Microbiology and oral microbiology

1. IMPRINT

Academic Year	2022/2023
Department	Faculty of Dental Medicine
Field of study / Subject	English Dentistry Division
Main scientific discipline *(in accord with appendix to the Regulation of Minister of Science and Higher educatio from 26th of July 2019)*	Medical sciences
Study Profile *(general academic / practical)*	General academic
Level of studies *(1st level /2nd level/ uniform MSc)*	Uniform MSc
Form of studies	Full-time studies
Type of module / course *(obligatory / non-compulsory)*	Obligatory
Form of verification of learning outcomes *(exam / completion)*	Exam
Educational Unit / Educational Units *(and address / addresses of unit / units)*	Department of Dental Microbiology (1S4) 1a Banacha, 02-097 Warszawa phone 22 599-17-77; e-mail: zms1@wum.edu.pl

Head of Educational Unit / Heads of Educational Units	prof. Marta Wróblewska, MD, PhD, DTM&H
Course coordinator *(title, First Name, Last Name, contact)*	prof. Marta Wróblewska, MD, PhD, DTM&H tel. (22) 599-17-77 marta.wroblewska@wum.edu.pl
Person responsible for syllabus *(First name, Last Name and contact for the person to whom any objections concerning syllabus should be reported)*	prof. Marta Wróblewska, MD, PhD, DTM&H tel. (22) 599-17-77 marta.wroblewska@wum.edu.pl
Teachers	prof. Marta Wróblewska, MD, PhD, DTM&H marta.wroblewska@wum.edu.pl

2. BASIC INFORMATION

Year and semester of studies	II year, I and II semester	**Number of ECTS credits**	5

FORMS OF CLASSES	**Number of hours**	**ECTS credits calculation**
Contacting hours with academic teacher		
Lecture (L)	10	0,4
Seminar (S)	15	0,6
Discussions (D)	-	-
e-learning (e-L)	-	-
Practical classes (PC)	45	1,8
Work placement (WP)	-	-
Unassisted student's work		
Preparation for classes and completions	55	2,2

3. COURSE OBJECTIVES

O1	Student learns about the basic characteristics of microorganisms pathogenic for humans, laboratory diagnostic methods and the principles of sterilisation and disinfection in dental practice
O2	Student learns about physiological microflora of the oral cavity, etiology and pathogenesis of dental caries, microbiology of periodontal disease, systemic odontogenic infections
O3	Student learns about pathogenesis and epidemiology of infectious diseases and defence mechanisms of the host (specific and nonspecific)

O4	Student learns about chemotherapy of bacterial, fungal and viral infections, control of infections in dental practice and prophylaxis of infectious diseases

4. STANDARDS OF LEARNING – DETAILED DESCRIPTION OF EFFECTS OF LEARNING *(concerns fields of study regulated by the Regulation of Minister of Science and Higher Education from 26 of July 2019; does not apply to other fields of study)*

Code and number of effect of learning in accordance with standards of learning *(in accordance with appendix to the Regulation of Minister of Science and Higher education from 26th of July 2019)*	**Effects in time**
Knowledge – Graduate* knows and understands:	
C.W1.	types and species as well as structure of viruses, bacteria, fungi and parasites, their biological features and mechanisms of pathogenicity
C.W2.	physiological human bacterial flora
C.W3.	basics of epidemiology of viral and bacterial infections, fungal and parasitic infections and the ways of their transmission in the human body
C.W4.	species of bacteria, viruses and fungi which are the most common etiological factors of infections
C.W5.	principles of disinfection, sterilization and aseptic procedures
C.W6.	external and internal pathogens
C.W9.	the phenomenon of drug resistance
C.W20.	principles of treatment of viral, bacterial, fungal and parasitic infections
E.W9.	the principles of immunisation against infectious diseases in children and adults
F.W3.	viral, bacterial and fungal flora of the oral cavity and its importance
F.W13.	principles of antibiotic therapy and antibiotic resistance
Skills– Graduate* is able to:	
C.U1.	collect an appropriately selected type of biological material for microbiological testing depending on the location and course of the infection
C.U2.	interpret the results of microbiological, serological and antibiogram tests
C.U3.	select and perform tests indicating the number of bacteria in body fluids
F.U14.	assess the risk of caries using bacteriological tests and saliva tests

** In appendix to the Regulation of Minister of Science and Higher education from 26th of July 2019 „graduate", not student is mentioned.*

5. ADDITIONAL EFFECTS OF LEARNING *(non-compulsory)*

Number of effect of learning	Effects of learning in time
Knowledge – Graduate knows and understands:	
K1	-
Skills – Graduate is able to:	
S1	-
Social Competencies – Graduate is ready for:	
SC1	-

6. CLASSES

Form of class	Class contents	Effects of Learning
Lectures (L)		
Lecture 1	L1 – Lecture 1 -Pathogenesis and epidemiology of bacterial infections of the oral cavity Definitions related to the epidemiology of infections. Routes of spread of bacterial infections. Factors of bacterial pathogenesis.	C.W3., C.W6.
Lecture 2	L2 – Lecture 2 - Anaerobic bacteria Characterization of clinically relevant anaerobes. Infections caused by anaerobic bacteria.	C.W1., C.W4.
Lecture 3	L3 – Lecture 3 - Pathogenesis and epidemiology of viral infections Factors of viral pathogenesis. Characteristics of the stages of viral infections. Defense mechanisms of viruses. Definitions related to the course of viral infections.	C.W3.C.W6.
Lecture 4	L4 – Lecture 4 - Viral infections of the oral cavity Characteristics of viruses which cause oral infections. Epidemiology and diagnosis of oral infections caused by viruses.	C.W1., C.W3., C.W4.
Lecture 5	L5 – Lecture 5 - Respiratory viral diseases Characteristics of viruses that cause respiratory-transmitted infections. Epidemiology of viral respiratory infections. Diagnosis, treatment and prevention of viral respiratory infections.	C.W1., C.W3., C.W4.
Lecture 6	L6 – Lecture 6 - Viral hepatitis in dental practice Characteristics of viruses that cause hepatitis. Epidemiology and laboratory diagnosis of hepatitis virus infections. Prevention of infections with hepatitis viruses.	C.W1., C.W4., C.W6.
Lecture 7	L7 – Lecture 7 - Infections in the immunocompromised host Classification of immune disorders. Risk factors for infections in immunocompromised patients. Infections that occur in immunocompromised patients. Pathogens most frequently causing infections in immunocompromised patients.	C.W6., E.W9.

Lecture 8	L8 – Lecture 8 - Systemic infections in dental practice Classification of infections. Infections of the respiratory system: etiological factors, diagnosis, treatment. Infections of the digestive system: etiological factors, diagnosis, treatment. Infections of the osteoarticular system: etiological factors, diagnosis, treatment. Infections of the urinary system: etiological factors, diagnosis, treatment. Infections of the cardiovascular and nervous systems: etiological factors, diagnosis, treatment.	C.W2., F.W3.
Lecture 9	L9 – Lecture 9 - New and re-emerging infections Causes of new and recurrent infections. Characteristics of pathogens causing new and recurrent infections: *Candida auris*, Ebola virus, Zika and SARS-COV2	C.W1. C.W3., C.W4.
Lecture 10	L10 – Lecture 10 – Prions Characterization of prions as disease agents and prion diseases. Epidemiology and diagnosis of infections.	C.W1., C.W3., C.W4.
Seminars (S)		
Seminar 1	S1 – Seminar 1 - Physiological microflora of the oral cavity. Etiology and pathogenesis of dental caries. Physiological niches distinguished within the oral cavity. Species composition of biofilms inhabiting particular microenvironments. Characteristics of species included in the oral microbiome. Age-dependent changes in microflora composition. Causes of carious lesions. Characteristics of microbial species important in the formation of carious lesions. Types of caries. Prevention of the formation and progression of carious lesions.	C.W2., F.W3. F.W3., F.U14.
Seminar 2	S2 - Seminar 2 - Prophylaxis of healthcare-associated infections in dental practice. Specimen collection for microbiological diagnostics. Infections associated with dental practice. Routes of spread of infections. Prevention of infections vaccination, hand hygiene. Control of infections in dental practice. Principles of collection and transport of clinical materials for microbiological studies. Types of materials to be collected. Schemes of collection of individual materials.	C.W3., C.W5. C.U1., C.U3.
Seminar 3	S3 – Seminar 3 - Microbiology of periodontal disease. Systemic odontogenic infections. Division of periodontal and gum diseases. Characteristics of microorganisms important in the development of periodontal disease. Bacterial complexes in the subgingival biofilm. Pathomechanism of periodontal diseases. Microbiological diagnosis and treatment guidelines. Definition of dental-associated infection. Types of infections associated with diseases of teeth and gums. Characteristics of systemic dental infections.	C.W2., F.W3. C.W2., F.W3.
Seminar 4	S4 – Seminar 4- Chemotherapy of bacterial infections. Prophylaxis of bacterial infections. Types of vaccines used in antimicrobial prophylaxis. The current vaccination calendar. Characteristics of preparations used for immunization against bacterial infections. Schemes of antimicrobial therapy. Use of β-lactam antibiotics, aminoglycosides, glycopeptides, chinolons and other groups of antimicrobial drugs in the treatment of infections. Recommendations for the use of antibiotics in dental treatment.	C.W9., C.W20., F.W13., C.U2. C.W5., E.W9.

Seminar 5	S5 - Seminar 5 - Antiviral agents. Prophylaxis of viral infections. Groups of antiviral drugs. Mechanism of action of antiviral drugs. Drug resistance. Types of vaccines used in the prevention of viral infections. Mandatory and recommended vaccinations. Passive and active prophylaxis. Characteristics of preparations used for immunization against viral infections.	C.W9., C.W20. C.W5., E.W9.
Practical classes (PC)		
Practical classes 1	PC1 - Principles of bacteriological diagnostics. Methods of isolation and identification of bacteria. Basic safety rules in the microbiology laboratory. Principles of collection and transport of clinical material for microbiological examination. The course of microbiological examination. Techniques of staining bacteria. Methods of culture and identification of bacteria. Methods of determining drug resistance of microorganisms.	C.W6., C.U1., C.U2., C.U3.
Practical classes 2	PC2 - Sterilisation and disinfection. Hand hygiene of the medical personnel, Methods of sterilization and disinfection of medical equipment, instruments and rooms. Control of sterilization and disinfection processes. Proper hand hygiene.	C.W3., C.W5.
Practical classes 3	PC3 - Gram-positive cocci and Gram-negative cocci. Blood culture. Cerebrospinal fluid diagnostics. Characterization of microorganisms belonging to Gram-positive and Gram-negative cocci. Methods of identifying clinically relevant species. Diagnosis and treatment of infections. Diagnostic methods for blood and cerebrospinal fluid infections.	C.W1., C.W4., C.U2., C.U3.
Practical classes 4	PC4 - Gram-negative aerobic bacilli. Characteristics of species belonging to aerobic fermenting and non-fermenting bacilli. Epidemiology, diagnosis and treatment of infections	C.W1,. C.W4., C.U2.
Practical classes 5	PC5 - Microaerophilic and capnophilic bacteria. Spirochaetes. Systematics of microaerophilic bacteria, capnophilic bacteria and spirochaetes. Characteristics of clinically relevant species of microaerophilic bacteria, capnophilic bacteria and spirochaetes. Epidemiology, diagnosis and treatment of infections.	C.W1., C.W4., C.U2.
Practical classes 6	PC6 - Rickettsiae, mycoplasmas, chlamydiae. Serological diagnostics. Anaerobic bacteria. Systematics, life cycle and characteristics of infections caused by chlamydia. Characteristics of mycoplasmas and rickettsiae and infections caused by them. Methods of laboratory diagnosis of infections caused by rickettsiae, mycoplasmas and chlamydiae. Basic serological methods used in microbiology. Characterization and diagnosis of anaerobic bacteria.	C.W1., C.W4., C.U2.
Practical classes 7	PC7 - Chemotherapy of bacterial and fungal infections. Basic groups of antibacterial and antifungal drugs. Mechanisms of action. Mechanisms of bacterial resistance to antibiotics and antifungal drugs. Methods of assessing susceptibility to antimicrobial drugs. Alert strains.	C.W9., C.W20., F.W13., C.U2.
Practical classes 8	PC8 - Bacteria of the genera: *Mycobacterium*, *Corynebacterium*, *Listeria*, *Bordetella.*	C.W1., C.W4., C.U2.

	Systematics of bacteria of the genera *Mycobacterium, Corynebacterium, Listeria, Bordetella.* Characterization of clinically relevant species. Epidemiology, diagnosis and treatment of infections.	
Practical classes 9	PC9 - Fungal infections of the oral cavity. Characteristics of clinically relevant fungal species. Epidemiology, diagnosis, and treatment of infections.	C.W1., C.W3., C.W4., C.U1.
Practical classes 10	PC10 - General properties of viruses. Methods of culture of viruses. Laboratory diagnosis of viral infections. Structure of viruses. Phases of viral replication. Methods used to multiply and isolate viruses. Cytopathic effects. Methods of virological diagnosis.	C.W1., C.W6., C.U2.
Practical classes 11	PC11 - DNA viruses. Herpesviridae family. Other DNA viruses: *Adenoviridae, Parvoviridae, Papillomaviridae, Polyomaviridae, Poxviridae*.	C.W1., C.W4., C.U2.
Practical classes 12	PC12 - RNA viruses. Picornaviridae family. Other RNA viruses: *Astroviridae, Caliciviridae, Flaviviridae* and others.	C.W1., C.W4., C.U2.
Practical classes 13	PC13 - HIV infection / AIDS. Laboratory diagnostics of viral hepatitis. Classification and general characteristics of retroviruses. Pathogenesis, epidemiology and clinical manifestations of HIV infection. Laboratory diagnosis of HIV infection. Therapeutic options and prevention of HIV infection.	C.W1., C.W4., C.U2.
Practical classes 14	PC 14 - Review of the course. Credit for practical classes	C.W1.- C.W20., E.W9., F.W3., F.W13., C.U1.- C.U3., F.U14.

7. LITERATURE

Obligatory literature:

1. Essential Microbiology for Dentistry. L. P. Samaranayake. Elsevier, 5th edition, 2018.
2. Medical Microbiology. P. R. Murray, K. S. Rosenthal, M. A. Pfaller. Elsevier, 9th edition, 2020.

Supplementary literature:

1. Review of Medical Microbiology and Immunology. Ed. W. Levinson. Lange, 16th edition, 2020.
2. Human virology. L. Collier, P. Kellam, J. Oxford. Oxford University Press, 5th edition, 2016.

8. VERIFYING THE EFFECT OF LEARNING

Code of the course effect of learning	Ways of verifying the effect of learning	Completion criterion
e.g. G.K1, G.S1, K1	*This field defines the methods used for grading students e.g. pop quiz, test, written report etc.*	*e.g. threshold number of points*
C.W1.- C.W6., C.W9., C.W20., E.W9., F.W3., F.W13., C.U1.- C.U3., F.U14.	1. Intermediate tests (4 tests during the course) 2. Credit for practical classes. 3. Final exam (100 MCQ)	1. Threshold number of points: 11/20 Scores and marks: <11,0/20 – 2.0 (failed) 11,0-12,8/20 – 3.0 (satisfactory) 12,9-14,6/20 – 3.5 (more than staisfactory) 14,7-16,4/20 – 4.0 (good) 16,5-18,2/20 – 4.5 (more than good) 18,3-20,0/20 – 5.0 (very good)

		2. Credit 3. Threshold number of points: 56/100 Scores and marks: ≤55/100 – 2.0 (failed) 56-64/100 – 3,0 satisfactory) 65-73/100 – 3.5 (more than satisfactory) 74-82/100 – 4.0 (good) 83-91/100 – 4.5 (more than good) 92-100/100 – 5.0 (very good)

9. ADDITIONAL INFORMATION *(information essential for the course instructor that are not included in the other part of the course syllabus e.g. if the course is related to scientific research, detailed description of, information about the Science Club)*

1. Person responsible for teaching: prof. Marta Wróblewska, e-mail: marta.wroblewska@wum.edu.pl
2. Students are welcome to sign in to the Students' Microbiology Research Group.
3. Practical classes are held in the Department of Physiology and Experimental Pathophysiology, 3c Pawińskiego street.
4. Seminars and lectures are held in the Department of Dental Microbiology, 1a Banacha street (block E, 1st floor).
5. Final exam may be organised before the summer exam session upon request of the students.