

B.SC. MICROBIOLOGY

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
III	25UMBVAC1	Value Added Course- I	30	-	-	100	100
Course Title HEALTH AND WEALTH MICROBIOLOGY							

SYLLABUS		
Unit	Contents	Hours
I	Introduction to Health: Definition, scope, concept and health awareness. Importance of microbes in the environment – Beneficial and harmful effects of microbes on human health. Role of microbiologist in public health – Health problems - Health situations and programmes in India. Disease prevention and Management - Vaccination schedule.	6
II	Fermented Food and Dairy Products: Role of microorganisms in food and dairy industry. Health benefits of fermented dairy products -Dahi, Lassi, Yogurt, Buttermilk, Cheese, Kefir and Koumiss. Nutritive values of South Indian traditional fermented foods- Idli, Dosa and Appam.	6
III	Gut Microbiome: Nutritional modulation of the gut microbiome for metabolic health- role of gut microbiomes in human. Probiotics and Prebiotics- Concept, types and importance of various probiotics, prebiotics and synbiotics. Effect of probiotics, prebiotics and synbiotics on human health. Dairy-based cereal foods and Soy-based yoghurt containing probiotics	6
IV	Entrepreneurial Implementation: Role of microbes in composting and organic matter decomposition. Biofuels and biogas production – mushroom cultivation. Biofertilizer production- <i>Rhizobium</i> sp., <i>Azospirillum</i> sp. and <i>Azotobacter</i> sp. Biopesticides- types and applications.	6
V	Industrial Application: Commercial Production and applications- Sanitizers, Antiseptic solutions. Antibiotics and Vaccines. Vitamin B12, β – Carotene and, Alcoholic and non-alcoholic beverages. Cosmetics, Biopigments and Bioplastics.	6

Text Book(s):

1. G. Paul Engelkirk., Janet Duben-Engelkirk and C Fader Robert. Burton's Microbiology for the Health Sciences (11th Edition), Jones & Bartlett Learning. Massachusetts.2020.
2. P.D.Michael and L.B Robert. Food Microbiology: Fundamentals and Frontiers (5th Edition) ASM Press, Washington, DC, 2020.
3. Vijay Kothari, Prasun Kumar, Subhasree Ray. Probiotics, Prebiotics, Synbiotics, and Postbiotics Human Microbiome and Human Health (1st Edition), Springer Verlag, Singapore,2023
- 4.N.S. SubbaRao, S. Soil Microbiology. (Soil Microorganisms and Plant Growth 4th Edition), Oxford & IBH Publishing Co. Pvt., Ltd., New Delhi, 2002.
5. Ralf Wilden, Massimo Garbuio, Federica Angeli, Daniele Mascia. Entrepreneurship in Healthcare (1st Edition), Routledge, New York, 2018.

Reference Book(s):

1. D. K. Verma, A. R. Patel, P.P. Srivastava, B. Mohapatra, A. K. Niamah. Microbiology for Food and Health: Technological Developments and Advances (1st Edition), Apple Academic Press., New York. 2020.
2. N.S. Subbarao. Bio-fertilizers in Agriculture and Forestry (4th Edition) Med tech publisher.2017.
3. Craig Shimasa. Biotechnology Entrepreneurship (1st Edition), Academic Press, San Diego .2018.

Web Resource(s):

- 1.<https://www.studocu.com/in/document/kerala-university-of-health-sciences/>
- 2.<http://ecoursesonline.iasri.res.in/mod/page/view.php?id=5331>
- 3.<https://microbenotes.com/bioremediation-types-factors/>
4. <https://www.iipcbbs.com/articles/microbial-pigments-production-and-their-applications-invarious-industries.pdf>

Course Outcomes	
Upon successful completion of this course, the student will be able to:	
CO No.	CO Statement
CO1	Observe the knowledge on importance of microbes on human health.
CO2	Determine the role of microorganisms in food and dairy products.
CO3	Acquire the knowledge on gut microbiome in human health.
CO4	Summarize the role of microbes in entrepreneurial implementation.
CO5	Compile the production process and industrial applications of commercial products.

Course Coordinator: Dr. K.Vijayalakshmi

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
V	25UMBVAC2	Value Added Course- II	30	-	-	100	100
Course Title		COSMETIC MICROBIOLOGY					

SYLLABUS		
Unit	Contents	Hours
I	Introduction to Cosmetic Microbiology: Regulatory definition of Cosmetics. History of cosmetic microbiology- Microbiology as a scientific discipline, Biology of microbes. Broad classification of cosmetic products for skin, hair and oral care.	6
II	Application of Cosmetics Products: Solutions, creams, lotions, ointment, paste, gels, sticks, tablets, capsules, powders and aerosols. Product Development: Defining the product, selection & sources of ingredients, formula optimization.	6
III	Cosmetic Ingredients: Classification and application in cosmetics – Foaming agents, emulsifiers, and solubilizers. Antioxidants, anti UV compounds, antimicrobial and chelating agents used as preservatives. Perfume: Classification of perfumes. Perfume ingredients listed as allergens in EU guidelines.	6
IV	Antimicrobial Preservative Testing: General product and raw materials tests -CTFA, ASTM and USP method- Microbial enumeration tests, Tests for specified microorganisms, Microbiological contamination limits for nonsterile products, D-value methods and Capacity tests.	6
V	Cosmetic Product Regulation: Ingredients, Safety assessment, Efficacy data, Labelling requirements for cosmetic products. Evolution of Cosmetics to Cosmeceuticals. Environmental and safety concerns of cosmetic ingredients. Guidelines on green cosmetics and challenges in green formulation.	6

Text Book(s):
<ol style="list-style-type: none"> 1. A. Philip Geis, Cosmetic Microbiology, 2nd Edition, Taylor & Francis Group, New York, London, 2006. 2. J.B. Wilkinson and R.J. Moore, Harry's Cosmeticology –7th edition, Chemical Publishing, New York, 2011. 3. P.P. Sharma, Cosmetics – Formulation, Manufacturing and Quality Control, 4th edition, Vandana Publications Pvt. Ltd., Delhi, 2014. 4. Hilda Butler, Poucher's Perfumes, Cosmetics and Soaps, 10th Edition, Kluwer Academic Publishers.
Reference Book(s):
<ol style="list-style-type: none"> 1. André O. Barel, Marc Paye, Howard I. Maibach, Handbook of Cosmetic Science and Technology, 3rd Edition, Marianne Mahieu Informa Healthcare USA, Inc. 2. Zoe Diana Draelos, Lauren A. Thaman, Cosmetic formulation of skin care products. 3. A. Geis, Cosmetic Microbiology: A Practical Approach, 2nd Edition, 2019.
Web Resource(s):
<ol style="list-style-type: none"> 1. https://www.ceway.eu/cosmetic-products-definition-in-the-eu/#:~:text= 2. https://thebeautybrains.com/2014/05/understanding-the-basic-forms-of-cosmetics/ 3. https://betaeq.com.br/index.php/en/2019/06/26/cosmetics-ii-classifications-and-applications-of-cosmetics/ 4. https://www.pharmamanufacturing.com/articles/2014/usp-microbial-examination-nonsterile-products/#

Course Outcomes	
Upon successful completion of this course, the student will be able to:	
CO No.	CO Statement
C01	Describe the importance of microbiology and cosmetic products.
C02	Explain the process of cosmetics product formation and its applications.
C03	Acquire the knowledge on cosmetic ingredients.
C04	Evaluate the antimicrobial preservative testing in cosmetics.
C05	Summarize the safety concerns of cosmetic products.

Course Coordinator: N. Vennila

M.SC. MICROBIOLOGY

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
III	25PMBVAC1	Value Added Course- I	30	-	-	100	100
Course Title		PHARMACEUTICAL MICROBIOLOGY					

SYLLABUS		
Unit	Contents	Hours
I	Introduction to pharmaceutical microbiology: Introduction, concepts and technologies in pharmaceutical and industrial applications of microorganisms. Ecology of microorganisms in pharmaceutical industry - Atmosphere, water, skin and respiratory flora of workers. Raw materials, packaging, building and equipment and their control measures. Biosensors- Working and applications of biosensors in pharmaceutical industries.	6
II	Microbial contamination and spoilage of pharmaceutical products: Microbial aspects of pharmaceutical products; Sterilization of pharmaceutical products: Heat, gaseous, radiation and filtration. Contamination and Spoilage of Pharmaceutical products: sterile injectable and non-injectable, ophthalmologic preparation, implants.	6
III	Production of antibiotics: Production of anti-bacterial – Penicillin and Tetracycline. Anti-fungal – Griseofulvin and Amphotericin. Anti-parasitic agents – Artemesin and Metronidazole. Antiviral – Remdesivir and Acyclovir. Biosensor in pharmaceutical sciences.	6
IV	Production of immunological products and their quality control: Vaccines - DNA vaccines, synthetic peptide vaccines, multivalent vaccines; Vaccine clinical trials; Immunodiagnostics - immuno sera and immunoglobulin; Quality control in Pharmaceutical: In – Process and Final Product Control; Sterility tests.	6
V	Quality Assurance and Validation: Introduction to Biosafety concerns. Good Manufacturing Practices (GMP) and Good Laboratory Practices (GLP) in pharmaceutical industry; Regulatory aspects of quality control; Quality assurance and quality management in pharmaceuticals – BIS (IS), ISI, ISO, WHO and US certification.	6

Text Book(s):

1. Chand Pasha Kedernath, Textbook of Pharmaceutical Microbiology, Ramnath Publisher, 2021.
2. W. B. Hugo and A.D. Russell, Pharmaceutical Microbiology VII edition, Blackwell Scientific Publication, Oxford, 2004.
3. D.J. Franklin and G. A. Snow, Biochemistry of antimicrobial action, Chapman Hall, 2013.
4. Kuntal Das. Pharmaceutical Microbiology, second edition, Nirali Prakashan, 2019.
5. Priyatama Powar, Shital Nimbargi, Vaijayanti Sapre, Pharmaceutical Microbiology, 1st edition, Technical publications, 2020.

Reference Book(s):

1. S.S. Handa and V. K. Kapoor, Pharmacognosy, 4th Edition, Vallabh Prakashan Publishers, New Delhi, 2022.
2. C.K. Kokate, A.P. Durohit and S.R. Gokhale, Pharmacognosy 12th edition Nirali Prakasham Publishers, Pune, 2002.
3. S. P. Vyas and V. K. Dixit, Pharmaceutical Biotechnology, CBS Publishers & Distributors, New Delhi, 2003.
4. T.E. Wallis, Text book of Pharmacognosy, 5th edition, CBS publishers and distributors, New Delhi, 2005.
5. M. W. Joanne, M. S. Linda, J. W. Christopher, and Prescott's Microbiology, 8th edition, McGraw Hill Publishers, 2011.

Web Resource(s):

- 1 <https://www.pharmapproach.com/introduction-to-pharmaceutical-microbiology/>
- 2 https://www.iptsalipur.org/wpcontent/uploads/2020/08/BP303T_PMB_UNIT_I.pdf3.
- 3 <https://www.pharmanotes.org/2021/11/pharmaceutical-microbiology-b-pharma.html>.
- 4 https://snsourseware.org/snscphs/notes.php?cw=CW_604b15c6313c5
- 5 <https://www.thermofisher.com>

Course Outcomes

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

CO No.	CO Statement
CO1	Outline the pharmaceutical and industrial applications of microorganisms.
CO2	Determine the microbial contamination and spoilage of pharmaceutical products.
CO3	Acquire the knowledge on production of different antibiotics.
CO4	Analyse the production of immunological products and their quality control.
CO5	Report the biosafety concern and quality assurance in pharmaceutical industry.

Course Coordinator: Dr. H. Vajiha Banu