GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	High-throughput methods in biotechnology, PG_00069250		
Field of study	Biotechnology		
Date of commencement of studies	February 2025	Academic year of realisation of subject	2025/2026
Education level	second-cycle studies	Subject group	
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	1	Language of instruction	Polish
Semester of study	2	ECTS credits	3.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Chemistry Technology and Biotechnology of Food -> Faculty of Chemistry -> Wydziały Politechniki Gdańskiej		
Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. inż. Agnieszka Bartoszek-Pączkowska	
	Teachers		

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	15.0	0.0	0.0	15.0	45

E-learning hours included: 0.0

Learning activity and number of study hours

Learning activity	Participation in didactic classes included in study plan	Participation in consultation hours	Self-study	SUM
Number of study hours	45	5.0	25.0	75

Subject objectives

The purpose of the course is to familiarise students with the history and current state of knowledge in the area of so called high-throughput biotechnological methods and major projects that transformed the picture of life sciences. These methods are increasingly frequently applied in biological sciences, medicine, nutrition and their practical usefulness is on the constant rise.

The subject addresses students of specialisations: BT, Ch, TCh, because all these subjects have the essential imput in the creation of multiomic technologies.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_K101] acknowledges the importance of knowledge related to the field of study in solving cognitive and practical problems, critically assessing the information obtained	Students appreciates the scientific and practical value of multiomic technologies for the development of mankind.	[SK2] Assessment of progress of work [SK5] Assessment of ability to solve problems that arise in practice
[K7_K02] is aware of the potential risks and opportunities associated with the development of science and technology for the natural environment and society	Student comprehends consequences, both beneficial as well as controvertial, resulting from the accessibility of detailed bioinformatic data concerning e.g. individual person.	[SK2] Assessment of progress of work [SK5] Assessment of ability to solve problems that arise in practice
[K7_U02] uses research methods used in biotechnology and related fields	Student knows informatic and bioinformatic methods applied in analysis of data obtained from omic technologies.	[SU2] Assessment of ability to analyse information
[K7_W01] defines the phenomena, processes and laws of living nature applied to the production of useful goods and the carrying out of services	Student exhibits the basic knowledge of biology and chemistry needed to understand biochemical phenomena and processes utilized in omic technologies.	[SW1] Assessment of factual knowledge

Subject contents	**Topics realized during lectures** Historical sketch from Mendel to Human Genome Project, the birth of epigenomics and discovery of small regulatory RNA molecules, variety of "-omes" and "-omics" in life science studies; big genomic projects and their intelectual and practical significance; the difference between genomics and transcriptomics and the opportunities of cognitive and practical applications they bring; high throughput methods in recognition of noncoding genome fragments; nutrigenomics and the application of omic technologies in the area of personalised nutrition, proteomics and its variants in medical and nutritional studies; scope and applications of metabolomics; microbiome and metagenomics as new areas of studies on human organism function as well as on environmental resources; big multiomic projects employing a variety of high throughput technologies in medical and nutritional research. **Topics realized during seminars** During seminars, students are expected to present talks based on the most recent scientific publications connected with subjects discussed during lectures and recommended by tutors. The aim is to support lectures with the newest information. **Topics realized during exercises aimed at making students familiar with technical side of high throughput methods:** 1/2. Strategies of synthesis of polynucleotides used in genomic experiments 3. Methods employed upon Human Genome Project realisation. 4. Methods developed as a result of Human Genome Project realisation, including bioinformatic tools. 5/6. Technological approaches employed in production of DNA arrays; design of sequences. 7/8. Research strategies and methods used in transcriptomic experiments; RT-PCR as an example. 9/10. Methods applied in proteomic studies; spectroscopic and immunological. 11. Methods used in studies on human metabolome; purpose decides 12/13. Research strategies and technologies used in metagenomic studies. 14/15. Presentation of big data derived on high throughput studies.
Prerequisites and co-requisites	Accomplished courses in organic chemistry and biochemistry.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Lecture: attendance and exam	50.0%	60.0%
Seminars	60.0%	20.0%
Exercises	60.0%	20.0%

Recommended reading

Basic literature	Genomes, Terrence A. Brown
Supplementary literature	DNA Science, David A.Micklos, Greg A. Freyer, David A. , Cold Spring Harbor Laboratory Press Francis S. Collins , The Language of Life
eResources addresses	

Example issues/ example questions/ tasks being completed	What are scopes of genomics, transcriptomics and proteomics? What is the difference between the impact of epigenetic vs. genetic mechanisms on transcriptome function? What is named "multiomic studies"?
Work placement	Not applicable

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