

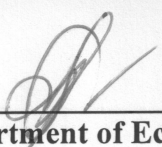
Ministry of Education and Science of Ukraine
Sumy National Agrarian University
Faculty of Agricultural Technologies and Environmental Management
Department of Ecology and Botany

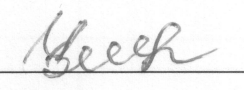
Course Syllabus

EC 6. BOTANY (compulsory)

Specialty	H1 Agronomy
Educational programme	Agronomy
Level of higher education	first (Bachelor's)

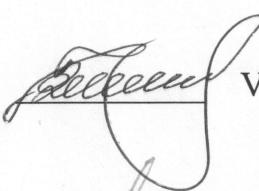
Sumy - 2026

Developer:  Liudmyla BONDARIEVA, PhD in Biology, Associate Professor
of the Department of Ecology and Botany

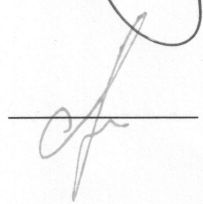
Reviewed, approved and adopted at the meeting of the Department of Ecology and Botany	Protocol No. 12 of 08.05.2026	
	Head of the Department	<u></u> Inna ZUBTSOVA

Agreed:

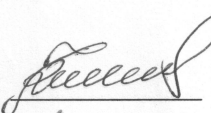
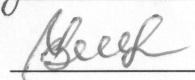
Programme Guarantor

 Viktor ONYCHKO

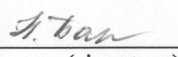
Dean of the Faculty implementing
the educational programme

 Serhii HORBAS

Review of the course syllabus (attached) provided by:

 V. Onychko
 Inna ZUBTSOVA

Methodologist of the Department
of Education Quality,
Licensing and Accreditation

 (N. Baranik)
(signature) (name)

Registered in the electronic database: date: 08.07. 2026

Information on revision of the course syllabus:

Academic year in which changes are made	Appendix number to the syllabus with a description of changes	Revisions reviewed and approved		
		Date and protocol number of the department meeting	Head of the Department	Programme Guarantor

1. GENERAL INFORMATION ABOUT THE COURSE

1.	Course title	Botany			
2.	Faculty/Department	Faculty of Agricultural Technologies and Environmental Management, Department of Ecology and Botany			
3.	Course status	Compulsory			
4.	Programme/Specialty (programmes of which this course is a component; completed for compulsory courses)	Implemented within the educational programme: Agronomy Specialty: H1 Agronomy First (Bachelor's) level of higher education			
5.	The course may be offered to (completed elective courses)	-			
6.	NQF level	6			
7.	Semester and duration of study	The course is taught during the 1st (autumn) semester of the 1st year of study			
8.	Number of ECTS credits	5 ECTS credits (150 hours) / 5 ECTS credits (150 hours)			
9.	Total student workload and its distribution (full-time/part-time) 1 (autumn) / 1 (autumn)	Contact hours			Independent study
		Total	Lectures	Practical / seminar classes	Laboratory classes
		150/150	30/-	-	30/6
10.	Language of instruction	English			
11.	Lecturer/Course coordinator	Bondarieva L. M., Department of Ecology and Botany			
	Contact information	Room 7v (building of the Faculty of Veterinary Medicine) https://agro.snau.edu.ua/en/chairs/department-of-ecology-and-botany/staff-of-the-department/bondareva-lyudmyla-mykolayina/milabond77@gmail.com			
12.	General course description	The course covers the external and internal structure of the plant organism, plant diversity and classification, the evolutionary origin of plants, and their adaptations to environmental conditions.			
13.	Course aim	The aim of the course is to provide students with thorough and systematic knowledge of the anatomical and morphological structure and life processes of the plant organism at different levels of organization, and to develop the ability to apply this knowledge in practice. The course develops logical thinking and the ability to establish cause-and-effect relationships between plant structure and function, environmental conditions and plant adaptations. It also promotes the perception of the plant as an integrated living organism and fosters a responsible attitude towards nature.			
14.	Prerequisites and links with other programme components	1. The course is based on knowledge from school courses in biology, chemistry and ecology. 2. The course provides a foundation for all components of the professional training cycle, as it covers the structure and functioning of the plant organism at different levels of organization.			
15.	Academic integrity policy	During the course «Botany», students must comply with the rules of academic integrity defined by the Regulations on the Organisation of the Educational Process at Sumy National Agrarian University (https://drive.google.com/file/d/1THXbcZySe0C6UwlnG3Uy_V64uRngnbzk/view) and the Code of Academic Ethics of Sumy National Agrarian University (https://drive.google.com/file/d/1aT-o1TmzZSEnW9NyaCF98_HgSCcrhARn/view). Students are expected to submit original work, either their own research or independently conducted analysis and synthesis. Missing references to sources used, falsification of sources, cheating and plagiarism, and interference with other students' work are examples of possible academic misconduct. Evidence of academic misconduct in a student's written work is grounds for not accepting the work, regardless of the extent of plagiarism.			
16.	Link to the course in Moodle	Theoretical and practical materials, module assessment: https://cdn.snau.edu.ua/moodle/course/view.php?id=1766			
17.	Keywords	Plants, plant diversity, vegetative and reproductive structures of plants, plant			

		reproduction, plant systematics, influence of abiotic and anthropogenic factors.
--	--	--

2. COURSE LEARNING OUTCOMES AND THEIR ALIGNMENT WITH PROGRAMME LEARNING OUTCOMES

Course Learning Outcomes (CLOs): after completing the course, the student will be able to:	Programme Learning Outcomes (PLOs) addressed by the course (number according to the educational programme)			Assessment methods
	PLO 2	PLO 6	PLO 9	
CLO 1. Explain the basic theoretical provisions, concepts and principles of modern botany.	+			oral questioning: conducted before and during laboratory classes to check the understanding of theoretical concepts required for practical tasks;
CLO 2. Describe the structure of the plant organism at all levels of organisation and apply theoretical knowledge in practical professional activities.		+		testing: conducted as express assessment using randomly selected test items prepared by the course lecturer; used to monitor students' independent study;
CLO 3. Use classical and modern methods for studying plant structure and plant classification.			+	monitoring of laboratory notebooks: carried out during and at the end of laboratory classes and demonstrates the successful completion of practical tasks and documentation of laboratory results;
CLO 4. Apply population-based methods in the study of cultivated and wild plants for bioindication of the stability of artificial and natural phytocoenoses and for predicting their persistence.			+	oral questioning: conducted before and during laboratory classes to check the understanding of theoretical concepts required for practical tasks;
CLO 5. Describe the biology, systematic position and environmental adaptations of major agricultural crops, forage crops, forest-forming and ornamental plant species.		+		written test: includes a written response to a theoretical question;
CLO 6. Use categories and taxonomic units of plant systematics, identify common representatives of higher spore plants, gymnosperms and angiosperms by morphological characters, and provide the Latin names of major representatives of higher plants.	+			testing: conducted as express assessment using randomly selected test items prepared by the course lecturer; used to monitor students' independent study;

3. COURSE CONTENT (COURSE PROGRAMME)

Topic. Issues to be covered within the topic	Distribution within the total time budget				Recommen- ded literature
	Classroom work			Independen- t study	
	Lec.	Pract. / sem.	Lab.		
Module 1					
Topic 1. Introduction. Botany as the science of plants and the vegetation cover of the Earth. Autotrophic and heterotrophic plants. The cosmic and planetary role of green plants.	1/2	-/2	1/-		Main sources: 1-7; methodolo- gical support: 1-7; informatio- n resources: 1-16; other sources: 1-
Topic 2. The cell. The cell as a functionally independent structural unit of living nature. Cell theory. General organisation of cell structure. Distinctive features of plant cells. Cell structure. Plasma membrane. Selective permeability. Cell wall. The nuclear system and its structure. The role of the nucleus in protein synthesis and heredity. Chloroplasts. Mitochondria. Ribosomes. Golgi apparatus, endoplasmic	1/-	-	2/-	10/15	

reticulum, vacuole.					23
Topic 3. Tissues. Classification. Concept of tissues. Prerequisites for the emergence of tissues in the course of evolution. Plant tissues and different approaches to their classification. Tissue groups according to function. Meristematic tissues. Dermal tissues. Ground (parenchymatous) tissues. Mechanical (supporting) tissues. Features of collenchyma, sclerenchyma and sclereids. Vascular tissues. Xylem and phloem. Secretory tissues.	2/-	-	3/-	8/15	
Topic 4. Root. Concept of vegetative and reproductive organs of plants. Definition of the root. Functions of a typical root. Morphology of the root and root systems. Functional zones of the root.	1/2	-	1/-		
Topic 5. Stem. Shoot. Definition of the stem. Functions of a typical stem. Diversity of stem morphology and anatomy. Types of stem branching.	1/-	-	2/-		
Topic 6. Leaf. Definition of the leaf. The leaf as an organ of photosynthesis. Diversity of leaf morphology. Phyllotaxis.	1/-	-	2/-		
Topic 7. Modifications of vegetative organs. Root modifications. Underground and above-ground stem modifications. Leaf modifications.	1/-	-	-	12/15	
Topic 8. Types of plant reproduction. Vegetative reproduction. Asexual reproduction. Sexual reproduction in plants.	1/2	-/2	1/-/		
Topic 9. Reproductive organs of angiosperms. Flower. Definition. Functions. Morphology and anatomy of the flower.	1/-	-	1/-		
Topic 10. Diversity of flowers. Types of inflorescences. Morphological and physiological diversity of flowers. Types of simple inflorescences. Types of compound inflorescences.	2/-	-	1/-		
Topic 11. Double fertilisation. Development of fruits and seeds. Stages of double fertilisation. Seed formation. Fruit formation. Diversity of fruits.	2/-	-	1/-	14/15	
Module 2					
Topic 12. Plant systematics. Modern classification of plants. Concept of the plant life cycle. Lower and higher plants.	2/-/	-/2	1/-	10/18	Main sources: 1-7; methodological support: 1-7; information resources: 1-16; other sources: 1-23
Topic 13. Kingdom Monera. Bacteria. Cyanobacteria.	1/-	-	-		
Topic 14. Kingdom Plantae. Algae. Structural features of algae. Types of morphological organisation. Ecological groups. Classification.		-	-	4/15	
Topic 15. Major divisions of algae. Euglenophytes, green algae. Yellow-green algae. Golden algae. Diatoms, brown algae.	1/-	-	1/-		
Topic 16. Higher spore plants. General characteristics. Classification. Divisions.	1/-	-	1/-		
Topic 17. Bryophytes. Structural features. Reproduction. Life cycle. Classification. Diversity.	-	-	1/-		
Topic 18. Rhyniophytes. Lycopodiophytes. Phylogenetic role of rhyniophytes. Structural features of clubmosses. Reproduction. Life cycle. Classification. Diversity.	1/-	-	1/-		
Topic 19. Equisetophytes. Structural features. Reproduction. Life cycle. Classification. Diversity of horsetails.	1/-	-	1/-		
Topic 20. Ferns. Structural features. Reproduction. Life cycle. Classification. Diversity of ferns.	1/-		1/-		
Topic 21. Gymnosperms. Classes of gymnosperms. Structure of vegetative organs. Life cycle.	2/-	-	2/-		
Topic 22. Angiosperms. Features of morphological and	2/-	-	2/-	11/15	

anatomical structure and reproduction. Micro- and megasporogenesis. Pollination and fertilisation.					
Topic 23. Classification of angiosperms. <i>Dicotyledons</i> . Subclass <i>Magnoliidae</i> . Subclass <i>Ranunculidae</i> . Subclass <i>Rosidae</i> . Subclass <i>Asteridae</i> . <i>Monocotyledons</i> . Subclass <i>Liliidae</i> . Order <i>Poales</i> . Family <i>Poaceae</i> .	2/-	-	2/-	13/15	
Topic 24. Basic life processes of the plant organism. Photosynthesis. Cellular respiration. Growth and development. Adaptation to growing conditions. Ecological groups of plants.	2/-	-/2	1/-	8/15	
Total	30/6	-/6	30/-	90/138	

4. TEACHING AND LEARNING METHODS

Course Learning Outcomes	Teaching methods (activities carried out by the lecturer during classes and consultations)	Hours	Learning methods (types of independent student learning activities)	Hours
CLO 1. Explain the basic theoretical provisions, concepts and principles of modern botany.	Lectures using multimedia presentations and practical (laboratory) classes. Analysis and assessment of students' work during task completion, including the quality and content of presentations (reports), the validity and argumentation of the work, and the level of subject mastery demonstrated during its defence.	10/2	work with educational and scientific literature study of additional material on relevant topics	20/24
CLO 2. Demonstrate the ability to obtain and provide the necessary information using modern Internet technologies.	Lectures using multimedia presentations and practical (laboratory) classes. Analysis and assessment of students' work during task completion, including the quality and content of presentations (reports), the validity and argumentation of the work, and the level of subject mastery demonstrated during its defence.	15/2	practical methods: laboratory work work with educational and scientific literature study of additional material on relevant topics	20/24
CLO 3. Use methods of observation, description, identification, classification and cultivation of ornamental plants and plant communities.	Lectures using multimedia presentations and practical (laboratory) classes. Analysis and assessment of students' work during task completion, including the quality and content of presentations (reports), the validity and argumentation of the work, and the level of subject mastery demonstrated during its defence.	15/2	practical methods: laboratory work work with educational and scientific literature	18/36
CLO 4. Use international categories and taxonomic units of plant systematics, identify common representatives of higher spore plants, gymnosperms and angiosperms by morphological characters, and provide the Latin names of major representatives of higher	Lectures using multimedia presentations and practical (laboratory) classes. Analysis and assessment of students' work during task completion, including the quality and content of presentations (reports), the validity and argumentation of the work, and the level of subject mastery demonstrated during its defence.	10/2	practical methods: laboratory work work with educational and scientific literature	16/24

plants.				
CLO 5. Understand the role of plants in nature and human economic activity. Take measures to conserve the gene pool and coenotic diversity of plants.	Lectures using multimedia presentations and practical (laboratory) classes. Analysis and assessment of students' work during task completion, including the quality and content of presentations (reports), the validity and argumentation of the work, and the level of subject mastery demonstrated during its defence.	10/4	practical methods: laboratory work work with educational and scientific literature	16/30
Total		60/12		90/138

5. COURSE ASSESSMENT

Course assessment is based on continuous assessment, combining summative and formative assessment. Continuous assessment is used to provide feedback to students and to record grades as part of summative assessment.

5.1. Diagnostic assessment (if applicable)

5.2. Summative assessment

Summative assessment summarises learning activities at a specific point in time, usually at the end of modules and during the examination. It can be described as end-of-course assessment that determines the student's level of achievement and summarises a particular stage of learning.

5.2.1. The following methods are used to assess the expected learning outcomes

Summative assessment methods	Points / weighting in the final grade	Due date (assessment week)
Module 1	35 points / 35%	By week 7
Testing of theoretical material	15 points	Week 7
Oral questioning	5 points	By week 7
Completion of laboratory and practical work	10 points	The week following completion of the work
Defence of laboratory work	5 points	Week 7
Module 2	35 points / 35%	By week 15
Testing of theoretical material	10 points	Week 15
Oral questioning; submission of Latin plant names	10 points	By week 14
Completion and defence of laboratory and practical work	5 points	Week 14
Completion and defence of the individual practical assignment "Morphological Atlas of Plants"	10 points	Week 15
Examination assignment: theoretical questions and tests	30 points / 30%	Examination week
Total for the semester	100 points / 100%	
Conditions for admission to the examination: students are admitted to the examination if they have completed all laboratory and practical assignments required by the programme, have defended their laboratory work, and have submitted the list of Latin plant names.		

5.2.2. Assessment criteria

Assessment component	Unsatisfactory	Satisfactory	Good	Excellent
Testing of	0-6 points. Fewer than	7-9 points. Some	10-13 points. The	14-15 points. The

theoretical material, 15 points	40% correct answers; the key concepts of the topic have not been mastered.	parts of the topic have been mastered, but answers contain significant errors.	main material has been mastered; answers are mostly correct, with minor inaccuracies.	material has been fully mastered; answers are correct and the student demonstrates systematic understanding of the topic.
Testing of theoretical material, 10 points	0-3 points. Fewer than 40% correct answers; the topic has been mastered only fragmentarily.	4-6 points. Part of the material has been mastered, but significant errors are present.	7-8 points. The material has been sufficiently mastered; answers are mostly correct.	9-10 points. The material has been fully mastered; answers are correct and logically justified.
Oral questioning, 5 points	0-1 point. The answer is absent or incorrect; the student does not know the basic concepts.	2-3 points. The answer is partial and contains errors; the student is oriented only in some issues.	4 points. The answer is generally correct but contains minor inaccuracies or incomplete justification.	5 points. The answer is complete and logical, with correct use of botanical terminology.
Completion of laboratory and practical work, 10 points	0-3 points. The work has not been completed or is fragmentary; results are not presented.	4-6 points. The work has been completed partially; there are errors in observations, descriptions or presentation.	7-8 points. The work has been completed, and the results are presented, with minor inaccuracies.	9-10 points. The work has been completed in full; results are presented correctly, and conclusions are justified.
Defence of laboratory work, 5 points	0-1 point. The student cannot explain the procedure and the results obtained.	2-3 points. The explanation is partial and includes significant errors in interpreting results.	4 points. The student generally explains the completed work correctly, but makes some inaccuracies.	5 points. The student provides a full and well-argued explanation of the work procedure, results and conclusions.
Oral questioning; submission of Latin plant names, 10 points	0-3 points. Latin names have not been mastered or are reproduced with numerous errors.	4-6 points. Some names have been mastered, but there are errors in spelling or pronunciation.	7-8 points. The main list of Latin names has been mastered, with minor inaccuracies.	9-10 points. Latin names have been fully mastered; spelling and pronunciation are correct.
Completion and defence of laboratory and practical work, 5 points	0-1 point. The assignment has not been completed or defended.	2-3 points. The assignment has been completed partially; the defence is incomplete and contains errors.	4 points. The assignment has been completed and defended, with minor inaccuracies.	5 points. The assignment has been completed in full; the defence is logical and well-argued.
Completion and defence of the individual practical assignment "Morphological Atlas of Plants", 10 points	0-3 points. The assignment has not been completed or is fragmentary; the material does not meet the requirements.	4-6 points. The atlas has been completed partially; there are errors in the selection, description or presentation of the material.	7-8 points. The atlas meets the main requirements, with minor inaccuracies.	9-10 points. The atlas is complete and well structured, with correct use of botanical terminology and illustrative material.
Examination assignment, 30 points	0-14 points. Answers are absent or fragmentary; the student does not demonstrate understanding of basic concepts and patterns.	15-19 points. Answers are partial and contain errors; the student is oriented in some course issues.	20-25 points. Answers are generally correct; the material has been mastered, with minor inaccuracies.	26-30 points. Answers are complete, logical and well-argued; the student demonstrates systematic understanding of the material.

5.3. Formative assessment:

Formative assessment provides information on the level of achievement of learning outcomes and supports the educational process by giving students timely feedback. It is carried out throughout the course and is used to adjust students' learning activities and improve teaching methods.

No.	Elements of formative assessment	Date
1.	Oral questioning and discussion of theoretical issues with feedback from the lecturer	During practical classes throughout the semester

2.	Completion of self-check and current-assessment test tasks followed by analysis of typical errors	After completion of individual topics and modules
3.	Checking and discussion of laboratory work at different stages of completion	Throughout the semester according to the work schedule
4	Individual consultations on the individual practical assignment	According to the consultation schedule
5	Observation of the task-completion process and provision of recommendations for improvement	Throughout the semester
6	Defence of laboratory work with discussion of errors and ways to eliminate them	According to the work schedule

Self-assessment may be used as an element of both summative and formative assessment.

TRANSFER AND RECOGNITION OF LEARNING OUTCOMES: transfer and recognition of learning outcomes for the course «Botany» or its individual elements are carried out in accordance with the Regulations on the Organisation of the Educational Process at Sumy National Agrarian University (https://drive.google.com/file/d/1THXbcZySe0C6UwlnG3Uy_V64uRngnbzk/view) and the Regulations on the Procedure for Recognising Learning Outcomes Acquired through Non-formal and/or Informal Education (<https://drive.google.com/file/d/1cUvzkDYN9cbJEaZKQvU5sOtxyBvB3ZTR/view>) .

6. LEARNING RESOURCES (LITERATURE)

Main sources

1. Yakubenko B. Ye., Aleinikov I. M., Shabarova S. I., Mashkovska S. P. Botanika. Kyiv : Lira-K, 2022. 436 s. URL: <https://newlibrary.snau.edu.ua/cgi-bin/koha/opac-detail.pl?biblionumber=122226>
2. Koval T. V., Ovcharuk O. V. Botanika. 2020. 477 s. URL: <https://newlibrary.snau.edu.ua/cgi-bin/koha/opac-detail.pl?biblionumber=132025>
3. Mashevska A. S., Yermichuk T. M., Ivantsiv O. Ya. Botanika. 2020. 181 s. URL: <https://newlibrary.snau.edu.ua/cgi-bin/koha/opac-detail.pl?biblionumber=132665>
4. Mezhenka L. O., Mezhenka V. M. Systematyka pokrytonasennykh derevnykh roslin Ukrainy : navchalnyi posibnyk. Kyiv : Lira-K, 2021. 822 s.
5. Mezhenka V. M., Mezhenka L. O. Suchasna systematyka kvitkovykh roslin. Ch. 1 : navchalnyi posibnyk. Kyiv : Lira-K, 2020.
6. Mezhenka V. M., Mezhenka L. O. Suchasna systematyka kvitkovykh roslin. Ch. 2 : navchalnyi posibnyk. Kyiv : Lira-K, 2020. 557 s.
7. Mezhenka V. M., Mezhenka L. O. Suchasna systematyka kvitkovykh roslin. Ch. 3 : navchalnyi posibnyk. Kyiv : Lira-K, 2020. 811 s.

Other sources

1. Barna M. M. Botanika. Terminy. Poniattia. Personalii: navchalnyi posibnyk dlia stud.vyshch. navch. zakl. 2-he vyd. dopov. i zmin. Ternopil: Ternohraf, 2013. 360 s.
2. Hryhora I.M. i in. Botanika. Pidruchnyk dlia ahrarynykh universytetiv. Kyiv: "Fitosotsiotsentr", 2004. 476 s.
3. Hryhora I.M. i insh. Praktikum z botaniky. Navchalnyi posibnyk. Kyiv: Vydavnychiy tsentr NAU, 2003. 291s.
4. Kostikov I. Yu., Dzhahan V. V., Demchenko E. M., Boiko O. A., Boiko V. R., Romanenko P. O. Botanika. Vodorosti ta hryby : navchalnyi posibnyk. Kyiv : Aristei, 2006. 473 s.
5. Mamchuk Z. I., Odintsova A. V.. Litnia navchalna praktyka z botaniky. Navch. - metod. posib. dlia stud. biol. f-tu. M-vo osvity i nauky Ukrainy, Lvivskiy nats. un-t im. Ivana Franka . L.: Vyd. tsentr LNU im. Ivana Franka, 2007. 176 s. :
6. Musienko M.M. Ekologhiia roslin : navch. posibnyk dlia studentiv vyshch. navch. Zakladiv. Kyiv: Lybid, 2006. 432 s.
7. Nevedomska Ye.O. Marunenko I.M., Omeri I.D. Botanika. Navchalnyi posibnyk. Kyiv: TsUL, 2013. 218 s.
8. Nechytailo V.A., Lypa O.L. Systematyka vyshchykh roslin. Kyiv: Vyshchashk., 2000. 426 s.
9. Paniuta O.O. Olkhovych O.P., Kapustian A.V. Anatomiiia roslin: terminy. Kyiv: TOV «Aveha», 2012. 110 s.
10. Perfilieva L. P., Perfilieva M. V. Botanika. Laboratorni roboty: navch. posibnyk. K., TsUL, 2008. 208 s.
11. Sokur L.M. Botanika. Kurs lektsii. Kyiv: Fitosotsiotsentr, 2001. 288 s.
12. Skliar V.H. Ekologichna fiziologhiia roslin. – Sumy: Universytetska knyha, 2015. 272 s.
13. Sukhomlin M. M., Dzhahan V. V. Hryby Ukrainy. Atlas-dovidnyk. Kyiv : Fitosotsiotsentr, 2000. 430 s.
14. Yakubenko B.Ye., Yakubenko I.M., Aleinikov S.I., Shabarova S.P., Mashkovska B.Ye. Botanika. Pidruchnyk. Kyiv: Vydavnytstvo Lira-K, 2018. 436 s.
15. Bondarieva L. M., Skliar V. H., Bondariev M. A. Dynamika vehetatyvnoi ta heneratyvnoi sfery populatsii zviroboiu zvychainoho. Visnyk Sumskoho natsionalnoho ahrarynoho universytetu. Serii: Ahronomiia i biologhiia. Vypusk 2 (52), 2023, s. 3-8. DOI: <https://doi.org/10.32782/agrobio.2023.2.1>

16. Konspekt flory sudynnykh roslyn m. Kirovohrada / H. F. Arkushyna, O. M. Popova ; M-vo osvity i nauky Ukrainy, Kirovohrad. derzh. ped. un-t im. V. K. Vynnychenka. Kirovohrad : Polimed-Servis, 2010. 232 s.
17. Berg L. R. Introductory Botany: Plants, People, and the Environment. 2nd ed. Thompson Brooks/Cole, 2008.
18. Simpson M. G. Plant Systematics. 3rd ed. Academic Press, 2019.
18. Bondarieva, L., Skliar, V., Bondariev, M., Roshchupkin, A., Butenko, S., Antal, T. ... Prokofiev, D. (2024). Ecological Monitoring of Medicinal Plants Populations under Different Ecological-Cenotic and Anthropogenic Environmental Conditions. Ecological Engineering & Environmental Technology, 25(8), 285-296.
19. Singh G. Plant Systematics: An Integrated Approach. 3rd ed. Enfield, N.H.: Science Publishers, 2010.
20. Singh G. Plant Systematics: An Integrated Approach. 3rd ed. Enfield, N.H.: Science Publishers, 2010.
21. Tertysnyi A. P. Botany. Part 1: Tutorial. Kyiv: Lira-K, 2020. 250 p.
22. Zhatova, H., Trotsenko V., Trotsenko, N., Radchenko M., Butenko, A., Bondarieva, L., Zubtsova, I. (2025). Quinoa Microbiota and Its Importance for Sustainable Crop Production. Modern Phytomorphology, 19, 178-182. <https://doi.org/10.5281/zenodo.200121>
23. Zlobin Y., Kovalenko I., Klymenko H., Kyrylchuk K., Bondarieva L., Tykhonova O., Zubtsova I. (2021). Vitality Analysis Algorithm in the Study of Plant Individuals and Populations. The Open Agriculture Journal, 15, 119-129.

Information resources

1. Angiosperm Phylogeny Website <http://www.mobot.org/MOBOT/research/APweb/>
2. Eurasian Dry Grassland Group <https://edgg.org/>
3. European Vegetation Archive (EVA) <http://euroveg.org/eva-database>
4. European Vegetation Survey <http://euroveg.org/>
5. Fundamental electronic library <http://ashipunov.info/shipunov/school/sch-ru.htm>
6. Global Biodiversity Information Facility (GBIF) <https://www.gbif.org>
7. Global Index of Vegetation-Plot Databases (GIVD) <http://www.givd.info/>
8. National Biodiversity Information Network <http://ukrbin.com>
9. National Vegetation Classification (NVC) <https://jncc.gov.uk/our-work/nvc/>
10. Open data about biodiversity <https://www.inaturalist.org>
11. Society for Ecological Restoration (SER) <https://www.ser.org/default.aspx>
12. The Gymnosperm Database <https://www.conifers.org/index.php>
13. The International Association for Vegetation Science (IAVS) <http://iavs.org/>
14. World Flora Online (WFO) <http://www.worldfloraonline.org/>
15. Ukrainian geobotanical site <http://geobot.org.ua/>
16. Virtual laboratories, herbaria and collections, etc.
[JSTOR Global Plants:](#)
[Virtual Herbarium - Botanical Survey of India](#)
[C. V. Starr Virtual Herbarium](#)
[Ecosystem Exploration - The Virtual Field](#)
[Nature Lab Virtual Field Trips](#)
[Labster](#)

Methodological support

1. Bondarieva L.M. Botanika. Botanika z osnovamy fiziologhii roslyn. Konspekt lektsii dlia studentiv 1 kursu spetsialnosti: 201 Ahronomiia, 202 Zakhyst i karantyn roslyn, 205 Lisove hospodarstvo, 206 Sadovo-parkove hospodarstvo dennoi ta zaochnoi formy navchannia osvitnoho stupenia «Bakalavr». Sumy: Sumskyi natsionalnyi ahrarnyi universytet, 2024. 82 s.
2. Bondarieva L.M. Botanika. Botanika z osnovamy fiziologhii roslyn. Metodychni vkazivky dlia provedennia laboratorno-praktychnykh zaniat dlia studentiv 1 kursu spetsialnosti: 201 Ahronomiia, 202 Zakhyst i karantyn roslyn, 205 Lisove hospodarstvo, 206 Sadovo-parkove hospodarstvo dennoi ta zaochnoi formy navchannia osvitnoho stupenia «Bakalavr». Sumy: Sumskyi natsionalnyi ahrarnyi universytet, 2024. 111 s.
3. Bondarieva L.M. Botanika. Botanika z osnovamy fiziologhii roslyn. Metodychni vkazivky dlia orhanizatsii samostiinoi roboty studentiv 1 kursu spetsialnosti: 201 Ahronomiia, 202 Zakhyst i karantyn roslyn, 205 Lisove hospodarstvo, 206 Sadovo-parkove hospodarstvodennoi ta zaochnoi formy navchannia osvitnoho stupenia «Bakalavr». Sumy: Sumskyi natsionalnyi ahrarnyi universytet, 2024. – 31 s.
4. Skliar V.H. Ekologhichna fiziologhiia roslyn. Navchalnyi posibnyk dlia studentiv fakultetu ahrotekhnologhii ta pryrodokorystuvannia 2 kursu spetsialnosti 101 «Ekologhiia». – Sumy: SNAU, 2023. 228 s.
5. Skliar V.H., Kyrylchuk K.S. Ekologhichna fiziologhiia roslyn. Metodychni rekomendatsii dlia provedennia laboratornykh robot u studentiv fakultetu ahrotekhnologhii ta pryrodokorystuvannia spetsialnosti 101 «Ekologhiia» dennoi ta zaochnoi form navchannia. Sumy: SNAU, 2024. 43 s.

6. Skliar V.H. Ekologichna fiziologhiia roslyn. Metodichni vkazivky shchodo vykonання samostiinoi roboty dlia studentiv fakultetu ahrotekhnolohii ta pryrodokorystuvannia spetsialnosti 101 «Ekologhiia» dennoi ta zaochnoi form navchannia. Sumy: SNAU, 2024. 83 s.

Software

Moodle learning platform, Excel, Microsoft Word text editor, Microsoft Office PowerPoint, Classroom Management Tools & Resources - Google.