



**CD 8.5.1 DISCIPLINE SYLLABUS FOR
UNIVERSITY STUDIES**

Edition: 09

Date: 08.09.2021

Page 1/8

**FACULTY OF PHARMACY
STUDY PROGRAM PHARMACY**

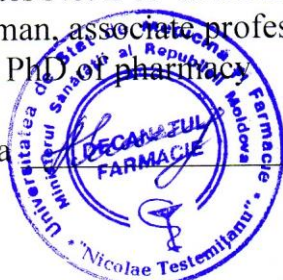
CHAIR OF PHARMACOGNOSY AND PHARMACEUTICAL BOTANY

APPROVED

at the meeting of the Commission for Quality Assurance and Evaluation of the Curriculum in Pharmacy

Minutes No. 2 of 09.11.2021
Chairman, associate professor,
PhD of pharmacy

Uncu Livia



APPROVED

at the Council meeting of the Faculty of Pharmacy

Minutes No 3 of 16.12.2021
Dean of Faculty, associate professor,
PhD of pharmacy

Ciobanu



APPROVED

at the meeting of the Chair of pharmacognosy and pharmaceutical botany

Minutes No. 27 of 30.06.2021

Head of chair, professor, Dr. hab. of biol.

Calalb Tatiana

SYLLABUS

DISCIPLINE ECOLOGY AND MEDICINAL PLANTS

Integrated studies

Type of course: **Optional discipline**

Curriculum was elaborated by authors:

Calalb Tatiana, Dr. hab. of biol., professor
Fursenco Cornelia, university assistant

Chisinau, 2021



CD 8.5.1 DISCIPLINE SYLLABUS FOR UNIVERSITY STUDIES

Edition:	09
Date:	08.09.2021
Page 2/8	

I. INTRODUCTION

- General presentation of the discipline: place and role of the discipline in the formation of the specific competences of the professional / specialty training program

Human society, indifferent of its degree of development, is a part of the global ecosystem and depends on the state of this system. Ecological parameters are reflected immediately or in time on the development and environmental quality of plants, which are the source of the food raw material and the natural medicine. The student, in becoming a pharmacist specialist, must be aware that the quality of plant products correlates with ecological parameters. In the last decades, they are negatively influenced by the abusive use of chemicals, techniques, modern technologies and global warming, the consequences of calamities, etc. The knowledge will be used at the courses of Pharmacognosy, Drug Technology, Biotechnologies on medicinal plants, Toxic plants, Medical chemistry. The course will contribute to the environmental education that is required for the future pharmacist to develop a conscious attitude towards the quality of the food/medicine.

- Mission of the curriculum (aim) in professional training
The aim of the course is to familiarize students with the influence of biotic/abiotic factors and their negative effects on the development of medicinal plants. Discipline Ecology and medicinal plants offers students knowledge of medicinal plants classification in organic groups, the influence of stressors and pollutants on plant biology and the compliance with the ecological conditions for obtaining the qualitative vegetable product. Students will be able to highlight the factors that lead to the air, water, soil pollution with a negative impact on the quality of the vegetable products. The course will serve as a support for building a professional and civic attitude towards product quality, environmental protection, and promoting healthy lifestyles.
- Languages of the course: romanian, russian, english
- Beneficiaries: students of the Ist year, faculty of Pharmacy

II. MANAGEMENT OF THE DISCIPLINE

Code of discipline		S.02.A.020.2	
Name of the discipline		Ecology and medicinal plants	
Persons in charge of the discipline		Tatiana Calalb dr. hab. in biol.sc., univ. prof.	
Year	I	Semester	II
Total number of hours, including:			60
Lectures	15	Practical/laboratory hours	-
Seminars	30	Self-training	15
Form of assessment	Exam	Number of credits	2



CD 8.5.1 DISCIPLINE SYLLABUS FOR UNIVERSITY STUDIES

Edition:	09
Date:	08.09.2021
Page 3/8	

III. TRAINING AIMS WITHIN THE DISCIPLINE

At the end of the discipline study the student will be able to:

- **at the level of knowledge and understanding:**
 - notions of biodiversity, ecosystems, biocenosis, population and biotope;
 - biological and chemical circuit in nature;
 - ecological factors and medicinal plants;
 - pollutants and medicinal plants;
 - the role of the human factor;
 - organic farming.
- **at the application level:**
 - population habitat research, structure of biocenosis, structural indices, interspecific relations;
 - argumentation of the ecological processes that take place in the environment;
 - the establishment of the plots for the cultivation of medicinal plants;
 - establishing the optimal ecological factors in the development of medicinal plants;
 - be able to distinguish and be aware of the influence of pollutants on the quality of natural products.
- **at the integration level:**
 - to determine the position and importance of the discipline Ecology and medicinal plants as part of the study plan;
 - the knowledge gained will serve as a benchmark for further understanding of the courses of Pharmacognosy, Toxic Plants, Phytotherapy;
 - acquired knowledge will contribute to the formation of the right professional attitude in the production and promotion of organic natural products.

IV. PROVISIONAL TERMS AND CONDITIONS

To understand the discipline Ecology and medicinal plants it is necessary to have deep knowledge in Biology, Geography and Ecology, obtained in pre-university studies and university courses of Pharmaceutical Botany, Molecular Biology.

V. THEMES AND ESTIMATE ALLOCATION OF HOURS

Lectures, practical hours/ laboratory hours/seminars and self-training

Nr. d/o	THEME	Number of hours		
		Lectures	Practical hours	Self- training
1.	Introduction and argumentation. Biodiversity, ecosystems, and biotopes. The biological natural cycle. Plants and ecological factors (abiotic and biotic).	2	2	-
2.	Abiotic factors. The light as an ecological factor. Classification of the plants according to the light. Examples on medicinal plants. The temperature as an ecological factor. Global warming and consequences.	2	6	1



**CD 8.5.1 DISCIPLINE SYLLABUS FOR
UNIVERSITY STUDIES**

Edition: 09
Date: 08.09.2021
Page 4/8

Nr. d/o	THEME	Number of hours		
		Lectures	Practical hours	Self-training
3.	The water as an ecological factor. Plant's adaptation to the hydric regime and characteristic of the ecological groups: hydrophytes, mesophytes and xerophytes. Examples on medicinal plants.	2	4	2
4.	The nutrition as an ecological factor. Soil. The role of macro- and microelements in the plant development.	2	4	2
5.	The biotic ecological factors and medicinal plants. The intra- and interspecific relationships. Antropogenic factor.	2	4	2
6.	The main sources of environmental pollution. The medicinal plants and pollutants. The medicinal plants and natural cataclysms.	3	6	6
7.	Legal framework for environmental protection. The role of the human factor in global and national strategies for ecological aspects. The necessity and perspectives of organic agriculture.	2	4	2
Total: 60 hours		15	15	30

VI. PRACTICAL SKILLS PURCHASED AT THE END OF THE COURSE

To be able to identify:

- population habitat research, structure of biocenosis, structural indices, interspecific relations;
- argumentation of the ecological processes that take place in the environment;
- the establishment of the plots for the cultivation of medicinal plants;
- establishing of the optimal ecological factors in the development of medicinal plants;
- and to distinguish and be aware of the influence of pollutants on the quality of natural products.

Nota: Vor fi listate manoperele practice esențiale caracteristice disciplinei, obligatorii de a fi achiziționate de fiecare student pe parcursul modulului. Acestea vor servi drept bază pentru etapa evaluării deprinderilor practice și vor constitui portofoliul acestora per program de studii.

VII. REFERENCE OBJECTIVES OF CONTENT UNIT

Objectives	Content units
Theme 1. The environment and plants	
<ul style="list-style-type: none"> • to define the notions biodiversity, ecosystems, and biotopes • to know the structure and the functions of ecosystems • to understand the biological natural cycle 	Biodiversity, ecosystems, and biotopes. The trophic and biochemical structure of ecosystems. The functions of ecosystems. The biological natural cycle.
Theme 2. The ecological factors and plants	
<ul style="list-style-type: none"> • to define abiotic and biotic ecological factors • to classify the plants according to ecological factors and to characterize ecological groups of plants • to understand the role of macro- and 	The abiotic and biotic ecological factors. Plants and ecological factors: light, temperature, water and nutrition. Hydrophytes, mesophytes, xerophytes, termophytes, heliophytes and sciophytes plants.



CD 8.5.1 DISCIPLINE SYLLABUS FOR UNIVERSITY STUDIES

Edition: 09

Date: 08.09.2021

Page 5/8

Objectives	Content units
<p>microelements in the plant development</p> <ul style="list-style-type: none">to explain the intra- and interspecific relationships	<p>The role of nutrition and its quality. Biotic ecological factors: phytogenic, zoogenic and anthropogenic. The intra- and interspecific relationships.</p>
Theme 3. The medicinal plants and pollutants	
<ul style="list-style-type: none">to define the notions of pollutants and pollutionto know the sources of pollution (pollution classification)to understand the influence of natural cataclysms on pollutionto understand the influence of natural cataclysms on pollutionto become aware of the role of the human factor in obtaining ecologically qualitative natural productsto know mondial/national strategies in the biodiversity conservationto know protected natural aria in the R.Moldova	<p>Pollution and medicinal plants.</p> <p>Sources of pollutants. Pollutants of air, water and soil. Natural cataclysms.</p> <p>The human factor in pollution. Risks and legal framework. Organic farming. Global warming and consequences. Strategies in the biodiversity conservation. Protected natural aria in the R.Moldova.</p>

VIII. PROFESSIONAL (SPECIFIC (SC)) AND TRANSVERSAL (TC) COMPETENCES AND STUDY OUTCOMES

✓ Professional (specific) (SC) competences

- PC1. Knowledge of the theoretical basis of the discipline Ecology and medicinal plants, general theory of ecosystems, ecological factors; knowledge of the main sources of pollution and global environmental issues.
- PC2. Knowledge of environmental processes taking place in the environment, their influence on plant development; implementing the measures in practice to solve global environmental problems.
- PC3. Use and adaptation of ecological theoretical knowledge to determine the influence of environmental factors on medicinal plants; use of various methods to avoid adverse effects on the development of medicinal plants, and the production of organic plant products.

✓ Transversal competences (TC)

- TC1. Promotion of the logical reasoning, practical applicability, assessment and self-assessment in decision-making.
- TC2. Effective use of language skills, knowledge in information technologies, research and communication skills.
- TC3. Promotion of the spirit of initiative, dialogue, cooperation, positive attitude and respect towards others, empathy, altruism and continuous improving of own activities.

✓ Study outcomes

By the end of the course Ecology and medicinal plants, a student will know:

- theoretical bases of ecology



**CD 8.5.1 DISCIPLINE SYLLABUS FOR
UNIVERSITY STUDIES**

Edition:	09
Date:	08.09.2021
Page 6/8	

- the circuit of substances in nature
- abiotic, biotic ecological factors and medicinal plants
- pollution and its influence on medicinal plants
- natural cataclysms
- global environmental problems
- the human factor in the ecology of medicinal plants
- organic farming

Note. Study outcomes (are deduced from the professional competencies and formative valences of the informational content of the discipline).

IX. STUDENT'S SELF-TRAINING

No.	Expected product	Implementation strategies	Assessment criteria	Implementation terms
1.	Working with information sources	Analysis of the informational material from the class hours. Working with recommended bibliographic sources. Selection of the main postulates, highlighting the basic elements of the topic discussed, argumentation, exemplification. Exploring current electronic sources on the subject. Formulation of conclusions.	Ability to analytical analysis and highlighting a the essential; Logical orientation skills in the volume of informational material. Interpretive skills and balanced selection of information.	During semester
2.	Thematically project	Analysis of relevant sources in the thematic project. Compilation of the work plan and presentation of the paper. Analysis, systematization and synthesis of information on the proposed theme. Compilation of the paper according to the requirements in force and presentation to the chair.	The quality of systematization and analysis of the informational material obtained through own activity. Concordance of the information with the proposed theme. The ability to highlight key positions, the need to address the subject, and the amount of concrete information on the subject.	During semester
3.	Graphic representation and presentation support	Establishing PowerPoint project / theme components - theme, purpose, results, conclusions, practical applications, bibliography. Selection of graphical presentation (tables, figures, diagrams, graphs, etc.).	Quality and fairness of presentation formulation. The volume of information material. Balanced use of different forms of graphical presentation. Ability to	During semester



**CD 8.5.1 DISCIPLINE SYLLABUS FOR
UNIVERSITY STUDIES**

Edition:	09
Date:	08.09.2021
Page 7/8	

		Determining the way of presentation (narrative, forwarding challenging questions, formulating the case issue, individual analysis of a problem, in the form of a dispute, etc.)	describe and present concrete and accessible material. The volume of work, the degree of penetration in the essence of the project theme, the level of scientific argumentation, the quality of the conclusions, the elements of creativity, the formation of the attitude. Ability to answer questions.	
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X. METHODOLOGICAL SUGGESTIONS FOR TEACHING-LEARNING-ASSESSMENT

• **Teaching and learning methods used**

Within the discipline Ecology and medicinal plants, the lectures take place through systematic exposure, conversation, problem-solving, demonstration (oral presentations coupled with PowerPoint). Laboratory works include the interactive teaching strategy based on collaborative learning. Teachers combine different teaching methods, when analyze the thematic material: disputes, interactive discussion, mini-conferences, individual discussions, problem situations, etc.

• **Applied teaching strategies/technologies (specific to the discipline)**

Methods and techniques for problem solving (brainstorming, brain writing), critical thinking development, and interactive-creative learning are used.

• **Methods of assessment (including the method of final mark calculation)**

Current: will be done through 2 assessments of the students' knowledge (1 evaluation – frontal and individual discussions, thematic debates, 1 evaluation – thematic project or portfolio).

Final: Differentiated colloquium with mark.

Final appreciation will consist of the annual average mark (composed of the thematic project or portfolio mark and the mark from an assessment of knowledge) with a coefficient of 0.5 and a colloquium (oral) – the coefficient of 0.5.

Current: Individual and frontal discussions in the debate of basic thematic topics. Organizing mini-conferences for expressing one's opinions and presenting thematic projects.

Final: Exam.

The final grade will consist of the annual average grade (consisting of the mark of the thematic project /thematic portfolio and the mark of thematic essay) with a coefficient of 0.5 and the mark from the exam (oral) - coefficient 0.5.

Note: At the Exam, students with the average annual score below grade 5, as well as students who have not recovered absences from the practical works are not admitted.

Method of mark rounding at different assessment stages

Intermediate marks scale (annual average, marks from the examination stages)	National Assessment System	ECTS Equivalent
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**CD 8.5.1 DISCIPLINE SYLLABUS FOR
UNIVERSITY STUDIES**

Edition: 09

Date: 08.09.2021

Page 8/8

1,00-3,00	2	F
3,01-4,99	4	FX
5,00	5	E
5,01-5,50	5,5	
5,51-6,0	6	
6,01-6,50	6,5	D
6,51-7,00	7	
7,01-7,50	7,5	C
7,51-8,00	8	
8,01-8,50	8,5	B
8,51-8,00	9	
9,01-9,50	9,5	A
9,51-10,0	10	

The average annual mark and the marks of all stages of final examination (computer assisted, test, oral) - are expressed in numbers according to the mark scale (according to the table), and the final mark obtained is expressed in number with two decimals, which is transferred to student's record-book.

Absence on examination without good reason is recorded as "absent" and is equivalent to 0 (zero). The student has the right to have two re-examinations.

XI. RECOMMENDED LITERATURE:

A. Compulsory:

1. Course support information on the Department web-site.
2. Schulze E-D., Beck E., Muller-Hohenstein K. Plant ecology. Springer Berlin Heidelberg, 2005.
3. John M. Marzluff, Eric Shulenberg. Urban ecology. Springer Science + Business media LLC, 2008.
4. Hommen Udo. Potential application of ecological models in the European environmental risk assessment of chemicals I: Review of protection goals in EU directives and regulations In: Integrated Environmental Assessment and Management. 2010, Volume 6, Issue 3.

B. Additional

1. Cartea Roșie a Republicii Moldova, ed. II-III, Chișinău, 2002, 2015.
2. Миркин Б.М., Наумова Л.Г. Основы общей экологии. М.: Университетская книга, 2005.
3. Pânzaru P., Negru A., Izverschi T. Taxoni rari din flora Republicii Moldova, Ed. Chișinău, 2002, 148 p.
4. Postolache Gh., Bucățel V., Lazu Ș. et al. Ariile naturale protejate din Moldova. Vol. I și IV, Ed. Î.E.P. Știința, 2016, 2017.