

NATIONAL PIROGOV MEMORIAL MEDICAL UNIVERSITY, VINNYTSIA

COURSE SYLLABUS



For the training of master's students

CULTIVATION OF MEDICINAL PLANTS

Specialty	I8 Pharmacy; Specialisation I8.01 Pharmacy
Educational Programme	Educational and Professional Programme (EPP) "Pharmacy, Industrial Pharmacy", 2025
Higher Education Level	Second (Master's) level
Academic Year	2026–2027
Status of the Discipline	Elective
Language of Instruction	Ukrainian, English
Total Workload	3.0 ECTS credits / 90 hours
Year of Study / Semester	Year II / Semester IV
Developer(s)	S. D. Kryklyva, Candidate of Biological Sciences, Associate Professor
Instructor(s), Guest Lecturers	S. D. Kryklyva, Candidate of Biological Sciences, Associate Professor V. V. Rodinkova, Doctor of Biological Sciences, Professor
Venue and Contact Details	Department of Pharmacy, 56 Pyrohova Street, Vinnytsia Telephone: 55–39–52; Email: pharmacy@vnmu.edu.ua

1. DESCRIPTION OF THE ACADEMIC DISCIPLINE

ABSTRACT

Cultivation of Medicinal Plants contributes to students' general development and the professional competence of future pharmacists.

The course supplements theoretical knowledge and develops practical skills required to study the ecological and morphological characteristics of medicinal plants, innovative cultivation technologies under protected and open-field conditions, the sustainable use and conservation of Ukraine's wild medicinal plants, and the principles of harvesting and using medicinal plant raw materials. It broadens students' understanding, encourages research, develops environmental awareness and professional identity, and promotes responsibility for conserving plant resources for future generations.

The discipline examines the growth and phenological stages of medicinal plants in relation to their habitats, their classification by morphological and pharmacological characteristics, cultivation techniques for selected species, and cultivation requirements for obtaining high-quality medicinal plant raw materials.

The course is relevant because the pharmaceutical industry's demand for high-quality medicinal plant raw materials is increasing. This creates a need to cultivate plants widely used in medicine and to master cultivation technologies that provide optimum conditions resembling the plants' natural habitats.

Prerequisites for the Educational Component. The course builds on Pharmaceutical Botany, Biology with the Fundamentals of Genetics, Inorganic and Organic Chemistry, Information Technology in Pharmacy, Ukrainian, and Latin.

PURPOSE AND OBJECTIVES

The aim is to develop a comprehensive understanding of plants within cultivation processes as the principal source of medicinal raw materials used to produce therapeutic and preventive products in modern medicine.

Integral Competence

The ability to solve typical and complex specialised tasks and practical problems in professional pharmaceutical activities using the principles, theories, and methods of fundamental, chemical, technological, biomedical, and socioeconomic sciences; integrate knowledge and resolve complex issues; formulate judgements based on incomplete or limited information; and communicate knowledge, conclusions, and their rationale clearly and unambiguously to specialist and non-specialist audiences.

General Competencies

GC 01. Commitment to environmental conservation.

GC 02. The ability to think abstractly and analyse and synthesise information.

GC 03. Knowledge and understanding of the subject area and professional practice.

GC 04. The ability to adapt and act in new situations and demonstrate initiative.

GC 05. The ability to communicate orally and in writing in the state language and to communicate in a foreign language, primarily English, at a level that supports effective professional practice.

GC 06. Skills in using information and communication technologies.

GC 08. The ability to assess and ensure the quality of work performed.

Specific Competencies

SC 01. The ability to collect, interpret, and apply data required for professional practice, research, and the implementation of innovative projects in pharmacy.

SC 02. The ability to integrate knowledge and solve complex pharmaceutical problems in broad or multidisciplinary contexts.

SC 20. The ability to organise and carry out the harvesting of medicinal plant raw materials in accordance with Good Agricultural and Collection Practices (GACP), ensuring the quality of medicinal plant raw materials and medicines derived from them. The ability to anticipate and evaluate approaches to the conservation and protection of wild medicinal plant populations in accordance with applicable legislation.

Post-requisites for the Educational Component. In accordance with the sectoral standard for higher education, the course supplements biological training and provides a foundation for Medicinal Plant Resource Studies, Pharmacognosy, Educational Practice in Pharmaceutical Botany, Educational Practice in Pharmacognosy, Pharmacology, and Homeopathy.

2. LEARNING OUTCOMES

Upon successful completion of the academic discipline, the student will be able to:

PLO 01. Apply specialised knowledge, abilities, and skills from general and professional disciplines in professional practice.

PLO 02. Critically analyse scientific and applied problems in pharmacy.

PLO 06. Communicate professionally in the state language, use oral communication skills in a foreign language, analyse professional texts, and translate foreign-language information sources.

PLO 13. Predict and determine the effects of environmental factors on the quality and consumer characteristics of medicines of natural and synthetic origin and other pharmacy products; organise their storage in accordance with their physicochemical properties and Good Storage Practices (GSP).

PLO 25. Organise and carry out the sustainable harvesting of medicinal plant raw materials. Develop and implement measures for the protection, regeneration, and sustainable use of wild medicinal plant species.

3. FORMS OF ORGANISATION OF THE EDUCATIONAL PROCESS AND THEIR SCOPE

Full-time Study

Type of Learning Activity	Hours
Lectures	14
Practical Classes	16
Independent Study (IS)	60
Total	90

Part-time Study

Type of Learning Activity	Hours
Lectures	4
Practical Classes	8
Independent Study (IS)	78
Total	90

4. THEMATIC PLAN

No.	Module and Topic Titles
Module 1	Cultivation of Medicinal Plants
1	Introduction to Cultivation of Medicinal Plants. An overview of the position of medicinal plants in classifications of the living world and their role and importance in human life. History of medicinal plant cultivation. Origins and distribution of medicinal plant species. Modern Ukrainian farms supplying plant-derived medicinal raw materials to the pharmaceutical industry. Regional adaptation and cultivation zoning of medicinal plants in Ukraine. Course aims, objectives, research methods and objects, and links with pharmaceutical botany, pharmacognosy, and other professional disciplines.

No.	Module and Topic Titles
2	General Methods of Cultivating Medicinal Plants. Propagation methods. Seed propagation and seed preparation. Vegetative propagation by cuttings, root suckers, and division. Tissue culture (in vitro): propagation from individual cells, tissues, or organs under sterile laboratory conditions; applications in conserving rare species and mass propagation of genetically uniform plants.
3	Fundamentals of Soil Science and Soil Cultivation Methods. Elements of cultivation technology in relation to natural factors: primary and pre-sowing soil preparation, fertiliser application, planting, and plant care, including integrated pest and disease management.
4	Fertiliser Use in Medicinal Plant Cultivation. Organic, mineral, and compound fertilisers (NPK), vermicompost, and micronutrient fertilisers. Selection of fertilisers to adapt plant nutrition to species requirements, soil type, and cultivation conditions, ensuring the quality and productivity of raw materials.
5	Pest Control Methods for Medicinal Plants. Agronomic methods: crop rotation to prevent pest accumulation and soil disinfection through treatment or sowing green manure crops. Selection of resistant cultivars. Biological methods using natural enemies (entomophages), bacteria, fungi, and viruses that suppress or destroy pests, including predatory insects, entomopathogenic fungi, <i>Bacillus thuringiensis</i> , and viruses. Mechanical and chemical methods, including insecticides and acaricides to destroy pests or prevent their development. Use of physical factors such as temperature, light, and moisture to destroy or suppress pests.
6	Requirements for Harvesting High-Quality Medicinal Plant Raw Materials. Manual harvesting, specialised harvesting machinery, and selective harvesting. Harvesting at appropriate phenological stages when concentrations of active constituents are highest. Collection in natural habitats. Drying, primary processing, and storage.
7	Innovative Technologies for Cultivating Medicinal Plants. Hydroponics and aeroponics. Vertical structures for multi-level indoor cultivation. Genetic and biotechnological methods for developing new cultivars. Digital technologies, including sensors, drones, and artificial intelligence, for monitoring and automating cultivation.
8	Cultivation of Plants Whose Underground Organs Are Used as Medicinal Raw Materials. Cultivation and breeding of medicinal plants and selection criteria. Plant care according to phenological stages. Preparation of cultivation technology plans. Cultivation of plants used for their roots and rhizomes: marshmallow, valerian, bistort, liquorice, great burnet, field restharrow, ginseng, Dzungarian aconite, European wild ginger, Siberian ginseng, sweet flag, elecampane, and tormentil.
9	Cultivation of Plants Whose Aboveground Organs Are Used as Medicinal Raw Materials. Cultivation of pot marigold, milk thistle, German chamomile, pineapple weed, common thyme, creeping thyme, sage, large-flowered foxglove, purple foxglove, deadly nightshade, black henbane, globe thistle, spring pheasant's eye, jimsonweed, St John's wort, five-lobed motherwort, trifid bur-marigold, woolly-flowered milkvetch, lily of the valley, stinging nettle, oregano, and lanceolate thermopsis.
10	Cultivation in Ukraine of Medicinal Plants Introduced from Other Regions. Plant introduction and acclimatisation. Soil, light, and moisture requirements of introduced medicinal plants. Bringing wild species into cultivation. Cultivation in Ukraine of clove, Japanese pagoda tree, ginger, European olive, lemon, and Chinese magnolia vine.
11	Cultivation of Medicinal Plants under Protected Conditions. Protected cultivation of tree aloe, kalanchoe, hibiscus, golden mustache, and Indian onion. Cultivation of medicinal trees and shrubs: silver birch, black alder, horse chestnut, walnut, pedunculate oak, common buckthorn, small-leaved lime, guelder rose, sea buckthorn, cinnamon rose, and Siberian hawthorn.
12	Cultivation of Medicinal Plants Grown as Fruit and Berry Crops. Cultivation of domesticated apple, common pear, sour cherry, black chokeberry, hawthorn, raspberry, and almond.
13	Cultivation of Medicinal Plants Grown as Agricultural Crops. Cultivation of maize, cultivated oat, common wheat, rice, onion, garlic, flax, buckwheat, common bean, pumpkin, brown mustard, black mustard, and potato. Cultivation of medicinal spice and aromatic plants: caraway, coriander, dill, fennel, sesame, anise, parsnip, parsley, toothpick weed, lemon balm, and peppermint.
14	Cultivation of Selected Gymnosperms, Algae, and Fungi. Cultivation of ginkgo, Scots pine, common juniper, and horsetail ephedra. Cultivation of fungi, unicellular organisms including <i>Spirulina platensis</i> , and kelp (<i>Laminaria</i>) for medicinal purposes.

5. FORMS AND METHODS OF ASSESSMENT OF LEARNING OUTCOMES

Ongoing Assessment during Practical Classes	Methods: oral and/or written questioning and testing, computer-based questioning and testing, and solving situational tasks.
Final Assessment of the Academic Discipline – Pass/Fail Assessment	Conducted during the final practical class and determined on the basis of ongoing academic performance in accordance with the University Regulations on the Organisation of the Educational Process: https://www.vnmu.edu.ua/downloads/other/polog_organiz_ocv_proc(2026).pdf
Assessment Tools for Learning Achievement	Theoretical questions, tests, situational tasks, practical assignments, and demonstration of practical skills.

6. ASSESSMENT CRITERIA

Assessment of students' knowledge is carried out in accordance with the current Regulations on the Organisation of the Educational Process at National Pirogov Memorial Medical University, Vinnytsia.

[https://www.vnmu.edu.ua/downloads/other/polog_organiz_ocv_proc\(2026\).pdf](https://www.vnmu.edu.ua/downloads/other/polog_organiz_ocv_proc(2026).pdf)

Type of Assessment	Assessment Criteria / Scale
Ongoing Assessment	According to the traditional grading scale: 5 – “Excellent”, 4 – “Good”, 3 – “Satisfactory”, 2 – “Unsatisfactory”
Interim Assessments	According to the traditional grading scale
Assessment of Practical Skills	According to the traditional grading scale
Pass/Fail Assessment	According to the 200-point scale (the arithmetic mean of the grades obtained during the semester is converted into points). Passed: 122–200 points. Failed: fewer than 122 points.

GRADING SCALE: NATIONAL AND ECTS

Total Score for All Learning Activities	ECTS Grade	National Grade: Examination, Course Project (Paper), Practical Training	National Grade: Pass
180–200	A	Excellent	Passed
170–179.99	B	Good	Passed
160–169.99	C	Good	Passed
141–159.99	D	Satisfactory	Passed
122–140.99	E	Satisfactory	Passed
0–121.99	FX	Unsatisfactory, with the possibility of retaking	Failed, with the possibility of retaking
0–121.99	F	Unsatisfactory, with mandatory repetition of the discipline	Failed, with mandatory repetition of the discipline

Criteria for Assessing Students' Knowledge

Assessment of Oral/Written Responses during Ongoing Assessment

The grade “Excellent” is awarded when a student demonstrates comprehensive knowledge of the topic, illustrating responses with a variety of relevant examples; provides complete, accurate, and clear answers without prompting or leading questions; presents the material without errors or inaccuracies; confidently solves problems and completes practical tasks of varying levels of complexity; and independently generates innovative ideas.

The grade “Good” is awarded when a student demonstrates good knowledge and understanding of the topic and provides correct, coherent, and well-structured answers, although they may not be fully comprehensive. The student answers additional questions correctly and without significant errors; successfully solves problems and completes practical tasks, experiencing difficulties only with the most complex assignments.

The grade “Satisfactory” is awarded when a student demonstrates knowledge of the overall content of the topic and a satisfactory level of understanding. With the help of guiding questions, the student is able to solve modified (simplified) problems; solves problems and completes practical tasks, although experiencing difficulties even with relatively simple assignments; is unable to formulate a coherent and systematic response independently but provides correct answers to direct questions.

The grade “Unsatisfactory” is awarded when a student’s knowledge and skills do not meet the requirements for the grade “Satisfactory”.

The assessment criteria for all other types of students’ academic work are based on the requirements of the Regulations on the Organisation of the Educational Process at National Pirogov Memorial Medical University, Vinnytsia ([https://www.vnmu.edu.ua/downloads/other/polog_organiz_ocv_proc\(2026\).pdf](https://www.vnmu.edu.ua/downloads/other/polog_organiz_ocv_proc(2026).pdf)) and are specified in the programme of the academic discipline.

Assessment of Students’ Independent Study

Students’ independent study undertaken as part of a topic alongside contact hours is assessed as part of the ongoing assessment of that topic during the relevant practical class.

The maximum number of points a student may receive upon completion of the discipline is 200 points. The minimum passing score is 122 points.

7. METHODOLOGICAL SUPPORT

Teaching and learning materials (lecture notes or extended lecture outlines), thematic plans for lectures, practical classes and independent study, assignments for ongoing assessment, methodological guidelines, and teaching manuals.

8. ACADEMIC DISCIPLINE POLICIES

The completion of learning activities and all academic work within the discipline must comply with the requirements of the Regulations on the Organisation of the Educational Process at National Pirogov Memorial Medical University, Vinnytsia; ([https://www.vnmu.edu.ua/downloads/other/polog_organiz_ocv_proc\(2026\).pdf](https://www.vnmu.edu.ua/downloads/other/polog_organiz_ocv_proc(2026).pdf)), the Regulations on the Organisation of the Educational Process for Higher Education Students Pursuing the Degree of Doctor of Philosophy at National Pirogov Memorial Medical University, Vinnytsia (https://www.vnmu.edu.ua/downloads/other/pologPhD_org.pdf); the Law of Ukraine “On Education” (Article 42); the Law of Ukraine “On Academic Integrity”; and the Code of Academic Integrity of National Pirogov Memorial Medical University, Vinnytsia (https://www.vnmu.edu.ua/downloads/other/kodex_akad_dobr_edit%202026.pdf)

Students are entitled to high-quality educational services and a safe learning environment under martial law, emergency situations and states of emergency; access to up-to-date scientific and educational information; and qualified academic guidance and support in studying the discipline and acquiring practical skills.

The Department’s policy on the provision of educational services is student-centred and is based on the regulatory documents of the Ministry of Education and Science of Ukraine and the Ministry of Health of Ukraine, the University Statute, the procedures governing the provision of educational services, including in emergency situations, as stipulated by the principal regulations and administrative directives governing the organisation of the educational process at National Pirogov Memorial Medical University, Vinnytsia, as well as on the principles of academic integrity.

Academic Integrity. When studying the discipline and completing all types of learning assignments and/or research activities, students must comply with the Law of Ukraine “On Education” (Article 42), the Law of Ukraine “On Academic Integrity”, and the Code of Academic Integrity of National Pirogov Memorial Medical University, Vinnytsia (University website →

General Information → Key Documents → Code of Academic Integrity). In the event of a violation of academic integrity principles, appropriate measures shall be taken in accordance with the applicable regulatory documents.

Compliance with VNMU Internal Regulations and Safety Requirements during Practical Classes. At the first practical class, the instructor provides a safety briefing on appropriate conduct on the Department premises, informs students of the location of the shelter and the evacuation route to the shelter in accordance with the approved evacuation plan, explains the rules of conduct while proceeding to and remaining in the shelter, and provides instructions on all actions stipulated by the Emergency Response Plan (pursuant to Order No. 505 dated 30 August 2023). In the event of an air raid alert or any other emergency warning signal, the instructor suspends the class. The instructor and students proceed together to the shelter and remain there until the warning signal is cancelled. Once the alert has been lifted, the instructor and students either resume the class in the Department's classrooms or students independently complete the remaining learning material, which is subsequently assessed at the next class.

Requirements for Preparation for Practical Classes

Students are required to participate actively in the educational process: attend classes and come adequately prepared; complete the test tasks related to the current topic in their workbooks and fill in the required diagrams and tables; actively participate in discussions of the class topic; complete all assignments specified in the programme; search for additional information relevant to the topic and present it to their peers.

Students are expected to arrive at classes on time. Late arrival is not permitted in accordance with the Internal Regulations for Students of VNMU. A student who arrives more than 10 minutes late is not admitted to the class and is required to make up the missed class in accordance with the established procedure.

For specialties within Field of Study I "Healthcare and Social Security", students are required to wear a medical coat during practical classes. Students who fail to comply with this requirement are not admitted to the class.

Students are expected to be polite, courteous, and respectful in their interactions with teaching staff, other University employees, fellow students, and other persons studying at VNMU. Students must maintain a quiet and orderly environment and demonstrate appropriate conduct on the Department premises.

In its activities, the Department adheres to the principles of mutual respect and tolerance. Students are expected to uphold the same principles.

Students must comply with safety regulations while on the Department premises.

When working in teaching and research laboratories, students must comply with the applicable safety regulations (published on the website of the Department of Pharmacy). When completing practical assignments, students must keep their workstations clean and orderly and leave them tidy upon completion of the practical work.

Use of Mobile Phones and Other Electronic Devices. The use of mobile phones and other electronic devices during classes is not permitted, except for emergency calls or when such devices are used to present supplementary materials relevant to the topic of the class.

Absence from Classes. Missed classes must be made up in accordance with the procedure established by the current Regulations on the Organization of the Educational Process at National Pirogov Memorial Medical University, Vinnytsia ([https://www.vnmdu.edu.ua/downloads/other/polog_organiz_ocv_proc\(2026\).pdf](https://www.vnmdu.edu.ua/downloads/other/polog_organiz_ocv_proc(2026).pdf)), at the times specified in the make-up schedule published on the website of the Department of Pharmacy (VNMU website), either with the instructor on duty or with the student's regular instructor. Making up a missed class involves completing the assignments related to the topic of the missed class in accordance with the specific requirements of the discipline.

Mastery of lecture topics is assessed during practical classes, seminars (including the assessment of practical skills), and final assessment, in accordance with the Regulations on the

Organisation of the Educational Process at National Pirogov Memorial Medical University, Vinnytsia ([https://www.vnmu.edu.ua/downloads/other/polog_organiz_ocv_proc\(2026\).pdf](https://www.vnmu.edu.ua/downloads/other/polog_organiz_ocv_proc(2026).pdf))

Admission to Final Assessment. The procedure for admission to final assessment in the discipline is set out in the current Regulations on the Organisation of the Educational Process at National Pirogov Memorial Medical University, Vinnytsia ([https://www.vnmu.edu.ua/downloads/other/polog_organiz_ocv_proc\(2026\).pdf](https://www.vnmu.edu.ua/downloads/other/polog_organiz_ocv_proc(2026).pdf)).

Students are admitted to final assessment provided that they have no outstanding academic requirements: the average grade for ongoing assessment must be at least 3.0 (72 points on the 120-point scale); all final sessions for the content modules must have been completed with a passing grade ("3" or higher); and all missed practical classes must have been made up with a passing grade ("3" or higher). Otherwise, the student must improve their average grade by making up unsatisfactory grades and must make up all missed classes.

Additional Points for Individual Assignments. Students may receive additional points in the discipline for the successful completion of individual assignments, the content of which is published on the Department's website as part of the teaching and learning materials for the discipline. The number of points awarded is determined based on the results of the individual assignment in accordance with the current Regulations on the Organisation of the Educational Process at National Pirogov Memorial Medical University, Vinnytsia. ([https://www.vnmu.edu.ua/downloads/other/polog_organiz_ocv_proc\(2026\).pdf](https://www.vnmu.edu.ua/downloads/other/polog_organiz_ocv_proc(2026).pdf)).

Resolution of Conflict Situations

In the event of misunderstandings or concerns regarding the quality of educational services, assessment of academic performance, or other conflict situations involving an instructor, students should first raise their concerns directly with the instructor. If the issue remains unresolved, the student has the right to submit an appeal to the Head of the Department in accordance with the Regulations on the Consideration of Appeals from Higher Education Students at National Pirogov Memorial Medical University, Vinnytsia (VNMU website → General Information → Key Documents).

Students also have the right to contact the student self-government bodies, the administration of the Faculty (Institute), or the University administration, either directly or through the designated feedback channels ("trust boxes"), links and addresses for which are available on the official VNMU website.

The Department recognises that a student-centred approach entails students' responsibility for the conscious and active acquisition of knowledge and for proper compliance with the rules and requirements established by applicable legislation and VNMU regulatory documents. The Department reserves the right to inform the relevant University bodies of any violations committed by students.

Policy on Blended Learning

The organisation of blended learning is governed by the Regulations on the Introduction of Elements of Distance Learning at National Pirogov Memorial Medical University, Vinnytsia (VNMU website → General Information → Key Documents). The main online learning platforms used for classes are Microsoft Teams and Google Meet.

The procedures for conducting practical classes, lectures, make-up classes, and consultations in the distance learning format are published on the Department's webpage (VNMU website → Department of Pharmacy → For Students/Postgraduate Students → Mode of Study → Year of Study → Teaching and Learning Materials).

Communication with the Instructor. Students may contact the instructor via Microsoft Teams chat, messaging applications (Viber, Telegram, WhatsApp), or email, as determined by the instructor, during working hours.

9. LEARNING RESOURCES

Teaching and learning materials for the discipline are available on the Department's website. The materials can be accessed via: VNMU website → Department of Pharmacy → For Students/Postgraduate Students.

LITERATURE

Core Literature for Cultivation of Medicinal Plants

1. European Medicines Agency. (2025). *Guideline on Good Agricultural and Collection Practice (GACP) for Starting Materials of Herbal Origin*. Revision 1. EMA/HMPC/246816/2005 Rev. 1.

European guidance for producing medicinal plant materials of consistent quality. **Free full text.**
Official guideline. European Medicines Agency (EMA)

2. Jha, S., & Halder, M. (Eds.). (2023). *Medicinal Plants: Biodiversity, Biotechnology and Conservation*. Springer.

Supports topics on conservation, sustainable use and biotechnological propagation.
Publisher / DOI. Springer Nature Link

3. Joshee, N., Dhekney, S. A., & Parajuli, P. (Eds.). (2019). *Medicinal Plants: From Farm to Pharmacy*. Springer.

Covers growing and harvesting medicinal plants, phytochemical content and pharmaceutical applications.

Publisher / DOI. Springer Nature Link

4. Canter, P. H., Thomas, H., & Ernst, E. (2005). Bringing medicinal plants into cultivation: Opportunities and challenges for biotechnology. *Trends in Biotechnology*, 23(4), 180–185.

A foundational review connecting cultivation, plant breeding and medicinal quality.

Article / DOI. pubmed.ncbi.nlm.nih.gov

Supplementary Literature for Cultivation of Medicinal Plants

1. George, E. F., Hall, M. A., & De Klerk, G.-J. (Eds.). (2008). *Plant Propagation by Tissue Culture. Volume 1: The Background*. 3rd ed. Springer.

Reference for micropropagation, culture media, plant growth regulators and regeneration.

Publisher / DOI. Springer Nature Link

2. World Health Organization. (2006). *WHO Monograph on Good Agricultural and Collection Practices (GACP) for Artemisia annua L.* Geneva: WHO. A species-specific case study for applying GACP to a medicinal crop. **Free full text.**

Official publication and download. who.int

3. World Health Organization. (2011). *Quality Control Methods for Herbal Materials*. Geneva: WHO.

Supports assessment of the quality of harvested medicinal plant raw materials. **Free full text.**

Official publication and download. who.int

4. World Health Organization. (2003). *WHO Guidelines on Good Agricultural and Collection Practices (GACP) for Medicinal Plants*. Geneva: WHO.

Foundational guidance on cultivation, collection, harvesting and primary processing. **Free full text.**

Official publication and download. who.int

ELECTRONIC RESOURCES

University website: <https://vnmu.edu.ua>

University Library: <https://library.vnmu.edu.ua>

World Health Organization: <https://www.who.int/en/>

Testing Board: <https://www.testcentr.org.ua/uk/>

Ministry of Health of Ukraine: <https://moz.gov.ua/>

Public Health Center of the Ministry of Health of Ukraine: <https://phc.org.ua/kontrol-zakhvoryuvan>

Plant Cell: https://en.wikipedia.org/wiki/Plant_cell

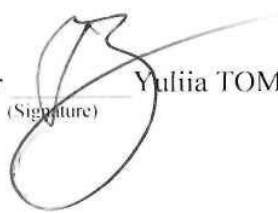
Plant Cell Anatomy: <http://www.enchantedlearning.com/subjects/plants/cell/>

Plant Cell Structure and Parts: <http://www.buzzle.com/articles/plant-cell-structure-and-parts.html>

Krok 1 Pharmacy: Pharmaceutical Botany, Test 1: <https://testkrok.org.ua/?test=31340>

The course syllabus for "Cultivation of Medicinal Plants" was discussed and approved at the meeting of the Department of Pharmacy (Minutes No. 1 dated 26 August 2026).

Course Coordinator:
Doctor of Biological Sciences, Professor  Viktoriia RODINKOVA
(Signature)

Acting Head of the Department of Pharmacy:
Candidate of Pharmaceutical Sciences, Associate Professor  Yuliia TOMASHEVSKA
(Signature)