# Course Specification
## (Bachelor)

| | |
|---|---|
| Course Title: | General Microbiology |
| Course Code: | BIOl 231 |
| Program: | Biology |
| Department: | Biology |
| College: | College of Science |
| Institution: | Majmaah University |
| Version: | 3 |
| Last Revision Date: | 01.03.1444H; |

## Table of Contents

## A. General information about the course:

### 1. Course Identification

| | | | | | |
|---|---|---|---|---|---|
| **1. Credit hours: 3 (2+1 )** | | | | | |
| Equivalent to ECTS Credit Point: 4.5 | | | | | |
| **2. Course type** | | | | | |
| **A.** | ☒ University | ☒ College | ☒ Department | ☐Track | ☐Others |
| **B.** | ☐Required | | ☐Elective | | |
| **3. Level/year at which this course is offered: Common 2nd Year: Level: 4** | | | | | |
| **4. Course General Description:** | | | | | |

➢ Through this course the students can able to understand the basic concepts, principles of Microbiology, historical review, subject development, classification, structures, asepsis, sterilization, microbial growth and growth requirements.

➢ Most importantly the students should gain the knowledge about microbial diseases/ controlling strategies' and industrial values.

**5. Pre-requirements for this course** (if any)**:**

BIOL: 101General Biology
BIOL 102 Cell Biology
BIOL 222 Plant Taxonomy

**6. Co-requisites for this course** (if any)**: Nil**

**7. Course Main Objective(s):**

General Microbiology is a wide scoped is introductory subject that gives students an overview of Bacteria, Fungi, Parasites, Viruses, Infection and Immunity, as well as laboratory skills in handling and using microbial cultures

The course demonstrates history, classification, biology, structure, growth, metabolism, genetics, medical, industrial importance of prokaryotic microorganisms, eukaryotic microorganisms, and viruses. Also includes the basic information about infection and Immunity, Asepsis, isinfection, Sterilization and disease controlling strategies in terms of diagnosis and treatment.

### 2. Teaching mode (mark all that apply)

| No | Mode of Instruction | Contact Hours | Percentage |
|---|---|---|---|
| 1 | Traditional classroom | 60 | 86% |
| 2 | E-learning | 10 | 14% |
| 3 | Hybrid<br>• Traditional classroom<br>• E-learning | | |
| 4 | Distance learning | | |

### 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 (specify)** | |
| **Total contact hours** | | 60 |

### Workload (based on the academic semester)

| No | Activity | Workload in Hours |
|---|---|---|
| 1. | **Contact hours** | 60 |
| 2. | Self-study (Assignments, quizzes, reports, Discussions, Library, research) | 60 |
| **Total Workload** | | 120 |
| Equivalent to ECTS credit points | | 4.5 |

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

| Code | Course Learning Outcomes | Code of PLOs aligned with the program | Teaching Strategies | Assessment Methods |
|---|---|---|---|---|
| **1.0** | **Knowledge and understanding** | | | |
| 1.1 | List various microbes; recall the history of microbiology field | **K2** | Lectures, individual and group discussion and videos | Quizzes, Midterm and final exams |

| Code | Course Learning Outcomes | Code of PLOs aligned with the program | Teaching Strategies | Assessment Methods |
|---|---|---|---|---|
| | development. Recognize the principles, classification, sterilization, growth and culture of organisms. | | | |
| 1.2 | Define the scope of microbiology and allied subjects and Medical and industrial applications | **K2** | Lectures, individual and group discussion and videos | Quizzes, Midterm and final exams |
| ... | | | | |
| **2.0** | **Skills** | | | |
| 2.1 | Evaluate the protocol for microbial identification, nutrient requirements, infection, pathogenicity and industrial applications | **S1** | Lectures, individual and group discussion oral presentation and videos. | Quizzes, Midterm and final exams |
| 2.2 | Lab Experiments: Demonstrate microorganisms by microscopic staining methods, media preparation culture and sterilization | **S4** | Demonstration, Hands on practical trainings. | Practical exams and presentations |
| **3.0** | **Values, autonomy, and responsibility** | | | |
| 3.1 | Committee toward group task contributing ideas. (KPI 20) | **V1** | Lectures, videos, Homework, Research | Assignments, Homework, Research work |
| 3.2 | | | | |

| Code | Course Learning Outcomes | Code of PLOs aligned with the program | Teaching Strategies | Assessment Methods |
|---|---|---|---|---|
| ... | | | | |

## C. Course Content

| No | List of Topics | Contact Hours |
|---|---|---|
| 1. | **Unit:1 Introduction to General Microbiology**<br><br>**Introduction:**<br><br>➢ **Microbiology and Its Scope**<br>• Pharmacy,<br>• Medicine,<br>• Clinical research,<br>• Agriculture,<br>• Dairy industry,<br>• Water industry,<br>• Nanotechnology &<br>• Chemical technology.<br>➢ **Subjects in Microbiology**<br>• Bacteriology<br>• Mycology<br>• Parasitology<br>• Virology<br>• Immunology<br>➢ **Specialization in Microbiology**<br>• Epidemiology and Public Health Microbiology<br>• Food Microbiology<br>• Agricultural and Veterinary Microbiology<br>• Environmental Microbiology<br>**Importance of Microorganisms**<br><br>➢ **Characteristics of Microorganisms**<br>➢ **Taxonomy**<br>➢ **Microbial control, Infection and Diseases**<br>➢ **History of Microbiology** | 4 |
| 2. | **Unit:2 Microbial Classification**<br><br>**Taxonomy and Characteristics**<br><br>➢ **5 Kingdom system Proposed by Robert Whittaker**<br>➢ **Clarification of bacteria**<br>➢ ***Bergey's Manual of Systematic Bacteriology.***<br>• Domin Prokarya<br>• Domin Eukarya | 4 |

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|---|---|---|
| | • Domin Archea<br>• Classification of fungi<br>• Classification of Algae<br>• Classification of Parasites<br>• Classification of viruses<br>➢ **Intra species classification based on**<br>• Biotypes<br>• Serotypes<br>• Phage types<br>• Colicin types<br>➢ **Classification vs. Identification Techniques**<br>➢ **Bergey's Manual: Identification**<br>• Microscopic appearance<br>• Biochemical reactions<br>• Growth requirements<br>• Serology (Immunological reaction)<br>• Phage typing (Using specific bacteriophage)<br>➢ **Prokaryote and Eukaryote evolution**<br>➢ **Bacterial structures, Pathogenic and useful bacteria**<br>➢ **Nutrition and reproduction** | |
| 3. | **Unit:3 Disinfection and Sterilization**<br>➢ **Introduction**<br>➢ Historical background<br>➢ Disinfectant and Antiseptics<br>➢ Common terminologies<br>➢ Factors that influence the degree of sterilization<br>➢ Ideal disinfectant and qualities<br>➢ **Methods disinfection**<br>• Natural methods<br>• Physical methods<br>• Chemical methods<br>Sterilization Control | 4 |
| 4. | **Unit: 4 Growth and Culture Media**<br>➢ Growth and Nutritional requirements<br>➢ Microbial enzymes and its activity<br>➢ Bacterial division and Microbial growth<br>➢ Microbial Growth measurement methods<br>➢ Culture media, types and composition<br>Anaerobic culture methods | 4 |
| 5. | **Unit: 5 Introduction to Parasitology**<br>➢ Key terminologies<br>➢ Types of parasitism<br>➢ Parasitic Groups<br>• Protozoa | 4 |

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|---|---|---|
| | • Metazoa<br>• Exoparasites<br>➢ **Protozoa: Classification based on the mode of locomotion**<br>• Amoeba: Phylum: Sarcodina<br>• Flagellates Phylum: Mastigophora<br>• Ciliates: Phylum: Ciliophora<br>• Sporozoans: Phylum: Apicomplexa (Malaria)<br>➢ **Helminthes**<br>• Cestodes (flatworms)<br>• Nematodes (roundworms)<br>Trematodes (flukes) | |
| 6. | **Unit: 6, Classification & General Properties of Fungi**<br>➢ **Introduction**<br>➢ **Classification depends on cell morphology**<br>• Yeast fungi (Eg: *Cryptococcus neoformans*)<br>• Yeast like fungi (*Candida albicans*)<br>• Molds (*Aspergillus* sp.)<br>• Dimorphic fungi (Blastomycosis)<br>➢ **Systematic classification based sexual spore formation**<br>• Zygomycetes<br>• Ascomycetes<br>• Basidiomycetes<br>• Deuteromycetes (fungi imperfectii)<br>➢ **Reproduction**<br>➢ **Vegetative Structures of Fungi**<br>➢ **Fungal Infections/ Mycoses**<br>• Superficial mycoses (Surface and cutaneous mycosis)<br>• Deep mycoses (Subcutaneous and systemic mycoses)<br>➢ **Useful properties of fungi** | 2 |
| 7. | **Unit: 7, Introduction to Virology**<br>➢ **Introduction**<br>➢ **Characteristics of viruses**<br>➢ Comparison of viruses and bacteria<br>➢ Structural components of viruses<br>➢ Classification (Baltimore classification of viruses)<br>➢ Viral Genome and Multiplication<br>➢ Important Human pathogenic DNA and RNA Viruses<br>➢ **Viruses and Cancer**<br>➢ Viroids<br>➢ Prions<br>**Detection of Viruses**<br>• Electron microscopy<br>• Immunologic Assays<br>• Biological Assays | 4 |

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| | • Hemagglutination Assay<br>• Molecular Assays<br>➢ **Cultivation of Viruses**<br>**Viral Vaccines** | |
| 8. | **Unit: 8, Introduction to Immunology**<br>➢ Definitions and terminologies<br>➢ Role of the immune system<br>➢ Immune system<br>• Organs<br>• Cells<br>• Molecules<br>➢ Types of immunity (Innate and Acquired immunity mechanisms)<br>➢ Cell-mediated immune response<br>➢ Humoral immune response<br>➢ Antibodies (immunoglobulins)<br>➢ Failure of immune response<br>➢ Hypersensitivity reactions<br>➢ Altered Immunity: immune compromised | 4 |
| 9. | **Practical excercises:**<br>1) General safety guidelines and Ethics (2 hrs)<br>2) Important Microbiology Equipment's (2 hrs)<br>3) Disinfection and Sterilization (8 hrs)<br>4) Microscopical Techniques (2 hrs)<br>5) Simple Staining (2 hrs)<br>6) Differential Staining (Grams Staining) ( 2hrs)<br>7) Motility Examination (2 hrs)<br>8) Culture media Preparation (4 hrs)<br>9) Enumeration of Microbes (Soil-by serial dilution, Water quality by MPN technique) ( 4hrs)<br>10) Bacterial quality examination of Milk (MBRT method) (2 hrs) | 30 |
| **Total** | | **60** |

## D. Students Assessment Activities

| No | Assessment Activities * | Assessment timing (in week no) | Percentage of Total Assessment Score |
|---|---|---|---|
| **1.** | **Quiz's, Assignments, Homework ( 3 quizes: 6 marks Assignement 2 marks Homework 2 marks )** | **Once every 2 weeks once on as applicable** | **10%** |

| No | Assessment Activities * | Assessment timing (in week no) | Percentage of Total Assessment Score |
|---|---|---|---|
| | | | |
| 2. | Mid-term Exam -1 | 5th week | 10% |
| 3. | Mid-term Exam -2 | 9th week | 10% |
| 4. | Black Board, e-Exam | 12th week | 10% |
| 5. | Practical Exam and Viva-voce (Activities 10 marks; Practical exam 10 marks) | 15th week | 20% |
| 6. | Final Exam | 18th 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**

| ISBN | سنة النشر Publishing Year | اسم الناشر Publisher | اسم المؤلف (رئيسي) Author's Name | اسم الكتاب المقرر Textbook title |
|---|---|---|---|---|
| ISBN-13: 978-1118743164 | 2015 | Wiley; 9 edition | Jacquelyn G Black | Microbiology Principles and Explorations |
| ISBN-10: 0321929152 | 2015 | Pearson; 12 edition | Gerard J. Tortora | Microbiology: An Introduction (12th Edition) 12th Edition |
| ISBN 10: 0074623206 / ISBN 13: 9780074623206 | 2000 | Tata-McGraw Hill (5th edition) | Pelczar. M., et al., | Microbiology |
| ISBN 10: 0333220145 ISBN 13: 9780333220146 | 1977 | Macmillan Press (5th edition) | Stanier, RY., et al., | General Microbiology |
| ISBN 10: 8173716749 / ISBN 13: 9788173716744 | 2017 | Universities Press | Ananthanarayan and Paniker's | Textbook of Microbiology |
| ISBN 10: 0697293904 / ISBN 13: 9780697293909 | 2005 | McGraw Hill International edition, New York | Prescott L.M, Harley J.P. and Klein D.A. | Microbiology |

**Supportive References**

**Desk Encyclopedia of Microbiology** by Moselio Schaechter (Editor)
Call Number: QR9 .D47 2004
ISBN: 0126213615
Publication Date: 2003-12-04

**Microbiological Media** by Ronald M. Atlas
Call Number: QR66.3.A85 2010
ISBN: 1439804060
Publication Date: 2010-03-17

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| **Electronic Materials** | https://anyfreepdf.com/lib/mcgraw-prescott-microbiology-6th-edition.pdf?web=kampanje.fsc.no<br><br>https://farabooks.com/ananthanarayan-and-paniker-microbiology-9th-edition.pdf?refhost=bunkerproxy.remotely.dk |
| **Other Learning Materials** | **Journals (general reading)**<br>Computer-based programs with professional standards or and virtual software's |

## 2. Required Facilities and equipment

| Items | Resources |
|---|---|
| **Facilities**<br>(Classrooms, laboratories, exhibition rooms, simulation rooms, etc.) | Classrooms should be 50-90 square meters, have at least 35 seats, air conditioning, smart boards, computers, and printers, while labs need teaching materials, and libraries must have current scientific books. Light microscopes can connect to video cameras and TVs, and good lab tools are needed for tissue work, ensuring they are easy to use and made from durable materials. |
| **Technology equipment**<br>(projector, smart board, software) | ▪ AV<br>▪ Data show<br>▪ Smart Board<br>▪ software and internet in the lecture hall and all labs<br>▪ Computer and microphone in Lecture rooms |
| **Other equipment**<br>(depending on the nature of the specialty) | Good lab facilities, Safe waste disposals; distilliation water pant; and Instruments with annual maintenance |

## F. Assessment of Course Quality

| Assessment Areas/Issues | Assessor | Assessment Methods |
|---|---|---|
| Effectiveness of teaching | Students | Direct Assessment |
| Effectiveness of students assessment | Course coordinator/Program Leader | Direct Assessment |
| Quality of learning resources | Students | Indirect Assessment |
| The extent to which CLOs have been achieved | Teaching Faculty | Direct Assessment |
| Other: Nil | | |

**Assessors** (Students, Faculty, Program Leaders, Peer Reviewers, Others (specify)

**Assessment Methods** (Direct, Indirect)

## G. Specification Approval

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|---|---|
| **COUNCIL /COMMITTEE** | Department of Biology counsil |
| **REFERENCE NO.** | **7** |
| **DATE** | **4/4/1446 (7/10/2024)** |