

UZO-475

Fundamentals of Microbiology-I

Cr. (2)

Course Objectives:

The objectives of the course are:-

1. To provide first-hand knowledge to students in the fundamental aspects of basic microbiology
2. To impart the practical know-how about the morphology and microbial activities
3. To acquaint the students with basic techniques of sterilization, culturing and isolation of microorganisms

Course Learning Outcomes:

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

1. **ATTAIN** the basic knowledge of microorganisms
2. **FAMILIARIZE** with the concepts of basic microbiological techniques
3. **ELUCIDATE** the role of microbes with reference to food, health and environment in general
4. **EXPLORE** the plant-microbial interaction
5. **INVESTIGATE** the potential of pathogenic microorganisms
6. **APPLY** the appropriate microbiological techniques, methodologies and equipment in accordance with Lab safety protocol

Course Contents:

History and Introduction of Microbiology: The beginnings of Microbiology; Discovery of the microbial world; Discovery of the role of microorganisms in transformation of organic matter, in the causation of diseases, development of pure culture methods. The scope of microbiology. **Characterization, Classification, and Identification of Microorganisms:** Microbial evolution, systematics and taxonomy; Characterization and identification of microorganisms. Nomenclature and Bergey's manual. **Morphology and fine structure of bacteria:** Size, shape and arrangement of bacterial cells, Flagella and motility, Pili, Capsules, sheaths, Prosthecae and stalks, structure and chemical composition of cell wall, cytoplasmic membrane, protoplasts, spheroplasts, the cytoplasm, nuclear material. **The Cultivation of Bacteria:** Nutritional requirements, nutritional types of bacteria, bacteriological media, physical conditions required for growth, choice of media, conditions of incubation. **Reproduction and growth of bacteria:** Modes of cell division, New cell formation, Normal growth cycle of bacteria, synchronous growth, continuous culture, quantitative measurement of bacterial growth; Direct microscopic count, Electronic enumeration of cell numbers, the plate count method, Membrane-filter count, Turbidimetric method, Determination of nitrogen content, Determination of the dry weight of cells, The selection of a procedure to measure growth, Importance of measurement of growth. **Pure cultures and cultural characteristics:** Natural microbial populations, selective methods; Chemical methods, Physical methods, Biological methods, Selection in nature, Pure cultures; Methods of isolating pure cultures, Maintenance and preservation of pure cultures, Culture collections, Cultural characteristics; Colony characteristics, Characteristics of broth cultures.

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. MICROBIAL APPLICATIONS (complete version) LABORATORY MANUAL IN GENERAL MICROBIOLOGY, 1994. Benson, H.J. WMC Brown Publishers, England.
2. MICROBIOLOGY, 1986. Pelczar Jr., Chan, E.C.S. and Krieg, M.R. McGraw Hill, London.
3. BROCK'S BIOLOGY OF MICROORGANISMS, 1997. Madigan, M.T., Martinko, J.M. and Parker, J. Prentice-Hall, London.
4. THE MICROBIAL WORLD, 1986. Stainier, R.Y., Ingraham, J.L., Wheelis, M.L. and Painter, R.R. Prentice Hall, London.

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Course Contents:

The culture of microorganisms: Preparation and sterilization of culture media, agar slope, agar slab, streak plate and pour plate methods. Isolation and pure culturing of bacteria. Staining of microorganisms: Simple stains, positive staining; negative staining.

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