Zał. nr 5 do ZW 78/2023

Attachment no. 4. to the Program of Studies

FACULTY of CHEMISTRY

SUBJECT CARD

Name of subject in Polish *Naturalne produkty medyczne*
Name of subject in English *Medicinal natural products*
Main field of study (if applicable): Biosciences
Specialization (if applicable): Medicinal chemistry
Profile: academic
Level and form of studies: 2nd level, full-time
Kind of subject: obligatory
Subject code: W03BSS-SM2022W, W03BSS-SM2022L

Group of courses: NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15		30		
Number of hours of total student workload (CNPS)	50		50		
Form of crediting (Examination / crediting with grade)	examination		passing with a grade		
For group of courses mark (X) final course					
Number of ECTS points	**2**		**2**		
including number of ECTS points for practical classes (P)	0		2		
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)	0,65		1,4		

*delete as not necessary

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge in the field of general and organic chemistry.
2. Skills in basic laboratory techniques used in organic and analytical chemistry.

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SUBJECT OBJECTIVES

C1 Acquiring knowledge about important groups of active compounds present in plant material – their structures, properties, isolation and identification methods, mechanism of action, activity, and sources of occurrence.
C2 Familiarizing students with methods of isolation and identification of biologically active compound products.
C3 Developing skills for selecting isolation methods for specific plant raw materials.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEU_W01 Familiarity with basic concepts in the field of phytochemistry and pharmacognosy.

PEU_W02: Understanding the chemical groups determining the therapeutic properties of plant substances and products.

PEU_W03: Knowledge of the basic chemical structures of coumarins, flavonoids, terpenoids, and alkaloids, including their actions and applications.

PEU_W04: Understanding the main biogenetic pathways and building blocks of plant secondary metabolites.

PEU_W05: Familiarity with methods for isolating biologically active compounds from plant material.

relating to skills:

PEU_U01: Safely handling tasks in organic chemistry laboratories.

PEU_U02: Properly conducting planned chemical experiments.

PEU_U03: Isolating biologically active compounds from natural materials (e.g., plants).

PEU_U04: Applying distillation and extraction techniques in the isolation of natural products.

PEU_U05: Using chromatographic methods for the purification and identification of isolated compounds.

PEU_U06: Writing a detailed report on conducted experiments, analyzing results, and drawing correct conclusions.

relating to social competences:

PEU_K01: Ability to collaborate effectively in a group during laboratory sessions.

PEU_K02: Willingness to organize one's work efficiently, critically assess acquired knowledge, and evaluate the progress of assigned tasks.

PROGRAMME CONTENT

	Lecture	**Number of hours**
Lec 1	**Development of phytochemistry and natural product chemistry.** Basic concepts, the role of compounds of natural origin in modern medicine and pharmacy. Secondary metabolites. Contemporary principles of classifying plant compounds. Preliminary information, assessment criteria.	1
Lec 2	**Biogenesis and Building Blocks.** Main biogenetic pathways and building blocks of plant secondary metabolites. The information will encompass elements of their biogenesis.	2
Lec 3	**Coumarins.** Characteristics of coumarins as a group of compounds with diverse pharmacological actions (e.g., anticoagulant, photosensitizing effects). Properties, structure, and mechanisms of action. Plant sources. Coumarin preparations available on the Polish market.	3
Lec 4	**Flavonoids and Stilbenes.** Occurrence and characteristics of polyphenolic compounds, exemplified by flavonoids and stilbenes, natural antioxidants with diverse pharmacological significance (e.g., anti-inflammatory, vasodilatory, antimicrobial, vascular-sealing effects). Structure, classification, properties, and application of polyphenolic compounds (including glycosides) in medicinal products; plant sources rich in polyphenolic compounds. Polyphenolic preparations available on the Polish	4

	market.	
Lec 5	**Terpenoids.** Characteristics, structure, and properties of terpenoid compounds present in essential oils, used as medicinal products and dietary supplements (e.g., in digestive system disorders). Plant sources rich in essential oils. Preparations available on the Polish market.	3
Lec 6	**Alkaloids and Their Glycosides.** Structure, definition, properties, and classification of alkaloids, pharmacological properties of selected alkaloids and protoalkaloids, plant sources. Selected alkaloid preparations available on the Polish market.	2
	Total hours	15

~~Classes~~		**~~Number of hours~~**
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		
	~~Total hours~~	

Laboratory		**Number of hours**
Lab 1	Organizational activities, discussion of methods for isolating active substances from plant material, and occupational health and safety training.	2
Lab 2	Plant fats – isolation of trimyristin from nutmeg. Determination of the saponification value. Hydrolysis of trimyristin to myristic acid. Determination of the acid value.	4
Lab 3	Terpenes – isolation of eugenol from clove oil.	4
Lab 4-5	The role of lycopene and β-carotene in the body – isolation of lycopene and β-carotene from tomatoes and carrots. Application of column chromatography for product separation.	8
Lab 6	Steroids - isolation of cholesterol from egg yolk.	4
Lab 7-8	Triterpene alcohols – isolation of betulin from birch bark. Continuous extraction. Passing grade colloquium.	8
	Total hours	**30**

~~Project~~		**~~Number of hours~~**
Proj 1		
Proj 2		
Proj 3		
Proj 4		
…		
	~~Total hours~~	

~~Seminar~~	**~~Number of hours~~**

~~Semin 1~~		
~~Semin 2~~		
~~Semin 3~~		
~~…~~		
	~~Total hours~~	

TEACHING TOOLS USED
N1. Lecture with audiovisual aids. N2. Laboratory classes – conducting experiments.

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming during semester), P – concluding (at semester end)	Learning outcomes code	Way of evaluating learning outcomes achievement
P (lecture)	PEU_W01-PEU_W05	examination
F1 (laboratory)	PEU_U01 - PEU_U06, PEU_K01-K02	passing with a grade
F2 (laboratory)	PEU_U01 - PEU_U06, PEU_K01-K02	Assessment of the correctness of experiment execution and preparation of a report after completing laboratory classes
P (laboratory) = F1 + F2; F1 – 60%; F2 – 40%		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] J. Sołoducho, J. Cabaj, *Medicinal natural products*, **http://zasobynauki.pl/**

SECONDARY LITERATURE:

[1] P.M. Dewick, *Medicinal natural products*, Wiley 2009

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

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