

COURSE SYLLABUS

1. Data about the program

1.1 Higher education institution	Babeş-Bolyai University
1.2 Faculty	Faculty of Biology and Geology
1.3 Doctoral school	Doctoral School of Integrative Biology
1.4 Field of study	Integrative Biology
1.5 Study cycle	Doctorate
1.6 Study program / Qualification	Doctoral training / PhD in Biology

2. Course data

2.1 Name of discipline	Pharmaceutical Natural Extracts						
2.2 Teacher responsible for lectures	Prof.dr. PÂRVU Marcel						
2.3 Teacher responsible for seminars	Prof.dr. PÂRVU Marcel						
2.4 Year of study	I	2.5 Semester	1	2.6. Type of evaluation	C	2.7 Course framework	Opt

3. Estimated total time of teaching activities (hours per semester)

3.1 Hours per week	4	Out of which: 3.2 Lectures	2	3.3 Seminars / Laboratory classes	2
3.4 Total hours in the curriculum	48	Out of which: 3.5 Lectures	24	3.6 Seminars / Laboratory classes	24
Allocation of study time:					hrs
Study supported by textbooks, other course materials, recommended bibliography and personal student notes					20
Additional learning activities in the library, on specialized online platforms and in the field					8
Preparation of seminars / laboratory classes, topics, papers, portfolios and essays					8
Tutoring					10
Examinations					2
Other activities: -					-
3.7 Individual study (total hours)					48
3.8 Total hours per semester					96
3.9 Number of credits					20

4. Preconditions (where applicable)

4.1 Curriculum	<ul style="list-style-type: none"> not applicable
4.2 Competences	<ul style="list-style-type: none"> Correct use of the biologic material and labware Identification of some common therapeutic plant species based on photos

5. Conditions (where applicable)

5.1 Conducting lectures	<ul style="list-style-type: none"> Logistic video support and/or portfolio with 50 therapeutic plant species
5.2 Conducting seminars / laboratory classes	<ul style="list-style-type: none"> Participation to at least 80% tutorial classes is mandatory in order to be evaluated

6. Specific competences acquired

Professional competences	<ul style="list-style-type: none"> • Knowledge about the main morphological characteristics of the most common cultivated and spontaneous therapeutic plants from Romania and the harvesting and conservation practices for their use; • Knowledge about the therapeutic effects (antimicrobial, sedative, hepatoprotective, analgesic, antirheumatic, antiviral, etc.) of some common cultivated and spontaneous plant species (about 50 species); • An edited report, based on literature, with a structure specific to a research article.
Transversal competences	<ul style="list-style-type: none"> • Developing the abilities to use information about therapeutic plants in other biological disciplines and other fields; • Using biochemistry, genetic, molecular and cell biology, microbiology, plant physiology, human anatomy, animal physiology, botany, etc. information to present some characteristics of therapeutic plants (alkaloids, polyphenols, sterols, peptides, proteins, enzymes, genes, toxins, metabolism, etc.); • Developing the practical-application capacity for the use of information.

7. Course objectives (based on the acquired competencies grid)

7.1 The general objective of the course	<ul style="list-style-type: none"> • Presenting the therapeutic effect of some common cultivated and spontaneous plants from Romania.
7.2 Specific objectives	<ul style="list-style-type: none"> • Knowledge about the identification and chorology of therapeutic plant species in nature (about 50 species). • Knowledge about the chemical composition of therapeutic plants, their harvesting and preparing the plant material to obtain the final product; contraindications. • Acquiring specific techniques necessary to obtain plant extracts by percolation and testing their antimicrobial activity.

8. Content

8.1 Lectures	Teaching methods	Comments
1. Therapeutic uses of some medicinal plants.	Conversation, problematization, description	Adaptative teaching, interactive teaching
2. Chemical composition of medicinal and aromatic plants: active principles (natural compounds).		
3. Aspects regarding the use of medicinal and aromatic plants in Romania.		
4. Toxicity of plant extracts; factors that influence the production and quality of medicinal and aromatic plants.		
5. Medicinal algae and mushrooms.		
6. Therapeutic effects of some pteridophytes and gymnosperm species (fir tree, spruce, pine). Rules for using plant preparations.		
7. Angiosperms medicinal plants from: Ranunculaceae, Rosaceae, Plantaginaceae and Tiliaceae families.		
8. Angiosperms therapeutic plants from: Urticaceae, Elaeagnaceae, Betulaceae, Apiaceae (Umbeliferae) families.		
9. Angiosperms medicinal plants from: Lamiaceae, Boraginaceae, Scrophulariaceae families.		
10. Angiosperms medicinal plants from: Ericaceae, Asteraceae, Gentianaceae families		
11. Angiosperms medicinal plants from: Apocynaceae, Liliaceae families.		

12. Romanian phytotherapeutic preparations

Bibliography

1. Muntean L.S., 2016, *Tratat de plante medicinale cultivate și spontane*, Risoprint, Cluj-Napoca; 847 pag.
2. Duke, J.A., Jo Bogenschutz-Godwin, M., duCellier, J., Duke, P-A.K., 2002, *Medicinal Herbs*, CRC Press, 870 pag.
3. Bhat S.V., Nagasampagi B.A., Sivakumar M., 2005, *Chemistry of Natural Products*, Narosa Publishing House, 840 pag.
4. Pârnu, M., 2020, *Botanică sistematică Thallophyta*, Presa Universitară Clujeană (<http://www.editura.ubbcluj.ro/bd/ebooks/pdf/2572.pdf>)
5. Pârnu, M., 2007, *Ghid practic de micologie*, Ed. Casa Cărții de Știință, Cluj-Napoca (<http://marcelparnu.ro/micologie/>)
6. Articole din reviste de specialitate: *Fitoterapia* (<https://www.journals.elsevier.com/fitoterapia>), *Phytotherapy Research* (<https://onlinelibrary.wiley.com/journal/10991573>), *Planta medica* (<https://www.thieme.com/books-main/biochemistry/product/3494-planta-medica>; [Molecules](https://www.mdpi.com/journal/molecules) (<https://www.mdpi.com/journal/molecules>) etc.

8.2 Seminars / laboratory classes	Teaching methods	Comments
1. Data base/journals accessing about phytotherapeutic information for ppt presentation/reports. Analyze scientific papers about pharmaceutical natural extracts;	Discourse, conversation, problematization,	Analyze article from bibliography
2. Natural extract (tincture) of <i>Allium sativum</i> and <i>Allium fistulosum</i> : botanic characteristics; species identification; plant material harvest; percolation; filtration; conservation; chemical composition; therapeutic effects; garlic varieties;	Individual activity, conversation, observation, problematization	Analyze article from bibliography
3. Natural extract (tincture) of <i>Allium cepa</i> and <i>Allium ursinum</i> : botanic characteristics; species identification; plant material harvest; percolation; filtration; conservation; chemical composition; therapeutic effects; voucher; onion varieties approved in Romania; reagents;	Individual activity, conversation, observation, problematization	Analyze article from bibliography
4. Natural extract (tincture) of <i>Allium senescens</i> ssp. <i>montanum</i> botanic characteristics; species identification; plant material harvest; percolation; filtration; conservation; chemical composition; therapeutic effects; voucher; reagents;	Individual activity, conversation, observation, problematization	Analyze article from bibliography
5. Natural extract of <i>Plantago</i> (<i>P. major</i> , <i>P. media</i> , <i>P. lanceolata</i> , <i>P. cornuti</i> , <i>P. sempervirens</i>): botanic characteristics; species identification; plant material harvest; percolation; filtration; conservation; chemical composition; therapeutic effects; voucher; reagents;	Individual activity, conversation, observation, problematization	Analyze article from bibliography
6. Natural extract of <i>Chelidonium majus</i> botanic characteristics; species identification; plant material harvest; percolation; filtration; conservation; chemical composition; therapeutic effects; voucher; reagents; green nanoparticles;	Individual activity, conversation, observation, problematization	Analyze article from bibliography
7. Natural extract of <i>Berberis vulgaris</i> : botanic characteristics; species identification; plant material harvest; percolation; filtration; tincture conservation; chemical composition; therapeutic effects; voucher;	Individual activity, conversation, observation, problematization	Analyze article from bibliography

8. Natural extract of <i>Vinca</i> (<i>V. minor</i> , <i>V. major</i> , <i>V. major</i> var. <i>variegata</i> , <i>V. herbacea</i>): botanic characteristics; species identification; plant material harvest; percolation; filtration; tincture conservation; chemical composition; therapeutic effects; voucher; reagents; green nanoparticles;	Individual activity, conversation, observation, problematization	Analyze article from bibliography
9. Natural extract of <i>Catharanthus roseus</i> : botanic characteristics; species identification; plant material harvest; percolation; filtration; tincture conservation; chemical composition; therapeutic effects; voucher; reagents; cultivated varieties;	Individual activity, conversation, problematization	Analyze article from bibliography
10. Natural extract of <i>Hedera helix</i> and <i>Mahonia aquifolium</i> : botanic characteristics; species identification; plant material harvest; percolation; filtration; conservation; chemical composition; therapeutic effects; voucher; reagents;	Individual activity, conversation, problematization, ppt presentation, grading	Analyze article from bibliography
11. Antifungal natural extracts: <i>Chelidonium majus</i> , <i>Hedera helix</i> ; <i>Allium sativum</i> ; research method; culture medium; minimum inhibitory concentration (MIC); fungicide effect, etc.	Individual activity, conversation, problematization	Analyze article from bibliography
12. Individual presentation of a chosen therapeutic plant as a ppt presentation and printed report, according to the individual study plan: Examination and report delivery.	Individual activity, conversation, problematization, ppt presentation, grading the ppt presentation	Examination

Bibliography:

1. Țigu AB., Moldovan CS., Toma V-A., Farcaș AD., Moț AC., Jurj A., Fischer-Fodor E., Mircea C., Pârvu M., **2021**, Phytochemical analysis and in vitro effects of *Allium fistulosum* L. and *Allium sativum* L., extracts on human normal and tumor cell lines: a comparative study, *Molecules*, 26 (3), 574, <https://doi.org/10.3390/molecules26030574>;
2. Ciorîță A., Zăgorean-Tuza C., Moț AC, Pârvu M., **2021**, The Phytochemical Analysis of *Vinca* L. Species Leaf Extracts Is Correlated with the Antioxidant, Antibacterial, and Antitumor Effects, *Molecules*, 26(10), 263040, <https://doi.org/10.3390/molecules26103040>;
3. Ciorîță, A., Suci, M., Macavei, S., Kacso I., Lung I., Soran M-L., Pârvu M., **2020**, Green Synthesis of Ag-MnO₂ Nanoparticles using *Chelidonium majus* and *Vinca minor* Extracts and Their In Vitro Cytotoxicity, *Molecules*, 25, 819; [doi:10.3390/molecules25040819](https://doi.org/10.3390/molecules25040819);
4. Pârvu M., Moț C.A., Pârvu A.E., Mircea C., Stoeber L., Roșca-Casian O., Țigu A.B., **2019**, *Allium sativum* Extract Chemical Composition, Antioxidant Activity and Antifungal Effect against *Meyerozyma guilliermondii* and *Rhodotorula mucilaginosa* Causing Onychomycosis, *Molecules* 24(21), 3958; [doi:10.3390/molecules24213958](https://doi.org/10.3390/molecules24213958);
5. Toma V.A., Țigu A.B., Farcaș A.D., Sevastre B., Taulescu M., Gherman A.M.R., Roman I., Fischer-Fodor E., Pârvu M., **2019**, New Aspects Towards a Molecular Understanding of the Allicin Immunostimulatory Mechanism via Colec12, MARCO, and SCARB1 Receptors, *Int. J. Mol. Sci.* 20(15), 3627; <https://doi.org/10.3390/ijms20153627>;
6. Farcaș AD., Moț AC., Pârvu AE., Toma VA., Popa M., Mihai MC., Sevastre B., Roman I., Vlase L., Pârvu M., **2019**, *In Vivo* Pharmacological and Anti-inflammatory Evaluation of Xerophyte *Plantago sempervirens* Crantz, *Oxidative Medicine and Cellular Longevity*, Article ID 5049643, 13 pages, <https://doi.org/10.1155/2019/5049643>;
7. Andreicuț, A.D., Fischer-Fodor E., Pârvu, A.E., Țigu, A.B., Cenariu, M., Pârvu, M., Cătoi, F.A., Irimie A., **2019**, Antitumoral and Immunomodulatory Effect of *Mahonia aquifolium* Extracts, *Oxidative Medicine and Cellular Longevity*, Volume 2019, Article ID 6439021, 13 pages, <https://doi.org/10.1155/2019/6439021>

8. Vlase L., Parvu M., Parvu E.A., Toiu A. **2013**, Chemical Constituents of Three *Allium* Species from Romania. *Molecules*. 18(1):114-127; (<http://dx.doi.org/10.3390/molecules18010114>)
9. Rosca-Casian, O., Mircea, C., Vlase, L., Gheldiu A-M., Teuca D.T., Pârvu, M., 2017, "Chemical composition and antifungal activity of *Hedera helix* leaf ethanolic extract" *Acta Biologica Hungarica* 68 (2), 2017, pp. 196-207.
10. Pârvu, M., Vlase, L., Pârvu, A.E., Roșca-Casian, O., Gheldiu A-M., Pârvu, O., 2015, Phenolic Compounds and Antifungal Activity of *Hedera helix* L. (Ivy) Flowers and Fruits, *Not Bot Horti Agrobo* 43(1), 53-58.
11. Pârvu, M., Vlase, L., Fodorpataki, L., Pârvu, O., Roșca-Casian, O., Bartha C., Barbu-Tudoran, L., Pârvu, A.E., 2013, Chemical Composition of Celandine (*Chelidonium majus* L.) Extract and its Effects on *Botrytis tulipae* (Lib.) Lind Fungus and the Tulip, *Notulae Botanicae Horti Agrobotanici Cluj-Napoca*, 41(2), 414-426.
12. Pârvu, M., Pârvu AE., 2011, *Antifungal plant extracts*, pag. 1055-1062, In: *Science against microbial pathogens: communicating current research and technological advances*, A. Méndez-Vilas (Ed.), Volume 2 ISBN (13): 978-84-939843-2-8, Publisher: Formatex Research Center, Badajoz, Spain (<http://www.formatex.info/microbiology3/book/1055-1062.pdf>)
13. Articol din revistă de specialitate: Fitoterapia (<https://www.journals.elsevier.com/fitoterapia>), *Phytotherapy Research* (<https://onlinelibrary.wiley.com/journal/10991573>), *Planta medica* (<https://www.thieme.com/books-main/biochemistry/product/3494-planta-medica>; *Molecules* (<https://www.mdpi.com/journal/molecules>) etc.

9. Aligning the contents of the discipline with the expectations of the epistemic community representatives, professional associations and standard employers operating in the program field

- Theoretical and practical training of students according to the latest information from literature.
- Specific notions and skills are formed, necessary to other disciplines in the field or related fields.
- Ensuring a practical applied training of students, stimulating their creative and innovative spirit.
- Stimulating the interest for knowing, protecting and nature exploitation, for the benefit of human health.

10. Examination

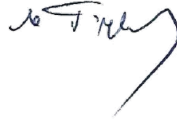
Activity type	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Weight in the final grade
10.4 Lectures	A printed report (6 pgs.) about a chosen therapeutic plant with the following structure: introduction, morphology, chorology, systematic taxonomy, chemical composition (active principles), therapeutic effects, conclusions, bibliography	Report assessment	50%
	The quality of bibliography, information diversity, scientific content, etc.		
10.5 Seminars / laboratory classes	Description of how to prepare a natural pharmaceutical extract from	Examination	50%
	Examples of pharmaceutical natural		

	extracts from plants of the genus		
10.6 Minimum performance standard: admission score			
<ul style="list-style-type: none"> • Knowledge of 50% from the information presented in the course; Knowledge of 60% from information in the seminar 			


Date of issue

March, 2021

Signature of the teacher
responsible for lectures
Prof.dr. PÂRVU Marcel



Signature of the teacher
responsible for seminars
Prof.dr. PÂRVU Marcel



Date of approval by the doctoral school council

Signature of the doctoral school director

