

Course Syllabus

I. General Information

Course name in English	Phytochemical analysis
Course name in Polish	Analiza fitochemiczna
Programme	Bioanalytical technologies
Level of studies (BA, BSc, MA, MSc, long-cycle MA)	MSc
Form of studies (full-time, part-time)	full-time
Discipline	Biological sciences
Language of instruction	English

Course coordinator/person responsible	Dr Paweł Patrzylas/ mgr Jakub Ciepielski
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Type of class (<i>use only the types mentioned below</i>)	Number of teaching hours	Semester	ECTS Points
lecture	30	III	6
tutorial			
classes	30	III	
laboratory classes			
workshops			
seminar			
introductory seminar			
foreign language classes			
practical placement			
field work			
diploma laboratory			
translation classes			
study visit			

Course pre-requisites	knowledge in biochemistry
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II. Course Objectives

Familiarization with the biosynthetic pathways of basic groups of plant primary and secondary metabolites.
Getting to know the structure, properties and occurrence of selected bioactive compounds and their application in various branches of industry.
To familiarize students with the methods of isolation, purification and identification of selected compounds of plant origin.

III. Course learning outcomes with reference to programme learning outcomes

Symbol	Description of course learning outcome	Reference to programme learning outcome
KNOWLEDGE		
W_01	student possesses ordered knowledge in terms of primary and secondary metabolism in plants, which allows him to understand complex processes and phenomena occurring in plant organisms	K_W01
W_02	enumerates and performs detailed characterization of plant metabolites, describes plant raw materials and their importance for industry, agriculture and pharmacology	K_W01, K_W02
W_03	possesses detailed knowledge of the chemical compounds contained in the plant body	K_W01
W_04	knows the methods of testing plant raw materials, selects a research tool for the type of material being analyzed	K_W05
SKILLS		
U_01	student is able to isolate, purify and identify selected compounds of plant origin	K_U01
U_02	plans and carries out laboratory experiments in the field of phytochemistry, is able to develop results and draw conclusions	K_U07
U_03	performs qualitative and quantitative analysis of the obtained results using mathematical or statistical methods	K_U04
U_04	based on literature data and the results of his own investigations he prepares a multimedia presentation and papers on a given topic	K_U05
SOCIAL COMPETENCIES		
K_01	spots the necessity to analyze the composition of raw materials in plants coming from various ecological niches and subjected to the influence of various environmental factors	K_K01
K_02	is able to work in a group in accordance with health and safety rules	K_K05

IV. Course Content

Lecture content: 1. Introduction and overview of plant metabolites. The concept of primary and secondary metabolism; 2. Plant constituents: proteins; 3. Plant constituents: carbohydrates; 4. Plant constituents: balsams and hormones; 5. Essential and nonessential oils; 6. Plant Crude Drugs; 7. The chemistry of plant metabolites; 8. Glycosides; 9. Alkaloids; 10. Tannins; 11. Terpenoids; 12. Flavonoids; 13. Other Plant Metabolites: lignins and vitamins; 14. Reactive oxygen species in plants; 15. Review and final exam preparations.

Classes content: 1. Introduction and syllabus; 2. The assessment of reactive oxygen species in plant material; 3. The measurement of plant antioxidant enzymes; 4. Plant proteins: determination and methods of analysis; 5. Isolation of essential oils from plant material; 6. Determination of the content of vitamin C; 7. Flavonoids and phenolic compounds – quantitative analysis. 8. Final test.

V. Didactic methods used and forms of assessment of learning outcomes

Symbol	Didactic methods (choose from the list)	Forms of assessment (choose from the list)	Documentation type (choose from the list)
KNOWLEDGE			
W_01	Conventional lecture	Exam / Written test	Evaluated test / written test
W_02	Conventional lecture	Exam / Written test	Evaluated test / written test
W_03	Conventional lecture	Exam / Written test	Evaluated test / written test
W_04	Conventional lecture	Exam / Written test	Evaluated test / written test
SKILLS			
U_01	Laboratory classes	Report	Report printout/ report file
U_02	Laboratory classes	Report	Report printout/ report file
U_03	Laboratory classes	Report	Report printout/ report file
U_04	Laboratory classes	Presentation	Presentation rating card
SOCIAL COMPETENCIES			
K_01	Laboratory classes	Report	Report printout/ report file
K_02	Laboratory classes	Observation	Observation report

VI. Grading criteria, weighting factors

Mark	Evaluation criteria	
Very good (5)	the student realizes the assumed learning outcomes at a very good level	the student demonstrates knowledge of the education content at the level of 95-100%
Over good (4.5)	the student accomplishes the assumed learning outcomes an over good level	the student demonstrates knowledge of the education content at the level of 85-94 %
good(4)	the student accomplishes the assumed learning outcomes at a good level	the student demonstrates knowledge of the education content at the level of 75-84%
Quite good(3.5)	the student accomplishes the assumed learning outcomes at a quite good level	the student demonstrates knowledge of the education content at the level of 65-74%

sufficient (3)	the student accomplishes the assumed learning outcomes at a sufficient level	the student demonstrates knowledge of the education content at the level of 55-64%
insufficient (2)	the student accomplishes the assumed learning outcomes at an insufficient level	the student demonstrates knowledge of the education content below the level of 55%

VII. Student workload

Form of activity	Number of hours
Number of contact hours (with the teacher)	70 (60 + 10 individual consultation)
Number of hours of individual student work	80

VIII. Literature

Basic literature
<ol style="list-style-type: none"> 1. McCreath S.B., Delgoda R., Pharmacognosy Fundamentals, Applications and Strategies, 1st Edition, 2016, Academic Press 2. Egbuna Ch., Ifemeje J.Ch., Chidi S.U., Kumar S., Kurhekar J.V., Sharif N., Phytochemistry: Volume 1: Fundamentals, Modern Techniques, and Applications, 2018, Apple Academic Press 3. Xu Z., Howard L.R., Analysis of Antioxidant-Rich Phytochemicals 1st edition, 2012, Wiley-Blackwell
Additional literature
Articles in some scientific journals