GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	General Microbiology, PG_00037400		
Field of study	Biotechnology		
Date of commencement of studies	October 2020	Academic year of realisation of subject	2021/2022
Education level	first-cycle studies	Subject group	Obligatory subject group in the field of study 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	3	ECTS credits	6.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Department of Microbiology -> Faculty of Chemistry		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Anna Brillowska-Dąbrowska	
	Teachers	dr hab. inż. Roman Kotlowski dr hab. inż. Rafał Piątek dr hab. inż. Anna Brillowska-Dąbrowska dr hab. Beata Zalewska-Piątek	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	0.0	30.0	0.0	0.0	60

E-learning hours included: 0.0

Mikrobiologia ogólna - Moodle ID: 18486
https://enauczanie.pg.edu.pl/moodle/course/view.php?id=18486

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	60	4.0	86.0	150

Subject objectives

Acquisition of knowledge on basic problems of microbiology used in the area of biotechnology. Acquisition of skills in selected microbiological techniques including those used in biotechnology.

Learning outcomes

Course outcome	Subject outcome	Method of verification
K6_U04	Student aquires knowledge about using basic microbiological techniques.	[SU4] Assessment of ability to use methods and tools
K6_W04	Student is familiar with biology, physiology and functions of microorganisms.	[SW1] Assessment of factual knowledge

<table>
<tr><td>Subject contents</td><td>LECTURE Microorganisms and microbiology. Microorganisms as cells. Microorganisms and their natural environments. The impact of microorganisms on humans. Pathways of discovery in microbiology. An overview of microbial life (cell structure and evolutionary life, the tree of life, physiological diversity of microorganisms, prokaryotic diversity, eukaryotic diversity). Macromolecules (chemical bonding and water in living systems, noninformational macromolecules, informational macromolecules). Cell structure and function (microscopy and cell morphology, cell membranes and cell walls, surface structures and inclusion of prokaryotes, microbial locomotion). Nutrition, laboratory culture and metabolism of microorganism. Microbial growth (bacterial cell division, growth of bacterial populations, measuring microbial growth, environmental effects on microbial growth). Molecular biology of microorganisms (genes and gene expression, DNA structure, DNA replication, tools for manipulation DNA, RNA synthesis, protein synthesis). Metabolic regulation (regulation of enzyme activity, DNA-binding proteins and regulation of transcription, global regulatory mechanisms, other mechanisms of regulation). Virology (virus and virion, growth and quantification, viral replication, viral diversity). Bacterial genetics (mutation and recombination, transformation, transduction, plasmids, transposons and insertion sequences, bacterial genetics and gene cloning, bacterial chromosome). Microbial taxonomy. The phylogeny of bacteria. The phylogeny of archaea. Eukaryotic cell biology and eukaryotic microorganisms. Microbial ecology (carbon, nitrogen, phosphorous, sulfur cycles and microorganisms, nitrogen fixation, water microbiology, waterborne diseases, hygene monitoring, food spoilige microorganisms, foodborne pathogens). Microorganisms as tools for industry and research. LABORATORY Laboratory organization. Safety in microorganisms handling - hazard groups. Sterilization and disinfection (principles of sterilization and disinfection, physical sterilization, chemical disinfectants). Cultivation of microorganisms (growth curve, culture media). Nutritional requirements of cells. Microorganisms in the laboratory environment (colony morphology, growth patterns in broth, agar slant and agar deep-tube). Pure culture techniques (spread plate technique, streak plate technique, specific media). Environmental factors affecting microbial growth (temperature, pH, osmotic pressure, ultraviolet light). Oxygen requirements – cultivation of anaerobes. Enumeration of bacteria. Antimicrobial agents. Metabolic activities of microorganisms (hydrolysis of starch, fats, proteins, fermentation of and β-galactosidase activity). Microbial relationships (bacterial commensalism, synergism, antagonism). Microscopic techniques and bacteria staining (microscope slide techniques, Gram staining). Identification of unknown bacteria from environmental samples. Microbial genetics (isolation of plasmid DNA, bacterial transformation).</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>Student has to finish Fundamental of Biotechnology</td></tr>
<tr><td>Assessment methods and criteria</td><td>
<table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Written exam</td><td>60.0%</td><td>70.0%</td></tr>
<tr><td>Practical exercise</td><td>60.0%</td><td>30.0%</td></tr>
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<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>1. Władysław Kunicki-Goldfinger „Życie bakterii”.
2. K.Kotełko, L.Sedlaczek, T.M.Lachowicz „Biologia bakterii”
3. „Ćwiczenia z mikrobiologii ogólnej” red. J.Kur, skrypt PG, Gdańsk 1993</td></tr>
<tr><td>Supplementary literature</td><td>1. E.Jawetz, J.L. Melnick, E.A. Adelberg „Przegląd mikrobiologii lekarskiej”
2. M.Janowiec ,,Mikrobiologia i serologia”
3. W.Kędzia, H.Koniar „Diagnostyka mikrobiologiczna”
4. Aleksander Chmiel „Biotechnologia”
5. Jaime S. Colome, A. M Kubinski, Raul Cano, D. V. Grady “Laboratory Exercises in Microbiology”
6. Jacquelyn G. Black “Microbiology - Principles &Applications”</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
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<tr><td>Example issues/ example questions/ tasks being completed</td><td>1.How can you distinguish bacteria from archaea:
based on 16S rRNA sequences
based on the microscopic method of staining spores
based on 18S rRNA sequences
based on transposon sequences
2.The generation time is:
time required for cell division
time required to divide genetic material
logarithmic time for bacterial growth in stationary culture
time required for bacteria to adapt in the new environment
3.Anaeroby:
grow in microaerophilic conditions
grow in the presence of 21% oxygen in the atmosphere
grow in anaerobic conditions
do not grow in anaerobic conditions</td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
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