.** Indicate the purpose of instrumental diagnostics of the tree recommended for the given problem detected during the tree inspection
K.1.33. The idea of calculators to assess the safety of trees and the possibility of their use	**S.1.24.** Determine the diagnostic method appropriate for an in-depth tree assessment, based on problems identified at tree inspection stage

Duration: 5 hours

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Topics (issues) and planned duration for each

1. Instrumental diagnostics: tree stability in the ground - load tests – 1 h
2. Instrumental diagnostics: examination of trunk interior - tomograph, resistance drill – 1 h
3. Calculators used to assess tree stability – 0.5 h
4. Demonstration of the application of the selected method - tomograph / resistograph on the cross-section of the trunk – 0.5 h
5. Demonstration of the application of the selected method on a live tree in the field – 2 h

Form of classes (including teaching methods and tools)

Lecture

Outdoor workshop

Required equipment and teaching aids – specific for this teaching area

Sonic tomograph

Resistance drill

Pulling-test equipment

Cross-section of a tree - a stump or plaster with a diameter of 40-60 cm

Standing tree - alive, but with problems, e.g. fruiting bodies of fungi at the base

Author: **Jerzy Stolarczyk**

Key terms:

tree tomography, tomogram, resistance drill, degree of wood decay, soil stability, trunk resistance to break, safety factor

Key issues:

instrumental diagnostics of trees, assessment of safety in the surroundings of trees, assessment of the level of wood decay

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Syllabus

Training: 1. Tree inspection

Subject: 1.12. Review of instrumental tree assessment

Short description of the training subject

The training is designed to provide knowledge about the most popular methods of instrumental diagnostic of trees, equipping them with the ability to recommend at the inspection stage the most appropriate method for an in-depth tree assessment. As part of the training, participants also gain knowledge about selected calculators used in assessing tree stability.

Educational objective:

O.1.17. – Provide knowledge about the methodology and tools of selected methods of instrumental diagnostics of trees and calculators and the relevance of their results.

O.1.18. – Provide the ability to determine the purpose of instrumental diagnostics and the selection of a method suitable for an in-depth assessment of the tree, based on problems identified in tree inspection.

Educational outcome:

Knowledge Student knows about:	**Skills** Student is able to:
K.1.32. Specificity of the most popular instrumental diagnostic methods of trees - their applications, limitations, extensions	**S.1.23.** Indicate the purpose of instrumental diagnostics of the tree recommended for the given problem detected during the tree inspection
K.1.33. The idea of calculators to assess the safety of trees and the possibility of their use	**S.1.24.** Determine the diagnostic method appropriate for an in-depth tree assessment, based on problems identified at tree inspection stage

Duration: 5 hours

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Topics (issues) and planned duration for each

1. Instrumental diagnostics: tree stability in the ground - load tests – 1 h
2. Instrumental diagnostics: examination of trunk interior - tomograph, resistance drill – 1 h
3. Calculators used to assess tree stability – 0.5 h
4. Demonstration of the application of the selected method - tomograph / resistograph on the cross-section of the trunk – 0.5 h
5. Demonstration of the application of the selected method on a live tree in the field – 2 h

Form of classes (including teaching methods and tools)

Lecture

Outdoor workshop

Required equipment and teaching aids – specific for this teaching area

Sonic tomograph

Resistance drill

Pulling-test equipment

Cross-section of a tree - a stump or plaster with a diameter of 40-60 cm

Standing tree - alive, but with problems, e.g. fruiting bodies of fungi at the base

Author: **Jerzy Stolarczyk**

Key terms:

tree tomography, tomogram, resistance drill, degree of wood decay, soil stability, trunk resistance to break, safety factor

Key issues:

instrumental diagnostics of trees, assessment of safety in the surroundings of trees, assessment of the level of wood decay

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Syllabus

Training: 1. Tree inspection

Subject: 1.14. Documentation in tree assessment

Short description of the training subject

The training is designed to provide participants with knowledge and skills for reporti ng tree inspection results, along with the selection of appropriate methods and tools.

Educational objective:

O.1.20. – Provide knowledge and develop skills necessary to create a concise, clear, factual report and digital databases.

Educational outcome:

Knowledge Student knows about:	**Skills** Student is able to:
K.1.37. Rules for collecting and processing collected data	**S.1.27.** Collect, sort and present tree inspection results
K.1.38. Ways to prepare written documention	**S.1.28.** Create high-quality written materials in the form of clear, factual and concise reports
K.1.39. Methods and tools for creating digital databases	**S.1.29.** Use digital tools to collect and manage tree data

Duration: 2 hours

Topics (issues) and planned duration for each

1. General rules for preparing documentation - 1 h
2. Written reports - 0.5 h
3. Digital documentation - 0.5 h

Form of classes (including teaching methods and tools)

Lecture

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Required equipment and teaching aids – specific for this teaching area	
Author:	**Kamil Witkoś-Gnach**

Key terms:

database, inspection report

Key issues:

data collection, data analysis, report preparation

Syllabus

Training: 1. Tree inspection

Subject: 1.15 Legislation related to tree management

Short description of the training subject

The training is designed to provide knowledge about the legal basis of tree inspections, including provisions relating to nature conservation and historic preservation.

Educational objective:

O.1.21. – Provide knowledge about basic provisions of law relevant to tree inspection.

Educational outcome:

Knowledge Student knows about:	**Skills** Student is able to:
K.1.40. Basic legal provisions in the field of nature protection related to issues related to tree inspection **K.1.41**. Basic legal provisions regarding the protection and care of nature and historic monuments relevant to tree inspection **K.1.42.** Basic provisions of the civil law relevant to tree inspection **K.1.43.** Other provisions relevant to tree inspection	**S.1.30.** Explain the legal principles related to tree operations **S.1.31.** Inspect trees in conjunction with legal provisions

Duration: 2 hours

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Topics (issues) and planned duration for each 1. Civil law – 0,5 h 2. Act on nature protection (with regulations) – 1 h 3. Act on historic preservation – 0,5 h
Form of classes (including teaching methods and tools) Lecture
Required equipment and teaching aids – specific for this teaching area
Author: **Mariusz Krynicki**

Key terms:

law

Key issues:

nature protection, monument protection, civil law, regulations in tree inspection

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Advanced tree assessment -specialist/ instrumental

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Syllabus

Training: 2. Advanced/specialist assessment

Subject: 2.1. Tree biology and ecology - advanced

Short description of the training subject

The training is an introduction to the course and covers advanced knowledge about trees as organisms and elements of the ecosystem. The lecture includes wide knowledge in tree anatomy and physiology, associations with other members of the community, as well as mechanisms of growth, adaptation to change, and defences against damage and fungal decay.

Educational objective:

O.2.1. – Provide wide, advanced and newest knowledge in tree biology and ecology.

O.2.2. – Develop skills to use this knowledge in tree assessment, recommendations and tree care plans.

Educational outcome:

Knowledge Student knows about:	**Skills** Student is able to:
K.2.1. Anatomy, physiology, ecology, and architecture of tree **K.2.2**. Tree's mutual relationships with biotic and abiotic elements of environment in changing conditions	**S.2.1.** Explain biological and ecological processes influencing tree stability and vitality **S.2.2.** Apply the acquired knowledge in tree biology and ecology in tree assessment, recommendations and tree care plans

Duration: 4 hours

Topics (issues) and planned duration for each

1. Tree biology and ecology - new knowledge and models - 3 h
2. Facts and Myths in tree biology and ecology in old and new models - 1 h

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Form of classes (including teaching methods and tools) Lecture
Required equipment and teaching aids – specific for this teaching area
Author: **Piotr Tyszko-Chmielowiec PhD**

Key terms:

CODIT models, tree vitality, ecosystem

Key issues:

tree anatomy, wood anatomy, tree architecture, tree physiology, biomechanics

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Syllabus

Training: 2. Advanced/specialist assessment

Subject: 2.2. Tree biomechanics - advanced

Short description of the training subject

The training is designed to provide knowledge necessary for understanding tree biomechanics and proper tree static assessment. Understanding main mechanical principles, related to tree stability.

Educational objective:

O.2.3. – Provide knowledge necessary to describe current biomechanical state of a tree.

O.2.4. – Develop skills to calulate and use in tree assessment safety factors based on static and dynamic models.

Educational outcome:

Knowledge Student knows about:	**Skills** Student is able to:
K.2.3. Compression, bending and shear stress calculation as well as pulling test principles **K.2.4**. Wind load calculation, breaking and uprooting safety factor calculation	**S.2.3.** Determine safety factors **S.2.4.** Use safety factors based on static and dynamic load on trees to assess current and future behaviour of tree

Duration: 3 hours

Topics (issues) and planned duration for each

1. Wind and self-load calculation - 1 h
2. Mechanical stress calculation, safety factor determination – 1 h
3. Tree dynamics – 1 h

Form of classes (including teaching methods and tools)

Lecture indoors: presentation of basic formulas, sample calculations

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Required equipment and teaching aids – specific for this teaching area	
Author:	**Ferenc Divos PhD**

Key terms:

wind load, compression stress, bending stress, shear stress, strength of wood material, generalized tipping curve

Key issues:

load calculation, mechanical stress calculation, safety factor determination, uprooting safety factor, braking safety factor

Syllabus

Training: 2. Advanced/specialist assessment

Subject: 2.3. Tree physiology assessment

Short description of the training subject

The training is to provide basic knowledge about most common methods of measuring physiological parameters, such as chlorophyll content, gas exchange (photosynthesis, respiration, transpiration), and water potential. Relevance of the parameters to assessment of tree's condition and interpretation of results will be also presented.

Educational objective:

O.2.5. – Teach about selected methods (methodology and tools) of measuring tree physiological parameters and interpretation of their results.

O.2.6. – Provide the ability to determine the purpose, select a specific tree physiology parameter, and interpret measurement results as part of tree assessment.

Educational outcome:

Knowledge	**Skills**
Student knows about: **K.2.5.** Most important and widely used methods of measuring physiological parameters in trees and common tools used for it	Student is able to: **S.2.5.** Chose, use and recommend use of physiological measurement in tree assessment and interpret results

Duration: 2 hours

Topics (issues) and planned duration for each

1. Most widely used physiological measurement methods (lecture) – 1 h
2. Common physiological measurement instruments used in arboriculture - 1h

Form of classes (including teaching methods and tools)

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Lecture indoors
Required equipment and teaching aids – specific for this teaching area samples of instruments to measure physiological parameters: chlorophyll content, gas exchange (photosynthesis, respiration, transpiration) and water potential
Author: **Piotr Tyszko-Chmielowiec PhD**

Key terms:

chlorophyll, photosynthesis, respiration, transpiration, water potential

Key issues:

tree physiology, gas exchange

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Syllabus

Training: 2. Advanced/specialist assessment

Subject: 2.4 Soil assessment

Short description of the training subject

The training is designed to provide knowledge and skills for soil assessment (includin g soil sampling), management and conservation.

Educational objective:

O.2.7.Provide knowledge for detailed soil assessment, including analysis of compone nts, vertical profile, conditions and limitations.

O.2.8. – Developing skills in soil sampling methods.

Educational outcome:

Knowledge Student knows about:	**Skills** Student is able to:
K.2.6. Physical, biological and chemical pr operties of soil (soil components, vertical profile, conditions, limitations)	**S.2.6.**Indicate visual signs of soil properti es in relation of tree stability and physica l condition
K.2.7. Soil sampling and analysis parameters	**S.2.7.** Collect soil samples using diverse sampli ng tools
K.2.8. Soil management and modification.	**S.2.8.**Give a conclusion of soil condition and limitations by analysing soil paramet ers
K.2.9. Soil conservation.	

Duration: 8 hours

Topics (issues) and planned duration for each

1. Soil components and properties - 2 h
2. Soil sampling methods and rules.
   Analysis parameters. Analysing soil vertical profile – 3 h
3. Soil management and modification methods for improvement of tree and shrubs growth, longevity, establishment (e.g. mulching, fertilization, adju

sting pH, microbial inoculants, organic and inorganic amendments, tillage , irrigation, drainage etc.) – 2 h 4. Soil conservation, developing soil conservation plan – 1 h
Form of classes (including teaching methods and tools) Lecture indoors Outdoor workshop
Required equipment and teaching aids – specific for this teaching area Stereo microscope (up to 40X magnification) Soil sampling probe Penetrometer Soil ph meter Soil auger Plastic or polythene bags for soil samples Handouts of basic information
Author: **Maija Medne, Laura Mazule**

Key terms:

nutrients, structure, texture, organic activity, profile, compaction, water movement i n soil

Key issues:

soil sampling and assessing methods, tools. Practical training in use of soil sampling probe and soil augers. Training in the use of penetrometer, soil pH meter

Syllabus

Training: 2. Advanced/specialist assessment

Subject: 2.5. Assessment of ancient and veteran trees

Short description of the training subject

The training aims to familiarize participants with the characteristics, significance and needs of ancient and other veteran trees. The participant will gain knowledge about their characteristics and methods of care.

Educational objective:

O.2.9. – Transfer of knowledge about the characteristics, value and importance of ancient trees and other veteran trees.

O.2.10. – Develop skills in assessing ancient trees and other veteran trees, including recommendations for further care.

Educational outcome:

Knowledge Student knows about:	**Skills** Student is able to:
K.2.10. Characteristics, needs and significance of ancient and veteran trees **K.2.11.** How the trees grow, grow older and change with age in the context of ancient and veteran tree care **K.2.12.** Methods for assessing ancient and veteran trees, including recommendations for caring for them	**S.2.9.** Recognize, characterize and evaluate a veteran tree, taking into account its history, form and environment **S.2.10.** Describe the development and aging process of trees and indicate what mechanisms allow for their long life **S.2.11.** Perform an assessment tailored to the characteristics, values and needs of veteran trees

Duration: 6 hours

Topics (issues) and planned duration for each

1. Ancient and other veteran trees - their value and significance - 0.5 h
2. Tree development and maturation in the life cycle - 1 h

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3. Root system and soil of veteran trees - 0.5 h 4. Veteran tree as a habitat, their cultural, historical and social value - 1 h 5. Assessment of veteran trees and their surroundings incl. risk assessment - 2 hours 6. Care of veteran trees: conclusions and recommendations - 1 h
Form of classes (including teaching methods and tools) Lecture indoors Indoor workshop Outdoor workshop
Required equipment and teaching aids – specific for this teaching area Ancient and/or veteran tree Forms for assessing aged trees and veterans
Author: **Kamil Witkoś-Gnach**

Key terms:

veteran tree, ancient tree, crown retrenchment, reiteration, cambial columns, veteranization

Key issues:

life cycle development, veteran tree value, veteran tree needs

Syllabus

Training: 2. Advanced/specialist assessment

Subject: 2.6. Assessment of groups of trees

Short description of the training subject

The training is designed to provide knowledge necessary for proper risk assessment of group of trees, indicates the use of appropriate testing equipment and methodology for performing visual inspections and tests as well as indicates ways of collecting, storing and managing tree data for static assessment.

Educational objective:

O.2.11. – Teaching methods of valuation of trees - reconstruction, ecosystem services, nature and landscape value.

O.2.12. – Adjusting tree statics assessment methods to values.

O.2.13. – Learning the principles and methods of managing a stand.

Educational outcome:

Knowledge Student knows about:	**Skills** Student is able to:
K.2.13. Provisions regarding the valuation of trees and the management of municipal stands	**S.2.12.** Assess the value of trees taking into account all important aspects
K.2.14. Determining the value of trees in terms of replacement value, ecosystem services, nature and landscape value	**S.2.13.** Choose the right method/ equipment for assessing the statics of the tree
K.2.15. Equipment and instruments that can be used to perform specialized research in the context of the value of trees	**S.2.14.** Choose the right approach in the field of stand management depending on the local specificity of the area
K.2.16. Possibilities of using computer programs and applications for forest management with particular emphasis on statics	

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Duration: 3 hours
Topics (issues) and planned duration for each 1. Foundations of valuation methods and rules for determining value of trees - 1h 2. The scope of specialized equipment in the context of specialized trees research - 15 min 3. Legal regulations regarding risk assessment - 15 min. 4. Stand management methods in the world and in Poland - 1 h 5. Zoning and inspection frequency - 15 min.
Form of classes (including teaching methods and tools) Lecture indoors
Required equipment and teaching aids – specific for this teaching area A Tree identification cards
Author: **Eng. Marzena Suchocka PhD**

Key terms:

groups of trees, replacement value, ecosystem services, nature and landscape value

Key issues:

tree value, ecosystem services, nature value, stand management, risk class, zoning

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Syllabus

Training: 2. Advanced/specialist assessment

Subject: 2.7. Assessment of threats to trees - advanced

Short description of the training subject

The training is intended to update knowledge about most important local and invasive pests & diseases, climate changes, as well as other biotic & abiotic threats and to assess their influence on tree health status & stability.

Educational objective:

O.2.14. – Provide knowledge necessary to recognize and assess the influence on tree health and stability coming from impact of the most common local pests, diseases, as well as climate changes and other common threats.

Educational outcome:

Knowledge	**Skills**
Student knows about:	Student is able to:
K.2.17. Range of local and invasive pests and diseases of trees	**S.2.15.** Identify species/ genera of pests / diseases and other biotic threats most common locally and invasive
K.2.18. Relation of climate changes and trees' pests and diseases	**S.2.16.** Recognise influence of climate change or other abiotic threats important for tree health or stability
K.2.19. Influence of the factors on tree's health and stability	
K.2.20. Methods, tools and products to control the factors and minimize their negative influence on a tree	

Duration: 4 hours

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Topics (issues) and planned duration for each 1. Range of pests, diseases local and new/invasive (lecture) - 1 h 2. Influence of climate changes and other threats locally occurring on trees (lecture) – 1 h 3. Identification of symptoms of these threats (workshop) – 2 h
Form of classes (including teaching methods and tools) Lecture indoors Indoor workshop Outdoor workshop
Required equipment and teaching aids – specific for this teaching area Samples and visuals of relevant species and genera of pests and diseases
Author: **Beata Pachnowska PhD**

Key terms:

biotic and abiotic threats, tree pest, tree disease, alien invasive species, drought and types of drought, global warming

Key issues:

the most common and new / invasive pests and diseases – biology and indication, influence on tree health status and tree stability. Climate changes and their influence on trees health status and tree stability. Other biotic and abiotic

Syllabus

Training: 2. Advanced/specialist assessment

Subject: 2.8. Assessment of cabling and bracing – ground level

Short description of the training subject

The training is designed to provide knowledge about the purposes, essence and methods of assessing the mechanical tree support systems. The participant will gain knowledge about how to order controls for such systems, the scope of assessment, the use of assessment results and their impact on further decisions regarding work on the tree. The training will include long-term protections, e.g. supports, bolting and those requiring frequent inspection and replacement, such as dynamic cabling.

Educational objective:

O.2.15. – Provide knowledge about the main goals, methods and techniques for assessing the mechanical support systems of trees.

O.2.16 – Developing the skills of commissioning/outsourcing and supervising the assessment of mechanical tree security and using the results of this type of assessment for furth er decisions and work on trees

Educational outcome:

Knowledge Student knows about:	**Skills** Student is able to:
K.2.21. Value, purpose, method of ground-level and aerial assessment of mechanical support systems of trees	**S.2.17.** Determine the purpose, scope and technique s of assessing the tree's security and how to s ave the assessment results
K.2.22. Method of recording and documenti ng the results of mechanical support systems assessment	**S.2.18.** Identify problems and determine the indicati on for further action on the basis of docume ntation collected during the crown inspectio n

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K.2.23. The use of mechanical support syste ms assessment results for further de cisions on trees and the security itsel f	

Duration: 4 hours

Topics (issues) and planned duration for each

1. Types of mechanical support systems and methods and scope of their ass essment - 1 h
2. Specification of the assessment of individual types of protections: props, bolting, cabling - 2 h
3. Establishing the control plan.
   Recording of the results of the security assessment and their use in the o verall tree assessment and decisions regarding further actions - 1 h

Form of classes (including teaching methods and tools)

Lecture indoors

Indoor workshop

Outdoor workshop

Required equipment and teaching aids – specific for this teaching area

A set of case studies with examples of tree protection assessment from ground level and with crown entry

Examples of elastic bindings and their markings (so-called ends)

Author: **Jerzy Stolarczyk**

Key terms: static cabling, elastic cabling, bolting, props

Key issues:
tree response to applied protections, durability of materials, impact of protections o n tree statics

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Syllabus

Training: 2. Advanced/specialist assessment

Subject: 2.9. Assessment of cabling and bracing - aerial level

Short description of the training subject

The training is designed to teach students about the purpose, essence and methods of assessing the mechanical tree support systems mounted in the crown or on a trunk. The training complements the training on ground level assessment of support systems and is intended for people who work at heights and use access techniques. Participants of the training may those able to work at the height of 3 m and above (certificate from an occupational medicine doctor or equivalent). In the absence of such a certificate, the participant may participate in ground-level assessment classes without accessing the crown.

Educational objective:

O.2.16. – Provide students with knowledge about the main goals, methods and techniques for assessing mechanical support systems for trees requiring assessment with access to the tree crown.

O.2.17. – Develop the ability to assess the mechanical support systems of trees mounted at height.

Educational outcome:

Knowledge Student knows about:	**Skills** Student is able to:
K.2.24. Types of tree support systems and problems requiring assessment with entering the crown	**S.2.19.** Specify the purpose, scope and technique of the tree security system assessment, and how to record the assessment's results
K.2.25. Specification for assessment of crown security systems – techniques, assessment areas, documentation	**S.2.20.** Perform a crown security system assessment
K.2.26. The use of assessment results for further decisions on trees and the support system itself	**S.2.21.** Identify problems and provide indications for further action based on documentation collected during crown

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	inspection
Duration: 6 hours	
Topics (issues) and planned duration for each 1. Performing aerial support system assessment - 4 h 2. Preparation of documentation from collected data and its use in tree assessment and further recommendations - 2 h	
Form of classes (including teaching methods and tools) Lecture indoors Indoor workshop Outdoor workshop	
Required equipment and teaching aids – specific for this teaching area Climbing equipment – access Protective equipment Work platform with operator Ladders with a height of min. 4 m Documentation equipment Trees with installed support systems, e.g.crown cabling, bolting, props Climbing helper - arborist with the ability of high-altitude rescue First aid kit	
Author:	**Jerzy Stolarczyk**

Key terms: static cabling, dynamic cabling, bolting, props

Key issues: tree reaction to applied support system, impact of support systems on tree statics and assessment of this impact

Syllabus

Training: 2. Advanced/specialist assessment

Subject: 2.10. Instrumental assessment: decay

Short description of the training subject

The training is designed to provide knowledge necessary for proper instrumental evaluation of decay in trunk, limbs and branches. Theoretical background, usage, practical advice and know-hows are presented, as well as the limitations of techniques. Evaluation of safety concerning trunk breakage is presented.

Educational objective:

O.2.18. – Provide knowledge necessary for the course participant to understand the operating principals of instrumentals used for decay evaluation.

O.2.19. – Provide knowledge and develop skills necessary for the course participant to perform instrumental investigations on decayed parts.

O.2.20. – Provide knowledge necessary for the course participant to evaluate safety of the examined tree.

Educational outcome:

Knowledge Student knows about:	**Skills** Student is able to:
K.2.27. Basics about acoustic and electric signal penetration in wood materials	**S.2.22.** Explain the operation principles of the methods used for decay evaluation
K.2.28. Operation principles of resistance drill and fractometer	**S.2.23.** Choose the proper instrument
K.2.29. The performance of time-of-flight (1D) measurements, acoustic and impedance tomography	**S.2.24.** Measure with acoustic tools, especially tomography
K.2.30. Usage of increment borer, resistance drill and fractometer	**S.2.25.** Perform impedance test
K.2.31. Calculations of wind loads and self-loads of the tree as well as safety	**S.2.26**. Perform wood material tests
	S.2.27. Evaluate safety with the help of software and interpret safety factor

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factors	

Duration: 14 hours

Topics (issues) and planned duration for each

1. Operation principles of acoustic and electric measurements (lecture) – 2 h
2. Wood material tests (increment borer, resistograph, fractometer) (lecture) – 1 h
3. Trunk measurement (field exercise with all the instruments) – 7 h
4. Reading and interpreting the results of the different instruments (seminar) – 2 h
5. Wind load calculations and safety calculation based on tomogram – 2 h

Form of classes (including teaching methods and tools)

Lecture indoors, indoor workshop, outdoor workshop

Required equipment and teaching aids – specific for this teaching area

Smartphone

1D acoustic device

Acoustic tomograph

Impedance tomograph

Caliper

Pulling test kit

Dynamic test kit

Case studies

Author: **Agnes Buza PhD, Ferenc Divos PhD**

Key terms: instrumental evaluation, tomography, velocity, tomogram, sensors, safety factor, healthy wood, sound wood, electric resistivity, resistivity, resistograph, fractometer, increment borer

Key issues: tree evaluation with tomography, tree evaluation with wood material examinations

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Syllabus

Training: 2. Advanced/specialist assessment

Subject: 2.11. Instrumental assessment: tree stability

Short description of the training subject

The training is designed to provide knowledge about instrumental tree assessment, especially tree stability measurements like pulling test inclino, pulling test elasto and dynamic tree stability evaluation techniques.

Educational objective:

O.2.21. – Provide knowledge necessary for the course participant to perform safety factor determination including static and dynamic models.

Educational outcome:

Knowledge	**Skills**
Student knows about: **K.2.32.** Principles behind pulling test. Practical application of tree statics **K.2.33.** Wind load as dynamic load, converting static pulling test to a dynamic test	Student is able to: **S.2.28.** Measure and interpret the safety factors **S.2.29.** Perform pulling test and dynamic test

Duration: 3 hours

Topics (issues) and planned duration for each

1. Pulling test inclino for tree root stability evaluation, force meters, inclinometers- 1 h
2. Pulling test elasto for tree trunk stability evaluation, elastometers, data loggers– 1 h
3. Dynamic version of pulling test, anemometers, evaluation principles – 1 h

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Form of classes (including teaching methods and tools) Lecture	
Required equipment and teaching aids – specific for this teaching area	
Author:	**Agnes Buza PhD, Ferenc Divos PhD**

Key terms:

wind load – load made by rope, uprooting curve, hooke low, force meter, inclinometer, elastometer, anemometer

Key issues:

uprooting safety factor determination, braking safety factor determination

Syllabus

Training: 2. Advanced/specialist assessment

Subject: 2.12. Tree assessment calculators

Short description of the training subject

The training aims to familiarize participants with the main programs and calculators used to assess trees. The participant will learn about currently used programs and applications for tree assessment, with particular application in assessing their statics and value. The possibilities and limitations associated with their use will be presented and the possibilities of use in making decisions about the tree will be presented.

Educational objective:

O.2.22. – Provide knowledge about major computer programs, applications and calculators for assessing the statics and value of trees.

O.2.23. – Development of skills for independent use of programs and applications and the use of results for further decisions on the tree.

Educational outcome:

Knowledge Student knows about:	**Skills** Student is able to:
K.2.34. Possibilities and limitations in the use of applications, programs and calculators for tree assessment	**S.2.30.** Identify the tools available to help assess trees, including their capabilities and limitations
K.2.35. The use of calculation and simulation results for further decisions on trees	**S.2.31.** Identify problems and determine indications for further actions based on calculations and simulations

Duration: 2 hours

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Topics (issues) and planned duration for each 1. Review of popular programs, applications and calculators - their specificity, possibilities and limitations - 1.5 h 2. Making recommendations based on simulations and calculations - 0.5 h
Form of classes (including teaching methods and tools) Lecture Indoor workshop
Required equipment and teaching aids – specific for this teaching area Tablet / laptop with software installed (possibly internet access for online applications)
Author: **Kamil Witkoś-Gnach**

Key terms:

tree statics, tree value, SIA, Treecalc, iTree

Key issues:

possibilities and limitations of simulations and calculations in the assessment of trees

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Syllabus

Training: 2. Advanced/specialist assessment

Subject: 2.13. Root detection systems

Short description of the training subject

The training is designed to provide knowledge and skill of root system location as well as the root detection systems (mechanical, acoustic and radar techniques). Operation principals are summarized. Advantages and disadvantages of the devices are presented.

Educational objective:

O.2.24. – Provide knowledge about the methods to find roots in the ground.

Educational outcome:

Knowledge Student knows about:	**Skills** Student is able to:
K.2.36. The importance of localization of roots	**S.2.32.** Map the main roots
K.2.37. The methods to find the main roots	

Duration: 2 hours

Topics (issues) and planned duration for each

1. Presentation of the instruments and their operation principles (lecture) – 1 h
2. Root mapping (field) – 1 h

Form of classes (including teaching methods and tools)

Lecture

Outdoor workshop

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Required equipment and teaching aids – specific for this teaching area
Root detector
Author: **Agnes Buza PhD, Ferenc Divos PhD**

Key terms:

root system, roots, root detector

Key issues:

root detecting methods, advantages of having trees in urban areas, importance and the value of trees

Syllabus

Training: 2. Advanced/specialist assessment

Subject: 2.14. Dendrochronology

Short description of the training subject

The training is intended to provide the insight into the growth of woody plants in response to both short and long term environmental conditions. The scope of the training is focused mainly on fundamentals of intra-annual wood formation and what information about tree growth determinative conditions could be inferred from tree ring studies.

Educational objective:

O.2.25. – The increase of professional educational background necessary for sufficient evaluation skills of tree-environment interaction.

Educational outcome:

Knowledge Student knows about:	**Skills** Student is able to:
K.2.38. Fundamentals of tree intra-annual and full-life-cycle growing patterns as a response to variation in environmental conditions.	**S.2.33.** Properly link the long-term variability in success of wood formation in relation to changes of tree growing conditions
K.2.39. Analysing of past climatic conditions and disturbances.	**S.2.34.** Predict the intra-annual tree growth as a function of upcoming weather conditions and past growing success

Duration: 8 hours

Topics (issues) and planned duration for each

1. Basic wood anatomy and physiology of woody plants (lecture) – 4 h
2. Tree growth climatic sensitivity (lecture) – 4 h

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Form of classes (including teaching methods and tools) Lecture	
Required equipment and teaching aids – specific for this teaching area	
Author	**Oskars Krisans**

Key terms:

wood formation climatic signal, intra-annual tree growth

Key issues:

seasonal wood formation characteristics, woody plant species ecological niche and growing strategies; adaptation to variety of site conditions within natural distribution range; adaptation capabilities to unfavourable conditions; activities of disturbance agents

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Syllabus

Training: 2. Advanced/specialist assessment

Subject: 2.15. Remote tree surveys

Short description of the training subject

The training is designed to provide knowledge about remote instrumental tree assessment, especially aerial Light Detection and Ranging, SLS (Satellite Laser Scanning), ALS (Airborne Laser Scanning), TLS (Terrestrial Laser Scanning) as well as drones.

Educational objective:

O.2.26. – Provide knowledge about new remote technologies and their outcomes to enrich data used to assess trees.

Educational outcome:

Knowledge Student knows about:	**Skills** Student is able to:
K.2.40. Range of scanning methods of trees **K.2.41.** Drones usage and technologies useful for assessing trees	**S.2.35.** Find and use in tree assessment data delivered by scanning technology by common resources (paid and unpaid) **S.2.36.** Use drones for assess tree parameters and gathering additional information for tree assessment

Duration: 4 hours

Topics (issues) and planned duration for each

1. Laser scanning technologies and data resources – 1 h
2. Drones usage and data delivered – 1 h
3. Use drones in gathering info about trees in practice – 2 h

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Form of classes (including teaching methods and tools) Lecture Indoor workshop Outdoor workshop
Required equipment and teaching aids – specific for this teaching area Drones with operator, laptop with an application for picture reviewing / editing, SD cards Laptops with internet connection to review LIDAR etc. resources
Author: **Beata Pachnowska PhD**

Key terms:

SLS, ALS, TLS, LIDAR, drones

Key issues:

digital aerial photography, tree biometry, digital crown surface modelling, reviewing the data resources of Lidar

Syllabus

Training: 2. Advanced/specialist assessment

Subject: 2.16. Aerial crown assessment - for ground assessors

Short description of the training subject

The training aims to familiarize participants with the purpose, essence and methods of aerial crown assessment.

Educational objective:

O.2.26. – Provide knowledge about the main goals, methods and techniques for aerial crown assessment

O.2.27. – Developing the skills of commissioning and supervising tree aerial crown of crown assessment and using the results of this type of assessment for the overall tree assessment.

Educational outcome:

Knowledge Student knows about:	**Skills** Student is able to:
K.2.42. Value, purpose, ways of aerial crown ass essment and limitations for this method	**S.2.37.** Indicate of the purpose and scope of the tree assessment from the crown level
K.2.43. Methods of recording and documenting tree aerial crown assessment results	**S.2.38.** Determine requirements for the tree aerial crown assessment
K.2.44. Qualifications and requirements for thos e performing an aerial crown assessment or collecting data for a tree diagnostician	**S.2.39** Identify problems and determine indicati ons for trees and species living on them based on photographic documentation c ollected during crown inspections

Duration: 4 hours

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Topics (issues) and planned duration for each

1. Tree assessment from ground level vs. from the crown level, noticed features, problems and habitats and organisms - comparison, applications, limitations - 1 h
2. Access techniques and tree aerial crown assessment - requirements for the contractor, impact on the tree, impact on the information obtained - 1 h
3. Record of the aerial crown assessment, interpretation of the results and use them in the overall tree assessment - 2 h

Form of classes (including teaching methods and tools)

Lecture

Indoor workshop

Outdoor workshop

Required equipment and teaching aids – specific for this teaching area

A case study set with examples of ground level trees assesments and aerial crown assessment

Author: **Jerzy Stolarczyk**

Key terms:

aerial crown assessment, access techniques

Key issues:

evaluation of forks, checking dead branches, included bark

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Syllabus

Training: 2. Advanced/specialist assessment

Subject: 2.17. Aerial crown assessment - for aerial assessors

Short description of the training subject

The training is designed to familiarize participants with performing an aerial crown assessment (with entering the crown). It is intended for people who work at heights who know and use access techniques. Participants of the training in the full scope (with entering the crown) can be people who can demonstrate no contra-indications to work at the height of above 3 m (certificate from an occupational medicine doctor or equivalent). In the absence of such a certificate, the participant may participate in ground-level classes without entering the crown.

Educational objective:

O.2.28. – Transfer of knowledge about tree aerial crown assessment techniques.

O.2.29. – Acquiring the skill of assessing a tree crown by various access techniques.

Educational outcome:

Knowledge Student knows about:	**Skills** Student is able to:
K.2.45. Non-invasive access techniques for aerial crown assessment	**S.2.40.** Recommend the tree and scope of the tree aerial crown assessment
K.2.46. Methods of aerial crown assessment	**S.2.41.** Collect tree crown inspection data

Duration: 14 hours

Topics (issues) and planned duration for each

1. Specific tree problems requiring crown inspection - 2 h
2. Aerial crown assessment of the tree using rope techniques and ladders - 7 h
3. Assessment of the tree from the aerial platform, ladders - 5 h

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Form of classes (including teaching methods and tools) Lecture Indoor workshop Outdoor workshop
Required equipment and teaching aids – specific for this teaching area Tree-climbing equipment Protective equipment Aerial platform with operator Ladders with a height of min. 4 m Documentation equipment Instrumental diagnostic equipment, e.g. resistance drill, tomograph Mature trees of various height and structure/ habit Helper climber - arborist with the ability to rescue at height First aid kit
Author: **Jerzy Stolarczyk**

Key terms:

aerial crown assesment, access techniques

Key issues:

evaluation of forks, checking dead
branches, preparing documentation when entering the crown of the tree

Syllabus

Training: 2. Advanced/specialist assessment **Subject: 2.18**. Long-term tree management plan	
Short description of the training subject The training is designed to provide students with knowledge and skills needed to prepare a long-term management plan for an ancient or other valuable tree. It includes a lecture on assessing ancient and veteran trees and on methodology of the plan. A field and room practice follows, where students draft a simplified, training version of the plan for a specific tree.	
Educational objective: O.2.30. – Provide students with knowledge and skills needed to prepare a long-term management plan for an ancient or other valuable tree. O.2.31. – Provide students with knowledge and skills needed to use tree assessment outcomes to built the long term tree management plan.	
Educational outcome:	
Knowledge Student knows about: **K.2.47.** Physiology, architecture and development of trees in different age phases **K.2.48.** Techniques to improve site conditions **K.2.49**. Care and stabilisation techniques of valuable trees	**Skills** Student is able to: **S.2.42.** Understand and implement recommendations of a long-term management plan
Duration: 5 hours	

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Topics (issues) and planned duration for each 1. Structure of a long-term management plan and implementation thereof – 1 h 2. Methodology of preparing long-term management plan (lecture) – 1 h 3. Practice in preparation of a simplified long-term management plan (outdoors and indoors) – 3 h
Form of classes (including teaching methods and tools) Lecture Indoor workshop Outdoor workshop
Required equipment and teaching aids – specific for this teaching area
Author: **Piotr Tyszko-Chmielowiec PhD**

Key terms:

valuable tree, ancient tree, habitat/site, tree care, crown retrenchment

Key issues:

long-term management plan, tree care recommendations

Syllabus

Training: 2. Advanced/specialist assessment

Subject: 2.19. Tree assessment reports

Short description of the training subject

The training includes the knowledge and skills necessary to design and make a report on tree assessment in the most commonly used electronic formats and in paper/ print form. Participants will learn about the process of preparing documentation: from determining the target/ requirements of the assessment client, through collecting data, to preparing a document with the results of the assessment and its effects (recommendations), for various levels and ranges of assessment. The course is intended for people who evaluate trees at least at the basic level.

Educational objective:

O.2.32. – Providing students with knowledge on the principles of preparing documentation from tree assessment, taking into account applicable legal provisions, including professional liability, copyright and personal data protection.

O.2.33. – Transfer of knowledge about available tools and sources of information helpful in creating documentation.

O.2.34. – Equipped with the ability to determine the scope of documentation, design the process of its preparation and implementation for various levels of tree assessment and types of recipients

Educational outcome:

Knowledge Student knows about:	**Skills** Student is able to:
K.2.50. Rules for preparing documentation from the assessment of trees, taking into account applicable legal provisions, including professional liability, copyright and personal data protection	**S.2.43.** Specify the scope of documentation and design the process of its preparation
K.2.51. Available data, tools and sources	**S.2.44.** Make documentation of tree assessment based on collected data at the basic level and using the results of

of information helpful in creating documentation	advanced diagnostics

Duration: 4 hours

Topics (issues) and planned duration for each

1. Preparation of documentation in the tree assessment process - from the purpose of assessment, through field work, to delivery of ready documentation - 0.5 h
2. Tools and data sources useful for preparing documentation (including maps, word and picture editors, printing equipment, data carriers) - 1 h
3. Preparation of documentation step by step - from data to expertise - 2 h
4. Legal aspects of documentation from tree assessment - 0.5 h

Form of classes (including teaching methods and tools)

Lecture

Indoor workshop

Required equipment and teaching aids – specific for this teaching area

Examples of documentation from tree assessment - at various levels (electronic and printed versions). Positive and negative.

A set of data for preparing a tree assessment document (tree measurement results, photo documentation, completed tree assessment form).

Laptops with text and image editor, internet access

Author: **Beata Pachnowska PhD**

Key terms: copyrights, personal data protection, geoportal, test editing, image editing

Key issues: designing documentation/ report from tree assessment, collecting and editing data for documentation, preparation of an expertise document

Syllabus

Training: 2. Advanced/specialist assessment

Subject: 2.20. Communication and management in tree assessment

Short description of the training subject

The training includes the knowledge and skills necessary to design and conduct a tree assessment process, taking into account different groups of assessment stakeholders and communication with these groups. The course is intended for people who assess trees at least at the basic level, especially for those who evaluate trees as a service in business operations.

Educational objective:

O.2.35. – Transfer of knowledge about various groups of stakeholders relevant to the tree assessment process and its effects, as well as their requirements and communication specificity and typical problems encountered by the tree assessor during work.

O.2.36. – Transfer of knowledge about the management of the tree assessment process from the request for proposal to the receipt of work.

O.2.37. – Developing the ability to communicate the importance of tree assessment, techniques and tools used, and effects in various groups of stakeholders.

Educational outcome:

Knowledge Student knows about:	**Skills** Student is able to:
K.2.52. Various stakeholder groups relevant to the tree assessment process and its effects as well as their requirements and communication specificity, and the typical problems encountered by tree assessors at work	**S.2.45.** Recognize the information needs of various stakeholder groups relevant to tree assessment
K.2.53. Methods and techniques for managing the process of assessing trees from the Rfq to the receipt of work	**S.2.46.** Use appropriate knowledge and arguments to convey and explain the importance of tree assessment, techniques and tools used, and effects relevant to a given group of stakeholder

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Duration: 4 hours
Topics (issues) and planned duration for each 1. Tree assessment – social and decision-making context, stakeholders – their goals and information needs – 1 h 2. Case study - tree assessment and related communication – 1 h 3. Management of the tree assessment process – 1 h 4. Case study – managing the tree assessment process – 1 hour
Form of classes (including teaching methods and tools) Lecture Indoor workshop
Required equipment and teaching aids – specific for this teaching area Case study - an example of tree assessment, involving many stakeholder groups Case study - example of the process of assessing trees from the offer inquiry to the acceptance protocol
Author: **Beata Pachnowska PhD**

Key terms:

stakeholder, tree defenders, decision maker, offer inquiry, offer, contract, acceptance protocol

Key issues:

identification of stakeholder information needs, communication with the client, communication with the social environment and the media, communicating the benefits of trees, offering and accounting for work related to the assessment of trees

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