



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Chemistry of natural compounds [S1IFar2>CZN]

Course

Field of study

Pharmaceutical Engineering

Year/Semester

1/2

Area of study (specialization)

–

Profile of study

general academic

Level of study

first-cycle

Course offered in

Polish

Form of study

full-time

Requirements

compulsory

Number of hours

Lecture

30

Laboratory classes

15

Other

0

Tutorials

0

Projects/seminars

0

Number of credit points

4,00

Coordinators

dr hab. inż. Katarzyna Materna prof. PP
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Lecturers

Prerequisites

Student will gain well-ordered and theoretically grounded knowledge of key issues of organic chemistry. Student is able to solve elementary problems of organic chemistry on the basis of possessed knowledge, the ability to acquire information from indicated sources in Polish and foreign language. Student understands the need of further education, the necessity of broadening his/her competence, readiness to cooperate within a team.

Course objective

The course covers basic information about organic compounds of natural origin, characterized by biological activity. The course aims to familiarize students with the occurrence and biological significance of selected compounds of plant and animal origin, which are used in pharmacology, medicine, food and cosmetics.

Course-related learning outcomes

Knowledge:

1. Student has a well-ordered, theoretically grounded general knowledge of organic and bioorganic chemistry related with bioactive substances. [K_W1]
2. Student has knowledge of natural and synthetic raw materials, products and processes used in

pharmaceutical industry. [K_W13]

Skills:

1. Student is able to prepare and present an oral presentation on detailed issues of pharmaceutical engineering. [K_U6]
2. Student has the ability of self-education. [K_U24]

Social competences:

1. Student is ready to critically evaluate his/her knowledge, understands the need for further education, complementing the field knowledge and improving his/her professional, personal and social competences, understands the importance of knowledge in problem solving and is ready to consult experts. [K_K1]
2. Student is ready to critically evaluate own and team actions, and is able to cooperate and work in a group. [K_K2]

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture - written exam; evaluation criteria: 3.0 - 50,0-59,9%; 3.5 - 60,0-69,9%; 4.0 - 70,0-79,9%; 4.5 - 80,0-89,9%; 5.0 - 90-100%.

Laboratory (stationary or remote form depending on the epidemiological situation) - reports from laboratory classes, colloquium, oral/written answer, presentation of theoretical and experimental material, solving of posed scientific problems, evaluation of student activity during classes, evaluation of the implementation and solving of posed tasks, evaluation of teamwork and self-presentation skills, evaluation criteria: 3 - basic theoretical and practical preparation, ability to prepare reports on laboratory exercises, basic participation in theoretical and practical classes without additional involvement; 4 - practical preparation supported by theoretical knowledge, ability to formulate appropriate conclusions from the data obtained during the laboratory, active participation in classes supported by the desire to acquire additional practical and theoretical knowledge; 5 - complete preparation for classes, the ability to formulate conclusions at an advanced level and defend the theses, precise performance of assigned tasks, independent search for additional theoretical knowledge, coordination of work in a research team, ambitious approach to the subject.

Programme content

The program covers the following topics:

1. Definition and classification of biologically active substances.
2. Methods for isolating organic compounds from plant products.
3. Applications of bioactive compounds.
4. Alkaloids.
5. Polyphenols.
6. Phytoestrogens.
7. Phytoncides as natural antibiotics.
8. Other biologically active substances of plant origin.

Course topics

Lecture:

1. Definition and classification of biologically active substances (biologically active substances) from natural sources. Plant primary and secondary metabolites.
2. Methods of isolating organic compounds from plant products.
3. Application of bioactive compounds in cosmetics, pharmacy, medicine and food industry (bioactive components of food products, uniqueness of aromatic substances, bee products in medicine and cosmetology, natural emulsifiers).
4. Alkaloids. Classification, medicinal and toxic effects.
5. Polyphenols. Structure, classification, biological properties and use.
6. Phytoestrogens. Biological activity. Use in food supplements.
7. Phytoncides as natural antibiotics. Pharmacological significance of tannins, coumarins and glycosides.
8. Other biologically active substances of plant origin: flavonoids, anthocyanins, karetenoids, organic hydroxyacids, essential oils, saponins, isothiocyanates, glucosinolates, phytosterols, their properties and

biological action.

Laboratory:

Problems of laboratory classes: students will use the knowledge gained at the lecture to master the practical skills related to the laboratory techniques used in the process of synthesis, modification, analysis and study of the activity of selected representatives of biologically active compounds of animal origin.

Teaching methods

Lecture - multimedia presentation, discussion.

Laboratory exercises - practical classes.

Bibliography

Basic:

1. Z.E. Sikorski (red.), *Chemia żywności*, WNT, Warszawa, 2012.
2. Z.E. Sikorski, H. Staroszczyk, *Chemia żywności*, PWN, Warszawa, 2017.
3. A. Kołodziejczyk, *Naturalne związki organiczne*, PWN, Warszawa, 2013.
4. R.B. Silverman, *Chemia organiczna w projektowaniu leków*, WNT, Warszawa, 2004.
5. P. Kafarski, B. Lejczak, *Chemia bioorganiczna*, PWN, Warszawa, 1994.
6. G.L. Patrick, *Chemia medyczna*, PWN, Warszawa, 2019.

Additional:

1. M. Molski, *Nowoczesna kosmetologia*, PWN, Warszawa, 2014.
2. K. Kacprzak, K. Gawronska, *Chemia kosmetyczna*, Wydawnictwo Naukowe UAM, Poznań, 2010.
3. Rzemieniecki T., Gwiazdowska D., Rybak K., Materna K., Jus K., Pernak J. (2019) Synthesis, Properties, and Antimicrobial Activity of 1-Alkyl-4-hydroxy-1-methylpiperidinium Ionic Liquids with Mandelate Anion. *ACS Sustain. Chem. Eng.*, 15053.

Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,00
Classes requiring direct contact with the teacher	50	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	50	2,00