

**Sri Dev Suman Uttarakhand University,
Badshahithaul, Tehri (Garhwal), Uttarakhand-
249199**

**NATIONAL EDUCATION POLICY-
2020**

**Syllabus for
Vocational or Skill Development
Sri Dev Suman Uttarakhand University Campus and
All Affiliated Colleges**



**STRUCTURE OF UG MICROBIOLOGY
VOCATIONAL SYLLABUS**

NATIONAL EDUCATION POLICY-2020
Skill Enhancement Course

Microbiology

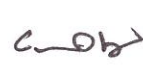
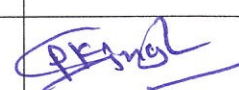

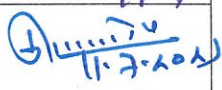
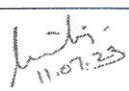
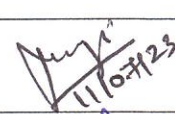
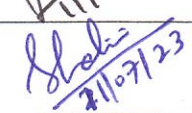
(2022-23)

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	 11.7.2023
05	Prof. Kuldeep Singh Negi	PG Principal	 11.7.2023
06	Prof. Anita Rawat	Director USERC	 11.07.23
07	Dr Neelam Negi	Member Expert	 11/07/23
08	Shalini Kotiyal	Member	 11/07/23

B.Sc. I Year

Semester – II

BMDSC –VC E 105

VC E-105 TOOLS AND TECHNIQUES

MM : 100

Sessional : 25

Time : 3 hrs

ESE : 75

L Credit

Pass Marks : 40

4 4

Total Hours: 60

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 Industrial microbiology- Definition and scope, history of industrial microbiology, industrial microbiology in present scenario, development of industrial microbiology in India. **06 Lectures)**

UNIT-II Basic knowledge of different instruments and their applications in microbiology such as microscope , micrometry, hot air oven, autoclave, laminar air flow and BOD incubator. **(10 Lectures)**

UNIT–III Isolation of industrially important microorganisms, Primary screening (crowded plate technique, auxanography technique, enrichment culture technique, differential culture technique), Importance of screening. **(14 Lectures)**

UNIT–IV Aseptic technique: contamination, sterilization (heating, steam sterilization, tyndallization, dry heat, chemicals, radiation sterilization, filter sterilization), sterilization of air. **(14 Lectures)**

UNIT–V Chromatography techniques: paper chromatography, thin layer chromatography, adsorption column chromatography, gas liquid chromatography, gel permeation, ion exchange

6-01 P. S. M. S. S.

and affinity chromatography, gel electrophoresis.

(16 Lectures)

Suggested Reading

1. Dubey R.C. and Maheshwari, D.K. *A Textbook of Microbiology*. 3rd ed., S. Chand & Co, Ram Nagar, New Delhi, p. 1034. ISBN 81-219-2620-3
2. Prescott's *Microbiology*, 10th Edition, McGraw Hill Publication
3. Dubey, R.C. and Maheshwari, D.K. *Practical Microbiology*. 2nd ed., S. Chand & Co. P Ltd, New Delhi, p. 413. ISBN: 81:219-2559-2
4. Dubey, R.C. *Advanced Biotechnology*. S. Chand & Co. P Ltd, New Delhi, p. 1161; ISBN: 81:219-4290-X.

BM DSC-205 - VC FOOD FERMENTATION TECHNOLOGY

MM : 100

Time : 3 hrs

L Credit

4 4

Sessional : 25

ESE : 75

Pass Marks : 40

Learning Objective:

The course aims to provide an advanced understanding of the core principles and topics of Food fermentation techniques.

Learning Outcome:

- Understand the role of different microorganisms in Food industry
- Learn different fermentation processes used in the food industry
- Understand role of Probiotics in food

Unit 1 Fermented Foods Definition, types, advantages and health benefits

Unit 2 Milk Based Fermented Foods Dahi, Yogurt, Buttermilk (Chach) and cheese: Preparation of inoculums, types of microorganisms and production process

Unit 3 Grain Based Fermented Foods Soy sauce, Bread, Idli and Dosa: Microorganisms and production process

Unit 4 Vegetable and Non Vegetarian Based Fermented Foods Pickels, Saeurkraut: Microorganisms and production process, **Fermented Meat and Fish** Types, microorganisms involved, fermentation process

Unit 6 Probiotic and Prebiotics Foods Definition, types, microorganisms and health benefits advantage for currant scenario .

6-04



BM D- VC –E307 MICROBIOLOGICAL ANALYSIS OF AIR AND WATER

MM : 100
Time : 3 hrs
L Credit
4 4

Sessional : 25
ESE : 75
Pass Marks : 40

Total Hours: 60

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 know different techniques of detection of microorganism from air, soil, and aquatic environment.
- To acquire knowledge of treating polluted water.

Learning outcomes:

At the end of course student will be able to

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

UNIT – I Aeromicrobiology: Bioaerosols, Air borne microorganisms (bacteria, viruses, fungi) and their impact on human health and environment, significance in food and pharma industries and operation theatres, allergens.

UNIT – II Air Sample Collection and Analysis: Bioaerosol sampling, air samplers, methods of analysis, CFU, culture media for bacteria and fungi, Identification characteristics.

UNIT – III Control Measures: Fate of bioaerosols, inactivation mechanisms – UV light, HEPA filters, desiccation, Incineration.

UNIT – IV Microbiological Analysis of Water: Sample Collection, Treatment and safety of drinking (potable) water, methods to detect portability of water samples: (a) standard qualitative procedure: presumptive/MPN tests, confirmed and completed tests for faecal coliforms (b) Membrane filter technique and (c) Presence/absence tests.

UNIT – V Control Measures: Precipitation, chemical disinfection, filtration, high temperature, UV light.

+Suggested Reading

G. D. S. P. K. S. S. S. S.

1. N.S. SubbhaRao, Soil Microbiology, Science Publisher, ISBN: 9781578080700
2. Dubey, R.C. *Advanced Biotechnology*. S. Chand & Co. P Ltd, New Delhi, p. 1161; ISBN: 81:219-4290-X.
3. P.D. Sharma, Microbiology, Rastogi Publication ISBN:978-8171339358.
4. Dubey R.C. and Maheshwari, D.K. *A Textbook of Microbiology*. 3rd ed., S. Chand & Co, Ram Nagar, New Delhi, p. 1034. ISBN 81-219-2620-3

B.Sc. II Year
Semester – IV
BMD VC- 407 INSTRUMENTATION AND BIOTECHNIQUES (THEORY)

MM : 100	Sessional : 25
Time : 3 hrs	ESE : 75
L Credit	Pass Marks : 40
4 4	
Total Hours: 60	

Learning objectives:

- To understand the prevalence of bacteria in food commodities.
- To understand the occurrence of food-borne diseases.
- To know the different test for the detection of food-borne infection.

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 1 Microscopy Brightfield and darkfield microscopy, Fluorescence Microscopy, Phase contrast Microscopy, Electron Microscopy (Scanning and Transmission Electron Microscopy) and Micrometry.

Unit 2 Chromatography Principles and applications of paper chromatography (including Descending and 2-D), Thin layer chromatography. Column packing and fraction collection. Gel filtration chromatography, ion-exchange chromatography and affinity chromatography, GLC, HPLC.

Unit 3 Electrophoresis Principle and applications of native polyacrylamide gel electrophoresis, SDS- polyacrylamide gel electrophoresis, 2D gel electrophoresis Isoelectric focusing, Zymogram preparation and Agarose gel electrophoresis.

G. Dh.  