COURSE DESCRIPTION CARD - SYLLABUS

Course name
Molecular biology [S1IFar1>BM]

Course

Field of study
Pharmaceutical Engineering

Year/Semester
2/3

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
15

Other (e.g. online)
0

Tutorials
0

Projects/seminars
0

Number of credit points

2,00

Coordinators

prof. dr hab. Błażej Rubiś

Lecturers

Prerequisites

Basic knowledge of biochemistry and genetics as well as genome structure.

Course objective

The aim of education is to acquire knowledge and skills by the student to understand the basics of molecular biology in the field of pharmaceutical engineering. In particular, students will learn the possibilities of diagnosis, planning prediction of patient response to therapy and monitoring. The scope of education includes issues in the areas of: - genome structure - the basics of genetically conditioned traits and mechanisms for regulating gene expression, and mastery of: - molecular biology methods used in pharmaceutical engineering, biotechnology as well as gene therapy and recombinant protein technology - methods of detection and quantification of nucleic acids and proteins - genome testing methods - using basic gene analysis techniques

Course-related learning outcomes

Knowledge:
student has knowledge of the physicochemical and biological foundations of health sciences within the scope appropriate for pharmaceutical engineering, including basic issues within the scope of subjects such as biology, pharmaceutical botany, biotechnology, biochemistry, molecular biology, human

anatomy and physiology k_w5, p6s_wg
knows the basic principles of laboratory work safety k_w27, p6s_wk

Skills:
student can prepare and present, both in polish and in a foreign language, an oral presentation on specific issues of pharmaceutical engineering k_u6, p6s_uk
uses basic techniques, research equipment and apparatus useful in biotechnology, synthesis and analysis of pharmaceutically active substances, drug form technology and toxicology, appropriate for pharmaceutical engineering, uses pharmacopoeial methods, prepares documentation k_u¬8, p6s_uw
is able to plan and carry out simple experiments in the field of pharmaceutical engineering, both experimental and simulation, and interpret their results and draw conclusions k_u12, p6s_uw, p6si_uw
uses computer programs supporting the implementation of tasks typical for pharmaceutical engineering; uses information technology to describe phenomena and data analysis k_u19, p6s_uw, p6si_uw
understands literature in the field of pharmaceutical engineering in polish; reads and understands uncomplicated scientific and technical texts in a foreign language, is able to obtain information from literature, databases and other sources related to pharmaceutical engineering, also in a foreign language, integrate them, interpret them, draw conclusions and formulate opinions k_u1, p6s_uw, p6s_uk

Social competences:
student is ready to critically assess his knowledge, understands the need for further education, is supplementing specialized knowledge and improving his professional, personal and social competences, understands the importance of knowledge in solving problems and is ready to seek expert opinions. k_k1, p6s_kk
is ready to make 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. k_k2, p6s_kk
is aware of the social role of the graduate of medical and technical universities, and in particular understands the need to initiate and cooperate for the benefit of both the social environment and the public interest. k_k3, p6s_kr
is able to properly set priorities for the implementation of the task specified by himself or others, has a habit of supporting assistance and remedial actions, is responsible for the safety of own and other work, knows how to act in an emergency k_k5, p6s_ko, p6s_kr

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:
The structure of the lecture includes active discussion, problem solving and seminar. Preliminary test for exercises. Observation of student"s work during exercises and assessment of his ability to work independently. Final test on the subject. Report of performed exercise.

Programme content

lectures
- recombination and cloning of DNA; restriction enzymes, vectors, introduction of DNA into cells, cloning, analysis and use of cloned DNA; genomic libraries; cDNa libraries; search procedures;
- molecular aspects of signal transduction and correlation with the cell cycle (protein kinases, cyclins and their kinases, types of cell death, cancer);
- methods of detection and analysis of proteins and nucleic acids used in molecular biology; analytical techniques used in molecular diagnostics (PCR, RTPCR, nested PCR, LCR, RFLP, NASBA, CPR, SSCP, sequencing); application of molecular biology methods in the diagnosis of selected diseases (metabolic, endocrine, parasitic, viral and other diseases);
- molecular biology methods in oncology (oncogenes and suppressor genes); application of DNA testing in the judiciary and forensics; use of RTPCR techniques in monitoring the course; gene therapy (genetic, cancer, AIDS).
- modern molecular technologies that form the basis of pharmaceutical engineering
exercises

- molecular diagnostics of diseases
- diagnostics and prevention of cancer
- identification of markers of human diseases (genetic, epigenetic and environmental conditions)
- recombination and DNA cloning
- molecular aspects of the cell cycle (proliferation, aapoptosis, tumor transformation)
- methods of detection and quantification of nucleic acids and proteins
- genome testing methods (hybridization, polymerase chain reaction - PCR)
- use of molecular biology methods in laboratory diagnostics, biotechnology and gene therapy

Teaching methods

lectures, laboratories

Bibliography

Basic
1.Molecular Biology, 3rd Edition, David Clark Nanette Pazdernik Michelle McGehee
2. Molecular Biology of the Cell, Bruce Alberts
Additional
1. Molecular Biology: A Very Short Introduction, Aysha Divan, Janice Royds

Breakdown of average student's workload

	Hours	ECTS
Total workload	60	2,00
Classes requiring direct contact with the teacher	35	1,20
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	25	0,80