وصف مقرر دراسي

Course File

Course Title : General Microbiology and Immunology
Course No. & Code : 222 MAC
Credit Hours : 3 Hours
Level : First Half of Second Year

| Course code: 222 MAC | رقم المقرر ورمزه: 222 ماك |
| Course name: General Microbiology and Immunology | اسم المقرر: علم الأحياء الدقيقة وعلم المناعة |
| Credits: 3 hrs (2 hour Lecture, 1 Practical in the 1st semester of the 2nd year) | عدد الساعات: 3 (ساعة محاضرة وعملي واحد في الفصل الأول من السنة الثانية) |
| Prequisite: None | المتطلب السابق: لا يوجد |

وصف المقرر:

تم وضع محتويات هذا المقرر لغرض إلقاء ضوء واطبائية كلية طب الأسنان بالأحياء الدقيقة (كالفيروسات والبكتيريا والفطريات) التي تسبب الأمراض للإنسان بصفة عامة وماده علاقة بالأمراض الفم والأسنان بصفة خاصة.

والمواضيع الرئيسية التي تدرس في هذا المقرر هي على النحو التالي:

1. أسس المناعة والعلاقة بين الإنسان والطفيليات المسببة للأمراض.
2. البكتيريا والأمراض التي تسببتها الإنسان.
3. الفيروسات والأمراض التي تسببتها في الإنسان.
4. الفطريات وأمراض الإنسان التي تسببتها.
5. مقدمة لعلم الأحياء الدقيقة الفمي.
A. Course Description:

The course Microbiology for dental student is designed to provide and facilitate the learning in which the student can make acquaintance, both in which the student can make acquaintance, both in a theoretical and practical context, with microorganisms as agents of human disease with relevance to dentistry. The major topics covered in this course will be:

1. Fundamentals of Immunology and Host-parasite relationship
2. Bacteria and Human Diseases caused by them
3. Viruses and Human Diseases caused by them
5. An introduction to Oral Microbiology

B. Course Objectives

By the end of the course the dental students should:

1. Have a basic understanding of the major pathogenic organisms, related disease-syndromes ad their modes of spread with particular reference to dentistry.
2. Have a basic understanding of the host-parasite relationship and the immune system
3. Have a basic understanding of the oral microbial ecology and pathogenesis of dental caries and periodontal disease
4. Be aware of the major clinical and biological factors to be taken into consideration for the appropriate use of anti-microbial therapy
5. Be familiarized with some of the laboratory procedures including specimen collection and handling, requesting appropriate tests and interpretation of laboratory reports.

C. Course Outline:

i. lecture topics

- Introduction
- Bacterial structures and functions
- Bacterial physiology and genetics
- Host-parasite relationship
- Sterilization and disinfection
- Antibiotics and chemotherapy
- Immunology
- Staphylococci
- Corynebactgeria
- Clostridia
- Actinoyces and nocardia
- Mycobacteria
- Neisseria and haemophilus
- Treponema, Borrelia
- Enterics and other gram-negatives
- Mycoplasma, rickettsia, Chlamydia
- Fungi
- Viruses –I - V
- Oral microflora, dental plaque

ii- Practical Sessions

- Microscopy
- Gram staining, negative staining
- Demonstration of bacterial cultural characteristics
- Sterilization and disinfection
- Antibiotic sensitivity detection
- Characteristics of Staphylococci
- Characteristics of Streptococci
- Characteristics of clostridia
- Pathogens of the gastrointestinal tract
- Characteristics of Yeast and molds
- Serological tests
- Virological methods

Lecture Topics in Details [Contents]:

1- Introduction Chap –I  pp5-6
Definition of microbiology, contribution of different scientists to microbiology field and differences between prokaryotic and eukaryotic cell.

2- Bacterial Structures and Functions Chap –I  pp6-10
Shape and arrangement of bacteria, cell wall, cytoplasmic membrane, nuclear material, ribosome, inclusions, flagella, pilli, capsule and spores.

3- Bacterial Physiology and Genetics Chap –I  pp13-19
Nutrition, chemical components, required elements, environmental conditions affecting growth, growth cycle, bacterial genetics, physiological variation, genetic variation, mutation, genotype, phenotype, plasmids, transposons, transcription and translation.

4- Host-parasite Relationship Chap –I  pp29-33
Host, parasite, symbiosis, pathogenic mechanisms, virulence, factor contributing to the virulence, toxins (endotoxins, exotoxins), infection, disease, etiology, source of infection, routes of infection, predisposing factors, defense mechanisms.

5- **Sterilization and Disinfection** Chap –6 pp327-333

Sterilization, disinfection, germicides, antiseptic, asepsis, sanitation, factors affecting cell death, physical methods, chemical agents, and disinfection, sterilization and asepsis in dentistry.

6- **Antibiotics and Chemotherapy** Chap –1 pp59-70

Definition, selective toxicity, difference between antibiotics and antiseptic, bactericidal, bacteriostatic, ideal antimicrobial drug, mechanism of action, examples of individual antimicrobial agents, drug resistance, resistance avoidance, sensitivity tests and principles of using antimicrobial agents.

7- **Immunology** Chap –3 pp155-192

Host defense mechanisms, natural immunity, acquired immunity (humoral immunity, cell-mediated immunity) complement viral and bacterial vaccines, immunological disorders (e.g. hypersensitivity, immunodeficiency, autoimmunity) and tests for immunological disorders.

8- **Staphylococci** Chap –2 pp79-81

Morphology and culture, staphylococcal enzymes and toxins, pathogenicity diagnosis and treatment.

9- **Streptococci** Chap –2 pp73-78

Classification, hemolysis, toxins and enzymes, streptococcal groups and species, pathogenicity, diagnosis and treatment.

10- **Corynebacteria** Chap –2 pp85-87

Morphology characteristics, culture, diphtheria toxin, pathogenicity, diagnosis, prevention and treatment.
11- Clostridia
General characteristics, main pathogenic clostridia, culture, toxins production, pathogenicity, identification, diagnosis, prevention and treatment, and anaerobic culture techniques.

12- Actinomyces and Nocardia
General characteristics, culture, main different species, epidemiology, diagnosis, and treatment.

13- Mycobacteria
General characteristics, main human pathogens, M. tuberculosis, M.leprae epidemiology, pathogenesis, tuberculin test, laboratory diagnosis, prevention and treatment.

14- Neisseria and Haemophilus
General characteristics, main human pathogens, culture, pathogenesis, diagnosis and treatment.

15- Treponema, Borrelia
General characteristics, main pathogenic Geneva, pathogenesis, syphilis (congenital and acquired), ANUG, diagnosis and treatment.

16- Enterics and other Gram-negatives
General characteristics, main pathogenic Genera and species identification, habitat, pathogenicity and treatment.

17- Mycoplasma, Rickettsia, Chlamydia
General characteristics, main species pathogenesis, diagnosis, prevention and treatment.

18- Yeast and related fungi
General characteristics, Structure and morphology main species, culture, pathogenicity, predisposing factors, oral mycoses, identification and diagnosis and treatment.
19- Viruses Chap –2 pp135-145
Viral structure, classification and diagnosis of viral diseases, Herpes viruses, hepatitis viruses, HIV and respiratory infection viruses.

20- Oral microflora, dental plaque Chap –5 pp263-266

A. Oral Microflora
Main microorganisms, distribution, development of oral flora, factors influencing the nature of oral flora, and defense mechanisms in the oral cavity.

B. Dental plaque Chap -5 pp 270-273
Definition, composition, type, development, pathogenicity of dental plaque and prevention.

Practical:

1- Microscopy
Proper use and focusing of light microscope bacterial smear preparation and the use of simple stain.

2- Gram staining, negative staining
Students do gram-stain and negative stain techniques

3- Demonstration of bacterial cultural characteristics, pure culture technique; use of liquid and solid media.

4- Sterilization and disinfection
Different methods of sterilization and disinfection (e.g. autoclave, flaming loops) are using 70% alcohol, iodine compounds and sodium hypochlorite)

5- Antibiotic sensitivity detection
Antibiotic paper disc technique and serial concentration method

6- Characteristics of Staphylococci
Gram stain, catalase test, coagulase test
7- Characteristics of Streptococci

Gram-stain, catalase test, blood type of haemolysis (B, , ), bicitracin sensitivity test, optichin sensitivity test and bile salt solubility test.

8- Characteristics of clostridia

Gram-stain, catalase test, blood agar and cooked meat medium, litmus milk test, Nagler plate test, spore stain and anaerobic cultural methods

9- Pathogens of gastrointestinal tract

Lactose fermentation test, growth on MacConkey’s, agar, biochemical tests (glucose fermentation with or without acid production, citrate utilization, reduction of nitrate to nitrite and oxidase test), and antibiotic sensitivity.

10- Characteristics of yeast and Molds

Growth on sabouraud agar, KOH test, fungal stain, gram-stain, germ-tube test, Chlamydiospores production. Type of hyphae and spores, fungi in patients specimens.

11- Serological tests

Single agglutination, microprecipatation and agar gel precipitation.

12- Virological methods:

Electron micrographs of medically important viruses, egg inoculation route, types of CPE in cell cultures.

D. Methodology:

Didactic + practical
E. Evaluation and grading:

The criteria of passing the course will be a cumulative grade of 60% or above on continuous assessment examination (one written and one practical) and final exam. The following percentage of total grade will be assigned to each:

<table>
<thead>
<tr>
<th>Tests No.</th>
<th>Type of Evaluation</th>
<th>Grades</th>
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<tbody>
<tr>
<td>1- CAT (Mid term)</td>
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<td>40%</td>
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<tr>
<td>a- Written</td>
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<td>25%</td>
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<tr>
<td>b- Practical</td>
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<td>15%</td>
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<tr>
<td>2- Final Examination</td>
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<td>60%</td>
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The continuous assessment and final exam will measure the student’s achievement of terminal objectives.

Make-Up-Exam

F- Required Text:

Essential Microbiology for Dentistry – L.P. Samaranayake

G- Reference Text:

- McCracken and Cawson, Clinical and Oral Microbiology, McGraw Hill
- Sleigh and Timbury, Notes on Medical bacteriology, Churchill Livingstone
- Timbury, Notes on medical Virology, Churchill Livingstone
- Kimball Introduction to Immunology, Macmillan