University of Gdańsk

Subject card

Subject name and code	Elements of Genetics and Diagnostics of Bacteria, PG_00193528						
Field of study	Bioinformatics						
Date of commencement of studies	October 2026		Academic year of realisation of subject		2027/2028		
Education level	Bachelor's studies		Subject group		Optional subject group Subject group related to scientific research 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		3.0		
Learning profile	academic		Assessment form		credit		
Conducting unit	Faculty of Biology -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		dr Agata Jurczak-Kurek				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	0.0	30.0	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		45.0	75
Subject objectives	• To understand the processes affecting the genetic variability of microorganisms with particular emphasis on gene transfer between species. • To learn the principles and methods of bacterial identification and the relationships between bacteria including the risks associated with their new faces.						

Learning outcomes

Course outcome	Subject outcome	Method of verification
[BIOINL3_U02] Graduate is able to apply knowledge of natural sciences and science to formulate, analyze and solve problems related to bioinformatics	Student can give the differences in the cell structure of Gram-positive and Gram-negative bacteria. Can give diagnostic features for selected groups of bacteria. Can give the systematic position of selected bacteria. Learns independently in a directed manner from indicated sources, including English-language sources.	[SU1] oral statement/conversation/ discussion [SU2] presentation/project/paper/ report [SU3] text preparation/written work
[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 is aware and understands the risks and dilemmas, including ethical ones, and the importance of intellectual property in bacterial research.	[SK1] oral statement/conversation/ discussion
[BIOINL3_W02] Has advanced scientific knowledge necessary to understand the basic processes in living organisms.	Student explains the differences in the structure of genetic material and in the stages of gene expression of a prokaryotic cell. Understands the molecular mechanisms and sources of genetic variation in prokaryotic organisms, lists their main pathways and knows their course. Understands the nature of continuous change in prokaryotic organisms in response to competition and environmental stress. Knows various methods of isolation and identification of pathogenic bacteria and human physiological biota. Knows specialized vocabulary including bacterial names and their systematics.	[SW1] oral statement/ conversation/discussion [SW2] presentation/project/paper/ report [SW3] text preparation/written work

Subject contents

1. Mechanisms and pathways of horizontal gene transfer in prokaryotic organisms.2. Methods for detection of horizontal transfer based on genomic DNA analysis.3. The course in conjugation in Gram-negative bacteria.4. Mechanisms of natural transformation and its functions.5. Regulation of the state of competence and conjugation.6. Structure and function of phage CRISPR systems and its application in so-called gene editing technology.7. Bacterial physiological biota and its importance for the human organism.8. Overview of selected groups of bacteria causing infectious diseases in a systematic approach.9. Methods of isolation and identification of bacterial etiological agent.10. Differentiation of selected bacteria using microscopic, biochemical, serological and molecular methods.

Prerequisites and co-requisites

Prerequisite requirements:

The student, after completing the compulsory subjects in the first three semesters, has the knowledge and skills that qualify him to participate and pass the subject.

formal requirements:

Completed cell biology and metabolism.Completed molecular biology and genetics.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Final grade based on: partial credits and individual student work in the section on bacterial diagnostics (50%) and a colloquium in the section on bacterial genetics (50%)	51.0%	100.0%

<table>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td>Literature required for final course credit (passing the exam):

A.1. used during the class

• Lewin B. Genes VII, Oxford University Press, USA 1999
• Szewczyk E.M. Diagnostyka bakteriologiczna PWN, Warszawa 2013.

A.2. studied independently by the student

• Scientific publications made available by the teacher in the educational portal</td></tr>
<tr><td>Supplementary literature</td><td>• Scientific publications made available by the teacher in the educational portal</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="2">1. The use of various molecular markers to identify human pathogenic bacteria

2. The design of primers for PCR reactions to identify pathogenic Enterobacteriales</td></tr>
<tr><td>Work placement</td><td colspan="2">Not applicable</td></tr>
</table>

Document generated electronically. Does not require a seal or signature.