SZKOŁA GŁÓWNA GOSPODARSTWA WIEJSKIEGO

Forest Ecology

Educational subject description sheet

Basic information

Field of study Course Offer for exchange students - second cycle studies, including uniform master studies (MA programmes) **Speciality** - **Organizational unit** Course Offer for exchange students **Study level** second cycle studies, including uniform master studies (MA programmes) **Study form** full-time studies **Education profile** General academic	**Didactic cycle** 2024/25 **Subject code** PWMPWM2S_D.B100000P.06334.24 **Lecture languages** english **Mandatory** Elective subjects **Block** Basic subjects **Disciplines**

Coordinator	Jarosław Skłodowski
Teacher	Jarosław Skłodowski, Marek Sławski, Grzegorz Zawadzki

Period Winter semester	**Examination** Pass with grade **Activities and hours** Lecture: 15 Laboratory exercises: 15 Field exercises: 15	**Number of ECTS points** 6

Goals

Code	Goal
C1	Understanding the principles of functioning of the forest ecosystem
C2	Understanding the functioning of forest ecosystem management and those disturbed by natural factors
C3	Ability to conduct forest exosytem research

Subject's learning outcomes

Code	Outcomes in terms of	Effects	Examination methods
Knowledge – Student knows and understands:			
W1	Understanding the principles of functioning of the forest ecosystem		Oral credit
W2	Understanding the influence of natural and anthropogenic factors on the functioning of the forest ecosystem		Oral credit
W3	Understanding the research methods assessing the state of development of the forest ecosystem and the consequences of stand disturbances		Oral credit
Skills – Student can:			
U1	The ability to plan and perform basic measurements and research on the forest structure		Report, Assessment of activity during classes
U2	The ability to assess the development state of a forest ecosystems		Report, Assessment of activity during classes
Social competences – Student is ready to:			
K1	Awareness of the accuracy of the assessment of the state of the ecosystem using various methods.		Report
K2	Ability to combine individual research into a joint report. Awareness of the good sides of team work; ability to conduct research in a research team		Report

Study content

No.	Course content	Subject's learning outcomes	Activities

1.	Lectures: Basic terms and definitions in forest ecology. Classification of forest habitats in the Polish forestry. Primary and secondary production of ecosystems. Factors influencing primary production. Processes of mater cycling within forest ecosystems. Decomposition and mineralization of organic matter. The role of dead wood in matter cycling. Trophic cascade. Strategy for leaf building and tree crown architecture. Mechanism of acidification of forest soils. Roots uptake of soil nutrients. Dynamics of forest ecosystem: successions gap dynamics, Phases of natural forest old-growth forest, concept of forest legacies, residual forest, green retention. Structural diversity of forest ecosystem. Sources of diversity in ecosystems, species richness, geographic patterns of biodiversity. Global threats to forest ecosystems: climate change, eutrophication, acidification, biodiversity loss. Ecosystem disturbances: hurricane, fire, insect outbreaks. Fragmentation of stands. The use of zooindication in the assessment of the condition of the forest ecosystem. Consequences of clear-cuts and the possibility of limiting them. The theory of islands and metapopulation in forest ecology.	W1, W2, W3	Lecture
2.	Exercise: Assessment of species importance in forest ecosystems. Life strategies of species and their adaptations to various environmental factors. Stress factors and disturbances as drivers of evolutionary changes. Research on the effects of hurricane stand disturbance and subsequent regeneration of forest ecosystem. Changes in the environment of pine stands after their disturbance by a hurricane. Minimum size of a forest island - zooindicative assessment. Processing of forest field measurement data.	U1, U2	Laboratory exercises
3.	Field exercises: Research of forest ecosystems. The structure of stands, forests layers: trees, undergrowths and ground cover - data collection and analysis. Biodiversity of the forest ecosystem. Predicting succession changes in the next generations of stands, data collection and analysis. Preparation of a forest ecosystem research report.	U1, U2, K1, K2	Field exercises

Course advanced

Activities	Methods of conducting classes
Lecture	Lecture, Problem lecture, Conversation lecture, Case study, Presentation
Laboratory exercises	Case study, Problem solving, Analysis of source materials
Field exercises	Case study, Observation, Field measurements, Field observations

Activities	Examination method	Percentage
Lecture	Oral credit	60%
Laboratory exercises	Assessment of activity during classes	15%
Field exercises	Report	25%

Activities	Credit conditions
Lecture	positive oral credit rating
Laboratory exercises	positive assessment of the report
Field exercises	discussion and positive assessment of the field exercise report

Literature

Obligatory

1. BARNES B.V., ZAK D.R., DENTON S.R., SPURR S.H. 1998. Forest Ecology. Wiley
2. BENGTSSON J. 2002. Disturbance and resilience in soil animal communities European Journal of Soil Biology 38: 119−125.
3. BERG B., LASKOWSKI R. 2006. Litter decomposition: a guide to carbon and nutrient turnover. Advances in Ecological Research V. 38. Elsevier s. 421.
4. BINKLEY D., Fischer R.D. 2019. Ecology and management of forest soils. Wiley.
5. CHAPIN III F.S., MATSON P.A., MOONEY H.A.2002. Principles of terrestrial ecosystem ecology. Springer-Verlag, New York, Berlin, Heidelberg. 436b ss.
6. GAUTHIER S. at al. 2015. Boreal forest health and global change. Science 349 (6250): 819-822.
7. JABIN M., MOHR D., KAPPES H., TOPP W. 2004. Influence of deadwood on density of soil macro-arthropods in a managed oak–beech forest. Forest Ecology and Management 194: 61-69.
8. SKŁODOWSKI J. 2014. Consequence of the transformation of a primeval forest into a managed forest for carabid beetles (Coleoptera: Carabidae) - a case study from Białowieża (Poland). European Journal of Entomology 2014, Vol. 111, nr 5: 639-648, doi. 10.14411/eje.2014.088
9. SKŁODOWSKI J. 2017. Manual soil preparation and piles of branches can support ground beetles (Coleoptera, carabidae) better than four different mechanical soil treatments in a clear-cut area of a closed-canopy pine forest in northern Poland. Scandinavian Journal of Forest Research 32 (2): 123-133.
10. SKŁODOWSKI J. 2020. Two directions of regeneration of post-windthrow pine stands depend on the composition of the undergrowth and the soil environment. Forest Ecology and Management. Forest Ecology and Management 461 (2020) 117950.
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13. SPIES T.A., 1998. Forest structure: a key to the ecosystem. Northwest Science 72: 34-39.

Optional

1. ARORA V.K., MONTENEGRO A. 2011. Small temperature benefits provided by realistic afforestation efforts. Nature Geoscience 4 (8): 514-518.
2. BIRD S.B., COULSON R.N., FISHERC R.F. 2004. Changes in soil and litter arthropod abundance following tree harvesting

and site preparation in a loblolly pine (Pinus taeda L.) plantation. Forest Ecology and management 202 (2004) 195–208
3. CHAMBERLAIN P.M., MCNAMARA N.P., CHAPLOW J., STOTT A.W., BLACK H.I.J. 2006. Translocation of surface litter carbon into soil by Collembola Soil Biology & Biochemistry 38: 2655–2664.
4. COTRUFO M.F., MILLERM., ZELLER B.2000. Litter decomposition. [W:] Schulze E.D. (red.) Carbon and nitrogen cycling in European forest ecosystems. Ecological Studies 142. Springer: 276–296.
5. FRANKLIN J.F., SPIES T.A., VAN PELT R., CAREY A.B., THORNBURGH D.A., BERG D.R., LINDENMAYER D.B., HARMON M.E., KEETON W.S., SHAW D.C., BIBLE K., CHEN J. 2002. Disturbances and structural development of natural forest ecosystems with silvicultural implications, using Douglas-Fir forests as an example. Forest Ecology and Management 155: 399-423.
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Calculation of ECTS points

Activity form	**Activity hours***
Lecture	15
Laboratory exercises	15
Field exercises	15
Preparation for exercises	10
Preparing the project	20
Preparing a report	20
Conducting literature research	30
Preparation for the exam	20
Preparation of the report	10
Student workload	**Hours** 155
Number of ECTS points	**ECTS** 6

* hour means 45 minutes