**Shiksha Mandal's**

# Bajaj college of Science, Wardha (Autonomous)

## General Elective III (GE-III) courses Offered by Department of Microbiology

**B.Sc. Sem III**

**Name of the course: Introduction to Fresh Water Biology**

**[2 lectures per week 15 weeks * 2 lectures = 30 L]**

**[Credits 2]**

## Course Description:

Water is fundamental to our existence. Therefore it is important to learn the water. Fresh water Microbiology is the applied field of Microbiology that aims to study the role of microorganisms in fresh water ecosystem.

## Course Objectives:

To recognize the possible role of microorganisms in fresh water ecosystem

## Course Learning Outcomes:

- Learner will acquire knowledge about fresh water bodies, microbes involved in fresh water system.
- Learner will acquire knowledge about potable water, water treatment using SSF and RSF, Methods of chlorination, Water Quality Standards.

**UNIT I:** Fresh water – Definition, Examples of fresh water i.e. ice sheets, ice caps, glaciers, icebergs, bogs, ponds, lakes, rivers, streams, and underground water and their outline.

**UNIT II:** Potable water – Definition, Water treatment using SSF and RSF, Methods of chlorination, Water Quality Standards (BIS and WHO).

**UNIT III:** Microbiological Quality Testing – Significance of bacteriological analysis of water, collection and handling of water samples, indicators of excretal pollution, bacteriological analysis of water for coliforms and faecal streptococci (MTFT, MFT), differences between fecal and non fecal organisms, Zooplankton, Phytoplankton.

**Books and References:**

Freshwater Microbiology By David C. Sigee (University of Manchester). John Wiley & Sons, Ltd., Chichester. 2005. xix + 524 pp.

Sewage & Waste treatment : Hammer

Water Pollution : Zajic J.E.

Water Pollution Microbiology : Mitchell R.

Aquatic Microbiology :Stainner & Shewan

Introduction to Waste Water Treatment processes: Ramalhr R.S.

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**General Elective-IV (GE-IV) courses Offered by Department of Microbiology**

**B.Sc. Sem III**

**Name of the course: Bioinnovation and Bioentrepreneurship**

**[2 lectures per week, 15 weeks * 2 lectures = 30 L]**

**[Credits 2]**

## Course Description:

This course introduces students to basic concepts of Bio- Entrepreneurship. It will also inculcate the importance, need & applications of these areas. This course will prepare the students for becoming an entrepreneur.

## Course Objectives:

To understand Entrepreneurship with reference Microbiology

To recognize the possible role of microbiologist in Entrepreneurship

## Course Learning Outcomes:

After completion of the course, students will be:

1)Student will be able to appreciate the importance of Bio-Entrepreneurship
2)Student will be able to exposed to different concepts needed for practical execution when they work as Entrepreneur
3) Student will gain skills useful for becoming an entrepreneur

**Unit I: Introduction to Entrepreneurship**:

Definitions & Concepts -Entrepreneur, Entrepreneurship, Enterprise & Startups.

Qualities of an Entrepreneur, Advantages & Disadvantages of Entrepreneurship

**Unit II: Microbial Entrepreneurship**:

Introduction and scope, Business development, product marketing, HRD, Bio-safety and Bioethics, IPR and patenting.

**Unit III: Industrial Entrepreneurship**: Microbiological industries – Types and products. Industrial production and applications of: Dairy products, Fermented foods, Sanitizers, Antiseptic solutions.

**References:**

Bioentrepreneurship Development: A Resource Book Prepared by Biotech Consortium India Limited (BCIL), New Delhi Compiled by: Ms. Shreya Sanghvi Malik, Deputy Manager Dr. Shiv Kant Shukla. Biotechnology Entrepreneurship (2014) Craig Shimasaki, Academic Press, USA.

Dynamics of Entrepreneurial Development and Management (2005) Vasant Desai, Himalaya Publishing House.

Crueger, W, and Crueger. A. (2000), Biotechnology: A Text Book of Industrial microbiology, 2nd Edition, Sinauer Associates :Sunderland.Mass.

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Food microbiology: fundamentals and frontiers. 2nd ed. Washington (DC): American Society for Microbiology MP, Beuchat LR, Montville TJ, editors. 2001.

Food Microbiology: Fundamentals and Frontiers, Third Edition, ASM Press Doyle, M. P. and Beuchat, L. R. 2007.

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**General Elective V (GE-V) courses Offered by Microbiology Department**

**B.Sc. SEM IV**

**Name of the course: Introduction to Fermented Food Products**

[2 lectures per week 15 weeks * 2 lectures = 30 L]

[Credits 2]

## Course Description

The course gives insight into fermented food products including types of microorganisms involved, fermentation process and significance of fermented food. The commercialized traditional fermented food products with their method of preparation and concept of microorganisms as food is discussed.

## Learning Objectives

At the conclusion of this course the students LO1: Understanding the role of microorganisms in food fermentation process LO2: Understanding the key concepts in food and dairy microbiology LO3: Give insight into commercialized fermented foods in the market LO4: Perception of microorganisms as food like SCP, probiotic and prebiotic

## Course Learning Outcome

- Learn in detail about the types of fermented foods and their significance.
- Understand the process of fermentation and role of microorganisms in it
- Understand the significance of probiotics, prebiotics and functional food

## Unit 1

### Introduction to Fermented food

Fermented foods: Definition and Types, basic of food fermentation process, microbes of importance in food fermentations– homo & hetero-fermentative bacteria, yeasts & fungi, significance of fermented foods

## Unit 2

### Fermented Food Products

Microbes associated with and manufacture of typical Fermented food - yoghurt, cheese, fermented milk, Kefir, Sauerkraut, Tempeh

**Unit 3**

**Microorganisms as Food**

Single cell protein: Types and production

Probiotics and prebiotics: health benefits, types of microorganisms used, probiotic foods available in market. Concept of functional food

**References**


1. Adams, M.R. and Moss M.O. (1995) Food Microbiology, Royal Society of Chemistry Publication, Cambridge.
2. Frazier W.C. and West haff D.C,(1988), Food Microbiology, Tata Mc.Graw Hill Publishing Company Limited, New Delhi.
3. Stantury, P.F., Whitekar, A. and Hall, S.J., (2016), Principles of Fermentation Technology.
4. Harrigan W.F., (1998) Laboratory methods in Food Microbiology.
5. Banwart G. J. (1989). Basic Food Microbiology, 2nd Edn. Chapman and Hall, International Thompson Publishing.
6. Jay, J.M. (2003) Modern Food Microbiology. 4th Edition. CBS Publishers.