هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد NCAAA T4 2020

Course Specifications

Course Title:	Microbial Physiology
Course Code:	334MIC
Program:	Bachelor
Department:	Biology
College:	Science
Institution:	Jazan University

- **Table of Contents**

- **A. Course Identification**

1. Credit hours: 3H.
2. Course type **a.** University ☐ College ☐ Department ☑ Others ☐ **b.** Required ☑ Elective ☐
3. Level/year at which this course is offered: 6/3
4. Pre-requisites for this course (if any)**:** Bacteriology 231MIC
5. Co-requisites for this course (if any)**:** **None**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	30	100%
2	**Blended**	--	--
3	**E-learning**	--	--
4	**Distance learning**	--	--
5	**Other**	--	--

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	**30**
2	**Laboratory/Studio**	**30**
3	**Tutorial**	**-**
4	**Others** (specify)	**-**
	Total	**60**

- **B. Course Objectives and Learning Outcomes**

1. Course Description

To study the principal characteristics of microorganisms, structure and function of their different organelles, growth, their biological activities and metabolism. Environmental and nutritional factors affecting microbial growth.

a) Course Objectives:

This course is designed to provide students with the following concepts:

- Study of the growth of microorganisms.
- Study the factors affecting microbial growth including Physical Chemical and Biological
- Nutritional mechanisms in microorganisms , metabolism and role of cell membranes in transport
- Classification of microorganisms according to nutritional categories
- Chemical control of microbial growth and their mechanisms
- Study the methanogenic bacteria and its role in environment.

b) Course Contents:

1- Introduction of microbial physiology and Microbial growth curve.
2- Closed system, open system: continuous culture.
3- Physical and chemical factors affecting microbial growth, Microbial nutrition
4- Nitrogen fixation, photosynthesis , Microbial Metabolism of carbohydrates, Microbial Metabolism of proteins, Microbial Metabolism of lipids
5- Methanogenic bacteria, Chemical control of microbial growth and their mechanisms
6- Transport of nutrients, Microbial interactions

c) Practical:

Using necessary reagents and equipments the student must be able to:

- Perform experiments to determine growth curve of bacteria, bacterial population count by turbidimetry and large scale growth of microorganisms by wet weight and dry weight.
- Perform experiments to investigate the effect of temperature, pH, osmotic pressure, radiation and Oxygen and chemicals on microbial growth.
- Perform experiments to determine the ability of microorganisms to lipid hydrolysis, carbohydrates fermentation, nitrates reduction, starch hydrolysis, and Catalase production .

d) Assessment:

- Periodic Exams and Quizzes: 30 %
- Assignments, and Classroom Activities: 20 %
- Final exam: 50%

e) Teaching Methods:

- Lectures, Reports and Essay Assignments, Homework, and Web-based Assignments.

f) Text Books:

-أ.د كوثر فؤاد عابد (فسيولوجيا الكائنات الأحياء الدقيقة) دار الأندلس للنشر والطباعة، المملكة العربية السعودية

Physiology. John Wily Albert G. Moat, John W. Foster, Michael P. Spector (2002) Microbial 2006 & Sons, New York

g) References:

- **Microbiology an introduction 12th edition (2016). Gerard J. Tortora. Pearson Education. USA**

2. Course Main Objective

Principal characteristics of microorganisms, structure and function of their different organelles, their biological activities and metabolism

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	**Knowledge and Understanding**	
1.1	Define all principals, concepts, theories and aspects concerning with Microbial Physiology.	K1-1
1.2	List all characteristics, importance, features, steps of Microbial Physiology aspects.	K1-3
1.3	Differentiate (Compare) between different mechanisms, functions, practices and aspects related to Microbial Physiology.	K2-1
1.4	Interpret by using your knowledge and understanding some of Microbial Physiology phenomena.	K3-2
2	**Skills :**	
2.1	Examine theoretically or practically the slides, photos, diagrams or statements of Microbial Physiology aspects.	S1-3
2.2	Argue different biological approaches in laboratory or field or even theoretically	S2-2
2.3	Design a biological experiment and procedures in laboratory or in the field or even theoretically.	S3-1
3	**Values:**	
3.1	Illustrate awareness of risk assessment and safety observation when dealing with various equipment at various fields.	V2-1

- **C. Course Content**

No	List of Topics	Contact Hours
1	Introduction of microbial physiology and Microbial growth curve.	2

2	Closed system, open system: continuous culture	2
3	Physical and chemical factors affecting microbial growth	4
4	Microbial nutrition	2
5	Nitrogen fixation, photosynthesis	3
6	Microbial Metabolism of carbohydrates	3
7	Microbial Metabolism of proteins	3
8	Microbial Metabolism of lipids	2
9	Methanogenic bacteria	2
10	Chemical control of microbial growth and their mechanisms	3
11	Transport of nutrients	2
12	Microbial interactions	2
Total		30

- **D. Teaching and Assessment**

1. **Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods**

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and Understanding**		
1.1	Define all principals, concepts, theories and aspects concerning with Microbial Physiology.	Lectures, Lab work	Quizzes, Short Answer Question, MCQs, Assignments
1.2	List all characteristics, importance, features, steps of Microbial Physiology aspects.	Lectures, Lab work	Quizzes, Short Answer Question, MCQs, Assignments
1.3	Differentiate (Compare) between different mechanisms, functions, practices and aspects related to Microbial Physiology.	Lectures, Lab work	Quizzes, Short Answer Question, MCQs, Assignments
1.4	Interpret by using your knowledge and understanding some of Microbial Physiology phenomena.	Lectures, Lab work	Quizzes, Short Answer Question, MCQs, Assignments
2.0	**Skills**		
2.1	Examine theoretically or practically the slides, photos, diagrams or statements of Microbial Physiology aspects.	Lectures, Lab work	Quizzes, Short Answer Quizzes
2.2	Argue different biological approaches in laboratory or field or even theoretically	Lectures, Lab work	Quizzes, Short Answer Question, Lab work assessment
2.3	Design a biological experiment and procedures in laboratory or in the field or even theoretically.	Lab work +Filed work	Short Answer Question, Assignments
3.0	**Values**		
3.1	Illustrate awareness of risk assessment and safety observation when dealing with various equipment at various fields.	Lectures, Lab work	Short Answer Question, Assignments

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Theoretical written assignment	3	5
2	Theoretical quiz	5	5

#	Assessment task*	Week Due	Percentage of Total Assessment Score
3	Theoretical Mid-term exam	7	10
4	Practical Mid-term exam	9	5
5	Practical assignment or Quiz	11	5
6	Final practical exam	13	20
7	Final Exam	15	50

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

- **E. Student Academic Counseling and Support**

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

10 Office hours/faculty/week.

- **F. Learning Resources and Facilities**

1.Learning Resources

Required Textbooks	أ.د كوثر فؤاد عابد (فسيولوجيا الكائنات الأحياء الدقيقة) دار الأندلس للنشر والطباعة، المملكة العربية السعودية 2006 Albert G. Moat, John W. Foster, Michael P. Spector (2002) Microbial Physiology. John Wily & Sons, New York
Essential References Materials	• **Microbiology an introduction 12th edition (2016). Gerard J. Tortora. Pearson Education. USA**
Electronic Materials	https://www.ncbi.nlm.nih.gov/pubmed/
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	1 Lecture room(s) for groups of 50 students .1 Laboratory for group of 25 students
Technology Resources (AV, data show, Smart Board, software, etc.)	AV, Data Show, Smart Board
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	-Incubators, Autoclaves, Chemical indicator and reagents , chemicals, Media for microbial growth, enzymes etc. -Light microscopes, glassware, chemicals, Microbiology books and software.

- **G. Course Quality Evaluation**

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching	Students, Faculty	Direct (Questionnaire)
Effectiveness of assessment	Peer Reviewer	Direct (Cross Check marking)

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Extent of achievement of course learning outcomes	Program Leader	Indirect (QA Committee)
Quality of learning resources	QA. Committee	Indirect (Benchmarking)

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)
Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods (Direct, Indirect)

- **H. Specification Approval Data**

Council / Committee	**Board of Biology Program**
Reference No.	**6TH MEETING OF THE BOARD OF BIOLOGY DEPARTMENT 1440-1441**
Date	**Updated/Revised Nov26, 2020**