



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Molecular Biology

Course

Field of study

Bioinformatics

Area of study (specialization)

Level of study

First-cycle studies

Form of study

full-time

Year/Semester

2/3

Profile of study

general academic

Course offered in

Polish

Requirements

compulsory

Number of hours

Lecture

30

Laboratory classes

30

Other (e.g. online)

Tutorials

Projects/seminars

Number of credit points

6

Lecturers

Responsible for the course/lecturer:

dr Agnieszka Żmienko

Responsible for the course/lecturer:

dr Anna Parus, dr Agata Zdarta

Institute of Bioorganic Chemistry PAS

The Faculty of Chemical Technology

Poznan University of Technology

Prerequisites

The student starting this course should have a basic knowledge of the structure of prokaryotic and eukaryotic cells, 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 Molecular Biology course is:

- providing students with general knowledge about the molecular basis of life and the mechanisms of genetic information storage and flow in biological systems
- to familiarize students with the basic techniques used in molecular biology
- developing the ability to perceive molecular, structural and functional relationships between different levels of the organization of a living matter



Course-related learning outcomes

Knowledge

Student:

- has knowledge about the biochemical and molecular basis of prokaryotic and eukaryotic cells functioning
- has knowledge on the processes responsible for the maintenance, transmission and expression of genetic information at the molecular level
- knows basic methods of nucleic acids and protein analysis, used in molecular biology
- has basic knowledge of -omics approaches

Skills

Student:

- can obtain information from literature, databases and other sources in order to consolidate and expand their knowledge in the field of molecular biology
- uses basic molecular biology techniques and standard laboratory equipment useful in the analysis of nucleic acids and proteins
- can plan and carry out simple experiments in the field of molecular biology under the supervision of a research tutor, interpret their results and draw conclusions

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 in molecular biology field

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture:

Ongoing verification based on answers to questions relating to the presented material and taking part in discussions. Systematic participation and activity in lectures is rewarded. Final verification takes the form of a written exam covering all the material discussed in the lectures and indicated in the literature, in the form of 7 questions / problem tasks, each scored on a 0-2 point scale (point fractioning acceptable). The condition for a positive evaluation is exceeding the fifty-percent threshold of obtained points. The resit examination is in a written or oral form.

Laboratories:



Assessment of the student's preparation for individual laboratory classes through a test, assessment of commitment and skills related to the implementation of individual exercises. Assessment is based on the summary grades of individual exercises.

Programme content

The program of the course covers the following contents in the field of molecular biology:

Lectures:

Cell structure and components; Structure and role of DNA; Structure and role of RNA; Structure and role of proteins; Organization of the prokaryotic and eukaryotic genome; DNA replication; Transcription in prokaryotes; Transcription in eukaryotes; Genetic code and translation; Expression regulation mechanisms; DNA mutagenesis and repair; Non-coding RNA; Structure and life cycle of viruses; Tumor viruses and oncogenes; Methods and applications of molecular biology.

Laboratories:

Isolation of nucleic acids; Methods of separation and visualization of nucleic acids; Polymerase chain reaction; Restriction enzymes; Protein analysis, Biological databases.

Teaching methods

Lecture illustrated with a presentation containing the discussed program content, discussion

Laboratories - laboratory exercises (individual and team work), discussion

Student's independent work with literature covering the program issues

Bibliography

Basic

Turner P., McLennan A., Bates A., White M. Krótkie wykłady Biologia Molekularna. Wydanie trzecie. Wydawnictwo Naukowe PWN, Warszawa 2011. / Turner P., McLennan A., Bates A., White M. BIOS Instant Notes in Molecular Biology 4th Edition Taylor & Francis 2012

Tymoczko JL, Berg JM, Stryer L. Biochemia krótki kurs. Wydawnictwo Naukowe PWN, Warszawa 2013. / Tymoczko JL, Berg JM, Stryer L. Biochemistry: A Short Course. W. H. Freeman; Fourth edition. 2018

Rewers M., Jędrzejczyk I, Dąbrowska G. Wybrane Techniki Biologii Molekularnej. Wydawnictwa Uczelniane Uniwersytetu Technologiczno-Przyrodniczego w Bydgoszczy. Bydgoszcz 2017

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

Additional

Berg JM, Stryer L, Tymoczko JL, Gatto GJ. Biochemia. Wydanie 5., Wydawnictwo Naukowe PWN,



Warszawa 2018. / Berg JM, Stryer L, Tymoczko JL, Gatto GJ. Biochemistry. 8th ed. W.H.Freeman & Co Ltd 2015

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

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

Breakdown of average student's workload

	Hours	ECTS
Total workload	150	6,0
Classes requiring direct contact with the teacher	60	3,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) ¹	90	3,0

¹ delete or add other activities as appropriate