VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
M.Sc. MICROBIOLOGY SEM III

MB 3002: INDUSTRIAL MICROBIOLOGY

1. Course Code & Title

Course code:	Core course 1 (MB 3002)
Course title:	Industrial microbiology
Course type:	Core
Course credits:	04

2. Course overview and Course Objectives

Industrial microbiology is a branch of applied microbiology in which microorganisms are used in industrial processes which includes production of high- value products such as drugs, chemicals, fuels and food product. This paper includes the production and processes of various microbial metabolites at industrial scale by use of microbes.

Course Objectives

- To study the technique to develop fermented food and dairy using microorganisms.
- To learn the process of microbial fermentations for industrial production of important metabolites.
- To gain an insight of the modern trends used for the production of microbial metabolites.
- To understand the algal products and microbial products of economic importance.

3. Course Content

UNIT 1	FERMENTED FOOD AND DAIRY PRODUCTS Teaching Duration: Lectures 15
1.1	Fungal biomass production: Bakers' , Food, Feed and alchohol yeast
1.2	Milk based fermented foods
1.3	Grain based fermented foods: Soy sauce
1.4	Alcohol based fermented products: Beer, Wine and spirits
1.5	Vegetable based fermented foods: Sauerkraut
1.6	Fermentations for production of stimulant beverages
1.7	Microbial flavours: Vanillin and terpenes

UNIT 2	MICROBIAL PRODUCTS FOR HEALTH CARE Teaching Duration: Lectures 15
2.1	Antibiotics: Cephalosporin and Bacteriocin
2.2	Anticancer agents: Anthracyclines and Antitumor Antibiotics
2.3	Monoclonal antibodies: Production and recovery
2.4	Hormones: Insulin
2.5	Vaccines production
2.6	Microbial Transformation and Steroids and Sterols
2.7	Production of Ergot Alkaloids
2.8	Production of fungal antibiotics and pharmacologically active products

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UNIT 3	VALUABLE INDUSTRIAL PRODUCTS FROM MICROBES Teaching Duration: Lectures 15
3.1	Microbial polysaccharides: Biosurfactants, Dextran and Xanthan
3.2	PHA: Separation, purification and manufacturing methods
3.3	Carotenoids: β carotene
3.5	Probiotics and pharmabiotics
3.6	Organic acids: Citric acid and Gluconic acid
3.7	Amino acids: L-Lysine
3.8	Enzymes: Protease and Cellulase

UNIT 4	MODERN TRENDS IN MICROBIAL PRODUCTION Teaching Duration: Lectures 15
4.1	Techniques and technologies to produce biomass of cyanobacteria and microalgae
4.2	Single Cell Protein (SCP)
4.3	Bio pesticides & Bio inoculants
4.4	Bacterial siderophores
4.5	Microbiologically induced calcium carbonate precipitation (MICP)
4.6	CRISPR-CAS system
4.7	Search for Microbial Products with Bioactive Properties: Conventional Processes and Newer Methods of Drug Discovery, Regulating Agency for Approval

4. Course Learning Outcomes/Student's Learning Outcomes (SLO)

Unit 1: Students shall learn skills to develop dairy and food products

Unit 2: Students shall gain knowledge of microbial fermentations

Unit 3: Students will gain an understanding of microbial products

Unit 4: Students shall develop an understanding of microbial products of economic importance.

Recommended learning resources

- Adam M. and Dick M., (2014), Food Microbiology: An introduction, 1st edition, Medtec Publication, (ISBN: 978-93-81714-61-4)
- Clarke W., (2016), Biotechnology: Industrial Microbiology, 1st edition, CBS Publishers, (ISBN: 978-81-239-2864-7)
- Flickinger M. C. and Drew S. W., (1999), Encyclopedia of Bioprocess Technology, Volumes 1-5, Wiley-Inter-science, (ISBN: 978-0471138228)
- Okafor N., (2017), Modern Industrial Microbiology and Biotechnology, 2nd edition, Science Publishers, (ISBN: 978-1-138-03614-7)
- Peppler H. J. and Perlman D., (2004), Microbial Biotechnology, Volume 1 and Volume 2, 2nd edition, Academic press, (ISBN: 978-81-8147-495-7/978-81-8147-496- 1)
- Ratledge C. and Kristiansen B., (2006), Basic Biotechnology, 3rd edition, Cambridge University Press, (ISBN: 978-0-521-72947-5)

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- Reed G., (2004). Prescott & Dunn's Industrial Microbiology, 4th edition, CBS Publishers, (ISBN: 81-239-1001-0)
- Rehm H. J. and Reed G., (2010). Biotechnology, Vol. 10, Wiley India Pvt. Ltd., (ISBN: 978-3527283200)
- Kevin Kavanagh, Fungi Biology and Applications, ISBN 0-470-86701-9 (HB) 2005, John Wiley & Sons Ltd
- Ram Prasad, Sarvajeet S. Gill, Narendra Tuteja, New and Future Developments in Microbial Biotechnology and Bioengineering, 2018 Elsevier, ISBN: 978-0-444-63987-5
- A. H. Patel, Industrial microbiology, Macmillan, new edition

16/05/2023