

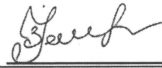
Ministry of Education and Science of Ukraine
Sumy National Agrarian University
Faculty of Agrotechnologies and Environmental Management
Department of Ecology and Botany

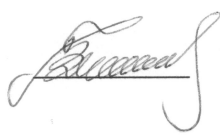
SYLLABUS OF THE EDUCATIONAL COMPONENT

**EC 9. Ecology
(Mandatory)**

Specialty	H1 Agronomy
Educational Programme:	Agronomy
Level of Higher Education:	First (Bachelor's) Level

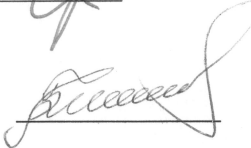
Developed by:  Hanna O. Klymenko, PhD in Biology, Associate Professor,
Department of Ecology and Botany

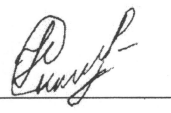
Reviewed, approved and adopted at the meeting of the Department of Ecology and Botany	Minutes No. 12 dated May 8, 2026
	Head of the Department <u></u> Inna ZUBTSOVA

Approved by:
Guarantor of the Educational Programme  Viktor ONYCHKO

Dean of the Faculty implementing the Educational Programme  Serhii HORBAS

Review of the syllabus attached and provided by:

 V. Onychko

 Yurii SKLIAR

Methodologist of the Department for Quality Assurance,

Licensing and Accreditation  (N. Baranik)

Registered in the electronic database: Date: 23.06 2026

Information on Revisions to the Syllabus:

Academic Year in which Amendments are Introduced	Appendix Number to the Syllabus Containing the Description of Amendments	Syllabus Containing the Description of Amendments Amendments Reviewed and Approved		
		Date and Minutes Number of the Department Meeting	Head of the Department	Guarantor of the Educational Programme

1. GENERAL INFORMATION ABOUT THE EDUCATIONAL COMPONENT

1	Name of the Educational Component	Ecology			
2	Faculty / Department	Faculty of Agrotechnologies and Environmental Management / Department of Ecology and Botany			
3	Status of the Educational Component	Mandatory			
4	Educational Programme / Specialty (Programmes) of which the Educational Component is a part (for mandatory components)	Educational Programme – Agronomy Specialty – H1 Agronomy			
5	Semester and Duration of Study	The course is taught during the first year of study, Semester 2 (full-time mode of study).			
6	ECTS Credits	5.0 ECTS credits (150 hours)			
7	Total Workload and Distribution of Hours (full-time / part-time)	Contact Hours / Independent Study			Independent Study (full-time / part-time)
		Lectures (full-time / part-time)	Practical / Seminar Classes (full-time / part-time)	Laboratory Classes (full-time / part-time)	
		30	30	-	90
8	Language of Instruction	Ukrainian, English			
9	Lecturer / Course Coordinator	Hanna Klymenko			
10	Contact Information	PhD in Biology, Associate Professor, Department of Ecology and Botany, Office 7. E-mail: annaklimenko2014@gmail.com			
11	General Description of the Educational Component	The course “Ecology” is an important component in the training of specialists in Agronomy. It is aimed at achieving the following objectives: introducing students to the fundamental and conceptual foundations of classical and contemporary ecology; studying the main legislative acts of Ukraine in the field of ecology, environmental management and environmental protection; developing a comprehensive understanding of the interactions and interrelationships among all components of nature, as well as the role and impact of humans on the environment.			
12	Aim of the Educational Component	The aim of the course “Ecology” is to provide students with theoretical knowledge of ecology; to develop an understanding of the relationships between living organisms and their environment; to study the most important processes occurring in the biosphere and methods for assessing the impact of human society on these processes; to understand the role of anthropogenic factors and their consequences for the environment; and to learn the main approaches to protecting the environment from anthropogenic degradation.			
13	Prerequisites and Links with Other Educational Components of the Programme	Prerequisite: Botany. Subsequent educational components: Agrochemistry, Herbology, Agrometeorology.			
14	Academic Integrity Policy	During the study of the course “Ecology”, students must comply with the principles of academic integrity established by the Regulations on the Organization of the Educational Process at Sumy National Agrarian University and the Code of Academic Ethics of Sumy National Agrarian University.			

		When completing practical assignments, individual tasks, independent work, module tests, pass/fail assessments, and examinations, students are required to adhere to academic integrity standards. Any forms of academic misconduct, including plagiarism, unauthorized use of others' ideas, data falsification, fabrication, or facilitation of such actions, are strictly prohibited and will not be tolerated. Detection of academic misconduct in a student's work constitutes grounds for rejection of the work regardless of the extent of the violation.
15	Keywords	Biodiversity, agroecosystems, population ecology, plant protection and environmental safety, organic farming, nature reserve fund, ecosystem conservation, natural resources.
16	Moodle Course Link	https://cdn.snau.edu.ua/moodle/course/view.php?id=1587

2. LEARNING OUTCOMES OF THE EDUCATIONAL COMPONENT AND THEIR ALIGNMENT WITH PROGRAMME LEARNING OUTCOMES

Learning Outcomes of the Educational Component (LOs) <i>Upon successful completion of the educational component, the student is expected to be able to:</i>	Programme Learning Outcomes (PLOs) to which the Educational Component contributes (indicate the number according to the Educational Programme)				Assessment of Learning Outcomes
	PLO 01. Analyse the main stages and patterns of the historical development of civic consciousness and citizenship formation.	PLO 02. Demonstrate the ability for self-organization and lifelong learning.	PLO 07. Demonstrate knowledge and understanding of the principles of plant physiological processes to the extent necessary for mastering fundamental and professional disciplines.	PLO 09. Apply operational-level methods of observation, description, identification, classification, cultivation of biological objects, and maintenance of agroecosystem stability while preserving natural biodiversity.	
LO 1. Explain the fundamental ecological principles governing the functioning of organisms, populations, biotic communities, ecosystems, and the biosphere, and evaluate their significance for agricultural production.			+		Based on the results of continuous assessment of knowledge (prepared and delivered presentations and reports, individual interviews regarding completed tasks, including the defence of laboratory work and independent study assignments, self-assessment and peer assessment activities, and testing), as well as the results of module assessments and the final examination.
LO 2. Analyse the impact of natural and anthropogenic factors on the condition of	+		+	+	Based on the results of continuous assessment of

agroecosystems, assess environmental risks, and justify measures for their mitigation in accordance with the principles of sustainable development.					knowledge (prepared and delivered presentations and reports, individual interviews regarding completed tasks, including the defence of laboratory work and independent study assignments, self-assessment and peer assessment activities, and testing), as well as the results of module assessments and the final examination.
LO 3. Apply methods of ecological observation, monitoring, and environmental assessment to characterize agroecosystem components and support biodiversity conservation.				+	Based on the results of continuous assessment of knowledge (prepared and delivered presentations and reports, individual interviews regarding completed tasks, including the defence of laboratory work and independent study assignments, self-assessment and peer assessment activities, and testing), as well as the results of module assessments and the final examination.
LO 4. Apply ecological knowledge to solve professional agronomy-related tasks aimed at maintaining the ecological sustainability of		+		+	Based on the results of continuous assessment of knowledge (prepared and delivered presentations and

agroecosystems and ensuring the rational use of natural resources.					reports, individual interviews regarding completed tasks, including the defence of laboratory work and independent study assignments, self-assessment and peer assessment activities, and testing), as well as the results of module assessments and the final examination.
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3. CONTENT OF THE EDUCATIONAL COMPONENT (COURSE SYLLABUS)

Topic. List of Issues to Be Covered Within the Topic	Distribution Within the Total Workload (Full-time / Part-time)			Independent Study	Recommended Literature
	Classroom Activities				
	Lectures	Practical / Seminar Classes	Laboratory Classes		
Module 1. Theoretical Foundations of Ecology and Functioning of Natural Systems					
Topic 1. Ecology as a Science and Its Importance for Agricultural Production Subject matter, object, and objectives of ecology. Methods of ecological research. The importance of ecology for agricultural activities.	2	2		10	1, 2, 3, 4, 5, 6, 13, 14, 15, 16
Topic 2. History of Ecology and Contemporary Ecological Concepts Major stages in the development of ecology. Prominent ecologists and their contributions. Ecological laws and principles. The concept of sustainable development.	2	2		10	1, 2, 3, 4, 5, 6, 13, 15, 16
Topic 3. Organisms and Their Environment Environmental factors and their classification. Patterns of environmental factor effects. Adaptations of organisms to environmental conditions. Ecological niche.	2	2		10	1, 2, 3, 4, 5, 6, 13, 15, 16, 18
Topic 4. Population Ecology Population as a form of species existence. Population structure. Population dynamics. Practical significance of population studies.	2	2		10	1, 2, 3, 4, 5, 6, 13, 15, 17, 18
Topic 5. Biotic Communities and Ecological Interactions Biotic community and its structure. Interactions among organisms. Ecological succession. The climax concept.	2	2		5	1, 2, 3, 4, 5, 6, 8, 9, 10, 15

Topic 6. Ecosystems and Their Functioning The concept of an ecosystem. Ecosystem structure. Energy flow and nutrient cycling. Ecosystem productivity. Ecosystem stability and self-regulation. Natural and anthropogenic ecosystems.	4	4		5	1, 2, 3, 4, 5, 6, 10, 13, 15, 16
Topic 7. Biosphere and Global Environmental Problems V. I. Vernadsky's doctrine of the biosphere. Structure of the biosphere. Global environmental problems. Climate change and its consequences.	2	2		5	1, 2, 3, 4, 5, 6, 10, 15, 16
Module 2. Applied Ecology, Agroecology and Environmental Conservation					
Topic 8. Agroecosystems and the Ecologization of Agricultural Production Agroecosystem as an anthropogenic system. Biodiversity of agricultural landscapes. Environmental consequences of intensive agriculture. Agroecological principles of sustainable production. Organic farming. Ecosystem services of agricultural landscapes.	4	4		5	1, 2, 3, 4, 5, 6, 13, 14, 15, 16
Topic 9. Urban Ecology and Anthropogenic Landscapes Urbanization as an environmental factor. Urban ecosystems. Urban green infrastructure and green spaces. Urbanization of agricultural landscapes.	2	2		5	1, 2, 3, 4, 5, 6, 10, 15, 17, 18
Topic 10. Applied Ecology and Environmental Safety Sources of environmental pollution. Atmospheric pollution. Soil pollution. Water pollution. Environmental risks and their assessment.	2	2		5	1, 2, 3, 4, 5, 6, 7, 13, 14, 15, 16
Topic 11. Environmental Consequences of Military Actions Impacts of war on the environment. Soil degradation. Wildfires and landmine contamination. Impacts on biodiversity. Post-war environmental restoration.	2	2		5	1, 2, 3, 4, 5, 6, 8, 9, 10, 12, 19
Topic 12. Environmental Monitoring and Geoinformation Technologies Environmental monitoring. Bioindication and biomonitoring. Remote sensing of the Earth. Geographic Information Systems (GIS) in ecology.	2	2		5	1, 2, 3, 4, 5, 6, 10, 17, 18, 20
Topic 13. Biodiversity Conservation and Nature Protection Activities The Nature Reserve Fund of Ukraine. The Red Data Book of Ukraine. The Green Book of Ukraine. The Emerald Network. Natura 2000 Network. The habitat-based approach to nature conservation.	2	2		10	1, 2, 3, 4, 5, 6, 8, 9, 10, 11, 12, 17, 21, 22
Total	30	30		90	

4. TEACHING AND LEARNING METHODS

Learning Outcomes (LOs)	Teaching Methods (activities conducted by the lecturer during classroom sessions and consultations)	Number of Hours	Learning Methods (types of learning activities performed independently by students)	Number of Hours
LO 1. Explain the fundamental ecological principles governing the functioning of organisms, populations, biotic communities, ecosystems, and the biosphere, and assess their significance for agricultural production.	Lectures supported by multimedia presentations; practical and laboratory classes; guided discussions; consultations; feedback on completed assignments.	15	- Completion of practical tasks; preparation of presentations, reports, essays and publications; independent study of recommended literature; oral presentation and defence of completed assignments; participation in discussions and problem-solving activities.	20
LO 2. Analyse the impact of natural and anthropogenic factors on agroecosystems, evaluate environmental risks, and justify measures for their mitigation in accordance with the principles of sustainable development.	Lectures supported by multimedia presentations; practical and laboratory classes; guided discussions; consultations; feedback on completed assignments.	15	- Completion of practical tasks; preparation of presentations, reports, essays and publications; independent study of recommended literature; oral presentation and defence of completed assignments; participation in discussions and problem-solving activities.	20
LO 3. Apply methods of ecological observation, environmental monitoring, and environmental assessment to characterize agroecosystem components and support biodiversity conservation.	Lectures supported by multimedia presentations; practical and laboratory classes; guided discussions; consultations; feedback on completed assignments.	15	- Completion of practical tasks; preparation of presentations, reports, essays and publications; independent study of recommended literature; oral presentation and defence of completed assignments; participation in discussions and	25

			problem-solving activities.	
LO 4. Use ecological knowledge to solve professional agronomic tasks aimed at maintaining the ecological stability of agroecosystems and ensuring the sustainable use of natural resources.	Lectures supported by multimedia presentations; practical and laboratory classes; guided discussions; consultations; feedback on completed assignments.	15	- Completion of practical tasks; preparation of presentations, reports, essays and publications; independent study of recommended literature; oral presentation and defence of completed assignments; participation in discussions and problem-solving activities.	25
Total Hours		60		90

5. ASSESSMENT OF THE EDUCATIONAL COMPONENT

5.1. Summative Assessment

5.1.1. Assessment Methods for Evaluating Expected Learning Outcomes

№	Summative Assessment Methods	Points / Weight in the Final Grade	Assessment Date
1	Multiple-choice test and individual assignment (Module 1. Theoretical Foundations of Ecology and Functioning of Natural Systems. Topics 1–7)	50 points / 50%	Semester 2, Week 6
2	Module assessment: test, individual assignment, or written examination (at the lecturer's discretion)		
3	Multiple-choice test and individual assignment (Module 2. Applied Ecology, Agroecology and Environmental Protection. Topics 8–13)	50 points / 50%	Semester 2, Week 14
4	Module assessment: test, individual assignment, or written examination (at the lecturer's discretion)		

5.1.2. Assessment Criteria

Component	Unsatisfactory	Satisfactory	Good	Excellent
	<12 points	12-19 points	20-28 points	29-35 points

Multiple-choice test and individual assignment (Module 1. Theoretical Foundations of Ecology and Functioning of Natural Systems. Topics 1–7)	The assignment requirements have not been met.	Most of the assignment requirements have been met; however, some issues have not been fully addressed and the analysis of the studied material is insufficient.	All assignment requirements have been met.	All assignment requirements have been met; the obtained results have been clearly interpreted; proposals for improvement and enhancement of specific issues have been provided; an independent opinion and personal perspective on the problem have been formulated; the ability to critically evaluate different sources of information has been demonstrated; thoughtful conclusions have been drawn regarding the application of acquired knowledge in professional activities.
Module assessment (test, individual assignment, or written examination at the lecturer's discretion)	<9 points	9-11 points	11-13 points	13-15 points
	The requirements of the assigned tasks have not been met.	Most requirements have been met; however, some issues have not been fully addressed and the student demonstrates only partial command of the material.	All requirements of the assigned tasks have been met; a good command of the subject matter has been demonstrated.	All requirements of the assigned tasks have been met; a high level of competence in the assigned topic has been demonstrated; the ability to critically evaluate different sources of information, analytical thinking, and thoughtful conclusions regarding the application of acquired knowledge in professional activities have been demonstrated.
Module 2. Applied Ecology, Agroecology and Environmental Protection. Topics 8–13)	<12 points	12-19 points	20-28 points	29-35 points
	The assignment requirements have not been met.	Most of the assignment requirements have been met; however, some issues have not been fully addressed and the analysis of the studied material is insufficient.	All assignment requirements have been met.	All assignment requirements have been met; the obtained results have been clearly interpreted; proposals for improvement and enhancement of specific issues have been provided; an independent opinion and personal perspective on the problem have been formulated; the ability to critically evaluate different sources of information has been demonstrated; thoughtful conclusions have been drawn regarding the application of acquired knowledge in professional activities.
	<9 points	9-11 points	11-13 points	13-15 points

Module assessment (test, individual assignment, or written examination at the lecturer's discretion)	The requirements of the assigned tasks have not been met.	Most requirements have been met; however, some issues have not been fully addressed and the student demonstrates only partial command of the material.	All requirements of the assigned tasks have been met; a good command of the subject matter has been demonstrated.	All requirements of the assigned tasks have been met; a high level of competence in the assigned topic has been demonstrated; the ability to critically evaluate different sources of information, analytical thinking, and thoughtful conclusions regarding the application of acquired knowledge in professional activities have been demonstrated.
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5.2. Formative Assessment:

No.	Formative Assessment Activities	Assessment Period
1	Ongoing oral and written assessment during lectures and practical classes	Throughout the semester
2	Preparation of short analytical essays	Throughout the semester
3	Online tests and assignments in the Moodle learning management system	According to the academic schedule
4	Feedback from the lecturer during practical classes and completion of practical assignments	Throughout the semester
5	Participation in discussions and debates on socio-environmental issues	Упродовж семестру

6. LEARNING RESOURCES (LITERATURE)

Methodological Support

- 1/ Klymenko, H.O. (2026). Ecology. Guidelines for Practical Classes for Bachelor's Degree Students of Specialty H1 Agronomy. Sumy: Sumy National Agrarian University. 55 p. (Approved at the meeting of the Department of Ecology and Botany, Minutes No. 12, May 8, 2026).
- 2/ Klymenko, H.O. (2026). Ecology. Lecture Notes for Bachelor's Degree Students of Specialty H1 Agronomy. Sumy: Sumy National Agrarian University. 48 p. (Approved at the meeting of the Department of Ecology and Botany, Minutes No. 12, May 8, 2026).
- 3/ Klymenko, H.O. (2026). Ecology. Guidelines for Independent Study for Bachelor's Degree Students of Specialty H1 Agronomy. Sumy: Sumy National Agrarian University. 62 p. (Approved at the meeting of the Department of Ecology and Botany, Minutes No. 12, May 8, 2026).

Core References

- 4/ Zabaluiev, V.O., Balaiev, A.D., Tonkha, O.L., Pikovska, O.V. (2023). Gruntovi dehradatsii i tekhnolohii vidtvorennia rodiuchosti gruntiv: navchalnyi posibnyk. Kyiv: Vydavnychiy tsentr NUBiP Ukrainy. 240 p.
- 5/ Yavorskyi, B.I., Karabiniuk, M.M. (2023). Landshaftoznavstvo. Praktychnyi kurs: navchalno-metodychnyi posibnyk. Uzhhorod: Hoverla.
- 6/ Yurchenko, A.A., Myronova, I.H. (2022). Gruntoznavstvo: navchalnyi posibnyk. Dnipro: NTU «Dniprovska Politehnika». 225 p.

Additional References

- 7/ Mykyta, Kh.I., Rohach, I.M. (2022). Hihiiena ta ekolohiia: navchalnyi posibnyk. Uzhhorod: DVNZ «Uzhhorodskiy Natsionalnyi Universytet».
- 8/ Didukh, Ya.P., Kuzemko, A.A., Ustymenko, P.M., Popovych, S.Yu., Sheliakh-Sosonko, Yu.R. (2017). Oselyshchna kontseptsii zberezhennia bioriznomanittia: bazovi dokumenty Yevropeiskoho Soiuzu. Kyiv: FOP Klymenko Yu.Ya. 278 p.
- 9/ Didukh, Ya.P., Aloskina, U.M., Kuzemko, A.A., Chusova, O.O., Fitsailo, T.V. (2018). Oselyshcha Ukrainy: dovidnyk Bernskoi konventsii. Kyiv: TOV «Makros». 124 p.
- 10/ Dubyna, D.V., Dziuba, T.P., Yemelianova, S.M. et al. (2019). Roslynnist Ukrainy. Kyiv: Fitosotsiotsentr. 452 p.
- 11/ Chervona knyha Ukrainy. Roslynniyi svit. (2009). Ed. Ya.P. Didukh. Kyiv: Hlobalkonsaltnykh. 900 p.
- 12/ Zakon Ukrainy «Pro pryrodno-zapovidnyi fond Ukrainy» vid 16.06.1992 No. 2456-XII (zi zminamy).
- 13/ Zlobin, Yu.A., Kochubei, A.A. (2003). Zahalna ekolohiia. Sumy: Universytetska knyha.
- 14/ Khudoba, V., Chykailo, Yu. (2016). Ekolohiia: navchalno-metodychnyi posibnyk. Lviv: LDUFK. 92 p.
- 15/ Solomenko, L.I., Boholiubov, V.M., Volokh, A.M. (2018). Zahalna ekolohiia. Kyiv: NUBiP Ukrainy. 350 p.
- 16/ Pakhomov, O.Ye. (Ed.). (2014). Ekolohiia: pidruchnyk dlia studentiv vyshcheykh navchalnykh zakladiv. Kharkiv: Folio. 666 p.
- 17/ Klymenko, H.O., Sherstiuk, M.Yu. (2019). Bioriznomanittia raryetnoi skladovoi pryrodnoho zapovidnyka «Mykhailivska tsilyna». In: Naukovi osnovy zberezhennia biotychnoi riznomanitnosti: Materialy III (XIV) Mizhnarodnoi naukovoï konferentsii molodykh uchenykh (Lviv, 15–16 zhovtnia 2019 roku). Lviv: Prostir-M. Pp. 50–51.
- 18/ Kovalenko, I.M., Klymenko, H.O., Yaroshchuk, R.A., Fedorchuk, M.I., Lykholat, O.A. (2018). Optimization of Ginkgo biloba cultivation technology in open soil conditions. Regulatory Mechanisms in Biosystems, 9(4), 58–62. DOI: 10.15421/021880.
- 19/ Didukh, Ya.P., Maruniak, Ye.O., Lisovskyi, S.A., Kuzemko, A.A., Chekhnii, V.M. (2024). Metodolohichni aspekty klasyfikatsii vplyviv na dovykillia, sprychynenykh rosiiskoïu ahresiiu v Ukraini. Ukrainskyi heohrafichnyi zhurnal, 2, 3–12. DOI: 10.15407/ugz2024.02.003.
- 20/ Bulyhin, S.Yu., Prykhodko, I.I., Savytskyi, M.V. (2023). Heoinformatsiini systemy ta dystantsiine zonduvannia Zemli: navchalnyi posibnyk. Kyiv: KPI imeni Ihoria Sikorskoho.
- 21/ Ministerstvo zakhystu dovykillia ta pryrodnykh resursiv Ukrainy. (2024). Natsionalna stratehiia zberezhennia bioriznomanittia Ukrainy do 2030 roku ta Plan dii shchodo yii realizatsii. Kyiv.
- 22/ Didukh, Ya.P., Kuzemko, A.A. (Eds.). (2023). Smaragdova merezha Ukrainy: naukovi zasady

formuvannia ta perspektyvy rozvytku. Kyiv.

English-Language References

- Harris E.P. (2023). Introduction to Environmental Sciences and Sustainability. University of West Florida Pressbooks. https://pressbooks.uwf.edu/envrioscience?utm_source=chatgpt.com
- Popolizio T. (2024). Understanding Organisms: An Evolutionary, Ecological and Comparative Approach. ROTEL Open Textbook. https://open.umn.edu/opentextbooks/textbooks/1729?utm_source=chatgpt.com
- Rakoid O.O., Klepko A.V., Bondar V.I. (2023). Social Ecology. Kyiv: NUBiP of Ukraine. 209 p. https://dglb.nubip.edu.ua/items/a155e9ac-cdee-4b4d-8153-d37548a6d328?utm_source=chatgpt.com
- Leal Filho W., Eustachio J.H.P.P., Fedoruk M., Lisovska T. (2024). War in Ukraine: an overview of environmental impacts and consequences for human health. Frontiers in Sustainable Resource Management. Vol. 3. DOI: 10.3389/fsrma.2024.1423444.
- de Lange N. (2023). Geoinformatics in Theory and Practice: An Integrated Approach to Geoinformation Systems, Remote Sensing and Digital Image Processing. Springer. Посилання для скачування: <https://link.springer.com/book/10.1007/978-3-662-65758-4>

Information Resources

- Ministry of Environmental Protection and Natural Resources of Ukraine: <https://mepr.gov.ua>
 - Open Data Portal of Ukraine: <https://data.gov.ua>
 - National Environmental Platform "EcoSystem": <https://eco.gov.ua>
 - Copernicus Browser (Sentinel Satellite Data): <https://browser.dataspace.copernicus.eu>
 - European Environment Agency (EEA): <https://www.eea.europa.eu>
 - IPBES – Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services: <https://www.ipbes.net>
 - UNEP – United Nations Environment Programme: <https://www.unep.org>
 - Red Data Book of Ukraine (electronic version): <https://redbook-ua.org>
 - National Atlas of Ukraine: <https://wdc.org.ua/atlas>
 - QGIS Documentation: <https://docs.qgis.org>
 - Law of Ukraine "On the Plant Kingdom": <https://zakon.rada.gov.ua/laws/show/591-14>
 - Law of Ukraine "On the Red Data Book of Ukraine": <https://zakon.rada.gov.ua/laws/show/3055-14>
 - Law of Ukraine "On the Nature Reserve Fund of Ukraine": <https://zakon.rada.gov.ua/laws/show/2456-12>
 - Law of Ukraine "On the Ecological Network of Ukraine": <https://zakon.rada.gov.ua/laws/show/1864-15>
 - Decree of the President of Ukraine No. 722/2019 "On the Sustainable Development Goals of Ukraine until 2030": <https://zakon.rada.gov.ua/laws/show/722/2019>
 - Regulations on Academic Integrity and Academic Ethics of Sumy National Agrarian University.
- Virtual laboratories, digital herbarium collections, biodiversity databases, and online educational platforms. [JSTOR Global Plants](#):
- [Virtual Herbarium - Botanical Survey of India](#)
 - [C. V. Starr Virtual Herbarium](#)
 - [Ecosystem Exploration - The Virtual Field](#)
 - [Nature Lab Virtual Field Trips](#)
 - [Платформа Labster](#)