هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

T-104
2022

Course Specification

Course Title:	**Industrial Microbiology**
Course Code:	**MICR431**
Program:	**Biology**
Department:	**Biology**
College:	**Science**
Institution:	**Jazan University**
Version:	**4**
Last Revision Date:	**Second Semester 2022**

Table of Contents:

A. General information about the course:

Course Identification					
1. Credit hours:	**2**				
2. Course type					
a.	University ☐	College ☐	Department☒	Track☐	Others☐
b.	Required ☒	Elective☐			
3. Level/year at which this course is offered: Level 10/4th year					
4. Course general Description This course deals with the following aspects, A study of the microbial cultures and bioprocess technologies for bioproduct synthesis and transformation by various industrial microorganisms, traditional and biotechnological strain improvements, fermentation systems.					
5. Pre-requirements for this course (if any): Microbial Physiology MICR334					
6. Co- requirements for this course (if any): None					
7. Course Main Objective(s) **After the students finish this course they will be able to have a good knowledge, understanding and skills in the following :** **1.**To give the students broad theoretical and practical skills in industrial microbiology. **2.**This course covers the principles of various processes associated with the production and rec of different bio-products derived from microorganisms. **3.**The students will be able to discuss the role of microorganisms in industry. **4.** To carry out experiments to produce microbial metabolites.					

1. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1.	Traditional classroom	33	100%
2.	E-learning		
3.	Hybrid • Traditional classroom • E-learning		
4.	Distance learning		

2. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	11
2.	Laboratory/Studio	22

3.	Field	
4.	Tutorial	
5.	Others (specify)	
	Total	33

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	Define all principals, concepts, theories and aspects concerning with Industrial Microbiology.	K1-1	Interactive lectures. Classroom discussions Tutorials. Self-learning activities.	MCQs. Short answer questions. True/False.
1.2	List all characteristics, importance, features, steps of Industrial Microbiology aspects.	K1-3	Interactive lectures. Classroom discussions Tutorials. Self-learning activities.	MCQs. Short answer questions. True/False. Compare
1.3	Differentiate (Compare) between different mechanisms, functions, practices and aspects related to Industrial Microbiology.	K2-1	Interactive lectures. Classroom discussions Tutorials. Self-learning activities.	MCQs. Short answer questions. True/False.
1.4	Interpret by using your knowledge and understanding some of Industrial Microbiology phenomena.	K3-2	Interactive lectures. Classroom discussions Tutorials. Self-learning activities.	MCQs. Short answer questions. True/False.
2.0	Skills			
2.1	Examine theoretically or practically the slides, photos, diagrams or statements of Industrial Microbiology aspects.	S1-3	Interactive lectures. Classroom discussions Tutorials. Self-learning activities.	MCQs. Short answer questions. True/False. Quizzes. Midterm. Final.
2.2	Argue different biological approaches in laboratory or field or even theoretically	S2-2	Interactive lectures. Classroom discussions Tutorials. Self-learning activities.	MCQs. Short answer questions. True/False. Quizzes. Midterm. Final.

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.3	Design a biological experiment and procedures in laboratory or in the field or even theoretically.	S3-1	Interactive lectures. Classroom discussions Tutorials. Self-learning activities.	MCQs. Short answer questions. True/False. 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: Industrial Microbiology, Fields of application. Why are microorganisms used in industry? Groups of microorganisms used in industry. The principles adopted in the selection of microbial strains in the industry. The economic and scientific importance of microbiology. Types of microbial products.	2
2.	Fermentor: Agricultural medium. Ventilation. Temperature, pH and foam control in fermenter. Physical and chemical methods of controlling (control) microbes	2
3.	Production of antibiotics: Natural sources of antibiotics. Mechanism of action of antibiotics. Types of antibiotics. Biosynthesis of antibiotics. Penicillin production.	1
4.	Baker's yeast production: Principal Factors in Commercial Yeast Production. Bread yeast production requirements. Yeast production stages.	1
5.	Role of microbes in the production of enzymes: The importance of enzymes. Production of amylase enzyme. Control the amount of enzyme produced	1
6.	Yogurt production: Yogurt production stages. Microorganisms used in the dairy industry (Starters). Reasons for the failure of the yogurt industry. Good Yogurt Qualities. Disadvantages of yogurt. Importance of yogurt.	1
7.	**Probiotics:** Definition of probiotics. Examples of probiotics. Characteristics of the organisms used as a probiotic. Lactic acid	1

	fermentation. Lactobacillus activities. Citric acid production. Vitamins production. Bacteriocins	
8.	**Synthesis of amino acids; Glutamic acid; Citric acid production; Vit production**	Self-Learning
9.	**Biogas Production:** The importance of biogas. Biogas production systems. Biogas production unit. Biogas-producing fermentation reactions. F affecting biogas production	1
10.	**Mushroom cultivation:** Mushroom life cycle, growing environments and containers. Spawn production. Tissue culture. The importance and objectives of mushroom cultivation. Method of cultivation and **P**roduction. preservation and storing the product.	1
11.	**Biofertilizers:** Types of biofertilizers. Nitrogen fixers. Phosphate Mobilizers. Potassium Mobilizers. Iron Mobilizers. Biofertilizer to get rid of some soil pollutants.	Self-Learning
12.	**Microorganisms and food spoilage:** Food Spoilage. Hazard analysis control point. sources of danger. Canned food spoilage. Food poisoning. poisoning prevention.	Self-Learning
Total		11

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Theoretical written assignment	3	5
2.	Theoretical quiz	4	5
3.	Theoretical Mid-term exam	6	10
4.	Practical Quiz	5	5
5.	Practical assignment	6	5
6.	Final practical exam	11	20
7.	Final Exam	12	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	Glazer A.N., Nikaido H. (2010) Microbial Biotechnology - Fundamentals of Applied Microbiology, Cambridge University Press, Cambridge. Japer zaied and others (2011) Basics of industrial microbiology. (In English). عبد الحافظ واخرون 1996 عبد الوهاب محمد .كتاب: الميكروبيولوجيا التطبيقية د أساسيات الميكروبيولوجيا الصناعية جابر زايد واخرون 2011
Supportive References	Nair A.J. (2008) Introduction to Biotechnology and Genetic Engineering (CD-ROM). Infinity Science Press, USA
Electronic Materials	https://learn.chm.msu.edu/vibl/
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	1 Lecture room(s) for groups of 50 students 1 Laboratory for group of 25 students.
Technology equipment (projector, smart board, software)	AV, Data Show, Smart Board
Other equipment (depending on the nature of the specialty)	HPLC, fermenter, glassware, chemicals, applied microbiology books and software.

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	Excel sheet of CLOs assessment (direct), Surveys (indirect)
Other		

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods (Direct, Indirect)

G. Specification Approval Data

COUNCIL /COMMITTEE	BIOLOGY PROGRAM BOARD
REFERENCE NO.	( )
DATE	---/---/2023