



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Molecular Biology [S1Bioinf1>BMOL]

### Course

Field of study  
Bioinformatics

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  
30

Laboratory classes  
30

Other  
0

Tutorials  
0

Projects/seminars  
0

### Number of credit points

6,00

### Coordinators

dr hab. Agnieszka Żmieńko  
agnieszka.zmienko@put.poznan.pl

### Lecturers

### 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:

On-site/on-line assessment via the [ekursy.put.poznan.pl](https://ekursy.put.poznan.pl) platform:

#### Lecture:

Ongoing verification based on answers to questions relating to the presented material and taking part in discussions. Final verification will be by a written exam in the form of open questions / closed questions / problem tasks, with different scores. Score information will be provided for each question. The condition for a positive evaluation is exceeding the 50% threshold of obtained points. The resit examination is in a written or oral form.

Detailed list of topics for the exam, based on the lectures and the basic literature will be provided at the end of the course.

#### Laboratories:

Evaluation of the student's preparation for individual laboratory classes in terms of familiarity with the exercise. Reports from classes subjected to evaluation by the instructor (one report per laboratory team submitted electronically via the platform [ekursy.put.poznan.pl](https://ekursy.put.poznan.pl) at the latest one day before the start of the next scheduled laboratory class). Final credit test during the last class. Credit is based on the following grades: average grade from the reports (50% of the final grade) and grade from the final credit test (50% of the final grade). The condition for a positive evaluation is exceeding the fifty-percent threshold of obtained points.

On-site assessment: average mark for the reports (50% of the final mark) and mark for the final credit test consisting of 6 single or multiple choice and 6 open questions (50% of the final mark). Credit from 50%.

On-line assessment: average mark for the reports (50% of final mark) and mark for the final credit test consisting of 6 single- or multiple-choice and 6 open questions (50% of final mark). Credit from 50%.

### Programme content

Biology at the molecular level, including:

- structure and function of the molecules involved in the living processes, mainly DNA, RNA and the proteins
- basic molecular mechanisms at the cell level, their importance and their regulation
- methods in molecular biology
- molecular biology vs genomics

### Course topics

#### Lectures:

Reminder and expanding the information on the structure and role of DNA, RNA, proteins, chromatin

organisation in the prokaryotic and eukaryotic genomes  
Molecular aspects of DNA replication, transcription and translation processes as well as their regulatory mechanisms;  
DNA mutations, recombination and repair;  
Epigenetics;  
Transposable elements and their impact on the chromatin organization and activity  
Molecular structure of some viruses, impact on the virus-host interactions and virus evolution  
Molecular basis of immunology  
Selection of molecular biology methods and their applications  
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  
Brown T. Genomy. Wydanie 3. Wydawnictwo Naukowe PWN. Warszawa 2019 / Brown T. Genomes. 3rd ed. New York: Garland Science, c2007.  
Lizbeth A. Allison Podstawy biologii molekularnej. Wydawnictwo Uniwersytetu Warszawskiego, Warszawa 2021  
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  
Additional  
Hames D, Hooper N. Krótkie wykłady Biochemia. Wydanie trzecie. Wydawnictwo Naukowe PWN, Warszawa 2021.  
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  
Bał 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	6,00
Classes requiring direct contact with the teacher	76	3,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	74	3,00