University of Gdańsk

Subject card

Subject name and code	The oral microbiota: friend or foe?, PG_00196925		
Field of study	Biotechnology		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2027/2028
Education level	Bachelor's studies	Subject group	Obligatory subject group in the field of study Optional subject group
Mode of study	full-time studies	Mode of delivery	at the university
Year of study	2	Language of instruction	English
Semester of study	3	ECTS credits	2.0
Learning profile	academic	Assessment form	credit
Conducting unit	Intercollegiate Faculty of Biotechnology UG-MUG -> Rector		
Name and surname of lecturer (lecturers)	Subject supervisor	dr Alessandro Negri	
	Teachers		

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	14.0	0.0	0.0	0.0	0.0	14

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	14	5.0	31.0	50

Subject objectives

The aim of the course is understanding the complexity of the dynamic interactions between the components of the oral microbiota and the host immune system for preserving homeostasis but also the consequences of the disruption of this balance in the manifestation of diseases. During the course, the student will learn the components of the oral microbiota with a main focus on main commensals and pathogens, the methods for determining its composition, the etiology of the main oral diseases (caries and periodontitis) as well as advanced knowledge of microbiology and immunology.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[BIOTECHL3_W03] The graduate possesses structured and advanced knowledge of organism-environment relationships and their importance for understanding biological processes and biotechnological applications.	The student knows the main commensals and pathogens of the oral microbiota and the methods to determine the oral microbiota composition. The student knows the interspecies interactions that maintain homeostasis or lead to disease in the oral cavity. The student knows the etiology of the main oral diseases.	[SW4] test/exam - oral or written
[BIOTECHL3_W09] The graduate possesses structured and advanced knowledge of the terminology and concepts used in biological and medical sciences and related disciplines.	The student knows advanced concepts of microbiology, oral cavity anatomy and immunology required to fully understand the subject. The student knows the proper terminology connected with the described topic.	[SW4] test/exam - oral or written

Subject contents

The present course aims to elucidate the complex as well important role of the microbial community that colonizes the oral cavity. It will describe the most relevant components of the microbiota which can be found in the oral cavity of humans. It will be enlightened the role of these microorganisms on homeostasis or dysbiosis, therefore on host health and disease. The course will focus on the interaction between the components of the oral microbiota and the cells of the host, which during homeostatic conditions emerge as a finely tuned collaboration to protect this area from colonization of extrinsic bacteria. On the other hand, additional focus will be taken on the manifestation of diseases caused by the disruption of this balance, which are some of the most common diseases affecting the humankind.

<table>
<tr><td>Prerequisites and co-requisites</td><td colspan="2"></td></tr>
<tr><td>Assessment methods and criteria</td><td colspan="2"><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>51.0%</td><td>100.0%</td></tr>
</table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td>- Lamont, R.J., Koo, H. & Hajishengallis, G. (2018). The oral microbiota: dynamic communities and host interactions. Nat Rev Microbiol 16, 745759. https://doi.org/10.1038/s41579-018-0089-x

- Arweiler, N. B., Netuschil, L. (2016). The Oral Microbiota. Adv Exp Med Biol, 902, 4560. https://doi.org/10.1007/978-3-319-31248-4_4

- Moutsopoulos N.M., Konkel J.E., (2018). Tissue-Specific Immunity at the Oral Mucosal Barrier, Trends in Immunology, 39, 276-287. https://doi.org/10.1016/j.it.2017.08.005.

- Bowen, W. H., Burne, R. A., Wu, H., & Koo, H. (2018). Oral Biofilms: Pathogens, Matrix, and Polymicrobial Interactions in Microenvironments. Trends in microbiology, 26(3), 229242. https://doi.org/10.1016/j.tim.2017.09.008</td></tr>
<tr><td>Supplementary literature</td><td>- Mark Welch, J. L., Rossetti, B. J., Rieken, C. W., Dewhirst, F. E., & Borisy, G. G. (2016). Biogeography of a human oral microbiome at the micron scale. Proceedings of the National Academy of Sciences of the United States of America, 113(6), E791E800. https://doi.org/10.1073/pnas.1522149113

- Moutsopoulos, N. M., & Konkel, J. E. (2018). Tissue-Specific Immunity at the Oral Mucosal Barrier. Trends in immunology, 39(4), 276287. https://doi.org/10.1016/j.it.2017.08.005

- Abranches, J., Zeng, L., Kajfasz, J. K., Palmer, S. R., Chakraborty, B., Wen, Z. T., Richards, V. P., Brady, L. J., & Lemos, J. A. (2018). Biology of Oral Streptococci. Microbiology spectrum, 6(5), 10.1128/microbiolspec.GPP3-0042-2018. https://doi.org/10.1128/microbiolspec.GPP3-0042-2018

- Visentin, D., Gobin, I., & Maglica, Ž. (2023). Periodontal Pathogens and Their Links to Neuroinflammation and Neurodegeneration. Microorganisms, 11(7), 1832. https://doi.org/10.3390/microorganisms11071832</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="2">- Describe the role of Streptococcus mutans in dental caries and explain why.

- For what reasons Lactobacillus species are mostly not implicated in the onset of the cariogenic process?

- What is considered the core microbiome of the oral microbiome?</td></tr>
<tr><td>Work placement</td><td colspan="2">Not applicable</td></tr>
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