



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Genetic Engineering

### Course

Field of study

Bioinformatics

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

compulsory

### Number of hours

Lecture

15

Laboratory classes

Other (e.g. online)

Tutorials

15

Projects/seminars

### Number of credit points

2

### Lecturers

Responsible for the course/lecturer:

dr Agnieszka Żmieńko

Responsible for the course/lecturer:

Institute of Bioorganic Chemistry PAS

### Prerequisites

The student starting this course should have knowledge of cell biology, molecular biology, biochemistry and genetics. He/She should also have the ability to obtain information from the indicated sources and be ready to cooperate within the team.

### Course objective

The aim of the Genetic Engineering course is: -to provide students with knowledge of the basic tools and techniques of genetic engineering -acquainting students with the latest trends and applications of genetic engineering - teaching students the ability to design experiments involving DNA manipulation

### Course-related learning outcomes

Knowledge

The student knows and understands:

- principles of operation of molecular tools used in genetic engineering
- fields of application and the latest development trends in genetic engineering



- genetic engineering techniques and their limitations
- social and legal conditions of activities involving genetic engineering techniques

#### Skills

The student is able to:

- Search for sources and retrieve information about the latest genetic engineering tools and applications
- use basic IT tools to identify sites amenable to genetic manipulation with the use of molecular tools
- plan experiments and predict the effects of genome modification by genetic engineering techniques

#### Social competences

Student:

- can work on a designated task independently and work in a team
- can properly define priorities for the implementation of a task set by himself or others
- understands the need to improve their competences and follow the latest discoveries and achievements of genetic engineering
- is aware of the dynamic development of modern genetic engineering techniques and the legal and ethical aspects of their application

#### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture - continuous verification based on answers to questions regarding the presented material and taking part in discussions. Systematic participation and activity in lectures is rewarded. Final verification based on a written test which involves test questions, open tasks and / or knowledge of simulation exercises carried out during the semester. The pass mark is to obtain more than 50% of the points in the test. Tutorials - the average of the marks obtained for accomplishing the tasks assigned during the class and the grade for the essay / student presentation on a predefined topic.

#### Programme content

Basic concepts of genetic engineering; Molecular tools for DNA manipulations; DNA cloning; Plant and animal transgenesis; DNA/gene libraries and library searches; DNA recombination; CRISPR technique; Gene therapy; Vaccines; Bioinformatics tools and databases useful in genetic engineering

#### Teaching methods

Lecture: discussion of the material supported by multimedia presentations, discussion. Classes: Discussing problem tasks; Team work on designing gene manipulation experiments; elaboration on a predefined topic.

#### Bibliography



Basic

Brown T. Genomy. Wydanie 3. Wydawnictwo Naukowe PWN. Warszawa 2019 / Brown T. Genomes. 3rd ed. New York: Garland Science, c2007.

Bal J. Red. nauk. Genetyka medyczna i molekularna. Wydanie czwarte. Wydawnictwo Naukowe PWN. Warszawa 2017.

Additional

Węgleński P. (red.) Genetyka Molekularna. Wyd. 6. Wydawnictwo Naukowe PWN, Warszawa 2006, 2021

Articles in scientific journals indicated by the teacher of the subject.

**Breakdown of average student's workload**

	Hours	ECTS
Total workload	50	2,0
Classes requiring direct contact with the teacher	30	1,5
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) <sup>1</sup>	20	0,5

<sup>1</sup> delete or add other activities as appropriate