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**Department of Biology**

**College of Science**

**Salahaddin University/ Erbil**

**Subject: General Microbiology**

**Course book- First year/ medical biology**

**Lecturer’s name (Theory): Dr. Pakhshan Abdullah Hassan**

**Lecturer's name: (Practical): Niga Othman Hamaameen**

**Academic year: 2022-2023**

**Course Book**

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| **1. Course name** | **General Microbiology (Theory and Practical)** |
| **2. Lecturer in charge** | **Pakhshan Abdullah Hassan**  **Niga Othman Hamaameen** |
| **3. Department/ College** | **Department of Biology/College of Science** |
| **4. Contacts** | **E-mail:**  [pakhshan.hassan@su.edu.krd](mailto:pakhshan.hassan@su.edu.krd)  niga.hamaameen@su.edu.krd |
| **5. Time (in hours) per week** | **2 hrs Theoretical**  **6 hrs Practical** |
| **6. Office hours** | **8 hours** |
| **7. Course code** | **General Microbiology course** |
| **8. Keywords** | **microbiology, bacterial structure, bacterial nutrition, bacterial growth** |
| **9. Course description**  This course is designed to introduce the students with the study of the general science of microbes. Microbiology is the study of all living organisms that are too small to be visible with the naked eye. Microbial world comprises microscopic algae, fungi, bacteria, viruses and protozoa. This course will cover the eukaryotic and prokaryotic microbes and viruses, but will emphasize bacteria. This course will make the student to become familiar with the foundation concepts of history of Microbiology, to understand the structure and functions of a typical prokaryotic cell. This course enables the students to provide basic knowledge about catabolism, anabolism, regulation of metabolism and pathway analysis of microbes. The general microbiology course describes the microbial diversity in the living world and the various physical and chemical growth requirements of bacteria. To become familiar with the foundation concepts of microbial genetics, ecology, pathogenesis and others. | |
| **10. Course objective:**  GENERAL OBJECTIVES: At the end of the course, the students should be able to:  1. Understand history, relevance of microbiology and classification of bacteria  2. To understand the structure of bacterial cells, its organelles, physiology and  Behaviour.  3. The student will learn the techniques of studying bacterial growth curve and factors effecting growth curve  4. The students will gain knowledge about role of macronutrients and micronutrients in growth of microbes.  5. Explain the underlying principles of the methods used to control microbial growth.  6. Describe the flow and control of genetic information and its influence on the evolution of life on earth.  7. To understand key concepts in immunology, virology and antimicrobial treatments. | |
| **11. Forms of teaching**  PowerPoint presentation, board, videos, in class activities, and sample identification | |
| **12. Assessment scheme (theory**  Student assessment will be based on scores obtained in the exams.  **Assessment scheme (Practical)**  Attendance and participation at all course sessions and completion of all assignments are required to receive credit for the course. Two practical examinations will carry out during the course beside the daily quiz and home works.  Practical examination: 30%  Quiz: 5% | |
| **13. Student's obligation (Practical)**  \* Attendance to the lab on time.  \* Preparation for sudden exam for the previous lab (quiz)  \* Must be wearing lab coat, gloves and have biblouse paper with them to clean the microscopes after use  \* Treat all microorganisms as potential pathogens.  \* Sterilize equipment and materials.  \* Disinfect work areas before and after use. ...  \* Wash your hands before leaving the laboratory.  \* Never pipette by mouth.  \* Do not eat or drink in the lab, nor store food in areas where microorganisms are stored.  \* Label everything clearly.  \* Long hair should be secured behind your head to minimize fire hazard or contamination of experiments.  \* Always wipe and clean the lenses of your microscope before putting it away. Use the appropriate tissue paper and cleaning solution for this purpose.  \* If you are injured in the laboratory, immediately contact your course instructor or TA.  \* Spills, cuts and other accidents should be reported to the instructor or TA in case further treatment is necessary. | |
| **14. Course References:**  References   1. Tortora, G.J., Funke, B.R. and Case, C.L. (2021) Microbiology an introduction.13th ed., Pearson Education, Inc 2. Joanne, M., Kathleen, M., Dorothy, H. (2021). Prescott’s Microbiology, 11th ed. The McGraw-Hill Companies. New York, USA. 3. Michael T. M., Kelly S. B., Daniel H. Matt hew B. W. and Davi, D. A. (2019). Brock Biology of Microorganisms, 15th ed., Global edition, Pearson Education, Inc. 4. Prescot, L.M, Harley, J.P, and Klein, D.A. (2005) Microbiology, 6th ed., the McGraw-Hill companies, inc; New York, USA. 5. Nester, E.W., Anderson, D.G., etal (2001) Microbiology a human perspective, 3rd.ed.the McGraw-Hill companies, inc; Chicago, USA. 6. Marjorie K. C. (2017). Microbiology: A Systems Approach, 3rd ed.; McGraw-Hill, New York, NY. | |

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| * **Course Reading List and References‌ for practical lectures**:   1. Stephen H. Gillespie (2006) Principles and Practice of Clinical Bacteriology Second Edition.  2.Atlus, Ronald M., Lawrence C. Parks and Alfred E. Brown (1995) Laboratory Manual of Experimental Microbiology.  3.Johnson, T.R. and C.L. Case (2007) Laboratory Experiments in Microbiology.  4. Forbers, A. Betty, Daniel F. Sahm and Alice S. Weissfeld (2007)  5. Baily and Scotts Diagnostic Microbiology 12th ed. Mosby Elsevier.  6. Nester, E.W.,Anderson,D.G., etal(2001) Microbiology a human perspective,3rd ed.the McGraw-Hill componies,inc;Chicago,USA.  7. Harley,J.P.,Prescott,L.M(1996).Laboratory Exercises in Microbiology ;TheMacGraw-Hill companies,USA.  8. Jawetz, M.; Adelberg, E. A.; Brroks, G. F.; Butel, J. S.; Melinck,J.and Ornston,L.N.Medical Microbiology, Appleton & Lane.(2010).  **15. Student learning outcome:**  After completing this course, students will be able to:   * Understanding what is the microbiology. * Recognized and be able to describe features of different types of pathogenic and normal flora of microorganisms * Use microscopy tools for studying microorganisms and identify them. | |
| **16. LEARNING CONTENTS**  **(TOPICS/TASKS): Theory** |  |
| Welcome to General Microbiology course, course content and description, books depend on and Introduction to microbiology | Week1 |
| History of Microbiology | Week 2 |
| Microbial cell structure and function: cells of bacteria and archaea and cell morphology. | Week 3 |
| Microbial cell structure and function: bacterial cell membrane and wall. | Week 4 |
| Microbial cell structure and function: bacterial locomotion. | Week 5 |
| Microbial cell structure and function: Cell Surface Structures and Inclusions | Week 6 |
| Microbial cell structure and function: Internal structure. | Week 7 |
| **PRELIMINARY EXAMINATION** | Week 8 |
| Microbial metabolism: Microbial nutrition and nutritional uptake Energetic, Enzymatic and redox | Week 9 |
| Microbial metabolism: Catabolism: Fermentation and Respiration | Week 10 |
| Microbial growth and it is control | Week 11 |
| Microbial regulatory system | Week 12 |
| Microbial genetics | Week 13 |
| Viruses , viroids and prions | Week 14 |
| HIV virus, AIDS and corona virus | Week 15 |
| Fungi, structure, classification, vegetative structure, reproductive structure and medically important fungi. | Week 16 |
| Microbe- human interactions health and disease and immune system | Week 17 |
| **Final course exam** | Week 18 |
| Antimicrobial treatment | Week 19 |
| Microbial infection and pathogenesis | Week 20 |
| Soil and water microbiology | Week 21 |
| Food ,dairy and industrial microbiology | Week 22 |
| Biotechnology and Synthetic Biology: Making Products from Genetically Engineered Microbes: Biotechnology | Week 23 |
| Microbial Evolution and Diversity | Week 24 |
| **Second course Final exam** |  |
| **Practical Topics**  Lab 1: Course book (Safety rules)  Lab 2: Microscope, types of Microscope and use of microscope  Lab 3: Control of Microbial growth (sterilization).  Lab 4: Types of Culture media and their preparation  Lab 5: Microflora of the environment  Lab 6: The size, shape and arrangement of bacterial cells  Lab 7: Cultural characteristics of bacteria  Lab 8: Determination of bacterial motility  **First practical exam**  Lab 9: Bacterial staining (simple staining and negative staining)  Lab 10: Gram staining    Lab 11: Capsule staining  Lab 12: Spore staining  Lab 13: Acid fast staining  **Second practical exam** |  |
| **17- Examination (Theory)**  **Examples of Semester Examinations**  **Q1/ Choose the correct answer**  1- Which of the following is *false* about fimbriae?  **a.** They are composed of protein.  **b.** They may be used for attachment.  **c.** They are composed of pilin.  **d.** They can be important in formation of biofilms  2- Which of the following is *not* a characteristic of algae?  **a.** has cell walls made of chitin  **b.** is able to photosynthesize  **c.** produces molecular and organic compounds  **d.** inhabits water, soil, and plants  3- Which of the following pairs is *mismatched*?  **a.** glycocalyx—adherence  **b.** pili—reproduction  **c.** cell wall—toxin  **d.** cell wall—protection  4- Spherical bacterial cells in chains would be a referred to as a ------------------\_\_\_\_\_  arrangement.  **A.** vibrio  **B.** streptococcus  **C.** staphylococcus  **D.** tetrad  5- Gram-negative bacteria would stain \_\_\_\_\_ with the Gram stain and  have -------------------------in the wall.  **A.** pink-red; teichoic acid  **B.** pink-red; lipopolysaccharide  **C.** purple; peptidoglycan  **D.** purple; teichoic acid  Q2/ Answer the followings   1. why we do stain Mycobacterium and Nocardia with acid fast stain and not gram stain. 2. Describe the basal body structure in G+ and G- bacteria?   Q3/ Define: 1- facilitated diffusion, 2-Metachromatic Granules:  **Examinations:**   1. ***Identifying slide:*** must be identify the slide perfectly and identifying pointed part if they needed.   ***2. Compositional:*** In this type of exam the questions usually start with Explain how, what are the reasons for…? Why…? How….?  With their typical answers  Examples should be provided  ***3.******True or false type of exams:***  In this type of exam, a short sentence about a specific subject will be provided, and then students will comment on the trueness or falseness of this particular sentence. Examples should be provided  ***4. Multiple choices:***  In this type of exam there will be a number of phrases next or below a statement, students will match the correct phrase.  ***5.*** ***Draw and label***: in this type question need to draw picture scientifically and labelling all parts of the slide. | |
| **20. Extra notes**  **I would like to be helpful person in my department and support any one wants to understand biology in general and microbiology in specific line.** | |
| **21. Peer review پێداچوونه‌وه‌ی** | |