INSTITUTE OF DENDROLOGY
POLISH ACADEMY OF SCIENCES

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Informacje ogólne/General information	**Nazwa przedmiotu/ Name of the subject**	Ekologia roślin drzewiastych/ Ecology of woody plants
	Jednostka prowadząca/Unit offering the subject	Instytut Dendrologii Polskiej Akademii Nauk Institute of Dendrology, Polish Academy of Sciences
	Język przedmiotu/Language of the subject	Język angielski/ English
	Limit miejsca w grupach/Limit of the places in groups	
	Terminy zajęć/Time of classes	10.05, 17.05, 24.05, 31.05 i 7.06
Informacje o przedmiocie/Information about the subject	**Typ przedmiotu/Type of the subject**	Obowiązkowy/ Obligatory
	Imię i nazwisko koordynatora przedmiotu/Person coordinating the subject	dr hab. Joanna Mucha, prof. ID PAN jmucha@man.poznan.pl
	Imię i nazwisko osób prowadzących/First and last names of people conducting the subject	Pracownicy naukowi Instytutu Dendrologii PAN/ Academics of Institute of Dendrology PAS
	Imię i nazwisko osób egzaminujących/First and last name of the examiner or the creditor	Pracownicy naukowi Instytutu Dendrologii PAN/ Academics of Institute of Dendrology PAS; osoba zaliczająca/ credits: dr hab. Joanna Mucha, prof. ID PAN
	Sposób realizacji/ Implementation method	Wykład z wykorzystaniem środków audiowizualnych poprzez MS TEAMS/ Lecture with the use of audiovisual means via MS TEAMS
	Wymagania dodatkowe/ Additional Requirements	Wiedza z zakresu podstaw biologii, fizjologii i biochemii roślin, genetyki roślin, biologii molekularnej, ekologii/ Knowledge of the basic biology, plant physiology and biochemistry, plant genetics, molecular biology, ecology
	Liczba punktów ECTS/Number of ECTS* credits	4 ECTS
	Metody dydaktyczne/ Didactic methods used	Wykład z prezentacją multimedialną, metoda studium przypadku, dyskusja dydaktyczna. Student: praca własna z literaturą/ Lecture with multimedia presentation, case study method, didactic discussion. Student: own work with the literature.
	Zakres tematów/ Scope of topics	Trees bud dormancy – benefits and threats under climate changes;

		Mechanism of seed survival in the natural environment and under stress conditions; Seed dormacy, germination and seedling establishment; The sex life of woody plants; Polluted enviornments and their phytoremediation by woody plants; Forest litter – it matters; Determinants and consequences of trees and shrubs invasions; Effects of global climate change on forest ecosystems; Plant-insect interactions; Mutualism and antagonism: ecological interactions among vertebrates and woody plants; Functional characteristic of fine roots; Plant-fungi interactions; Mycorrhizal symbiosis – diversity and functions;
	Materiały dodatkowe/ **Additional materials**	
Efekty kształcenia/ **Learning outcomes**	**Efekty kształcenia dla przedmiotu ujęte w kategorii: wiedzy, umiejętności I kompetencji społecznych/** **Learning outcomes for the subject included in the category of knowledge, skills and social competences**	**<u>Knowledge</u>** P8S_WG_1. The student gains basic knowledge about the biology of tree seeds and buds, their structure, development, and adaptive mechanisms that determine survival in stressful conditions (drought, cold, and frost stress), also considered in the context of climate change. P8S_WG_2. The student is familiar with the processes of plant response to abiotic stresses with particular emphasis on plant tolerance to abiotic stresses and the role of mentioned factors in the phytoremediation process; is familiar with various phytoremediation processes and with indicators related to phytoremediation; is familiar with the processes that determine the litter development. P8S_WG_3. The student has knowledge on forest ecosystem functioning in a changing environment, has organized knowledge on tree invasion determinants and pathways and knows mechanisms facilitating tree invasions. P8S_WG_4. The student can describe the adaptation of individual groups of animals and plants to the environment in which they live, knows and interprets the phenomena and processes occurring in the life of animals and plants related to their reproduction, development, and growth, knows the dependencies and types of dependencies that occur between plant and animal species. P8S_WG_5. The student has knowledge of fine root growth, development, function and survivorship in relation to different fungi, is familiar with mycorrhizal diversity and factors shaping

		their community and pattern of global distribution of mycorrhizal types. P8S_WK_2. The student can indicate the threats for forest litter and their consequences for ecosystem functioning. P8S_WK_3. The student is familiar with consequences of biological invasions at various levels of life organization. **Skills** P8S_UW_1. The student is able to present the structure and development of tree seeds and buds, knows the basic adaptation mechanisms to stressful conditions, understands the biological significance of the existence of buds and seeds and their proper development, uses the appropriate terminology, knows the definitions and classification systems of dormancy, can characterize its various types, knows to justify the importance of dormancy as a complex adaptive mechanism deciding on the survival of an individual and species. P8S_UW_2. The student is able to indicate theoretical phytoremediation solutions adapted to a given polluted environment; is able to indicate theoretical solutions that inhibit the litter degeneration/transformation. P8S_UU_2. The student is able to interpret the indicators related to the litter decomposition, and relates them to the features of decomposing material. P8S_UW_3 The student is able to analyze factors determining tree invasions in forest ecosystems; can interpret context-dependent mechanisms of biological invasions. P8S_UU_3 The student can predict the consequences of tree invasions for biodiversity and ecosystem functioning. P8S_UW_4. The student can use the literature in order to properly gather knowledge about the biology of species and relation to other organisms. P8S_UW_5. The student interprets how roots heterogeneity and the rhizosphere respond to the environment including soil, abiotic stress; can give some examples of environmental factors and explain their impact on the mycorrhizal symbiosis of trees and fungi. P8S_UW_5. The student define mycorrhizal symbiosis; can describe anatomical differences of the main types of mycorrhiza; can give some examples of hot-spots of ectomycorrhizal fungi. **Social competence** P8S_KK. The student understands the need for constant updating of knowledge from recognized sources of scientific information on the adaptation of plants to environmental conditions, and is ready to verify knowledge from various sources.

		P8S_KR. The student is aware of diverse opinions and stakeholder views on challenges in ecology of woody plants and can communicate with them, knows and appreciates the rules of cultural discussion. P8S_KO. The student is aware of the most serious global environmental problems and its influence on ecomy and society, is aware of the importance of adaptation of trees to changing climate and social, professional, and ethical responsibility for the shaping and condition of the natural environment.
	Metody sprawdzenia efektów kształcenia/ **Assessment methods & criteria**	Assessment methods: - written test – P8S_W and P8S_K - discussions and active participations in lectures – P8S_U
Warunki zaliczenia i literatura/ **Credit requirements and literature**	**Forma i warunki zaliczenia/** **Form and conditions of completing the course**	exam*:* written test
	Literatura/ **Literature**	Berg B., McClaugherty C. 2014. Plant Litter. Decomposition, Humus Formation, Carbon Sequestration, 3rd ed. Springer-Verlag GmbH, Berlin-Hidelberg. Herrera C.M., Pellmyr O. 2009. Plant animal interactions: an evolutionary approach. John Wiley & Sons. Jolivet J. 1998. Interrelationship between insects and plants CRC Press; Boca Raton, Boston, London, New York, Washington. Peterson R.L., Massicotte H.B., Melville L.H. 2004. Mycorrhizas: anatomy and cell biology. NRC Research Press. Ansari A.A., Gill S.S., Gill R., Lanza G.R., Newman L. 2016. Phytoremediation management of environmental contaminants. Springer. Rejmánek M. 2014. Invasive trees and shrubs: where do they come from and what we should expect in the future? Biological Invasions 16: 483–498. Richardson D.M., Pyšek P., Carlton J.T. 2011. A compendium of esssential concepts and terminology in invasion ecology. In: Richardson D.M. (ed.). Fifty years of invasion ecology: the legacy of Charles Elton. Blackwell Publishing Ltd, Oxford, pp 409–420. Schoonhoven L.M., van Loon J.J.A., Dicke M. 2005. Insect-plant biology. Oxford University Press; Oxford, Ney York. Tedersoo L. et al. 2014. Global diversity and geography of soil fungi. Science 1256688. Vogt K.A., Grier C.C., Vogt D.J., 1986. Production, Turnover, and Nutrient Dynamics of Above- and Belowground Detritus of World Forests. In: MacFadyen A., Ford E.D. (eds.). Advances in Ecological Research. Academic Press. Pp. 303–377. McCormack M.L. et al. 2015. Redefining fine roots improves understanding of below-ground contributions to terrestrial biosphere processes. New Phytologist 207(3): 505–518. Bravo F., LeMay V., Jandl R. (eds.) 2017. Managing Forest Ecosystems: The Challenge of Climate Change. 2nd Edition. Springer