

Study Programme: Bachelor Academic Studies in Biochemistry
Course Unit Title: Biochemistry of Medicinal Plants
Course Unit Code: B-403
Name of Lecturer(s): full professor, Neda Mimica-Dukić, assistant professor Nataša Simin
Type and Level of Studies: Bachelor of Science Degree
Course Status (compulsory/elective): elective
Semester (winter/summer): winter
Language of instruction: English
Mode of course unit delivery (face-to-face/distance learning): Face-to-face
Number of ECTS Allocated: 6
Prerequisites: None
Course Aims: To provide students with basic knowledge of structures of significant biologically and pharmacologically active classes of plant secondary biomolecules, biosynthetic pathways and pharmacological mechanisms of action. To introduce students to the latest scientific achievements in application of drugs and phytopreparations in modern medicine. Developing students' practical skills to apply laboratory techniques for isolation and chemical determination of pharmacologically active natural products.
Learning Outcomes: After successful completion of this course, the student is able to: (1) explain the importance of secondary biomolecules for plants and humans, (2) describe structural divergence, biosynthetic origin and pharmacological effects of major classes of secondary plant biomolecules, (3) apply appropriate experimental methods for the isolation and analysis of certain classes of secondary biomolecules.
<p>Syllabus:</p> <p><i>Theory</i></p> <p>Medicinal plants and their role in the development of modern medicine and pharmacology. Biologically active constituents of medicinal plants. Physiological and ecological role of secondary molecules in plants. Alkaloids in modern medicine. Biological and pharmacological functions of alkaloids, biosynthesis of certain classes of alkaloids, alkaloid drugs and their usage. Plant phenolics: classification, physiological and ecological significance in plants. General pathways of biosynthesis and degradation of phenolic compounds. Cannabinols, phenolic acids, phenylpropanoids, coumarins. Anthraquinone drug application in phytotherapy. Flavonoids: division, biosynthesis. Pharmacological significance and role of flavonoids. Essential oils: chemical structures, biosynthesis, and biological role and pharmacological effects. Aromatic herbal drugs and their usage in phytotherapy. Diterpenoids: biosynthesis, physiological and pharmacological significance. Triterpenoid compounds as potential non-steroidal anti-inflammatory drugs. Cardiotonic glycosides, classification, distribution in plants and pharmacological activity.</p> <p><i>Practice</i></p> <p>Methods of extraction of secondary metabolites from plant material. Detection of particular groups of alkaloids in plant extracts. Volumetric determination of alkaloids. Detections of particular classes of phenolic compounds. Spectrophotometric determination of total phenolics and total flavonoids. Detection and quantitative determination of anthraquinone glycosides in herbal drugs. Colored test-reactions on saponins and cardiotonic glycosides. Hydro distillation of essential oils. Evaluation of chemical and physical properties of essential oils. Chromatographic techniques in analysis of plant extract (TLC, HPLC, GS/MS).</p>
Required Reading:

1. Dewick P.M. Medicinal Natural Products. Wiley, 2009.
2. Heinrich, M., Barnes, J., Gibbons, S., Williamson, E.M. Fundamentals of Pharmacognosy and Phytotherapy. 2nd. Edition. Churhill Livingstone, Elsevier, 2012.
3. Gunnar Samuelsson, Drugs of Natural Origin. Text book of Pharmacognosy, 4th Edition. Apotekarsocieteten, 1999.

Weekly Contact Hours: 5 (75)	Lectures: 3 (45)	Practical work: 2 (30)
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Teaching Methods:

Lectures, laboratory work, seminar.

Knowledge Assessment (maximum of 100 points): 100

Pre-exam obligations	points	Final exam	points
Active class participation	5	written exam/tests 1,2,3	60
Practical work	25	oral exam	
Preliminary exam(s)		
Seminar(s)	10		

The methods of knowledge assessment may differ; the table presents only some of the options: written exam, oral exam, project presentation, seminars, etc.