



Course Specifications

Course Title:	Industrial Microbiology
Course Code:	2014218-3
Program:	Bachelor in Microbiology
Department:	Department of Biology
College:	College of Sciences
Institution:	Taif University

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A. Course Identification

1. Credit hours: 3h
2. Course type
a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: 12 th level – 4 rd year
4. Pre-requisites for this course (if any): Microbial physiology - 2013215-3
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	6 hrs/Week	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: This course investigates the microbial fermentation, culture systems at the industrial level, nutrient requirements, growth kinetics and scaling-up, design of bioreactors and aeration systems, microbial production of biomass, vitamins, single cell oils, single cell proteins, antibiotics, solvents, organic acid, steroids, alkaloids and vaccines.
2. Course Main Objective: This course aims to enable graduates to enter industry with an appropriate level of understanding of the need for both the science and business aspects to be achievable to make a viable product.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and Understanding:	
1.1	Describe the raw materials, structure of bioreactors and conditions for microbial production at the industrial scale	K3

CLOs		Aligned PLOs
2	Skills:	
2.1	Differentiate between industrial microorganisms related to products	S2
2.2	Investigate the mode of molecules production, their recovery and nutrient requirements of microorganisms	S3
2.3	Perform experiments for transferring production conditions of the laboratory level to the industrial-scale.	S4
3	Values:	
3.1	Undertake an independent investigation to propose microbiological options for developing a new production a large-scale commercial basis	V2

C. Course Content

No	List of Topics	Contact Hours
1	Chapter 1: Introduction to industrial microbiology	3L + 3P
2	Chapter 2: Nutrient requirements of microorganisms.	3L + 3P
3	Chapter 3: Industrial raw materials used for culturing microorganisms.	3L + 3P
4	Chapter 4: Growth kinetics.	3L + 3P
5	Chapter 5: Culturing Methods.	3L + 3P
6	Chapter 6: Microbial Production	15L + 15P
	Biomass production.	
	Single cell protein.	
	Microbial production of vitamins.	
	Microbial production of antibiotics.	
	Microbial production of organic solvents.	
	Microbial production of organic acids.	
	Microbial production of Vaccines, steroids and alkaloids.	
Total		30L + 30P

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	Recognize the raw materials, structure of bioreactors and conditions for microbial production at the industrial scale	Lectures Brain storming	Paper-based exams
1.2			
2.0	Skills:		
2.1	Differentiate between industrial microorganisms related to products	Lectures	Paper-based exams
2.2	Calculate Nutrient requirements of microorganisms related to kinetics growth	Open discussion Small group activities	Assignments
2.3	Investigate experiments for molecules production and their recovery	Lectures	Paper-based exams

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
3.0	Values:		
3.1	Design experiments for transferring production conditions of the laboratory level to the industrial-scale.	Interactive learning Brain storming	Practical reports Practical exam

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Assignments and activities: 1- Written Assignment Power-point presentation	Variable	10
2	Midterm Exam	5 th	20
3	Periodic Exam	7 th	10
4	Practical Reports	Continuous	15
5	Final Practical Exam	11 th	5
6	Final Exam	12 th	40

*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 :

6 hours per week for academic advice and consultations

Teaching staff is also available using Blackboard web site and Taif University “Edugate” System

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	David B. Wilson, Hermann Sahn, Klaus-Peter Stahmann, Mattheos Koffas. 2019. Industrial Microbiology. ISBN: 978-3-527-69731-1. Waites MJ. 2001. Industrial Microbiology: An Introduction. ISBN: 9780632053070. Wiley-Blackwell.
Essential References Materials	Nduka Okafor, Benedict C. Okeke. 2018. Modern Industrial Microbiology and Biotechnology. ISBN 9780367781675
Electronic Materials	Blackboard website Website of Saudi digital Library
Other Learning Materials	Computer-based programs and professional software

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	<ul style="list-style-type: none"> Classroom (capacity not more than 40 students) for 2 h/week. Microbiology Lab (capacity not more than 20 students) for 3 h/week.

Item	Resources
Technology Resources (AV, data show, Smart Board, software, etc.)	<ul style="list-style-type: none"> ▪ Data Show projectors, smart blackboard ▪ Computer Portable PowerPoint presentations to special lectures.
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	<ul style="list-style-type: none"> ▪ Bioreactor ▪ Hemocytometer slide ▪ Autoclave ▪ Incubators ▪ Micropipettes and its tips ▪ Petri dishes ▪ Disinfectants ▪ Culture media

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment	Students	Indirect
Quality of learning resources	Peer Reviewer Students	Direct Indirect
Extent of achieving the course learning outcomes	Peer Reviewer Students	Direct Indirect

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	Biology Department
Reference No.	Committee number 14 - Academic Year 1442-1443H
Date	22\5\2022G – 21\10\1443H

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