



**CD 8.5.1 DISCIPLINE SYLLABUS FOR  
UNIVERSITY STUDIES**

**Edition: 09**

**Date: 08.09.2021**

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**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**

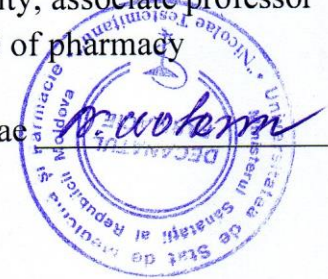
at the Council meeting of the Faculty of Pharmacy

Minutes No.3 of 16.12.2021

Dean of Faculty, associate professor

PhD of pharmacy

Ciobanu Nicolae



**APPROVED**

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 PRACTICAL TRAINING PHARMACOGNOSY**

Integrated studies

Type of course: **Compulsory discipline**

Curriculum was elaborated by authors:

Cojocaru-Toma Maria, PhD, associate professor

Benea Anna, university assistant

Chisinau, 2021



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### I. INTRODUCTION

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

Practical training represents an important component and continuity in the studying of the Pharmacognosy discipline. The activities during the training period will contribute to the formation of practical skills for identification, collection, processing and storing of the vegetal products as well as the rational use of the medicinal plant resources. Practical knowledge will serve as a basic support to the better studies of Phytotherapy, Toxic plants, and the gained skills will contribute to the training of the pharmacist specialist.

- **Mission of the curriculum in professional training**

The development of practical skills in identification, collection, drying, storing of vegetal products from cultivated and spontaneous medicinal plants. The practical skills gained in the practical training activities will form the pharmacist specialist, who will contribute to the development of the national phytotherapeutic industry through valuing of the local flora.

- **Language (s) of the course:** Romanian, English;
- **Beneficiaries:** students of the III<sup>rd</sup> year, Faculty of Pharmacy

### II. MANAGEMENT OF THE DISCIPLINE

Code of discipline			
Name of the discipline		<b>Practical training Pharmacognosy</b>	
Person(s) in charge of the discipline		PhD, associate professor, <b>Cojocaru-Toma Maria</b>	
Year	III	Semester/Semesters	VI
Total number of hours, including:			<b>60</b>
Lectures	-	Practical/laboratory hours	<b>60</b>
Seminars	-	Self-training	-
Form of assessment	Exam	Number of credits	<b>2</b>

### 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:**
  - medicinal plants from the spontaneous and cultivated flora of the Republic of Moldova;
  - organs of medicinal plants which serve as sources for the production of vegetal products;
  - macroscopic characters of vegetal products, numerical indices that regulate their quality;
  - vegetal products containing: polyholosides, vitamins, essential oils, alkaloids, cardiotonic heterosides, saponosides, anthracene derivatives, phenolic compounds, flavonoids, coumarins, tannins substances etc;
  - phytotherapeutic products spectrum from the „Nicolae Testemitanu” SUMPh University Pharmaceutical Center, authorized in the Republic of Moldova and included in the State



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Nomenclature of Medicines.

- **at the application level:**
  - to identify vegetal products according their macroscopic characters;
  - to be able to determine the optimum period of vegetal products harvesting, drying and storage conditions in order to obtain products with maximum content of active principles;
  - to possess the technologies of cultivation and care of medicinal plants;
  - to know the ecological aspects of the collection of the vegetal products, biodiversity conservation and reserve of the medicinal plants in different natural biocenoses in the Republic of Moldova;
  - to carry out the pharmacognostical analysis of the vegetable products according to the requirements of the analytical normative documentation;
  - to know the rules for the packaging, marking, storage of vegetal products;
  - to know the actions of the most important groups of active principles of vegetal origin and of the medicinal products obtained from them;
  - to inform patients, doctors, pharmacists about the rational use of vegetal products and phytotherapeutic products.
- **at the integration level:**
  - awareness of the importance of the practical training in Pharmacognosy in all disciplines provided by the study plan;
  - application of the knowledge and practical skills acquired in the post-pharmacy activity;
  - the awareness of doctors, pharmacists and patients over the multiple advantages of phytotherapeutic products.

#### IV. PROVISIONAL TERMS AND CONDITIONS

The 3<sup>rd</sup> year student requires the following:

- ✓ knowledge of the instruction language;
- ✓ knowledge from the Pharmaceutical botany and Toxic plants courses;
- ✓ skills in modern information technologies (internet use, document processing, electronic tables and presentations, use of graphic programs);
- ✓ individual and team work skills;
- ✓ analytical and synthesis skills, generalization and communication skills.
- ✓ qualities - tolerance, compassion, autonomy, collegiality.

#### V. THEMES AND ESTIMATE ALLOCATION OF HOURS

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

No. d/o.	THEME	Number of hours/ Practical hours
1.	Acquaintance with the practical training plan of pharmacognosy and the safety technique instructions. Distribution of herbariums, vegetal products for collection and labeling. Requirements for fulfilling the notebook for practical training in pharmacognosy.	6
2.	Evaluation and accomplishment of the base of vegetal products, herbariums and phytodrugs of Pharmacognosy discipline, according to chemical compounds groups: polyholosides, vitamins, essential oils, bitter and resinous substances, saponosides, heterosides, alkaloids, phenolic compounds, flavonoids, coumarins, tannins, anthracene derivatives.	6



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3.	Knowledge of vegetal products, medicinal species and phytotherapeutic products within the "Nicolae Testemitanu" SUMPh University Pharmaceutical Center: evaluation of product name, pharmaceutical form, dose, composition, pharmacological action and uses according of the chemical compounds, primary and secondary packaging, availability and storage conditions).	6
4.	Evaluation of vegetal products, medicinal species and phytotherapeutic products according to the State Nomenclature of Medicines ( <i>amed.md</i> ). Particularities in the administration.	6
5.	Particularities of storage of vegetal products, medicinal species and phytotherapeutic products in pharmacy, of the chemical compounds groups, according to the conditions of regulatory storage and pharmacopoeial monographs.	6
6.	Morphological description of medicinal plants and vegetal products from the collection of "Nicolae Testemitanu" SUMPh of SCFMP and spontaneous flora. Acquisition of collection methods, primary processing, storage of vegetal products from different morphological groups depending on the nature of the active principles. The technique of herbalization of medicinal plants.	6
7.	Evaluation of medicinal plants and vegetal products from the collection of "Nicolae Testemitanu" SUMPh of SCFMP, sources of polyholosides, vitamins, bitter and resinous substances, saponosides, cardiotoxic heterosides. Learning methods of collection, primary processing, storage of vegetal products.	6
8.	Evaluation of medicinal plants and vegetal products from the collection of "Nicolae Testemitanu" SUMPh of SCFMP, sources of phenolic compounds, coumarins and cromones, flavonoids, tannins, anthracene derivatives. Learning methods of collection, primary processing, storage of vegetal products.	6
9.	Evaluation of medicinal plants and vegetal products from the collection of "Nicolae Testemitanu" SUMPh of SCFMP, sources of alkaloids and essential oils. Learning methods of collection, primary processing, storage of vegetal products.	6
10.	The evaluation of the practical training of pharmacognosy. Conference on the balance of practical training. Exam.	6
	<b>Total</b>	<b>60</b>

**VI. PRACTICAL ABILITIES PURCHASED AT THE END OF THE PRACTICAL TRAINING**

Purchased practical tools:

- to develop skills of identification of medicinal plants and vegetal products according to the macro- and microscopic characters;
- to apply correctly the rules of collection, drying and primary processing of vegetal products according to the nature of vegetal products and the group of chemical compounds;
- to apply qualitative and quantitative analysis of vegetal and phytotherapeutic products in pharmaceutical enterprises;



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- to communicate with the doctor and the patient regarding to the pharmaceutical forms and phytopreparations, precautions in their administration;
- to know the rules of storage in pharmaceutical enterprises of vegetal and phytotherapeutic products according to the groups of chemical compounds;
- to apply the knowledge and contribute in the rational use of vegetal and phytotherapeutic products.

### VII. REFERENCE OBJECTIVES of CONTENT UNITS

Objectives	Content units
<b>Theme (chapter) 1. Evaluation and development of the base of the vegetable products, herbariums and phytotherapeutic products</b>	
<ul style="list-style-type: none"><li>• to know and to follow the instructions on safety techniques during the practical training period;</li><li>• to evaluate and accomplish the base of the vegetal products, herbariums and phytotherapeutic products specific for the acquisition of the pharmacognostical course;</li><li>• to learn how to work with the Analytical Normative Documentation.</li></ul>	Instructions on the safety technique during practical training on Pharmacognosy. Standardization of vegetable products. Applying the Analytical Normative Documentation. Applying pharmacognostical analysis techniques for different types of vegetal products.
<b>Theme (chapter) 2. Evaluation of vegetal products, medicinal species and phytotherapeutic products in the "Nicolae Testemitanu" SUMPh of University Pharmaceutical Center and State Nomenclature of Medicines</b>	
<ul style="list-style-type: none"><li>• to describe the primary and secondary packaging of the phytotherapeutic product, including the name, pharmaceutical form, dose, composition, availability and storage conditions;</li><li>• to inform consumers about the rational use of phytotherapeutic product;</li><li>• to define the pharmacological actions of the phytotherapeutic product according to the nature of the active principles and the specific administration particularities;</li><li>• to know the range of medicinal products from the "Nicolae Testemitanu" SUMPh of University Pharmaceutical Center and after the State Nomenclature of Medicines.</li></ul>	Storage conditions of phytotherapeutic product in the pharmacy according to the chemical classification. Pharmacological action and particularities in the administration of vegetal medicinal products depending on their chemical nature and active principles. Authorized phytotherapeutic product in the Republic of Moldova, included in the State Nomenclature of Medicines. Used of vegetal products in the pharmaceutical industry of the Republic of Moldova. Pharmaceutical counseling in rational use of phytotherapeutic product.
<b>Theme (chapter) 3. Familiarization with medicinal plants from the spontaneous flora of the Republic of Moldova</b>	
<ul style="list-style-type: none"><li>• to identify medicinal plants from the spontaneous flora of the Republic of Moldova;</li><li>• to apply herbal techniques and labeling of medicinal plants;</li></ul>	Resources of medicinal plants from the spontaneous flora of the country. Collection, processing and storage conditions of vegetal products depending on the nature of the active principles and the morphological groups.



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Objectives	Content units
<ul style="list-style-type: none"><li>to know the methods of collecting plant organs - sources of vegetal products.</li></ul>	
<b>Theme (chapter) 4. Evaluation of medicinal plants from the collections of "Nicolae Testemitanu" Scientific Center in the Field of Medicinal Plants (SCFMP) and other collections</b>	
<ul style="list-style-type: none"><li>to know the medicinal plants from the collections according to the groups of active principles and their actions;</li><li>to acquire methods of preparation of herbarium and labeling of medicinal plants</li><li>to acquire methods of collecting, conditioning and storing of vegetal products according to the nature of the active principles.</li></ul>	Acquaintance with the collection of medicinal plants of the "Nicolae Testemitanu" SUMPh of SCFMP and other collections. Preparation of herbariums of medicinal plants and collection of vegetal products. Medicinal plants and vegetal products containing active principles (polyholosides, vitamins, essential oils, bitter substances, cardiotoxic heterosides, saponosides, alkaloids, anthracene derivatives, phenol compounds, coumarins and chromones, flavonoids, tannins).
<b>Theme (chapter) 5. The evaluation of the practical training and the report on practical training of pharmacognosy</b>	
<ul style="list-style-type: none"><li>to complete the notebook for the practical training in pharmacognosy according to the requirements;</li><li>to know the medicinal plants and vegetal products from the collections and spontaneous flora through the prism of chemical compounds and pharmacological action;</li><li>to acquire vegetal products, medicinal species and phytotherapeutic products from pharmacies;</li><li>to know the particularities in the administration of phytotherapeutic products;</li><li>to be competent in the rational use vegetal products and phytodrugs;</li><li>to apply knowledge and participate in the elaboration of the thematic report for the conference;</li><li>to demonstrate knowledge and skills in the conference on the balance of the practical training of pharmacognosy</li></ul>	Documentation for the practical training of pharmacognosy: the notebook for the practical training of pharmacognosy; vegetal products labeled; herbs labeled; phytotherapeutic products; thematic report (vegetal products and medicinal plants from the collections and spontaneous flora of the Republic of Moldova through the chemical compounds, mechanisms of action, particularities in administration, phytotherapeutic products); Active participation in the Conference on the balance of the practical training of pharmacognosy.

### VIII. PROFESSIONAL (specific (Sc) and TRANSVERSAL (Tc) COMPETENCES AND STUDY OUTCOMES

#### ✓ Professional (specific) (SC) competences

- PC1. Knowledge, understanding and use of specific terms of pharmacognosy of general principles in the evaluation of vegetal products.
- PC2. Application of methods of pharmacognostical analysis: macroscopic of vegetal products from different morphological groups. Knowledge of phytopreparations through action, indications, contraindications, adverse effects, administration mode and their interactions.



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- PC3. Use and adaptation of theoretical knowledge from the field of Pharmacognosy in situations of practical activity, application of the pharmacopoeial requirements in the practical activity: in preparation of herbarium of medicinal plants, collecting of vegetal products and using phytodrugs.
- PC4. Knowledge of vegetal products and active principles responsible for pharmacotherapeutical effect. Active framing in the development process of practical training in pharmacognosy.
- PC5. Pharmaceutical counseling in the rational use of phytopreparations depending on the nature of the active principles. Knowledge of scientific research methodology in pharmaceutical activity through the pharmacognostical profile analyzes.
- PC6. Uses of the capacity to solve situation problems through good collaboration, promoting the principles of tolerance and compassion towards the consumer of phytotherapeutic products, the use of information technologies and multilingual communication.

### ✓ **Transversal competences (TC)**

- TC1. Set personal attitude by promoting logical argumentation and following pharmaceutical deontology and ethics rules in counseling regarding phytodrugs.
- TC2. Ability to social interaction and group activity, priority determination in professional training.
- TC3. Fitting into interdisciplinary projects, extracurricular activities, performing activities and accomplish specific roles in team activities. Promoting intuitive spirit, dialogue, cooperation, positive attitude and respect for colleagues.

### ✓ **Study outcomes**

- to know medicinal plants, vegetal products, active principles and their pharmacotherapeutic profile;
- to be able to apply techniques for collecting, conditioning of the vegetal products depending on the morphological group and the particularities of the active principles accumulation;
- to be able to identify vegetal products based on macroscopic characters;
- to be competent in the rational use of phytodrugs by knowing the particularities of their administration;
- to be able to apply the gained knowledge in the research activity and to follow the pharmacist's professional ethics norms.

**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	Evaluation and acquisition of the provided information at the practical training of pharmacognosy; Selection of compulsory and additional sources according to the respective themes; Analyzing and evaluation of the relevant questions; Define conclusions regarding to subjects importance.	Interpretative skills; The ability to select the essentials; The ability to define the conclusions.	During the practical training
2.	Working with the	Report of daily activities	Results of self-	



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	practical notebook for practical training in pharmacognosy	according to the practical training plan; Exploring individual work and student contribution at the conference reported in the practical training notebook; Assessment of the notebook for practical training in pharmacognosy.	assessments; The modality to present the activities included in notebook for practical training.	During the practical training
3.	Participation in the conference of practical training of pharmacognosy and taking the exam	Assessment of herbaria materials; Evaluation of vegetable products; Theme selection and distribution of the components for the conference; Establishment of accomplishment terms and requirements according to the plan; Mentioning practical applications, creativity elements, conclusions and sources of bibliography. Elaboration of the thematic report for the conference of practical training of pharmacognosy	The way of herbaria presentation, the vegetable products and phytodrugs; The degree of insight into the essence of the theme presented at the conference; The level of scientific argumentation; Formation of personal attitude, coherence of the report.	During the practical training

### X. METHODOLOGICAL SUGGESTIONS FOR TEACHING-LEARNING-assessment

#### • *Teaching and learning methods used*

The practical training provides several types of activities:

- ✓ on the ground accomplishment with medicinal plants from the collections and spontaneous flora according to the chemical index, the type of the vegetal product and the harvesting period, with description, collecting, labeling, drying, packing of vegetal products;
- ✓ in the laboratory (working with the herbariums, vegetal and phytoterapeutic products of the chair, etc.);
- ✓ at pharmacy (evaluation of vegetal products, medicinal species, phytodrugs, according to the chemical composition and therapeutical action; storage conditions);

Each student is expected to complete all the tasks provided by the practical program and to complete the notebook for practical training in pharmacognosy.

The notebook for practical training in pharmacognosy must include information on the safety technique and the concrete activities performed daily, medicinal plants collections visited (latin name of medicinal plants, vegetal products, family, according to groups of chemical compounds).

As a result of the pharmacy visit, the notebook will include: the name, pharmaceutical form, dose, composition and action of the medicinal product, with classification on vegetal products, medicinal species and mono- and multi-component phytodrugs. It also will include the evaluation of the





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practical internship in pharmacognosy and student's contribution to the conference on the on the "Balance of Practical Traineeship".

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

Front work, in microgroups and individually, interactive discussions with the case study, presentations and discussions at the conference on "The Balance of of practical training of pharmacognosy".

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

**Current:** frontal and /or individual control by 2 practical skills assessments (1st evaluation – oral test by knowledge of medicinal plants and vegetal products from the collections and spontaneous flora through the chemical compounds, pharmacological action and their phytotherapeutic products; quality of vegetal products and herbarium; 2nd evaluation – fulfilling the notebook for practical training in pharmacognosy and the thematic report for the conference on the balance of the practical training in pharmacognosy.

**Final:** exam.

**Final appreciation** will consist of the average mark from 2 assessments (practical skills in knowing of medicinal plants and vegetal products and the the evaluation of notebook for practical training in pharmacognosy) with a share of 50% and the exam mark (50%).

### Method of mark rounding at different assessment stages

Intermediate marks scale (annual average, marks from the examination stages)	National Assessment System	ECTS equivalent
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	D
6,01-6,50	6,5	
6,51-7,00	7	C
7,01-7,50	7,5	
7,51-8,00	8	B
8,01-8,50	8,5	
8,51-8,00	9	A
9,01-9,50	9,5	
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. Evans W. Trease and Evans Pharmacognosy. Saunders Company Ltd. 1989
2. Nisteanu A.; Calalb T. Stagiul de practică la Farmacognozie. Recomandări metodice. Chişinău, 2015.
3. Nisteanu A. Farmacognozie. Chişinău, 2000.
4. Cojocaru-Toma M. Produse vegetale și fitopreparate din Republica Moldova. Compendiu pentru lucrări de laborator la farmacognozie. Chişinău, 2017.



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5. Negru A. Determinator de plante din flora Republicii Moldova. Chişinău. 2007.

*B. Additional*

1. European Pharmacopoeia, vol. I, II, 2016.
2. Farmacopeea română, ediția X. Editura medicală, Bucureşti, 1993.
3. Государственная Фармакопея. XI издание. Москва. «Медицина», том 1, 1987 и том 2, 1990.
4. Государственная Фармакопея Республики Беларусь. Том II, 2007, Том III, 2009.
5. Matcovschi C.; Safta V. Ghid farmacoterapeutic. Editura „Vector”. Chişinău, 2010.
6. Cojocaru-Toma M.; Chiru T. Analiza farmacognostică a speciilor medicinale. Chişinău, 2019.
7. Chiru T.; Nisteanu A. Determinator de produse vegetale medicinale. Chişinău, 2018.