Study program: Integrated academic studies of Pharmacy

Type and level of the study program: integrated academic studies

Course title: PHARMACOGNOSY I (PhIII-PHGNI)

Teachers: Neda S. Gavarić, Nebojša V. Kladar

Course status: compulsory

ECTS Credits: 8

Condition: Organic Chemistry II; General Biochemistry

Course aim

The main objective of the course is to provide students basic knowledge about the most important biologically and pharmacologically active compounds of natural origin, through learning about their biological (ecological) role in organisms that synthesize them, biogenetic origin and pathways of biosynthesis of main classes of secondary biomolecules, as well as about their chemical characteristics and pharmacological activities. Additional goal of the course is that students acquire a range of skills in the basic experimental methods for the isolation and determination of main classes of pharmacologically active biomolecules, as well as for the chemical characterization of certain isolated bioactive compounds of natural origin. Through this course, students should develop the ability of critical thinking, analysis and interpretation of certain problems in this scientific discipline.

Expected outcome of the course:

It is expected that after completion of the course, students are able to explain the biosynthetic pathways of different classes of biologically active compounds, their structural characteristics and pharmacological activity. The gained knowledge is the basis for their active participation in the higher courses of Pharmacognosy and Phytotherapy.

Furthermore, it is expected that students acquire the skills to work in laboratories and master the experimental techniques for isolation and analysis of selected pharmacologically active classes of secondary biomolecules from natural resources. In addition, it is expected also to develop skills for critical evaluation and interpretation of results of specific analyzes.

Course description

Theoretical education

1. Pharmacognosy as a science. Definition and history.
2. Secondary metabolism, relationship between the primary and secondary metabolism and the role of secondary biomolecules (SB) in plants. Basic biosynthetic pathways of bioactive molecules in drugs.
3. Biologically active primary plant metabolites.
4. Basic mechanisms sof biosynthetic reactions. Biological and physiological functions of SB. Pharmacological role. Classification of secondary biomolecules.
5. Definition of alkaloids. Basic structural characteristics. Classification of alkaloids based on their structure, biosynthetic origin and biological activity.
6. Alkaloids derived from L-ornithine. Alkaloids derived from L-lysine.
7. Alkaloids derived from *phenylalanine* and tyrosine; Alkaloids derived from L-tryptophan. Indole alkaloids. Biosynthesis, structure and pharmacological activity.
8. Alkaloids derived from L-histidine, terpene, steroid and purine alkaloids.
9. Plant phenols. Generally. Simple phenolics.
10. Phenols synthesized by elongation of the side chain.
11. Polyphenols.
12. Phenolic polymers. Anthraquinones.
13. Isoprenoids- terpenoids.
14. Iridoids. Diterpenes.
15. Triterpenes: saponines and cardiac glycosides (cardenolides and bufadienolides).

Practical education (labs):

1. Work in the laboratory of Pharmacognosy - chemical methods, chromatographic techniques and methods of spectral analysis.
2. Isolation, qualitative and quantitative analysis of alkaloids - tropane, purine morphinan, steroid and phenylalkylamine type.
3. Qualitative reactions (determination) of certain classes of biomolecules in secondary plant extracts (cardiac, cyanogenic, sulfur, phenolic, flavonoid, coumarin and anthraquinone glycosides).
4. Quantitative determination of anthraquinone glycosides.
5. Isolation, qualitative and quantitative determination of flavonoids and anthocyanins.
6. Determination of sugar and vitamins in herbal drugs.
7. Determination of the value of bitter drugs.
8. Determination the value of mucilage drugs.
9. Isolation and analysis of essential oils from aromatic drugs.
10. Isolation and analysis of fatty oil from the seeds of selected drugs.
11. Qualitative reactions and quantification of saponins.
12. Qualitative reactions and quantification of tannins.

Literature

Compulsory

1. Dewick PM. Medical Natural products (second edition). John Wiley and sons, Ltd 2002.
2. Wagner H, Bladt S. Plant Drug Analysis, 2nd edition. Springer-Verlag, Berlin, Heidelberg, New York, 2001.
3. Laboratory classes in Pharmacognosy, script for internal use. Department of Pharmacy, Faculty of Medicine, Novi Sad.

Additional

-

Number of active classes				Other:
Lectures: 45	Practice: 60	Other types of teaching: -	Research related activities: -	-

Teaching methods: 1. Theoretical education. 2. Practical education (labs)

Student activity assessment (maximally 100 points)

Pre-exam activities	**points**	**Final exam**	**points**
Lectures	5	Written	20
Practices	10	Oral	20
Colloquium	3x15	.....	
Essay	-		