COURSE DESCRIPTION CARD - SYLLABUS

Course name
Bioorganic chemistry [S1IFar1>CB]

Course

Field of study
Pharmaceutical Engineering

Year/Semester
2/4

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
15

Laboratory classes
0

Other (e.g. online)
0

Tutorials
15

Projects/seminars
0

Number of credit points

2,00

Coordinators

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Lecturers

Prerequisites

A student starting the subject "Bioorganic chemistry" should have structured knowledge of organic, physical and analytical chemistry and biochemistry; knowledge of basic equipment and reagents used in the chemical laboratory and the ability to perform chemical calculations. The student should also be able to use basic laboratory techniques in the synthesis, isolation and purification of chemical compounds. In addition, the student should understand the need for further training and raising his professional and personal competences.

Course objective

The course aims are to familiarize students with the basic topics of bioorganic chemistry, such as: general knowledge of organic compounds found in organisms, methods for chemical synthesis and purification of natural compounds and their modified derivatives and analogues. Strategies for rational choice of protective groups for given synthetic purposes will be presented. The most important properties and applications of synthetic analogues of natural compounds will be discussed. Contemporary trends in research related to bioorganic chemistry will be presented.

Course-related learning outcomes

Knowledge:
1. has basic knowledge of techniques and methods for the synthesis and purification of natural compounds and their analogues [k_w7, k_w13]
2. has basic knowledge of the techniques and methods of analysis of synthetic natural compounds and their analogues [k_w7, k_w13]
3. has basic knowledge of the properties and applications of synthetic analogues of natural compounds [k_w24]
4. has basic knowledge in current studies in the field of bioorganic chemistry [k_w7, k_w13, k_w24]

Skills:
1. is able to plan the synthesis of simple analogues of natural compounds [k_u12]
2. is able to use scientific publications to solve simple synthetic problems related to bioorganic chemistry [k_u1, k_u3, k_u8, k_u10]
3. selects methods analytical methods adequate to determine the structure and purity of synthetic analogues of natural compounds [k_u11]

Social competences:
1. understands the need to improve professional qualifications [k_k1]
2. is responsible for the tasks carried out in the team [k_k2]

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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Knowledge acquired during the lecture is verified by a 45-minute written test carried out during the 15th lecture, consisting of open and closed questions covering the topics presented during the lectures. If it is impossible to organize a test with the physical presence of the students, it will be carried out remotely, with the requirement of continuous provision of audio and video by each student. Passing threshold: 40% of points.
Knowledge acquired during the tutorials is verified by the attendance at classes and continuous assessment during the tutorials. After 14 classes, students will complete written essays that will be discussed and evaluated during 15th class. Assessment criteria: evaluation of the final essay, taking into account the quality of work assigned during the exercises and activity during the exercises.

Programme content

Structure and properties of amino acids. Nucleosides and nucleotides. Protective groups - types and application in bioorganic chemistry. Synthesis of polypeptides and oligonucleotides. Methods of isolation, purification and determination of the structure and purity of synthetic biomolecules. Applications of synthetic biopolymers. Fundamentals of stereochemistry of natural and synthetic biomolecules. Therapeutic uses of nucleoside and nucleotide analogues.
Chemistry of natural products. Classification and nomenclature. Sources of natural products. Function: primary and secondary metabolites. Biosynthetic pathways. Chemical synthesis vs biosynthesis of natural products. Biotransformation and biocatalysis. Isolation and purification. Applications of natural products.
Introduction to enzymology. Definition, structures and functions of enzymes as biocatalysts. Mechanisms of their action and cofactors. Fundamentals of thermodynamics and kinetics of enzymes. Inhibition and biological function of enzymes.

Teaching methods

Lecture: multimedia presentation
Tutorials: multimedia presentation, discussed on a regular basis with students; analysis of scientific publications.

Bibliography

Basic
1. P. Kafarski, B. Lejczak, "Chemia bioorganiczna", PWN, Warszawa, 1994

2. A. Kołodziejczyk, "Naturalne związki organiczne", PWN, Warszawa 2004
Additional
1. Podręczniki chemii organicznej i biochemii.
2. R.M. Silverstein, F.X. Webster, D.J. Kremle, "Spektroskopowe metody identyfikacji związków organicznych", PWN, Warszawa, 2007
3. "Metody spektroskopowe i ich zastosowanie do identyfikacji związków organicznych", praca zbiorowa pod red. W. Zielińskiego i A. Rajcy, WNT, Warszawa, 1995

Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,00
Classes requiring direct contact with the teacher	30	1,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	20	0,50