| | CD 8.5.1 CURRICULUM DISCIPLINĂ | Redacția: | 06 |
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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 **PHARMACEUTICAL BOTANY**

**Integrated studies**

Type of course: **Compulsory**

Chisinau, 2017

## 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**

The practical training is an important component and logic continuity in the study of the Pharmaceutical botany discipline. The expected activities will contribute to the completion of the theoretical knowledge, but the main purpose is to develop the practical skills of recognition and identification the plants from the Republic of Moldova spontaneous and cultivated flora, to apply the theoretical knowledge in the botanical field activities, to orientate in the natural vegetation associations, collecting and herborizing the botanical materials, etc. The role of the practical training is to familiarize the future pharmacist specialist with: local and global medicinal flora (in natural biocenosis and plant collections), morphological criteria for recognition, harvesting conditions respecting plant protection standards and contributing to the conservation of plant biodiversity.

Practical skills will serve as a basic support for the subsequent acquisition of the disciplines: Pharmacognosy (3rd year); Phytotherapy (3rd year); Pharmaceutical technology (3rd year) – sources of vegetable raw material in the production of phytopreparations and medicinal species; Toxic plants (5th year) – will apply the skills to identify with certainty the potentially toxic species. The acquired knowledge and skills will help to educate the specialist for pharmaceutical and research activity in the domain of medicinal plant valorization.

- **Mission of the curriculum (aim) in professional training**

Familiarization of the students with spontaneous and cultivated flora and developing practical skills of: detection, identification, description, determination and planting plants from different biocenoses (natural and artificial); maintenance of the medicinal plants collection; introducing into crop of plant species from local spontaneous flora and other geographical regions.

The knowledge and developed practical skills during the practical training on Pharmaceutical botany will contribute to complete the knowledge of the plant world, especially the medicinal flora, sources of local vegetable raw material, necessary for student for the further studies in order to become a contemporary specialist in the pharmaceutical domain.

The activities during the practical training will contribute to the development of critical thinking in addressing the basic issues of application of knowledge in the field of plant pharmacy. The knowledge and skills will serve as a benchmark in developing of correct professional and civic attitudes towards harnessing the local medicinal flora for the phytopreparations industry through the strategies of bioconservation and protection of the vegetable world.

- **Languages of the course:** Romanian, English, Russian
- **Beneficiaries:** students of the I$^{st}$ year, faculty of Pharmacy.

# I. MANAGEMENT OF THE DISCIPLINE

| | |
|---|---|
| Code of discipline | **S.02.O.023** |
| Name of the discipline | **Practical training on Pharmaceutical botany** |

| | | | |
|---|---|---|---|
| Person in charge of the discipline | | **dr. hab. in biol., univ. prof., Tatiana Calalb** | |
| Year | **I** | Semester/Semesters | **II** |
| Total number of hours, including: | | | **60** |
| Lectures | | Practical/laboratory hours | **60** |
| Seminars | | Self-training | **-** |
| Form of assessment | **colloquium** | Number of credits | **2** |

## II. 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:***

- general concept of vegetal cell structure organization;
- principles of vegetal world classification in taxa;
- to know the scientific taxonomy of species;
- morphological criteria of medicinal plants recognition and identification;
- to know the bases and the way to determine the taxonomy of spontaneous or cultivated plants.
- notions and national/global policies on the biodiversity of the spontaneous and cultivated vegetal world, plant protection.

✓ ***at the application level:***

- correct use of the morpho-anatomic and systematic terminology;
- ability to apply theoretical knowledge in the morphological description and identification of plant species in biocenoses;
- application of knowledge and skills in the practical activities of the SCCMP collection of USMF "Nicolae Testemitanu";
- identifying, collecting and herborizing medicinal plants and preserved / dried botanical material;
- to be able to apply the knowledge for the valorization of the local medicinal flora in terms of biodiversity and the protection of the vegetal world.

✓ ***at the integration level:***

- to realize the importance of the practical training on Pharmaceutical Botany for all disciplines provided by the study plan;
- applying the knowledge and practical skills to further acquirement of the courses of Pharmacognosy, Toxic Plants, Phytotherapy, Pharmacology;
- the use of abilities to highlight the morphological criteria for describing and identifying vegetable products and producing plants on disciplines of Pharmacognosy and Toxic Plants;
- correct application of the scientific nomenclature, the systematic classification of medicinal plants from the spontaneous and cultivated flora.

## III. PROVISIONAL TERMS AND CONDITIONS

The student of the I$^{st}$ year needs the following:

- knowledge of the language of instruction;
- knowledge in biology (lyceum level), and knowledge from Pharmaceutical botany course;
- competences in modern information technologies (using the Internet, document processing, electronic tables and presentations, using graphics software);
- teamwork skills;
- analytical and synthesis skills, generalization and communication skills;
- qualities – tolerance, compassion, autonomy, collegiality.

## IV. THEMES AND ESTIMATE ALLOCATION OF HOURS

***Practical training:***

| No. d/o | THEME | Number of hours<br>Practical hours |
|---|---|---|
| 1. | Program of practical training, methodical procedures and work techniques in field (natural biocenoses and medicinal plant collections) and laboratory, rules and technical security. Task-sharing of work. | 6 |
| 2. | Species of plants from spontaneous and cultivated flora from green areas of Chisinau municipality. Phenological notice, description, determination, herborization. Species of medicinal plants from division *Pynophyta*. | 6 |
| 3. | Species of medicinal plants in the field, greenhouse and medicinal and aromatic plant collections of Botany Garden (Institute) Academy of Science of Moldova. | 6 |
| 4. | Species of medicinal plants in the field and greenhouse collections of Dendrological Park (Chisinau) and in the collection of medicinal and aromatic plants of the Institute of Genetics, Physiology and Plant Protection of Academy of Science of Moldova. | 6 |
| 5. | Works in Laboratory herbarium: evaluation of chair herbaria and dried, preserved plant products, inventory activities and updating of herborized materials. Working with determiners and botanical specialized literature. | 6 |
| 6. | Morpho-anatomical analysis, description, herbarization of medicinal plants species, collection of botanical material for drying and preservation from the collection of the Scientific Center of Medicinal Plants Cultivation of USMF "Nicolae Testemitanu". Mounting, formation, provisional labeling of herbaria and thematic botanical exhibits. Collection, drying, preservation of botanical material. Practical activities in plant collections and laboratory activities. Familiarizing with growing technologies and introducing into crop of different plant species. | 18 |
| 7. | Familiarization with the medicinal plant species from spontaneous flora. Morpho-anatomical analysis, description, determination, herborization of plant species from spontaneous flora and adjacent areas CC of MP: terraced hill, forest, meadow, etc. | 6 |
| 8. | Final determination of species, assembly, formulation and labeling of herborized materials. Conference on the balance of practical training. Colloquium. | 6 |
| **Total** | | **60** |

## V. REFERENCE OBJECTIVES OF CONTENT UNITS

| Objectives | Content units |
|---|---|
| **Theme (chapter) 1. Program and work technique** | |
| • To know the purpose of the practical training.<br>• To familiarize with the security technique.<br>• To know the laboratory techniques and working methods for laboratory and field.<br>• To know the tools, materials and application techniques.<br>• To know how to work in the field and collections.<br>• To know the components of the documentation for the practical training and the way of accomplishment.<br>• To know the requirements for the herborization technique.<br>• To develop the skills of phenological observation.<br>• To be able to integrate knowledge through the strategies of bioconservation and plant protection. | Purpose and objectives.<br>Rules security technique.<br>Behavioral rules and standards of plant collecting.<br>Working technique and methods in laboratory and field.<br>Instrumentation, materials and application technique.<br>The working modality in field and plant collections.<br>Components of the documentation for practical training and mode of accomplishment.<br>Requirements for herborizing technique.<br>Strategies (global and national) for bio-conservation and plant protection. |
| **Theme (chapter) 2. Practical activities in the field** | |
| • To be able to highlight the morphological characteristics of the taxa: division, class, family, gender, species.<br>• To know the plant description plan.<br>• To be able to develop the plant morphological passport.<br>• To be able to apply morpho-anatomical diagnostic criteria in plant identification.<br>• To develop phenological observation and comparison skills.<br>• To develop practical working skills in medicinal plant collections and various natural biocenoses (grassland, meadow, forest, aquatic basin, etc.).<br>• To be able to apply the instruments correctly.<br>• To develop skills of collecting, drying, preserving, and planting.<br>• To be able to use knowledge to determine plant species in natural communities.<br>• To know plant species from medicinal plant collections and natural biocenoses, analyzed according to the systematic index.<br>• To demonstrate that they know the principles of the *Nicolae Testemitanu* SUMPh SCCMP and the | Morphological characteristics of taxa: division, class, family, genus, species.<br>Plans for morphological description of plants.<br>Morpho-anatomical diagnostic criteria.<br>Practical skills and techniques of working in collections: phenological observations, biometric measurements, analysis with magnifying apparatus, cropping of organs for preservation/drying, herborizing of various morphological types of plants (herbaceous, woody), specifications in succulent plant organs (flowers, fruits, leaves) or with metamorphosed organs (bulbs, rhizomes, tubers, etc.).<br>Morphology and taxonomy of plant species from *Nicolae Testemitanu* SCCMP of SUMPh.<br>Plant species from different natural biocenoses (meadow, forest, aquatic basin, etc.).<br>The dichotomical text keys in the determination of taxa.<br>Principles of medicinal plant organization. |

| Objectives | Content units |
|---|---|
| systematic taxonomy of the species. | |
| **Theme (chapter) 3. Laboratory practical activities and the report on practical training** | |
| • To be able to complete the practice book daily.<br>• To define properly the scientific taxonomy of herborized plants or collected botanical material.<br>• To develop the herb sheet mounting skills according to the advanced standards.<br>• To design correctly labels according to the requirements.<br>• To apply and integrate knowledge in the drafting of the thematic report.<br>• To demonstrate the knowledge and skills of presenting the documentation and the thematic report on the practical training balance.<br>• To be able to highlight the value and role of practical training in becoming a pharmacist specialist. | The notebook on practical training.<br>Herb sheets labeled.<br>Dried/preserved botanical material.<br>Documentation on practical training.<br>Thematic report (spontaneous and cultivated medicinal flora, types of vegetation, protected reserves and areas, protected plants, bio-conservation strategies, etc.).<br>The scientific taxonomy of plant species in SCCMP of SUMPh "Nicolae Testemitanu".<br>The role of practical training - opinions. |

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

✓ **Professional (specific) (SC) competences**

- CP 1. Knowledge of the scientific taxonomy, the spontaneous and cultivated medicinal plant species, including the SCCMP of the *Nicolae Testemitanu* SUMPh, the norms for the valorization of the medicinal flora through the strategies of plants bioconservation and protection.
- CP 2. Development of the abilities of: observation, morphological description, highlighting of morphological indices with diagnostic character, application of dichotomic textual keys in the identification of taxa, collection and herborization of botanical materials.
- CP 3. Applying knowledge in identifying the reasons for insufficiently studying and valorization of the local medicinal flora.

✓ **Transversal competences (TC)**

- CT 1. Responsible implementation of professional tasks with the application of the values and norms of professional ethics, the tendency to develop practical knowledge and skills, selection of digital materials, critical analysis and the formulation of conclusions, compliance with ethical and deontological norms.
- CT 2. Promoting initiative spirit, team work ability and respect for colleagues, continually developing practical skills and applying them to know the medicinal flora and identifying plant products.

✓ **Study outcomes**

- To be able to apply theoretical knowledge in the morphological description and identification of the taxa.
- To know the principles of creation, maintenance works and SCCMP gene pool of *Nicolae Testemitanu* SUMPh.
- To know the medicinal spontaneous and cultivated local flora (scientific taxonomy).
- To know the medicinal plants of spontaneous flora, cultivated locally and globally.
- To be able to implement the accumulated knowledge and gained practical skills in becoming a pharmacist specialist and later in the pharmaceutical and research activity.
- To be competent and to contribute to the valorization of the local flora and to promote the development of the field of national production of phytopreparations.

## VII. STUDENT'S SELF-TRAINING*

| No. | Expected product | Implementation strategies | Assessment criteria | Implementation terms |
|---|---|---|---|---|
| 1. | | | | |
| 2. | | | | |
| 3. | | | | |
| 4. | | | | |

*Note: No hours were allocated for the student's self-training

## VIII. METHODOLOGICAL SUGGESTIONS FOR TEACHING-LEARNING-ASSESSMENT

- ***Teaching and learning methods used***

Practical training on Pharmaceutical botany includes: laboratory activities (working with determiners, herborized, preserved or fixed material), documentation (phenological observations, notes, labels, morphological description of plants, work with determiners, botanical atlases, graphic and illustrative material); and field activities (phenological observations, biometric measurements, bio-morphological analysis according to the scheme, collection of whole/fragmented botanical material, fixed/preserved, herborization on sheets of plants , plant maintenance in collections, knowledge of different vegetation types - excursions in various biocenoses and medicinal plant collections, etc.).

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

Works in micro groups and individually. Interactive discussions with "Case study"; "Portfolio", debates at the conference on "The Balance of field practical training".

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

**Current**: frontal and/or individual control by 2 practical skills assessments (1 evaluation - knowledge of the tools and working techniques in the collection/field, description, identification, taxonomy of the medicinal plant species in the field; 1 evaluation - fulfilling the practical notebook, the recognition of the herborized plants, quality of preserved / fixed botanical material, herbarium quality, contribution to the thematic report).

**Final:** colloquium with ”atested”

**Final appreciation** will consist of the average mark (0.5/0.5) from 2 assessments of the practical skills with the qualification – atested.

**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.

*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.*

## IX. RECOMMENDED LITERATURE:

### *A. Compulsory:*

1. Calalb T., Nistreanu A. Stagiul practic la botanica farmaceutică, Chişinău, Ed. Medicina, 2015.
2. Гурина Н., Мушкина В., Волочник М. Ботаническая практика, Учебно-методическое пособие, Минск, ГБМУ, 2016.
3. Negru A. Determinator de plante din flora Republicii Moldova, Chişinău, Ed. Universul, 2007.
4. Kruger A. The pochet guide to HERBS, Ed. Parkgate Books, London, 1992.

*B. Additional:*

1. Calalb T. Bodrug M. Botanica faramaceutică. CEP Medicina, Chişinău, 2009.
2. Dutta T. Botany (for degree students). Oxford University press. 6th Ed., 1999.
3. Яковлев Г., Челомбитько В. Ботаника, Москва, Изд. «Просвещение», 1990.
4. Balan V., Sava P. Calalb T. et al. Cultura arbuștilor fructiferi și căpșunului. Tipog. „Bons Offices", Chisinau, 2017.
5. Cartea Roşie a Republicii Moldova. Plante. ed. a III., Chişinău: Ştiinţa. 2015.
6. Popovici L., Mourzi C., Toma L. Atlas botanic. Bucureşti, 1998, 2002.
7. Oroian S. Botanică farmaceutică, Ed. Universităţii de Medicină şi Farmacie Târgu-Mureş, 2011.
8. Surse informaționale de pe *site*-uri de specialitate.