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FACULTY OF PHARMACY

STUDY PROGRAM 0916.1 PHARMACY

CHAIR OF PHARMACOGNOSY AND PHARMACEUTICAL BOTANY

APPROVED

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

Minutes No.2 of 21.12.2017

Chairman, PhD pharmacy, associate professor

UNCU Livia

(signature)

APPROVED

at the Council meeting of the Faculty of Pharmacy

Minutes No.2 of 22.12.2017

Dean of Faculty, PhD pharmacy, associate professor

CIOBANU Nicolae

(signature)

APPROVED

approved at the meeting of the chair of Pharmacognosy and pharmaceutical botany

Minutes No.10 of 10.11.2017

Head of chair, Dr. hab. biology, university professor

CALALB Tatiana

(signature)

SYLLABUS

PRACTICAL TRAINING OF PHARMACOGNOSY

Integrated studies

Type of course: **Compulsory**

Chisinau, 2017



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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 vegetable 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 vegetable 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.

- **Languages of the course:** Romanian, English;

- **Beneficiaries:** students of the IIIrd year, faculty of Pharmacy

II. MANAGEMENT OF THE DISCIPLINE

Code of discipline		S06O067	
Name of the discipline		Practical training of Pharmacognosy	
Person in charge of the discipline		PhD, associate professor, Cojocaru-Toma Maria	
Year	III	Semester	VI
Total number of hours, including:			60
Lectures	-	Practical/laboratory hours	60
Seminars	-	Self-training	-
Form of assessment	differentiated colloquium	Number of credits	2

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 vegetable products;
- macroscopic characters of vegetable products, numerical indices that regulate their quality;
- vegetable products containing: polyholosides, vitamins, volatile oils, alkaloids, cardiogenic heterosides, saponosides, anthracene derivatives, phenolic compounds, flavonoids, coumarins, tannins substances etc;
- phytodrugs spectrum from the „Nicolae Testemitanu” SUMPh University Pharmaceutical Center, authorized in the Republic of Moldova and included in the State Medicines Nomenclature.



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- **at the application level:**

- to identify vegetable products according their macroscopic characters using the determiner;
- to be able to determine the optimum period of plant organ harvesting, drying and storage conditions in order to obtain vegetable products with maximum content of active principles;
- to possess the technologies of cultivation and care of medicinal plants;
- to be able to determine the medicinal plants resources in the spontaneous flora;
- to know the ecological aspects of the collection of the vegetable products, biodiversity conservation and reserve of the medicinal plants in different natural biocenoses in the Republic of Moldova;
- to determine the specific impurities of the vegetable products;
- 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 vegetable products;
- to know the actions of the most important groups of active principles of vegetable origin and of the medicinal products obtained from them;
- to inform patients, doctors, pharmacists about the rational use of vegetable products and phytodrugs.

- **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 practitioner doctors, pharmacists and patients over the multiple advantages of nature pharmacy.

IV. PROVISIONAL TERMS AND CONDITIONS

The 3rd year student requires the following:

- ✓ knowledge of the instruction language;
- ✓ knowledge from the Pharmaceutical botany course;
- ✓ 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
1.	Acquaintance with the practical training calendar plan of pharmacognosy and the safety technique instructions. Evaluation and accomplishment of the base of vegetable products, herbaceous and phytodrugs of Pharmacognosy discipline.	6
2.	Knowledge of phytodrugs within the "Nicolae Testemitanu" SUMPh University Pharmaceutical Center (evaluation of primary and secondary packaging, product name, pharmaceutical form, dose, composition, action, uses, validity and storage conditions).	6

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3.	Acquaintance with medicinal plants from the spontaneous and cultivated flora of the Republic of Moldova. Technique of the herborized of medicinal plants.	6
4.	Determination of the spontaneous medicinal plants resources of the flora in the Republic of Moldova in different habitats (forest, meadow, glade, etc.).	6
5.	Morphological description of medicinal plants and vegetable products. Acquisition of collection methods, primary processing, storage of vegetable products from different morphological groups depending on the nature of the active principles.	6
6.	Acquaintance with the methods and technologies of plants cultivation from the collection of "Nicolae Testemitanu" SUMPh of SCMPC.	6
7.	Evaluation of medicinal plants from the collection of "Nicolae Testemitanu" SUMPh of SCMPC, sources of polyholoside, vitamins, saponosides, cardiotoxic heterosides, alkaloids.	6
8.	Evaluation of medicinal plants from the collection of "Nicolae Testemitanu" SUMPh of SCMPC, sources of volatile oils, bitter substances, resins, anthracene derivatives, phenolic compounds, coumarins and chromones, flavonoids, tannins substances.	6
9.	Ecological aspects of the collection of vegetable products, biodiversity conservation and medicinal plants reserve in various natural biocenosis of the Republic of Moldova.	6
10.	Conference on the practical training of pharmacognosy. Differentiated colloquium.	6
	Total	60

VI. REFERENCE OBJECTIVES OF CONTENT UNITS

Objectives	Content units
Chapter 1. Evaluation and development of the base of the vegetable products, herbaria and phytodrugs	
<ul style="list-style-type: none">to know and to follow the instructions on safety techniques during the practical training period;to evaluate and accomplish the base of the vegetable products, herbaria and phytodrugs specific for the acquisition of the pharmacognostical course;to learn how to work with the Analytical Normative Documentation.	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 vegetable products.
Chapter 2. Evaluation of phytodrugs in the "Nicolae Testemitanu" SUMPh University Pharmaceutical Center	
<ul style="list-style-type: none">to describe the primary and secondary packaging of the medicinal product, including the name, pharmaceutical form, dose,	Storage conditions of phytodrugs in the pharmacy according to the chemical classification. Pharmacological action and particularities in the



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Objectives	Content units
<p>composition, validity and storage conditions;</p> <ul style="list-style-type: none">to inform consumers about the rational use of phytodrugs;to define the pharmacological actions of the phytodrugs according to the nature of the active principles and the specific administration particularities;to know the range of medicinal products from the "Nicolae Testemitanu" SUMPh of University Pharmaceutical Center.	<p>administration of vegetable medicinal products depending on their chemical nature and active principles.</p> <p>Authorized phytodrugs in the Republic of Moldova, included in the State Medicines Nomenclature.</p> <p>Used of vegetable products in the pharmaceutical industry of the Republic of Moldova.</p> <p>Pharmaceutical counseling in rational use of phytodrugs.</p>
Chapter 3. Familiarization with medicinal plants from the spontaneous flora of the Republic of Moldova	
<ul style="list-style-type: none">to identify medicinal plants from the spontaneous flora of the Republic of Moldova, using the determinator;to know the determination methods of the resurse of spontaneous medicinal plants from the Republic of Moldova flora;to apply herbal techniques and labeling of herbs;to know the methods of collecting plant organs - sources of vegetable products;to know the ecological aspects and conservation of the biodiversity of plants.	<p>Medicinal plants from the spontaneous flora of the Republic of Moldova.</p> <p>Resources of medicinal plants from the spontaneous flora of the country.</p> <p>Collection, processing and storage of vegetable products depending on the nature of the active principles and the morphological groups.</p> <p>Ecological aspects of the collection of vegetable products, biodiversity conservation and medicinal plants reserve in different natural biocenosis of the Republic of Moldova.</p>
Chapter 4. Evaluation of Medicinal Plants from the collections of "Nicolae Testemitanu" Scientific Center of Medicinal Plants Cultivation and other collections	
<ul style="list-style-type: none">to know the medicinal plants from the collections according to the groups of active principles and their actions;to know the methods and technologies of plant cultivation in the Center's collection;to acquire methods of preparation of herbarium and labeling of medicinal plantsto acquire methods of collecting, conditioning and storing of vegetable products according to the nature of the active principles.	<p>Acquaintance with the collection of medicinal plants of the "Nicolae Testemitanu" SUMPh SCMPC and other collections, with the methods and technologies of plant cultivation.</p> <p>Preparation of herbaria of medicinal plants and collection of vegetable products.</p> <p>Medicinal plants and vegetable products containing active principles (polyholosides, vitamins, volatile oils, bitter substances, cardiotonic heterosides, saponosides, alkaloids, anthracene derivatives, phenolic compounds, coumarins and chromones, flavonoids, tannins).</p>
VII. PROFESSIONAL (SPECIFIC (SC) AND TRANSVERSAL (TC) COMPETENCES AND STUDY OUTCOMES ✓ Professional (specific) (SC) competences <ul style="list-style-type: none">PC1. Knowledge, understanding and use of specific terms of pharmacognosy of general principles in the evaluation of vegetable products.PC2. Application of methods of pharmacognostical analysis: macroscopic of vegetal products	



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from different morphological groups. Knowledge of phytopreparations through action, indications, contraindications, adverse effects, administration mode and their interactions.

- 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 vegetable products and using phytodrugs.
- PC4. Knowledge of vegetable products and active principles responsible for pharmacotherapeutical effect. Active fit in the development process of practical training in pharmacognosy and participating in a conference of the practical study.
- 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 products of vegetable origin, active principles and their pharmacotherapeutic profile;
- to be able to apply techniques for collecting, conditioning of the vegetable products depending on the morphological group and the particularities of the active principles accumulation;
- to be able to identify vegetable products based on macroscopic characters using the determiner;
- 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).*

VIII. 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;	Interpretative skills; The ability to select the essentials; The ability to define the conclusions.	During the semester

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		Analyzing and evaluation of the relevant questions; Define conclusions regarding to subjects importance.		
2.	Working with the practical notebook for practical training in pharmacognosy	Report of daily activities 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.	Results of self-assessments; The modality to present the activities included in notebook for practical training.	During the semester
3.	Participation in the conference of practical training of pharmacognosy, and supporting of the colloquium.	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.	The way of herbaria presentation, the vegetable products; 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 semester

IX. 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 plant collections from autochthon and alohtown flora according to the chemical index, the type of the vegetable product and the harvesting period, with description, collecting, labeling, drying, packing of vegetable products;
- ✓ in the laboratory (working with the determiner, herbaria and vegetable products of the chair, etc.);
- ✓ at pharmacy (evaluation of vegetable 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 The practice notebook must include information on the safety technique and the concrete activities performed daily, plants collections visited (latin name of medicinal plants, vegetable 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 vegetable products, medicinal



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species and mono- and multi-component phytodrugs. It also will include the student's contribution to the conference's review of the study practice.

- **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 Practical Traineeship".

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

Current:

Student knowledge will be appreciated by:

- oral test;
- the correctness of completing the practice notebook;
- the quality of vegetable products;
- the quality of herbaria;
- the thematic report presented at the conference on the practical training.

Final: differentiated colloquium

The final mark consists of 2 components (0.5/0.5): oral examination and practical skills (identification of vegetable products and producing plants, the correctness of the completing of practice notebook, quality of vegetable products, herbaria and topic report).

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	
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.



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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.

X. RECOMMENDED LITERATURE:

A. Compulsory:

1. Evans W. Trease and Evans Pharmacognosy. Saunders Company Ltd. 1989
2. Nistreanu A., Calalb T. Stagiul de practică la Farmacognozie. Recomandări metodice. Chișinău, 2015.
3. Nistreanu A. Farmacognozie. Chișinău, 2000.
4. Cojocaru-Toma M. Produse vegetale și fitopreparate din Republica Moldova. Compendiu pentru lucrări de laborator la farmacognozie. Chișinău, 2017.
5. Negru A. Determinator de plante din flora Republicii Moldova. Chișinău. 2007.

B. Additional

1. European Pharmacopoeia, vol. I, II, 2016.
2. Farmacopeea română, ediția X. Editura medicală, București, 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”. Chișinău, 2010.