Republic of Yemen

Ministry of Higher Education & Scientific Research

21 September University of Medical & Applied Sciences

Faculty of Laboratory Medicine..

Department of Microbiology & Immunology

Course Specification of Bacterial Physiology
Course No. (03.02. 322)
2022/2023

I. Course Identification and General Information:

1	**Course Title:**	BACTERIAL PHYSIOLOGY			
2	**Course Code & Number:**	03.02.322			
3	**Credit Hours:**	**Theory Hours**			
		Lecture	**Exercise**	Practical	**Credit Hours**
		2	0	2	3
4	**Study Level/ Semester at which this Course is offered:**	2nd Level / 1st Semester			
5	**Pre –Requisite (if any):**	General Biology			
6	**Co –Requisite (if any):**	None			
7	**Program (s) in which the Course is Offered:**	Bachelor in laboratory medicine			
8	**Language of Teaching the Course:**	English			
9	**Study System:**	semester			
10	**Mode of Delivery:**	Regular			
11	**Location of Teaching the Course:**	University Campus			
12	**Prepared by:**	Dr. Gamil Taher Abdul Mughni			
13	**Date of Approval:**	2022-2023			

II. Course Description:

This course provides a comprehensive review on the nature of bacteria, History of bacterial discovery. The morphology of bacteria and different forms and arrangement. The different methods of staining and different factors affecting their growth. Bacterial identification, classification, and taxonomy.

III. Alignment Course Intended Learning Outcomes with program outcomes

	III. Course Intended Learning Outcomes (CILOs)	**Referenced PILOs**
A.	**Knowledge and Understanding:** ***Upon successful completion of the course, students will be able to:***	
a1	**Discuss** the classification, ultrastructure, physiology and metabolisms of bacteria, pathogenesis and virulence factors of bacteria and the sources, modes of transmission	**A1**
a2	**Describe** the different methods of infection control and practices in laboratory and their role in hospital infection control program and principles of Antibiotic sensitivity testing and their role in drug resistance in bacteria.	A2
B.	**Intellectual Skills:** ***Upon successful completion of the course, students will be able to:***	
b1	**Interpret** microbiology growth on culture media and biochemical reactions	B3
C.	**Professional and Practical Skills:** ***Upon successful completion of the course, students will be able to:***	
c1	**Perform** a Gram stain and a Ziehl-Neelsen stain and identify micro-organisms according to morphology and characteristics, stained preparations.	**C1**
c2	**Examine** culture media and biochemical tests commonly used for bacterial identification and distinguish positive and negative results.	**C1**
D.	**Transferable Skills:** ***Upon successful completion of the course, students will be able to:***	
d1	Communicate in groups and team in laboratory experiments	**D1**

IV. Alignment Course Intended Learning Outcomes with Teaching Strategies and Assessment methods :

(A) Alignment Course Intended Learning Outcomes of Knowledge and Understanding to Teaching Strategies and Assessment Strategies:

	Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1	**Discuss** the classification, ultrastructure, physiology and metabolisms of bacteria, pathogenesis and virulence factors of bacteria and culture medias of bacteria	• Interactive lectures	• Written exam (mid and final terms and quizzes)
a2	**Describe** the different methods of infection control and practices in laboratory and their role in hospital infection control program and principles of Antibiotic sensitivity testing and their role in drug resistance in bacteria.	• Interactive lectures • Self learning	• Written exam (mid and final terms and quizzes)
(B) Alignment Course Intended Learning Outcomes of Intellectual Skills to Teaching Strategies and Assessment Strategies:			
	Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1	**Interpret** microbiology growth on culture media and biochemical reactions	• Interactive lectures	• Written exam (mid and final terms and quizzes).
C Alignment Course Intended Learning Outcomes of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:			
	Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1	**Perform** a Gram stain and a Ziehl-Neelsen stain and identify micro-organisms according to morphology and characteristics, stained preparations.	• Practical session	Practical exam
c2	**Examine** culture media and biochemical tests commonly used for bacterial identification and distinguish positive and negative results.	• Practical session	Practical exam
(D) Alignment Course Intended Learning Outcomes of Transferable Skills to Teaching Strategies and Assessment Strategies:			
	Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1	Communicate in groups and team in laboratory experiments	• Seminars	• Assignment: - Research - Homework - Team work

III. Course Content:					
	A – Theoretical Aspect:				
Order	**Units/Topics List**	**Sub Topics List**	Number of Weeks	**contact hours**	**Learning Outcomes**
1	Introduction to microbiology	-Definitions -Classifications -Differentiate between eukaryote and prokaryote cells -Effect of microorganisms on human life	1	2	a1, a2, b1
2	Introduction to Bacteriology	-Structures internal to cell wall -Cell wall structures -Structures external to the cell wall -Wall-less bacteria.	1	2	a1, a2, b1
3	Structure of Bacterial Cell	Describe the structure and function: • Internal to cell wall wall •External to the cell wall . Appendages •Wall-less bacteria -Endospore formation	1	2	a1, a2, b1
4	Bacterial morphology , Nomenclature and classification of bacteria	-Describe the size , Shape and arrangement of bacterial cells - Explain the use of the Gram and acid-fast stains Describe the methods used to classify bacteria Describe the methods used to identify bacteria in the clinical laboratory	1	2	a1, a2, b1
5	Growth and nutrition of bacteria.	-Requirement of microbial	1	2	a1, a2, b1

		growth -Bacterial growth mechanisms -Different bacterial groups according to oxygen requirements -To know the morphology and staining characteristic of bacteria -To identify different mechanisms of microbial metabolism			
6	Bacterial Genetics (Bacterial genetics, genotypic identification, molecular methods of identifying bacteria and their clinical importance.)	- Understanding the bacterial genetic components	1	2	a1, a2, b1
7	Genetic Recombination	- Understanding mechanism of DNA transfer in bacteria -Understanding mutation in bacteria	1	2	a1, a2, b1
8	Mid-Term Exam		1	2	c1, c2
9	Classification of Medically Important Bacteria	size Shape Arrangements bacteria stain	1	2	a1, a2, b1
10	Host parasite relationship, Pathogenesis of Bacterial Infections	- Definition of bacterial pathogenicity -Different mechanisms of bacterial pathogenicity -To know different bacterial invasion proteins -Toxins released by bacteria -Evasion of host defense mechanisms	1	2	a1, a2, b1
11	Bacterial -normal flora of human body.	-Definition -Types of normal flora -Function of normal flora. -Factors influence normal flora	1	2	a1, a2, b1

12	Sterilization & Disinfection	·Terminology of microbial control ·Physical methods of microbial control ·Chemical methods of microbial control	2	4	a1, a2, b1
13	Antimicrobial Chemotherapy (Anti microbial susceptibility, resistance and detection of different resistance mechanisms.)	-To know the acceptable characteristic features of antibiotics used by human. -Mechanism of antibiotic action -Categorization of antibiotics according to mechanisms of action -Antibiotic resistant mechanisms	2	4	a1, a2, b1
14	Antimicrobial Chemotherapy (Anti microbial susceptibility, resistance and detection of different resistance mechanisms.)	-To know the acceptable characteristic features of antibiotics used by human. -Mechanism of antibiotic action -Categorization of antibiotics according to mechanisms of action -Antibiotic resistant mechanisms	2	4	a1, a2, b1
15	Final exam				c1, c2
	Number of Weeks /and Units Per Semester		**15**	**30**	

B - Practical Aspect: (if any)

Order	**Tasks/ Experiments**	**Number of Weeks**	**contact hours**	**Learning Outcomes**
1	Introduction	**1**	**2**	**c1,c2**
2	Laboratory Safety Measures	**1**	**2**	**c1,c2**
3	Microscopy	**1**	**2**	**c1,c2**
4	Introduction to Diagnosis of Bacterial Infections	**1**	**2**	**c1,c2**
5	Bacterial Stains - Gram stain	**1**	**2**	**c1,c2**

6	Bacterial Stains - Ziehl-Neelsen stain	**1**	**2**	**c1,c2**
7	Bacterial Culture Media	**1**	**2**	**c1,c2**
8	Midterm Exam	**1**	**2**	**c1,c2**
9	Antibiotic Sensitivity Testing	**1**	**2**	**c1,c2**
10	Antibiotic Sensitivity Testing	**1**	**2**	**c1,c2**
11	Sterilization & Disinfection	**1**	**2**	**c1,c2**
		10	**2**	
Number of Weeks /and Units Per Semester				

V. Teaching Strategies of the Course:	
1-	Lectures
2-	practical session
3-	Seminars
4	**Self learning**

VI. Assessment Methods of the Course:	
No	**Assignment**
1	Written Exams (Short Essays) and Quizzes
2	Multiple Choice Questions (MCQ)
3	Practical Exams (PE)
4	Assignment

VII. Assignments:

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes
	Assignment		5	5%	d1
1	**Midterm Exam**	8	15	15%	a1, a2, b1
2	**Practical exam**	12	30	30%	c1,c2
3	**Final Exam**	16	50	50%	a1, a2, b1,d1
	Total	100		100%	

IX. Learning Resources:

· *Written in the following order: (Author - Year of publication – Title – Edition – Place of publication – Publisher).*

1- Required Textbook(s)

1-	Warren Levinson, Peter Chin-Honh, Elizabeth A. Joyce, Jesse Nussbaum and Brian Schwartz, Review of Medical Microbiology and Immunology, 2018, 15th edition, McGraw-Hill, ISBN: 978-1-259- 64449-8
2-	Jawetz, Melnick, & Adelberg's Medical Microbiology, 28e **Riedel, Stefan** Published by McGraw-Hill Education, 2019 ISBN 10: 1260012026ISBN 13: 9781260012026

2- Essential References.

1-	Warren Levinson, Peter Chin-Honh, Elizabeth A. Joyce, Jesse Nussbaum and Brian Schwartz, Review of Medical Microbiology and Immunology, 2018, 15th edition, McGraw-Hill, ISBN: 978-1-259- 64449-8
2-	Bailey & Scott's Diagnostic Microbiology 15th Edition Patricia M. Tille- February 4, 2021

3- Electronic Materials and Web Sites *etc*.

1-	http://www.asmusa.org\

2-	http://www.phage.org/black09.htm
3-	http://www.microbe.org/microbes/virus_or_bacterium.asp
4-	http://www.microbelibrary.org
	http://www.bact.wisc.edu/Bact330/330Lecturetopics

XI. *Course Policies:*	
1	**Class Attendance:** Class Attendance is mandatory. A student is considered absent and shall be banned from taking the final exam if his/her absence exceeds 25% of total classes.
2	**Tardiness:** -If the student dose not attend for more than 6 times, the student will be obligated to withdrew from the course
3	**Exam Attendance/Punctuality:** No student shall be allowed to the exam hall after 30 minutes of the start time, and shall not leave the hall before half of the exam time has passed.
4	**Assignments & Projects:** Assignments and projects must be submitted on time. Students who delay their assignments or projects shall lose the mark allocated for the same.
5	**Cheating:** Cheating is an act of fraud that results in the cancelation of the student's exam or assignment. If it takes place in a final exam, the penalties stipulated for in the Uniform Students' Bylaw (2007) shall apply.
6	**Forgery and Impersonation:** Forgery/Impersonation is an act of fraud that results in the cancelation of the student's exam, assignment or project. If it takes place in a final exam, the penalties stipulated for in the Uniform Students' Bylaw (2007) shall apply.
7	**Other policies:** The University official regulations in force will be strictly observed and students shall comply with all rules and regulations of the examination set by the Department, Faculty and University Administration