

UZO-417

Applied Microbiology-II

Cr. (2)

Introduction:

The exploitation of microorganisms for a specific product or use is the main domain of applied microbiology. In short, it deals with the applications of microbiology.

Course Objectives:

The objectives of the course are:-

1. To provide knowledge to the students about the application of microbes in different fields of life
2. To develop an understanding of relevant applied scientific knowledge with the ability to use microbes in a wide range of professional disciplines
3. To enhance the ability to employ appropriate laboratory and other materials and equipment in a safe and responsible manner and follow standard operating procedures

4. To apply microbiological principles and methods to identify and solve problems associated with a particular area of professional expertise

Course Learning Outcomes:

Upon successful completion of the course, the student will be able to:

1. **ATTAIN** the sufficient knowledge about the uses and benefits of microorganisms in different aspects of human life
2. **APPREHEND** the relevant applied scientific knowledge and impact of microbiology
3. **ELUCIDATE** the problems associated with a particular area of microbiology by using the acquired knowledge and practical skills
4. **EXPLORE** the microbial world for applications of microorganisms in biotechnology, medicine and industry
5. **EVALUATE** critically the principles and mechanisms underlying the different fields of microbiology
6. **DETERMINE** the potential of microorganisms to make a great impact on the development of basic and applied research

Course Contents:

Basic and Theoretical Aspects of the Immune Response: The immune response, The immune system, Hypersensitivity. **Environmental microbiology: Aquatic microbiology:** Natural waters, The aquatic environment, Distribution of microorganisms in the aquatic environment, Techniques for the study of aquatic microorganisms, Aquatic microorganisms, The role and importance of aquatic microbial ecosystems, Productivity of aquatic ecosystems, Biogeochemical transformations. **Soil microbiology:** Physical characteristics of soil, Microbial flora of soil, Interactions among soil microorganisms, Biogeochemical role of soil microorganisms, Biochemical transformations of nitrogen and nitrogen compounds, The nitrogen cycle, Biochemical Transformations of carbon and carbon compounds The carbon cycle, Biochemical transformations of sulfur and sulfur compounds The Sulfur cycle. Biodegradation of herbicides and pesticides. **Microbiology of domestic water and sewage:** Water purification, Determining sanitary quality, Swimming pools, Water pollution, Wastewater, Wastewater treatment and disposal, wastewater-treatment processes, Microorganisms and wastewater-treatment procedures, Efficiency of wastewater-treatment procedures, The pollution problem. **Microbiology of foods:** Microbial flora of fresh foods, Microbial spoilage of foods, Microbiological examination of foods, Preservation of foods, fermented foods, Microorganisms as food, single-cell protein. **Industrial Microbiology:** Scope of industrial microbiology in food production, control of insects, human therapy, petroleum, mining and bioremediation. Biotechnology and its role in modern human comforts.

Teaching-Learning Strategies

Teaching will be a combination of class lectures, class discussions, and group work. Short videos /films will be shown on occasion.

Assignments

The sessional work will be a combination of written assignments, class quizzes, presentation, and class participation/attendance.

Assessments and Examination

Sessional Work:	25 marks
Midterm Exam:	35 marks
Final term Exam:	40 marks

Books Recommended:

1. MICROBIOLOGY: A HUMAN PERSPECTIVE, 2001. Eugene W. Nester, Denise, G., Anderson, Martha, T., Nester, C., Evans Roberts, Nancy, N. McGraw Hill Higher Education.
2. MICROBIOLOGY PRINCIPLES AND EXPLORATIONS, 2001. Jacquelyn, G.G. Wiley John and Sons Inc.

3. MICROBIOLOGY, 1986. Pelczar Jr., Chan, E.C.S. and Krieg, M.R., 1986. Mc-Graw Hill, London.
4. MICROBIAL APPLICATIONS: LAB MANUAL IN GENERAL MICROBIOLOGY, 1994. Benson, H.J. WMC Brown Publishers, England.

UZO-418

Applied Microbiology –II (Lab.)

Cr. (1)

Introduction:

The exploitation of microorganisms for a specific product or use is the main domain of applied microbiology. In short, it deals with the applications of microbiology.

Course Objectives:

The objectives of the course are:-

1. To provide knowledge to the students about the application of microbes in different fields of life
2. To develop an understanding of relevant applied scientific knowledge with the ability to use microbes in a wide range of professional disciplines
3. To enhance the ability to employ appropriate laboratory and other materials and equipment in a safe and responsible manner and follow standard operating procedures
4. To apply microbiological principles and methods to identify and solve problems associated with a particular area of professional expertise

Course Learning Outcomes:

Upon successful completion of the course, the student will be able to:

1. **ATTAIN** the sufficient knowledge about the uses and benefits of microorganisms in different aspects of human life
2. **APPREHEND** the relevant applied scientific knowledge and impact of microbiology
3. **ELUCIDATE** the problems associated with a particular area of microbiology by using the acquired knowledge and practical skills
4. **EXPLORE** the microbial world for applications of microorganisms in biotechnology, medicine and industry
5. **EVALUATE** critically the principles and mechanisms underlying the different fields of microbiology
6. **DETERMINE** the potential of microorganisms to make a great impact on the development of basic and applied research.

Course Contents:

Isolation and identification of coliform bacteria.
 Bacteriological examination of water.
 Bacterial examination of food and raw milk.
 Phosphatase Test
 Total Leucocyte Count
 Total Erythrocyte count
 Estimation of microbial Protease production
 Estimation of microbial amylase production
 Estimation of microbial tannase production
 Surveys of microorganisms' activities based industries.

Teaching-Learning Strategies

Teaching will be a combination of class lectures, class discussions, and group work. Short videos /films will be shown on occasion.

Assignments

The sessional work will be a combination of written assignments, class quizzes, presentation, and class participation/attendance.

Assessments and Examination

Sessional Work: 25 marks

Midterm Exam: 35 marks

Final term Exam: 40 marks