NATIONAL EDUCATION POLICY-2020

Skill Enhancement Course

Microbiology

(2022-23)

DEPARTMENT OF

MICROBIOLOGY

FACULTY OF SCIENCE

SRI DEV SUMAN UTTARAKHAND VISHWAVIDYALAYA, BADSHAHITHAUL, TEHRI GARHWAL

S. No.	Name	Designation	Signature
01	Prof. G. K. Dhingra	Dean Science & HOD Microbiology	
02	Dr Prabhat Kumar Singh	Subject Expert	
03	Prof. Pushpa Negi	PG Principal	
04	Prof. Pankaj Pant	PG Principal	
05	Prof. Kuldeep Singh Negi	PG Principal	
06	Prof. Anita Rawat	Director USERC	
07	Dr Neelam Negi	Member Expert	
08	Shalini Kotiyal	Member	

Skill Based Interdisciplinary Generic Electives (Four) Offered to the students of other Departments **Syllabus**

Programme Outcomes (PO)

1. Syllabus for Fundamentals of Microbiology

MM : 100
Time : 3 hrs
L Credit
3 3
Total Hours: 60

Sessional : 25
ESE : 75
Pass Marks : 40

Learning objectives:

- To understand the Vedic culture in which there is description of different information related to microorganisms and also they will know how earth evolved and also know the landmarks discoveries of microbiology
- To acquire knowledge of different technique to stain microorganism and how they can visualize the microorganisms in different types of microscope.
- To acquire an overall knowledge on the morphology and functions of the structures with the prokaryotes and eukaryotes.
- To become familiar with general characteristic of prokaryotic and Eukaryotic microbes and also acquire

Learning outcomes:

At the end of course student will be able

- To know the different milestones in the history of microbiology, importance of Vedic microbiology and scope of microbiology
- To understand and know the application of techniques used in the field of Microbiology.
- To stain the bacteria with simple, differential and special stain.

Unit-I	Introduction to Microbiology	History of Microbiology Leeuwenhoek ,Biogenesis Vs Abiogenesis, Germ theory of fermentation and disease, Koch's postulates, Antisepsis, Immunization , Introduction of Microbial word –Bacteria, Fungi, Virus, Protozoan and Algae
Unit-II	Scope of Microbiology	Scope of Microbiology: Beneficial and harmful activities of microorganisms. Introduction to applied branches of Microbiology: Air, Water, Sewage, Soil, Dairy, Food, Medical, Industrial, Biotechnology ,Pharmaceutical.
Unit-III	Instrumentation and Glassware	Demonstration of working of Analytical Balance, pH, Microscope ,Autoclave, hot air oven, UV hoods, Laminar Air Flow, BOD , Incubator, Fogger, and Membrane Filter unit. , Conical Flask, Petriplate, Pipette , Micropipette, Beaker. Cleaning and Sterilization
Unit-IV	Culture media and Staining	Culture Media: Definition, uses, basic requirements, Types of Media General , Selective and Differential Staining Methods: Simple, Grams staining, Ziehl-Neelsen staining . Lactophenol cotton blue Stain , Leishman Stain.

2. Microbiological Tools and Technique

MM : 100 — Sessional : 25
Time : 3 hrs — ESE : 75
L Credit — Pass Marks : 40
3 3

Total Hours: 50

Learning objectives:

- To get the knowledge of sophisticated and common instruments used in the microbiology laboratory
- To know aseptic techniques to keep the instrument and media sterile.

Learning outcomes:

At the end of course students will be able to

- Maintain the sterility of glassware, utensils and medium by different physical and chemical procedure.
- Operate the different sophisticated instruments available in the laboratory.

Unit I	Preparation and Sterilization of Media	Preparation sterilization of culture medium , Application and storage; Ingredients of media, selective, differential, indicator, enriched and enrichment media.
Unit II	Isolation and cultivation and Preservation of microorganisms	Isolation, Identification and cultivation of microorganisms: Collection of samples, processing of samples, serial dilution, technique, inoculation of samples, incubation and observations of microbial colonies . Sub- culturing of microorganisms and pure culture techniques. Preservation of microorganisms.
Unit III	Analysis and Preparation COA	Analysis of TBC, TYMC, Water Sample Raw Material, and Preparation of COA , SOP, and Specification
Unit IV	control of microorganisms	Physical and Chemical , and gaseous agents for control of microorganisms High temperature-moist heat and dry heat, Low temperatures, Radiation, Osmotic pressure, dessication, physical removal of microorganisms- bacteriological filters

3. Microbial Technology for Human Welfare

MM : 100 — Sessional : 25
Time : 3 hrs — ESE : 75
L Credit — Pass Marks : 40
3 3

Total Hours: 50

Learning objectives:

- To understand the prevalence of bacteria in food commodities.
- To understand the occurrence of Fermented food.

Learning outcomes:

At the end of course student will be able to

- Explain the role of microorganism in food commodities.
- Explain the factor responsible for the growth of bacteria.

Perform the different microbiological test to determine the quality of food.

Unit I	Introduction Of Food Microbiology	Introduction: Importance of food and dairy Microbiology - Types of microorganisms in food - Source of contamination (primary sources) - Factors influencing microbial growth in foods
Unit II	Fermented Food	Fermented food: Cheese, bread, wine, fermented vegetables - methods and organisms used. Food and enzymes from microorganisms -single cell protein, production of enzymes.
Unit III	Food Preservation	Food preservation: Principles of food preservation - methods of preservation. Physical (irradiation, drying, heat processing, chilling and freezing, high pressure and modification of atmosphere). Chemical preservation- (Class I & II).
Unit IV	Food Regulation	Food Sanitation: Good manufacturing practices - HACCP, Personal hygiene

4. Microbial Quality Control in Food, Water and Pharmaceutical Industries

MM : 100
Time : 3 hrs
L Credit
3 3

Sessional : 25
ESE : 75
Pass Marks : 40

Total Hours: 50

Learning objectives:

- To understand how microorganisms adapt to different environments and their interaction with different habitat and also the spread of microorganism from the environment.
- To acquire knowledge of treating water.

Learning outcomes:

At the end of course student will be able to

- Perform and demonstrate different methods used to determine the quality of food, Pharmaceutical water and air.
- Purify the household water through physical, chemical and biological method.

Unit-I	Microbiological Laboratory and Safe Practices	- Good laboratory practices, Good microbiological practices Biosafety cabinets – Working of biosafety cabinets, using protective clothing, specification , Discarding biohazardous waste – Methodology of Disinfection, Autoclaving
Unit-II	Determining Microbes in Food , Water , Pharmaceutical	Culture and microscopic methods - Standard plate count, Most probable numbers, Direct microscopic counts, MLT , Membrane Filter Unit technique
Unit-III	Collection of Samples	How to collect clinical, Pharmaceutical, Foods Water samples and precautions required. Method of transport of samples to laboratory and storage
Unit-IV	Prevention of Microbial	General preventive measures, Importance of personal

	Infection and Discarding and Disposal	hygiene, environmental sanitation and methods to prevent Discarding of laboratory waste and disposal Methods