

Textbooks –

Warren Levinson et al. Review of Medical Microbiology and Immunology. 15th edition

Richard J. Lamont, Howard F. Jenkinson - Oral Microbiology at a Glance.

Philip D Marsh, Michael V Martin - Oral Microbiology. 5th edition.

Faculty of Stomatology

Microbiology 1

Thematic Plan of Lectures and Practical Classes

Study Weeks	Lectures	Duration (hours)
1.	Introduction of study course. Bacteria Compared with other microorganisms. Structure of bacterial cells.	1h.
2.	Growth of Bacteria. Genetics of bacteria.	1h.
3.	Human normal microflora. Sterilization and disinfection. Bacterial Vaccines.	1h.
4.	Pathogenesis of bacterial infections. Types of bacterial infection. mechanisms of toxin production and modes of action. Stages of Infectious infections.	1h.
5.	Antimicrobial Drugs: Mechanism of Action and antibiotic resistance.	1h.
6.	Gram-positive cocci – <i>Staphylococcus spp.</i> , <i>Streptococcus spp.</i> , Gram-negative cocci - <i>Neisseriaceae</i> .	1h.
7.	Medically important Gram-positive rods - spore-forming and non-spore-forming Gram-positive rods.	1h.
8.	Gram-negative rods – Enterobacteriaceae (<i>Escherichia</i> , <i>Salmonella</i> , <i>Shigella</i> , <i>Klebsiella</i> , <i>Proteus</i>)	1h.
9.	Gram-negative rods – <i>Pseudomonas aeruginosa</i> ; Curved gram-negative rods (<i>Vibrio</i> , <i>Helicobacter</i> , <i>Campylobacter</i>).	1h.
10.	Gram-Negative Rods Related to the Respiratory Tract – <i>Haemophilus</i> , <i>Bordetella</i> , <i>Legionella</i> . <i>Acinetobacter spp.</i>	1h.
11.	Gram-Negative Rods Related to Animal Sources (Zoonotic Organisms) – <i>Brucella</i> , <i>Francisella</i> <i>Yersinia</i> , <i>Pasteurella</i> , <i>Bartonella</i> .	1h.
12.	Mycobacteria. Actinomycetes. Mycoplasmas.	1h.
13.	Spirochetes. Rickettsiae. Chlamydiae.	1h.
14.	Anaerobic infections in dental practices.	1h.

Study Weeks	Practical Classes	Study Materials
1.	<p>Microbiology laboratory rules and safety;</p> <ul style="list-style-type: none"> • Classify major groups of organisms causing infectious diseases in humans • Discuss important features of microbes • Define eukaryotes and prokaryotes • Classify bacteria according to their shape and size • Describe the structure of Bacteria (cell wall, cytoplasmic membrane, cytoplasm, etc.) • Define structures outside the cell wall (capsule, flagella, pili, glycocalyx, etc.) • Discuss bacterial staining methods <p><u>Laboratory Session - Gram staining technique</u></p>	Levinson's chapters 1,2
2.	<ul style="list-style-type: none"> • Discuss the growth cycle • Describe the aerobic and anaerobic growth • importance of sugar fermentation, and iron metabolism. • Discuss bacterial genetics: types of mutations and their importance. Transposons and transfer of DNA within Bacterial cells, Programmed rearrangements. • Transfer of DNA between Bacterial cells; conjugation, transduction and transformation • Explain recombination: homologous and nonhomologous <p><u>Laboratory Session - Cultivation technique</u></p>	Levinson's Chapters 3,4
3.	<ul style="list-style-type: none"> • Normal flora – Concept of Normal flora. The human microbiome. • Introduction to oral microbiology - commensals and pathogens, oral diseases. • Microbes in the oral cavity – (primary colonizers, beneficial effects of bacterial colonizers, ecological plaque hypothesis; ecology and disease). • Role of plaque bacteria in periodontal diseases. • Acquisition of the resident oral microflora. Aging and the oral microflora. • Bacterial vaccines. • Principles of sterilization and disinfection, and their clinical importance. 	<p>Levinson's Chapters - 6,12,13</p> <p>Lamont R., Jenkinson H. - Chapter 1</p> <p>Marsh P. Martin M. - Chapters 4 and 5 - only - "chapter summary"</p>

4.	<ul style="list-style-type: none"> • Transmission, portals of entry of some common pathogens, Describe stages of an infectious disease • Explain why people get infectious diseases. • Discuss types of bacterial infections, mechanisms of toxin production, invasion and inflammation, and intracellular survival. endotoxins and exotoxins, their characteristics, and their mode of action. 	Levinson's Chapter 7
5.	<ul style="list-style-type: none"> • Antimicrobial drugs, and their targets (cell wall, ribosomes, nucleic acids, cell membrane). Additional mechanisms of action (isoniazid, metronidazole, ethambutol, pyrazinamide); • Principles of antibiotic resistance four major mechanisms (enzyme production, synthesis of modified targets, reducing permeability, MDR and "efflux" pumps), high and low-level resistance • principles of a combination of antibiotic therapy and clinical importance; • Antibiotics in dentistry. <p><u>Laboratory Session - defining antibiotic sensitivity: disc diffusion (Kirby-Bauer method) and its interpretation</u></p>	<p>Levinson's Chapter 10 and Chapter 11 -only "Pearls";</p> <p>Lamont R., Jenkinson H. – Chapter 36</p>
Midterm 1		
6.	<ul style="list-style-type: none"> • Gram-positive cocci: • Discuss Staphylococcus, diseases related to staphylococci, important properties, transmission and pathogenesis, clinical findings related to <i>S. aureus</i>: Pyogenic diseases, toxin-mediated diseases, Kawasaki disease, <i>S. epidermidis</i> and <i>S. saprophyticus</i>. • Laboratory diagnosis of staphylococcal infections; • Discuss Streptococci, diseases related to this agent, • Important properties and classification of Streptococci. • Important features of <i>S. pyogenes</i> and classification. laboratory diagnosis and treatment of <i>S. pyogenes</i> infections. • Other important streptococcal pathogens - transmission and pathogenesis; • Streptococcus Pneumoniae-related diseases, transmission, pathogenesis, treatment, and prevention; • Viridans Streptococci (<i>S. mutans</i>, <i>S. salivarius</i>, etc.) • Microbiological and immunological methods for diagnosis, treatment and prevention of different groups of streptococci; • Microbiology of caries, Important bacteria in caries (<i>Streptococcus mutans</i>) • Gram-negative cocci: <i>Neisseria meningitidis</i>, <i>Neisseria gonorrhoeae</i> - diseases, diagnosis, treatment and prevention. <p><u>Discussion of clinical cases</u></p> <p><u>Laboratory Session - Gram staining of cocci</u></p>	<p>Levinson's Chapters 15,16</p> <p>Lamont R., Jenkinson H. - Chapters 17,18</p>
7.	<ul style="list-style-type: none"> • Medically important Gram-positive rods. <p>Spore-forming Gram-positive rods:</p> <ul style="list-style-type: none"> • <i>B. cereus</i>, <i>B. anthracis</i> – diseases, transmission, pathogenesis, clinical signs, laboratory diagnosis, treatment, and prevention. • Clostridium - <i>C. tetani</i>, <i>C. botulinum</i>, <i>C. perfringens</i>, <i>C. difficile</i> diseases, transmission, pathogenesis, clinical signs, laboratory diagnosis, treatment 	Levinson's Chapter 17

	<p>and prevention.</p> <p>Non-spore-forming Gram-positive rods:</p> <ul style="list-style-type: none"> • <i>Corynebacterium diphtheriae</i> - diseases, transmission, pathogenesis, clinical signs, laboratory diagnosis, treatment and prevention. • <i>Listeria monocytogenes</i> - diseases, transmission, pathogenesis, clinical signs, laboratory diagnosis, treatment and prevention. • <i>Gardnerella vaginalis</i> - disease, transmission, pathogenesis, clinical signs, laboratory diagnosis, treatment and prevention. <p><u>Discussion of clinical cases</u></p>	
8.	<ul style="list-style-type: none"> • Gram-negative rods (<i>Escherichia, Salmonella, Shigella, Klebsiella, Proteus</i>) - diseases, transmission, pathogenesis, clinical signs, laboratory diagnosis, prevention. • <u>Discussion of clinical cases;</u> 	Levinson's Chapter 18 (part 1)
9.	<ul style="list-style-type: none"> • Gram-negative rods – <i>Pseudomonas aeruginosa</i> - diseases, transmission, pathogenesis, clinical signs, laboratory diagnosis, prevention; • Curved gram-negative rods (<i>Vibrio, Helicobacter, Campylobacter</i>) - diseases, transmission, pathogenesis, clinical signs, laboratory diagnosis, prevention <p><u>Discussion of clinical cases</u></p>	Levinson's Chapter 18 (part 2)
10.	<ul style="list-style-type: none"> • Gram-negative rods related to the respiratory Tract (<i>Haemophilus, Bordetella, Legionella, Acinetobacter</i>) - diseases, transmission, pathogenesis, clinical signs, laboratory diagnosis, prevention; <p><u>Discussion of clinical cases</u></p>	Levinson's Chapter 19
11.	<ul style="list-style-type: none"> • Gram-negative rods related to animal sources (<i>Brucella, Francisella, Yersinia, Pasteurella, Bartonella</i>) - diseases, transmission, pathogenesis, clinical signs, laboratory diagnosis, prevention; <p><u>Discussion of clinical cases</u></p>	Levinson's Chapter 20
12.	<ul style="list-style-type: none"> • <i>Mycobacteriaceae</i> - diseases, transmission, pathogenesis, clinical signs, laboratory diagnosis, prevention. • Actinomyces. - diseases, transmission, pathogenesis, clinical signs, laboratory diagnosis, prevention • Mycoplasmas- diseases, transmission, pathogenesis, clinical signs, laboratory diagnosis, prevention; <p><u>Discussion of clinical cases</u></p>	Levinson's Chapters 21,22,23
13.	<ul style="list-style-type: none"> • Spirochetes - diseases, transmission, pathogenesis, clinical signs, laboratory diagnosis, prevention; • Rickettsiae and Chlamydiae - diseases, transmission, pathogenesis, clinical signs, laboratory diagnosis, prevention <p><u>Discussion of clinical cases</u></p>	Levinson's Chapters 24,25,26

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14.	<p>Microbiological aspects of dental infections.</p> <ul style="list-style-type: none"> • Introduction to anaerobic bacteria - important Properties, Anaerobes of Medical Interest, clinical infections, laboratory diagnosis, treatment. • Gram-negative anaerobic rods - <i>Bacteroides</i>, <i>Fusobacterium</i>, <i>Prevotella</i>, <i>Porphyromonas</i>, HACEK-group (<i>Haemophilus aphrophilus</i> and <i>Haemophilus paraphrophilus</i>, <i>Actinobacillus (Aggrigatibacter) actinomycetemcomitans</i>, <i>Cardiobacterium hominis</i>, <i>Eikenella corrodens</i>, and <i>Kingella kingae</i>); • Gram-positive anaerobic rods - <i>Actinomyces</i>, <i>Bifidobacterium</i>, <i>Eubacterium</i>, <i>Lactobacillus</i>, <i>Propionibacterium</i>, <i>Clostridium</i>; Gram-positive anaerobic cocci (<i>Peptrostreptococcus</i>, <i>Peptococcus</i>, <i>Gemella</i>); Gram-negative anaerobic cocci (<i>Veillonella</i>); • Microorganisms associated with periodontal diseases. Relationship between periodontal infections and systemic health. Peri-implantitis, organisms most commonly isolated from peri-implantitis lesions. Bacteria associated with peri-implantitis. • Anaerobic infections in dental practice. Endodontic infections. Microbiota of endodontic infections. Pulpal infections. Periapical abscesses. Infective endocarditis and oral bacteria. Oral mucosal, bone and systemic infections. Orofacial bacterial infections 	<p>Levinson's Chapters - 14, 18 (part 3); 27 (particular bacteria, according to study plan)</p> <p>Lamont R., Jenkinson H. – Chapter 23, 27-32</p> <p>Marsh P. Martin M. - Chapter 7 (chapter summary)</p>
15.	Midterm II	