Course Specification
(Bachelor)

Course Title:	*Physiology of Microorganisms*
Course Code:	*BIO1405*
Program:	*Bachelor of Science in Biology*
Department:	*Department of Biology*
College:	*Faculty of Science*
Institution:	*University of Tabuk*
Version:	***Course Specification Version Number***
Last Revision Date:	*September 2023*

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours:					
3 Credit (2 theoretical + 1 practical) hours.					
2. Course type					
A.	☐University	☐ College	☒ Department	☐Track	☐Others
B.	☐ Required		☒ Elective		
3. Level/year at which this course is offered: (7th Level / 4th year)					
4. Course general Description:					
The course covers topics on culturing microorganism in different media including methods of preparing pure culture with emphasis on bacteria and fungi, Growth of microorganisms; Typical curve , metabolic Diversity Among Microorganisms, Respiration and Photosynthesis, acetogenesis, methanogenesis, nitrogen fixation, Central pathways and microbial activities, factors affecting growth of microorganisms, preservation of microorganisms, Nutrition in microorganisms; carbon nutrition and nitrogen nutrition, Aerobic vs anaerobic processes, Fermentation and fermentative microorganisms, Vitamins and growth factors (Inhibitory substances), and Quorum Sensing or Biofilms .					
5. Pre-requirements for this course (if any)**:**					
General Microbiology (BIO1206).					
6. Co-requirements for this course (if any)**:**					
None					
7. Course Main Objective(s):					
By the end of this course the student will be able to: - Identify and describe the functioning of microorganisms. - Identify the forms of bacteria and fungi. - Distinguish growth and culture of bacteria and fungi. - Identify preservation techniques of microorganisms. - Describes carbon and nitrogen nutrition in microorganisms. - Describes the role of vitamins and other factors in growth of microorganisms. - Describes metabolic Diversity Among Microorganisms, Respiration and Photosynthesis, acetogenesis, methanogenesis, nitrogen fixation.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	2	50%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		
5	**Others (Lab work)**	2	50%

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	30
3.	**Field**	
4.	**Tutorial**	
5.	**Others**	
Total		**60**

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

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	To recognize the concepts and fundamental principles of microbiology and physiology.	K1	-Lectures. -Class discussion. -Group discussion. -Case studies.	-Quizzes -Midterm examination. -Final examination. -Class discussion and participation. -Homework (Problem-solving).
1.2	To describe the physiological	K2	-Lectures. -Class discussion.	-Quizzes

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	features, metabolic processes, behavioral responses, and regulatory mechanisms of bacteria and fungi.		-Group discussion. -Homework assignments. -Case studies.	-Midterm examination. -Final examination. -Class discussion and participation. -Homework assignments.
2.0	**Skills**			
2.1	To measure bacterial growth and assays of enzymes and cellular components.	S2	-Lab work. -Lectures. -Class discussion. -Group discussion. -Brainstorming. - Filed trip.	-Quizzes -reports -Final examination. -Class discussion and participation. -Homework (Problem-solving).
2.2	To apply the principles of the energy yielding and consuming reactions, the various catabolic and anabolic pathways, the transport systems and the mechanisms of energy conservation in microbial metabolism	S5	-Lab work. -Lectures. -Short essay -Class discussion. -Group discussion. -Brainstorming. -individual or group presentation.	-Quizzes -reports -Final examination. -Class discussion and participation. -Homework (Problem-solving).
3.0	**Values, autonomy, and responsibility**			
3.1	To show ethical behavior in individual work or as a member in a team in	V1	- -Individual or group presentation. - Short essay	-Class discussion and participation.

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	microbiological project.		- Class discussion - Group discussion	-Homework (Problem-solving)

C. Course Content

No	List of Topics	Contact Hours
1.	Overview: Culturing of Microorganisms Bacteria and fungi	2
2.	Microbial Growth & Typical Growth Curve	2
3.	Metabolic Diversity Among Microorganisms, Respiration and Photosynthesis	2
4.	Acetogenesis, methanogenesis, nitrogen fixation.	2
5.	Preservation of microorganisms	2
6.	Central pathways and microbial activities	2
7.	Factors affecting growth (Part1).	2
8.	Factors affecting growth (Part2).	2
9.	Carbon Nutrition.	2
10.	Nitrogen Nutrition.	2
11.	Aerobic vs anaerobic processes.	2
12.	Fermentation and fermentative microorganisms.	2
13.	Biocatalysis and Biocatalyst and Microbial enzymes.	2
14.	Vitamins and growth factors.	2
15.	Quorum Sensing or Biofilms.	2
Total		30

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Class Participation	During whole teaching period	5
2.	Homework (Problem-solving)	3 to 13	5
3.	Short Exams (Quizzes)	During	5

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
		whole teaching period	
4.	Midterm Theoretical Examination	8-9	20
4.	Reports (For Practical)	During whole teaching period	10
5.	Final Practical Examination	15	15
6.	Final Theoretical Examination	17	40

*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	- Rosenberg, E., DeLong, E.F., Lory, S., Stackebrandt, E. and Thompson, F. eds., 2013. The prokaryotes: prokaryotic physiology and biochemistry. Springer Berlin Heidelberg. - Madigan, M., Matinko, J., Dunlap, P. V. and Clark, D. P. (2008). Brock Biology of Microorganisms, 12th edition.
Supportive References	- Todar, K. (2004). Todar's online textbook of bacteriology. - Sigee, D. C. (2005). Freshwater microbiology: biodiversity and dynamic interactions of microorganisms in the aquatic environment. John Wiley & Sons.
Electronic Materials	- http://www.textbookofbacteriology.net/kt_toc.html, - 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.)	- Well-equipped classrooms and laboratories that accommodate a sufficient number of students
Technology equipment (projector, smart board, software)	- Multimedia projectors and smart boards. - Smart blackboard.

Items	Resources
Other equipment (depending on the nature of the specialty)	- Laboratory instruments such as: autoclave- oven- microscope- spectrophotometer- incubator-air laminar flow-shaking incubator- distillatory- ultrabalance-refrigerator- deep freezer. Bunsen burner flame

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	- Students. - Faculty members.	Indirect & direct: - Questionnaires. - Meetings.
Effectiveness of Students assessment	- Quality and development committee. - Department chair.	- Course report. - Program annual report.
Quality of learning resources	- Plan and program committee. - Students. - Staff members.	Indirect & direct: - Questionnaires. - Meetings. - Reports.
The extent to which CLOs have been achieved	- Quality and development committee. - Peer Reviewer. - Program leaders.	Indirect & direct: - Questionnaires. - Meetings. - Reports.
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	PROGRAMS AND STUDY PLANS COMMITTEE
REFERENCE NO.	
DATE	SEPTEMBER 2023