University of Gdańsk

Subject card

Subject name and code	Genomics, PG_00156253		
Field of study	Bioinformatics		
Date of commencement of studies	October 2025	Academic year of realisation of subject	2026/2027
Education level	Bachelor's studies	Subject group	Obligatory subject group in the field of study
Mode of study	full-time studies	Mode of delivery	at the university
Year of study	2	Language of instruction	Polish
Semester of study	4	ECTS credits	2.0
Learning profile	academic	Assessment form	exam
Conducting unit	Laboratory of Evolutionary Biochemistry -> UG Institute of Biotechnology -> Intercollegiate Faculty of Biotechnology UG-MUG -> Rector		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Bartłomiej Tomiczek	
	Teachers		

Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	10.0	0.0	20.0	0.0	0.0	30
	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	30	0.0	20.0	50

Subject objectives	The aim of the course is to familiarize the student with the most important achievements in genomics. Differences in the organization and genetic content of prokaryotic and eukaryotic genomes will be discussed, with particular emphasis on the human genome (KW_02). During the course, the student will acquire knowledge and skills enabling them to genome assemble based on the results of sequencing, annotation of genes in genomes and comparative analysis of genomes (KW_04, KU_01). Student will gain the ability to independently interpret published results of genomic analyzes (KU-05).

Learning outcomes

Course outcome	Subject outcome	Method of verification
[BIOINL3_U01] Graduate is able to program using modern programming tools, including tools dedicated to bioinformatics	1. Use the software and program yourself to perform the genomic analyzes discussed in class.	[SU1] oral statement/conversation/ discussion [SU3] text preparation/written work [SU4] test/exam - oral or written [SU5] implementation of a problem task [SU6] demonstration of practical skills
[BIOINL3_K03] Has an awareness and understanding of the risks and dilemmas, including ethical dilemmas, involved in conducting scientific research and introducing advanced technologies; understands and appreciates the importance of intellectual property; acts ethically	Student understands The impact of genomics on medicine and society	[SK1] oral statement/conversation/ discussion [SK4] test/exam - oral or written
[BIOINL3_W02] Has the scientific knowledge necessary to understand the basic processes in living organisms.	Student knows: 1. Organization of prokaryotic, eukaryotic and viral genomes. 2. Organization of the human genome 3. Principles of genome evolution, including the role of mobile genetic elements in this process	[SW4] test/exam - oral or written [SW1] oral statement/ conversation/discussion
[BIOINL3_U05] Graduate has the ability to use scientific literature, including English-language sources on bioinformatics; has ability to use appropriate databases	Student is able to: 1. Independently obtain information from scientific publications and electronic resources, including databases, available in English. 2. Interpret the results of genomic analyzes published in English obtained using the methods and techniques discussed in class.	[SU1] oral statement/conversation/ discussion [SU4] test/exam - oral or written [SU6] demonstration of practical skills [SU8] observation of student's independent or team work
[BIOINL3_W04] Has knowledge of basic research techniques and tools used in bioinformatics	Student knows 1. Knows strategies and techniques for isolating genomic DNA and sequencing genomes 2. Techniques for modifying genes in the genome.	[SW4] test/exam - oral or written [SW1] oral statement/ conversation/discussion [SW5] implementation of a problem task

Subject contents

Lecture: Organization and genetic content of prokaryotic genomes (bacteria, archaea) and eukaryotic genomes (yeast, humans, plants). Human genome project. The importance of mobile genetic elements for the organization and size of genomes. Mitochondrial genome and plastid genome. Viral genomes. Comparative genomics. The impact of genomics on medicine and society. The use of ancient DNA in genomics. Evolution of genomes.

Laboratory: Genomic DNA isolation - strategies and techniques. Genome sequencing - strategies and techniques. Gene assembly and identification of protein and RNA-coding genes, including assembly of Sanger sequencing sequences. Identification of orthologous genes in the newly sequenced genome. Mapping short sequence reads to the reference genome. Annotation of gene functions in the genome. Genetic modifications in prokaryotic and eukaryotic genomes - techniques and methods. Identification of genes associated with genetic diseases.

Prerequisites and co-requisites

Entrance requirements: After completing the compulsory subjects in the first three semesters, the student has knowledge and skills qualifying him to participate in and pass the course.

Formal requirements: Passed: Biodiversity and principles of taxonomy, Bioinformatic sequence analysis, Molecular biology and genetics

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Examination	51.0%	75.0%
Laboratory and computational exercises	51.0%	25.0%

Recommended reading	Basic literature	Scientific publications prepared by the teacher and made available to students during classes. Genomes 3 T.A. Brown, 2007, Garland Science Brown T.A. Genomes, ed. II, translation edited by P. Węgleński, Wydawnictwo Naukowe PWN, Warszawa 2009. Molecular Biology of the Gene, 7th edition, 2014, Pearson
	Supplementary literature	not applicable
	eResources addresses	
Example issues/ example questions/ tasks being completed	not applicable	
Work placement	Not applicable	

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