Course Specification

(Bachelor)

Course Title:	General microbiology
Course Code:	BIO1241
Program:	Bachelor of Science in Biology
Department:	Biology
College:	Science
Institution:	Imam Mohammad Ibn Saud Islamic University
Version:	*Course Specification Version Number*
Last Revision Date:	*Pick Revision Date.*

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: 4 (3 Lectures + 2 Lab + 0 Tutorials).					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (4)					
4. Course general Description:					
This course covers principles of microbiology with emphasis on microorganisms and human disease. Topics include an overview of microbiology and identification and control of pathogens, disease transmission, host resistance, and immunity. Upon completion, students should be able to demonstrate knowledge of microorganisms and the disease process as well as aseptic and sterile techniques.					
5. Pre-requirements for this course (if any)**:**					
Taxonomy of Zoology - BIO 111					
6. Co-requisites for this course (if any)**:**					
None					
7. Course Main Objective(s):					
Upon completion of this course students should be able to: • **To recognize the fundamentals of microbiology. To differentiate between the structure of prokaryotic and eukaryotic microorganisms.** • **To identify host-microbe interactions, immunity and human infectious diseases.** • **To compare and distinguish the basic groups of microbes, including prokaryotic microbes (Archaea, Bacteria), and Viruses, as well as eukaryotic microbes.** To apply culture techniques, methods of staining and the microscopic, colonial and biochemical identification of microorganisms.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	√	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		

No	Mode of Instruction	Contact Hours	Percentage
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	45
2.	**Laboratory/Studio**	30
3.	**Field**	0
4.	**Tutorial**	0
5.	**Others (specify)**	0
Total		75

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 name microorganisms and classify them.	1.1-1.2	Three hours weekly containing lectures	Students will be evaluated on their ability to present complete solutions to problems.
1.2	To recall chemical principals and list microbial metabolism and growth.	1.1-1.2	Two hours weekly of Laboratory devoted to experiments.	Students will be evaluated on their ability to present complete solutions to problems.
...				
2.0	**Skills**			
2.1	To analyze the properties of microorganisms in	2.1	Self-study is an important method	Questions in Lectures.

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	terms of cellular anatomy and physiology.		for students' learning	Short Quizzes and Exams
2.2	To evaluate how physical and chemical methods can be used to control microbial growth.	2.1-2.2	Encourage Students to communicate their microbiology thinking to ask and answer question when they arise.	Participation through class work and Homework.
2.3	To explain how the human body interacts with various microorganisms through symbiotic relationships and host defenses.	2.1-2.2	Motivate students to work cooperatively with their class mates to develop individual skills.	Work portfolio.
3.0	**Values, autonomy, and responsibility**			
3.1	To illustrate the application of microbiology concepts to current issues in human health and infectious diseases.	3.1	Encourage students to work cooperatively during laboratory classes.	Laboratory reports writing
3.2	To employ safety measures and operate laboratory instruments during laboratory sessions.	3.3	• Presentations. • Virtual labs	Laboratory performance and reports
3.3	To Perform microbiological experiments and handle various slides and technics during laboratory classes.	3.3	1. Virtual labs 2. Demonstrations.	Examinations Laboratory performance and reports

C. Course Content

No	List of Topics	Contact Hours
1	Microbes in our Lives • Naming and Classifying Microorganisms the Bacteria, The Fungus, The Protozoa, The Algae, The Virus, Multicellular Animal Parasites.	6

	• History of Microbiology: The First Observations of Hooke and Anton van Leeuwenhoek, The Debate over Spontaneous Generation; The Views of Francisco Redi, John Needham • Lazzaro Spallanzani, The Golden Age of Microbiology. Fermentation and Pasteurization o The Germ Theory of Diseases Vaccination, Modern Developments in Microbiology. • The Three Domains Classification: Binomial System of Nomenclature, Naming and Classifying Microorganisms. Chemical principal. • Structure of the Atom Chemical Elements: Chemical Bonds, Ionic, Covalent, Hydrogen • Chemical Reactions Biological Molecules: Acid and Bases, pH and Buffers, Oxidation and Reduction, Functional Groups. The Macromolecules: Carbohydrates, Lipids, Proteins, Nucleic acid.	
2	The Anatomy of the Prokaryotic cell (Comparison of Prokaryotic and Eukaryotic Cells – Overview The Prokaryotic Cell). • Size, Shape and Arrangements of Bacteria . • Structures External to the Cell Wall: Glycocalyx, Flagella, Axial Filaments, Pili and Fimbriae. • The Cell Wall: Composition and Characteristics, Cell Wall and the Gram Stain, Atypical Cell Wall and Damage to the Cell Wall. Structures Internal to the Cell Wall: The Plasma Membrane, The Cytoplasm, The Nucleoid, Plasmids and Resistance Factors, Ribosomes and Other Inclusions.	6
3	Microbial Metabolism (Catabolic and Anabolic Reactions Enzymes Energy Production Metabolic Pathways Carbohydrate Catabolism) • Glycolysis • Aerobic Respiration, The Kreb's Cycle, The Electron Transport System, Summary of ATP production . • Anaerobic Respiration and Fermentation Lipid and Protein Catabolism. Microbial Growth. • The Requirements for Growth: Physical Requirements, Chemical Requirements. • Culture Media: General Media, Selective and Differential Media, Enriched Media. • Growth of Bacterial Culture: Bacterial Division and Generation Time, The Growth Curve and Growth Phases. Measurement of Growth: Estimation of Growth by Direct Methods, Estimation of Growth by Indirect Methods.	9
4	The Protozoa • Characteristics of Protozoa, Life Cycle, Reproduction and Nutrition, Protective Structures. • Medically Important Phyla • Methods of Classification. • Examples of Each Class and the Diseases They Cause. Trypanosomiasis, Toxoplasmosis and Malaria, Protozoan Diseases of the Digestive System.	6

	The Fungus • Characteristics of Fungi • Nutrition and Cultivation • Yeast, Molds and Dimorphics • Sexual and Asexual Spores • Medically Important Phyla of Fungi • Methods of Classification Examples of Organisms in Each Class • Diseases Caused by Fungi • Superficial Mycoses • Systemic Mycoses • Fungal Diseases of the Digestive System • Histoplasmosis • Coccidioidomycosis • Pneumocystis Pneumonia • Blastomycoses • Economic Effects of Fungi • Fungi in the Food and Wine Industries • Fungi in Agriculture and Forestry Fungi and Antibiotics.	
5	Viruses, Viroids and Prions • General Characteristics of Viruses: Viral Structure • The Nucleic Acid • Capsid and Envelope • Shape and Other Morphological Features • Taxonomy of Viruses and Some Examples and the Diseases They Cause Cultivation of Viruses • The Bacteriophage: Structure, Multiplication, The Growth Curve of the Bacteriophage Viruses and Cancer.	6
6	Specific Immune Response • Antigens and Antibodies • Nature of Antigens, Classes of Antigens, Nature of Antibodies Antibody Structure, Immunoglobulin Classes • The Duality of the Immune System Cells and Humoral Immunity Immunological Memory T Cells and Cell-Mediated Immunity • Types of T Cells Interrelation of Cell-Mediated and Humoral Immunity Disorders Associated with the Immune System • Allergies (Hypersensitivities) Autoimmune Diseases • The Relationship between the Immune System and Cancer Immunodeficiencies AIDS	3
7	Diseases of the digestive tract • Structure and Function of the Digestive System • Normal Flora of the Digestive System • Bacterial Disease of the Mouth: Dental Caries, Periodontal Diseases • Bacterial Diseases of the Lower Digestive System: Staphylococcal Food Poisoning, Shigellosis (Bacillary Dysentery), Salmonellosis and Typhoid	6

	Fever, Cholera, Campylobacter Gastroenteritis and Helicobacter Peptic Ulcer Disease Diseases of the respiratory tract • Structure and Function of the Respiratory System. • Normal Flora of the Respiratory System • Microbial Diseases of the Upper Respiratory tract: Streptococcal Pharyngitis, Scarlet Fever, Diphtheria, The Common Cold • Bacterial Diseases of the Lower Respiratory Tract: Pertussis, Tuberculosis, Bacterial Pneumonia Viral Diseases of the Lower Respiratory Tract: Viral Pneumonia, Influenza	
8	Venereal Diseases Gonorrhea Syphilis Trichomoniasis Genital Herpes Genital Warts. Diseases of the Skin and Eyes Acne Measles Small Pox Chicken Pox Rubella Anthrax Gangrene Leishmaniasis.	3
Total		**45**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm 1	Around 6th -7th week	15%
2.	Midterm 2	Around 11th - 12th week	15%
3.	Quizzes, Attendance, Participation, Home works.	All the semester	10 %
4.	Lab reports.	All the semester	5%
5.	Lab Exam.	Around 15th week	15 %
6.	Final Exam.	Around 15th - 16th week	40 %
...	**TOTAL**		100%

*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	• Tortora, Funke, Case: Microbiology – An Introduction; Pearson (Benjamin Cummings 11e). 12 ed, (2015). ISBN-13: 978-0321929150. • Brock's Biology of Microorganisms. (2012). Madigan, M., J.M. Martinko, D.A. Stahl and D.P. Clark. 13th edition. [Benjamin Cummings, Boston, MA). Microbiology Laboratory, New York City College of Technology. McGraw Hill Publishing.(2013). ISBN 13: 9781121951501.
Supportive References	http://ocw.mit.edu/courses/biology/7-06-cell-biology-spring-2007/syllabus.
Electronic Materials	• http://www.csus.edu/indiv/t/telleena/biol440/http://ocw.mit.edu/courses/biology/7-06-cell-biology-spring-2007/syllabus/ • http://www.sci.sdsu.edu/bioadvise/syllabi/Bio350_S10.pdf • http://www.csus.edu/indiv/t/telleena/biol440/ http://www.washington.edu/students/crscat/microbio.html
Other Learning Materials	CD for Bacteriology

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Each classroom is equipped with PC and retro projector with a maximum of 30 students. And the laboratory room is equipped with many laboratory instruments with a maximum of 20 students.
Technology equipment (projector, smart board, software)	The computers are equipped with different software's. and connected to data show and to smart board.
Other equipment (depending on the nature of the specialty)	Specific laboratory equipment for this course including posters, models of different experimental animals, dissection instruments, light microscopes, dissection microscopes, microtome instrument, slide preparations, mixer, fluorescent microscopes, ELISA unit for detecting Ag-Ab reactions, different media for cultures and sensitivities, centrifuges, incubators, ovens and other glasswares.

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Specialized committees	Indirect
Effectiveness of Students assessment	Students	Direct
Quality of learning resources	Course coordinator	Direct
The extent to which CLOs have been achieved	Faculty	Indirect
Other		

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

G. Specification Approval

COUNCIL /COMMITTEE	Head of biology department
REFERENCE NO.	
DATE	