|  |  |
| --- | --- |
| **Course Title:** | **General Microbiology** |
| **Course Code:** | **MBIO 140** |
| **Program:** | **Bachelor degree in Microbiology program** |
| **Department:** | **Botany and Microbiology** |
| **College:** | **Science** |
| **Institution:** | **King Saud University** |

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# A. Course Identification

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1. Credit hours:** | | | |  | | | | | | | | | | | | |
| **2. Course type** | | | | | | | | | | | | | | | | |
| **a.** | University | |  | | College | | |  | Department | | | | **\*** | Others |  |  |
| **b.** | | Required | | | |  | Elective | | |  |  | | | | | |
| **3. Level/year at which this course is offered:** | | | | | | | | | | | | 2th | | | | |
| **4. Pre-requisites for this course** (if any)**:** | | | | | | | | | | | | | | | | |
| **5. Co-requisites for this course** (if any)**:** | | | | | | | | | | | | | | | | |
| **Not applicable** | | | | | | | | | | | | | | | | |

## 6. Mode of Instruction (mark all that apply)

| **No** | **Mode of Instruction** | **Contact Hours** | **Percentage** |
| --- | --- | --- | --- |
| **1** | **Traditional classroom** | 60 | 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 Introduction –Principals of Microbiology-–Historical Review of the pioneer Microbiologist –Development of Microbiology – Methods of Studying Microorganisms – Classification of Microorganisms – Chemistry of Microbial Cell - Structure of Microbial Cell – Microbial Genetic – Nutrition and Microbial Metabolism –Survey Of microorganisms and their habitats – Growth and Reproduction – Relationships with other Organisms – Antimicrobial Agents-Immunity – Biotechnology - Microorganisms in medicine – Microorganisms in Industries- Microorganisms and Pollution |
|  |
| 2. Course Main Objective |
| 1. **Understand and appreciate the significance of microbiology with reference to its intricate role in the biology of living organisms and their environment.** 2. **They will know how microbiological techniques and methods were developed by early microbiologists which play an important role in modern biology through studying history of microbiology.** 3. **Familiarize with the major concepts and principles of microbiology towards better understanding of microorganisms and their interaction with other living organisms.** 4. **Learn the major concepts and principles of various methods of cultivation, isolation, preservation and study of microorganism.** 5. Understand the various types of microorganism and their classification, nutritional requirements, growth, physiology, genetics, and reproduction. 6. **Learn the scope and applications of microbiology in disease management, conservation of environment, in food production, in agriculture, industrial production of various pharmaceuticals, chemicals and other commercial products, and in various human endeavours.** |

## 3. Course Learning Outcomes

| **CLOs** | | **Aligned****PLOs** |
| --- | --- | --- |
| 1 | **Knowledge and Understanding** |  |
| 1.1 | Define the microbiology, bacteriology, mycology, virology, phycology and protozoology. | - |
| 1.2 | Memorize of history of microbiology. | - |
| 1.3 | Describe the prokaryotic and eukaryotic cells. |  |
| 1.4 | List the methods that use to observe the microorganisms. |  |
| 1.5 | Recognize the immunology and microbial growth. |  |
|  |  |  |
| **2** | **Skills :** |  |
| 2.1 | Use the instruments related to microbiological section | - |
| **3** | **Values:** |  |
| 3.1 | Explain assay to study the microbes suing microscopes. | - |
| 3.2 | Differentiate between gram positive and gram negative bacteria. |  |
| 3.3 | Prepare the microbial cultivation media. |  |
| 3.4 | Explain the isolation and purification of microbes. |  |
| 3..5 | Work in group in different microbiological activities |  |
| 3.6 | Evaluate the microbial risks in laboratory. |  |
| 3.7 | Access into scientific databases and software |  |

# C. Course Content

|  |  |  |
| --- | --- | --- |
| **No** | **List of Topics** | **Contact Hours** |
| 1 | Definition and importance of microbiology; History and Development of microbiology; Contributions of pioneering microbiologists; |branches of microbiology; Inter relationship of microbiology with other branches of science; General introduction of various microorganisms; Role of microorganisms in biology and biotechnology, and ecology- brief introduction. | 2 |
| 2 | Principles and concept of classification of microorganisms; Principles of numerical taxonomy and molecular taxonomy; Identification and Nomenclature of microorganism; Bergys Manual of systematic Bacteriology; Whittaker’s Five kingdom concept and Domain concepts | 4 |
| 3 | Differences between prokaryotic and eukaryotic cells; Morphology of bacteria, fungi, microalgae, algae, viruses; flagella; Ultrastructures of bacteria, yeast, fungi and bacteriophage | 4 |
| 4 | Nutritional requirements of microorganisms; nutritional grouping of microorganisms. Cultivation media and components of medium; Methods of cultivation of microorganisms; Methods of enumeration of microorganisms from various environments Different methods of isolation of microorganisms; Culture maintenance and Preservation of microorganisms | 4 |
| 5 | Microbial metabolism and Macromolecular synthesis; Microbial photosynthesis; nitrogen fixation and cycling of elements  Microbial Genetics-concepts and principles | 4 |
| 6 | Survey of microorganisms and their habitats; Microorganisms of air, water, soil and extreme environments; Quantitative and qualitative distribution in various environments; Microorganisms associated with food, milk, drinking water; Indicator microbes | 2 |
| 7 | Growth and Reproduction of microorganisms: Growth curve. Influence of environmental factors on microbial growth; Concepts of physical and chemical control of microorganisms; concept of sterilization and techniques of sterilization; disinfectants and antimicrobial Agents | 4 |
| 8 | Microbial interactions: Plant –microbe interactions; mycorrhiza, symbiosis, | 2 |
| 9 | Microbes as plant and animal pathogens; Principles of pathogenicity; Immunity:- concept of antigen and antibody; Microbial toxins; concept of vaccines;  Microorganisms in medicine:- concept of probiotics, production of antibiotics and bioactive substances | 2 |
| 10 | Microorganisms in Industries- production of commercial products such as enzymes, vitamins, aminoacids, ethanol, alkaloids  Microorganisms and pollution; concepts of microbial fouling and corrosion; biodegradation, biodeterioration, and bioremediation | 2 |
| **Total** | | 60 |

# 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 | Define the microbiology, bacteriology, mycology, virology, phycology and protozoology. | Lecture | theoretical exams, Written Quizzes |
| 1.2 | Memorize of history of microbiology. | Lecture | theoretical exams, Written Quizzes |
| 1.3 | Describe the prokaryotic and eukaryotic cells. | Lecture | theoretical exams, Written Quizzes |
| 1.4 | List the methods that use to observe the microorganisms. | Lecture | theoretical exams, Written Quizzes |
| 1.5 | Recognize the immunology and microbial growth. | Lecture | theoretical exams, Written Quizzes |
| **2.0** | **Skills** | | |
| 2.1 | Use the instruments related to microbiological section | Practical activities | Practical exams |
| **3.0** | **Values** | | |
| 3.1 | Explain assay to study the microbes suing microscopes. | Practices laboratory. | Practical exams, Written Quizzes |
| 3.2 | Differentiate between gram positive and gram negative bacteria. | Practices laboratory. | Practical exams, Written Quizzes |
| 3.3 | Prepare the microbial cultivation media. | Practices laboratory. | Practical exams, Written Quizzes |
| 3.4 | Explain the isolation and purification of microbes. | Practices laboratory. | Practical exams, Written Quizzes |
| 3.5 | Work in group in different microbiological activities | Cooperative activities | Direct observation using rubrics |
| 3.6 | Evaluate the microbial risks in laboratory. | Cooperative activities | Direct observation using rubrics |
| 3.7 | Access into scientific databases and software | Practical activities | Practical tests, Evaluation of the research project |

## 2. Assessment Tasks for Students

| **#** | **Assessment task\*** | **Week Due** | **Percentage of Total Assessment Score** |
| --- | --- | --- | --- |
| **1** | 1st midterm exam | 7 | 15/100 |
| **2** | 2nd midterm exam | 13 | 15/100 |
| **3** | Final practical exam | 14 | 30/100 |
| **4** | Final exam | 15 | 40/100 |

**\*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 :** |
| * Tutorial :3hours/week * Communications through electronic mail between the tutor and the student at any available time. * Personal website by faculty members displaying lecture notes and power point presentations |

# F. Learning Resources and Facilities

## 1.Learning Resources

|  |  |
| --- | --- |
| **Required Textbooks** | 1. Microbiology principles and Exploration (2004) by Jacquelyn G Black, 920 pages 2. Microbiology (2004) by Lansing M prescot John P Harley Donald Alkein, 1152 pages |
| **Essential References Materials** | Applied Microbiology journal |
| **Electronic Materials** | 1. [**http://www.microbiologyonline.org.uk/**](http://www.microbiologyonline.org.uk/)  Online MicrobiologyLab Manual  1. **http://microbiologyon-line.blogspot.com/** |
| **Other Learning Materials** | **DVD for fungal biology, Plant pathogenic fungi** |

## 2. Facilities Required

| **Item** | **Resources** |
| --- | --- |
| **Accommodation**  (Classrooms, laboratories, demonstration rooms/labs, etc.) | * Data show room * Laboratory * E-learning room   Live presentations from the internet |
| **Technology Resources**  (AV, data show, Smart Board, software, etc.) | * Computer supported with important softwares , printer and scanner and access to internet   Smart board |
| **Other Resources**  (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list) | * Provision for equipping the lecture room with latest state of art audio-visual aids and teaching kits, and the laboratory with new equipments and lab wares. |

# G. Course Quality Evaluation

| **Evaluation**  **Areas/Issues** | **Evaluators** | **Evaluation Methods** |
| --- | --- | --- |
| Student feedback | Instructors | Evaluation questioner  Final exam results  Direct discussion |
| Evaluation of Teaching by the Instructor | Students, Peer reviewer | Self-evaluation  External annual evaluation |
| Processes for Improvement of Teaching | Program leader and Faculty | Evaluation of reports  Revision of student results between previous semester  Workshop |
| Standards of Student Achievement | Instructors | Evaluation of homework and exams |

**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** |  |
| **Reference No.** |  |
| **Date** |  |