COURSE DESCRIPTION CARD - SYLLABUS

Course name
Biomimetic tools and Eenzymes in Organic Synthesis - Natural and Artificial Enzymes and Biomimetic Reactions in Modern Organic Synthesis

Course

Field of study
Pharmaceutical Engineering
Area of study (specialization)
-
Level of study
First-cycle studies
Form of study
full-time
Year/Semester
3/6
Profile of study
general academic
Course offered in
polish
Requirements
elective

Number of hours

Lecture
0
Laboratory classes
0
Other (e.g. online)
0
Tutorials
15
Projects/seminars
0

Number of credit points

1

Lecturers

Responsible for the course/lecturer:
Marcin Wierzchowski PhD

Responsible for the course/lecturer:

Prerequisites

Student starting this subject should have basic knowledge and skills in biology, biotechnology and chemistry acquired as part of the first degree of studies in Pharmaceutical Engineering

Course objective

Chemical reactions involving enzymes play an increasingly important role in the synthesis of organic compounds. Due to the catalytic nature of the reaction, selectivity and regioselectivity towards

substrates or chemical groups, enzymatic reactions will play an increasingly important role in derivatization and biosynthesis processes. The growing role of biomimetics is also observed due to the development of material chemistry and nanotechnology. This allows obtaining artificial enzymes that mimic the action of enzymes found in nature

Course-related learning outcomes

Knowledge

K_W01. Student has advanced knowledge in the field of exact sciences: biomathematics, biophysics, biochemistry, specialized in the field of biotechnology

K_W11. Student knows the biomaterials used in medicine

K_W12. Student has knowledge about conducting experiments on a large laboratory scale, transformation of chemical molecules and nanobiotechnology

K_W16. Student knows and understands the principles of operation of specialized equipment and apparatus used in research in the field of biotechnology and knows the detailed laboratory and industrial procedures

K_W19. Student has the knowledge in the field of independent research planning, conducting experimental works, data collection, compiling results in a manner suitable for discussion, assessment or publication

Skills

K_U01. Student uses advanced research tools and techniques specific to biological and medical sciences

K_U04. Student plans and performs research tasks under the supervision of a scientific supervisor

K_U06. Student collects empirical data, interprets them and formulates appropriate conclusions

Social competences

K_K01. Student understands the need for lifelong learning, is able to inspire and organize the learning process of others

K_K05. Student is able to cooperate and work in a group, shows entrepreneurship, is able to organize team work

K_K06. The student is responsible for the scope of research work entrusted to him, he respects his own work and that of others

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Students' skills acquired as part of the laboratory classes are verified on the basis of the final test, and on the basis of the developed and submitted documentation from the experiments carried out (exercise reports). Passing threshold: 60% of points.

Programme content

As part of the exercises, students will carry out the processes of transformation of functional groups of chemical compounds using microorganisms for this purpose. They will learn about the methods of obtaining and stabilizing the enzymes used in biocatalysis and their immobilization. They will assess the efficiency and balancing of processes. They will assess the biocatalysis of processes carried out in combination with traditional organic synthesis in the context of asymmetric or regioselective synthesis. They will carry out chemical reactions using artificial cytochrome models and become familiar with catalytic properties.

Teaching methods

Multimedia presentation illustrated with examples given in the materials for exercises and performance of tasks given by the teacher - practical exercises

Bibliography

Basic

1. K.W. Szewczyk Technologia biochemiczna , Oficyna Wydawnicza Politechniki Warszawskiej, 2003.

2. K.W. Szewczyk Laboratorium bioprocesów , Oficyna Wydawnicza Politechniki Warszawskiej, 2002.

3. Chemia bioorganiczna Chemia bioorganiczna , Państwowe Wydawnictwo Naukowe, 1994.

4. Katarzyna Konopka Wzorce z Natury w technice i inżynierii materiałowej , Oficyna Wydawnicza Politechniki Warszawskiej, 2011.

Additional

1. Meyers M.A., Chen P.Y., Lin A.Y.M., Seki Y Biological materials: Structure and mechanical properties , Elsevier, 2008.

Breakdown of average student's workload

	Hours	ECTS
Total workload	25	1,0
Classes requiring direct contact with the teacher	15	0,6
Student's own work (literature studies, preparation for classes, preparation for colloquium, preparation of documentation of laboratory exercises) [1]	10	0,4

[1] delete or add other activities as appropriate