Course Specification
(Bachelor)

Course Title:	Microbial physiology
Course Code:	334MIC-3
Program:	Biology
Department:	Biology
College:	Science
Institution:	Jazan University
Version:	1st version
Last Revision Date:	30 August 2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3 CH)					
2. Course type					
A.	☐ University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (6th level/3rd year)					
4. Course general Description:					
- **Microbial growth, Dynamics of growth and growth measurements, effects of physical factors on micro growth e.g. pH, temperature, oxygen need and water etc. Microbial enzymes: classification, proper mode of action, production, and regulation, Microbial photosynthesis, Microbial respiration, Trans across the membrane, Microbial fermentations, Biochemical pathways, Microbial preservation.**					
5. Pre-requirements for this course (if any)**:**					
Bacteriology (231MIC-3).					
6. Co-requisites for this course (if any)**:**					
None					
7. Course Main Objective(s):					
After completion of the lecture component of the course, successful students will: **1. Demonstrate an understanding of cellular superstructure and the functional components of cells.** **2. Demonstrate an understanding of how organisms build and maintain a proton motive force.** **3. Comprehend how cells metabolize nutrients, including carbon, nitrogen, sulfur and phosphorus.** **4. Appreciate how biochemical pathways and processes are integrated into a network, providing life robustness.** **5. Comprehend how interactions between microbes and the environment alter cellular physiology.** 6.**Appreciate that the diversity of life is driven by the metabolic diversity of microbes**					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100%
2	E-learning	0	0
3	Hybrid • Traditional classroom • E-learning	0	0
4	Distance learning	0	0

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	28
2.	**Laboratory/Studio**	28
3.	**Field**	-
4.	**Tutorial**	-
5.	**Others (specify)**	-
Total		56

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Define all principals, concepts, theories and aspects concerning with bacteriology	K1.1	Interactive lectures. Classroom discussions Tutorials. Self-learning activities.	MCQs. Short answer questions. True/False. Quizzes. Midterm. Final
1.2	Explain all processes, mechanisms, definitions, theories, modes of actions of all biological aspects	K2.٢	Interactive lectures. Classroom discussions Tutorials. Self-learning activities.	MCQs. Short answer questions. True/False. Quizzes. Midterm. Final
1.3	Interpret by using your knowledge and understanding some of biological phenomena.	K٣.٢	Interactive lectures. Classroom discussions Tutorials. Self-learning activities.	MCQs. Short answer questions. True/False. Quizzes. Midterm. Final
2.0	**Skills**			
2.1	Debate the bacteriology theories, principles and processes.	S1.1	Interactive lectures. Classroom discussions Tutorials. Self-learning activities.	MCQs. Short answer questions. True/False. Quizzes. Midterm. Final
2.2	Set-up an experiment, investigation and research project for	S٢.3	Interactive lectures. Classroom discussions Tutorials.	MCQs. Short answer questions. True/False.

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
	complex issues and problems in Biology		Self-learning activities.	Quizzes. Midterm. Final
3.0	**Values, autonomy, and responsibility**			
3.1	Illustrate awareness of risk assessment and safety observation when dealing with various equipment at various fields.	V2.1	Individual assignments. Group discussion. Lab-work. Self-learning activities. Micro-Project Presentation (individual and teamwork)	Group Assignment. Observation. Group Discussion. Oral exam. Laboratory work.

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction: Introduction of microbial physiology. Growth in microorganisms. Measuring Microbial Growth	2
2.	Microbial growth curve. Lag phase. Exponential phase. Stationary phase. Death phase.	2
3.	Culture systems: Closed system, open system: continuous culture.	2
4.	Physical factors affecting microbial growth: Temperature. pH. Oxygen. Water activity.	2
5.	Physical factors affecting microbial growth: Redox potential. Surface tension. Osmotic pressure. Pressure. Radiation. Visible light	3
6.	Chemical factors affecting microbial growth: Germistatic agents. Germicidal agents. Disinfectants. Antibiotic. Growth-Factor Analogues.	3
7.	Microbial interactions: Neutral, Antagonism and Synergism Relationships	٢
8.	Microbial nutrition: Macronutrients. Micronutrients. Physiological functions of the basic elements. Growth factor. Autotrophic. Heterotrophic. Metabolism in microorganisms. Enzymes.	٤
9.	Photosynthesis in microorganisms. Nitrogen fixation (Symbiotic and asymbiotic)	٢
10.	Microbial Metabolism: Microbial Metabolism of carbohydrates, proteins, and lipids.	3
11.	Transport of nutrients: passive diffusion, facilitated diffusion, active transport.	3
12.	Submitting a research project, oral presentation delivers by student to explain research findings and both tasks evaluates by department staff members.	2
Total		**30**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Theoretical quiz	4	5
2.	Theoretical Mid-term exam	10	10
3.	Theoretical assignment	٦	٥
4.	Practical quiz	5	5
5.	Practical assignment	6	5
6.	Final practical exam	16	20
7.	Final theoretical exam	18	50

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	**Reda Ahame Biomy 2007. Principle of Microbiology, Al-Anglo Library, Egypt (In Arabic)** **Lamia Mahmoud Morsy 2018. Evidence in Biology: Environmental and Social Microbiology. (In Arabic)** **Brock Biology of Microorganisms, Global Edition 16th Edition (2021) . By Michael Madigan, Jennifer Aiyer, Daniel Buckley, W. Sattley, David Stahl.**
Supportive References	
Electronic Materials	**Website of Saudi Digital Library**
Other Learning Materials	**Digital programs and professional software**

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	**- Classrooms for 40 students/lecture** **- Laboratory for 20 students/lab activity**
Technology equipment (projector, smart board, software)	**Computer laboratories for groups of 25 students.**
Other equipment (depending on the nature of the specialty)	**Light microscopes, glassware, chemicals, cultured media, antibiotics & antiseptics…..etc.**

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Peer to peer Reviewer, students	Indirect (Surveys).
Effectiveness of Students assessment	Program quality committee, Program leader, peer reviewer	-Direct (Cross Check) -Indirect (Surveys)
Quality of learning resources	Students	Indirect (Surveys)
The extent to which CLOs have been achieved	Course coordinator	-Direct (Excel sheet of CLOs assessment). - Indirect (Surveys).
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	

Course coordinator:

Signature:

Head of Department

Signature: