COURSE DESCRIPTION CARD - SYLLABUS

Course name
Modern Methods of Synthesis of Drugs - Microwave Organic Synthesis in Medicinal Chemistry

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:
Dr n. farm. Tomasz Koczorowski

Chair and Department of Chemical Technology of Drugs

Poznan University of Medical Sciences

Phone: 61 854 66 33

tkoczorowski@ump.edu.pl

Responsible for the course/lecturer:

Prerequisites

Before the course, students should have well-grounded theoretical and practical knowledge in the field of organic, physical and drug chemistry, as well as from the basic course of Synthesis and technology of drugs. They should also become familiar with selected procedures regarding good laboratory practice as well as health and safety and fire protection rules.

Course objective

Students learn about the process of planning and obtaining already known drug substances or intermediates used for their synthesis with the use of modern organic synthesis methods such as homo- and heterogeneous catalysis and microwave assisted organic synthesis (MAOS).

Course-related learning outcomes

Knowledge

Student:

K_W4 has structured, theoretically founded general knowledge in the field of inorganic, organic, physical and analytical chemistry enabling understanding, description and investigation of chemical phenomena and processes related to pharmaceutical engineering

K_W7 knows the basic techniques, methods for characterization and identifying pharmaceutical products and research tools used in pharmaceutical engineering, knows the classical and instrumental methods used in assessing the quality of substances for pharmaceutical purposes and in quantitative analysis in drugs, knows the physicochemical properties of substances for pharmaceutical purpose on the activity of drugs, knows the classification of analytical techniques together with the criteria for the selection of methods and their validation

K_W24 has basic knowledge in the field of searching for new drugs, natural and synthetic products as well as their biochemical and molecular gripping points, pharmacopoeial standards and norms related to pharmaceutical engineering; knows methods and techniques for researching new drug substances in chemical, pharmaceutical and toxicological terms

K_W14 knows the development of pharmaceutical engineering and research methods used in it, as well as directions of development of the pharmaceutical industry in the country and all over the world

K_W15 has solid knowledge in the field of separation and purification processes of raw materials and products found in the pharmaceutical, cosmetics and chemical industries

Skills

Student:

K_U1 understands literature in the field of pharmaceutical engineering in Polish; reads and understands simple scientific and technical texts in English, is able to obtain information from literature, databases and other sources related to pharmaceutical engineering, also in English, is able to integrate and interpret them, draw conclusions and formulate opinions

K_U2 is able to explain the basic phenomena associated with significant processes, to distinguish between types of chemical reactions and has the ability to select them for chemical processes, can characterize various states of matter, the structure of chemical compounds, including drug substances, using theories of their description, methods and experimental techniques

K_U8 uses basic techniques, research equipment and apparatus useful in biotechnology, synthesis and analysis of pharmaceutically active substances, dosage form technology and toxicology, appropriate for pharmaceutical engineering, uses pharmacopoeial methods, prepares documentation

Social competences

Student:

K_K2 is ready to make an independent decisions and lead a team, critically assess his own actions and those of the team, take responsibility for the effects of these activities and is able to cooperate and work in a group, inspire and integrate the professional environment

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Forming methods:

1. The structure of course includes active discussion, problem solving and seminar

2. Observation of student work during seminars and analysis of his ability to work independently and teamwork.

Summary methods:

1. The test, consisting of 20 single-choice questions.

2. The report of the exercise performed together with the solution of tasks and problem questions.

Programme content

Students will learn the theoretical and practical base of catalytic and photocatalytic reactions, using homogeneous (e.g. palladium or ruthenium) and heterogeneous catalysts (embedded on titanium oxide or mesoporous materials) and microwave synthesis, used to obtain selected pharmaceutically active substances (API). Students have the opportunity to learn the basic parameters affecting the speed, kinetics and efficiency of catalytic reactions, as well as affecting the optimization of the microwave-assisted organic synthesis reaction, by observing the procedures prepared by an assistant. Students are also actively involved in the search and creation of synthesis plans for selected pharmaceutically active substances, using databases in the field of modern organic chemistry.

Teaching methods

The course is performed in the form of demonstration and seminar classes in the laboratory, combined with a theoretical introduction. As part of independent work during lab classes, students deal with

planning processes as part of a selected synthetic task, conducting the process, developing the results obtained and analyzing the results confirming the identity of the synthesized compounds.

Bibliography

Basic

1. D. Obermayer, J.M. Kremsner, A. Stadler, Minutes, Not Hours! A practical Guide to High-speed OrganicSynthesis in Modern Microwave Reactors Anton Paar GMBH Austria, Gratz 2016

2. J. Gawroński, K. Gawrońska, K. Kacprzak, M. Kwit, Współczesna synteza organiczna. Wybór eksperymentów, PWN, Warszawa, 2004.

Additional

1. R.B. Silverman, Chemia organiczna w projektowaniu leków, WNT, 2004.

2. G.L. Patrick, Chemia medyczna podstawowe zagadnienia, WNT, 2003.

3. F. Gualtieri, New trends in synthetic medicinal chemistry, Wiley-VCH, Weinheim, 2000

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 tutorials, preparation for tests) [1]	10	0,4

[1] delete or add other activities as appropriate