MAZHARUL ULOOM COLLEGE

(AUTONOMOUS)

(Established & Managed by the Ambur Muslim Educational Society)
Accredited by NAAC with Grade 'A" CGPA 3.23 in Cycle 3
Affiliated to Thiruvalluvar University, Vellore
Ambur 635802 (Tirupattur District)

COURSE STRUCTURE & SYLLABUS

(For the students admitted from year 2025-2026 onwards)

Programme: B.Sc

Course : MICROBIOLOGY

Program Outcomes (POs)	
PO Code	**Program Outcome Statement**
PO1	**Disciplinary Knowledge-** Acquire detailed knowledge and expertise in all the disciplines of the subject.
PO2	**Communication Skills**- Ability to express thoughts and ideas effectively in writing, listening and confidently Communicate with others using appropriate media.
PO3	**Critical Thinking**- Students will develop aptitude Integrate skills of analysis, critiquing, application and creativity.
PO4	**Analytical Reasoning**- Familiarize to evaluate the reliability and relevance of evidence, collect, analyze and interpret data.
PO5	**Problem Solving**- Capacity to extrapolate the learned competencies to solve different kinds of non-familiar problems.
PO6	**Information/Digital Literacy-** Capability to use ICT in variety of learning situation,demonnstrate ability to access, evaluate and use a variety of relevant information sources: Use appropriate softwares for analysis of data
PO7	**Moral & Ethical Ethics awareness/reasoning-** Ability to embrace moral/ethical values in conducting one's life. **Life Long Learning-**Engage in lifelong learning work on careers enhancement and adopting changing personal, professional and societal needs

Program Specific Outcomes (POs)	
PSO Code	**Program Specific Outcome Statement**
PSO1	Understand the fundamental principles, concepts, and theories related to Microbiology. Also, exhibit proficiency in performing experiments in the laboratory.
PSO2	Exhibit ethical conduct, critical thinking, and collaborative skills in addressing scientific challenges and advancing knowledge in Microbiology.
PSO3	Analyze the concept in Microbial Metabolism, Microbial Genetics, Molecular biology, Immunology and Evaluate the role of Microorganisms in clinical pathogenesis, Food safety, Agriculture, Dairy, Bioprocessing, Pharmaceutical Industries, Microbial Ethics and Preventive Medicine.
PSO4	Formulate research questions, conduct literature reviews, design and execute research studies, communicate research findings and collaborate in research projects.
PSO5	Apply communication skills, Core values and Environmental awareness, Nutrition awareness with social responsibility for Entrepreneurship and Employability. The ability to enhance entrepreneurial skills across various domains of Microbiology.

Level	Definition	Key Actions
K1 : Remembering	Ability to recall or recognize facts, terms, basic concepts, or answers without necessarily understanding them.	Retrieve, Memorize, Repeat, Define, Identify, Recognize
K2 : Understanding	Comprehending the meaning of information, interpreting or translating knowledge into your own words.	Explain, Describe, Summarize, Interpret, Paraphrase
K3 : Applying	Using knowledge in new situations, such as solving problems or applying theories to real-world situations.	Use, Demonstrate, Implement, Calculate, Practice
K4 : Analyzing	Breaking information into parts to explore understandings and relationships; identifying motives or causes.	Compare, Contrast, Categorize, Distinguish, Examine, Organize
K5 : Evaluating	Making judgments based on criteria and standards, often involving checking and critiquing.	Judge, Critique, Justify, Assess, Prioritize, Recommend
K6 : Creating	Putting elements together to form a new coherent whole or original product.	Design, Develop, Invent, Compose, Construct, Generate

B .Sc (Micro Biology)									
Sem	**Course Code**	**Part**	**Course Category**	**Course Title**	**Ins. Hrs/ Week**	**Credit**	**Marks CIA - ESE**		**Total**
Semester I	URDU -25BLU10 / TAMIL - 25BLT10	I	Language–I (Tamil / Urdu)	General Tamil-I /Urdu-I	6	3	25	75	100
	25BLE10	II	English-I	General English–I	6	3	25	75	100
	25BMB11	III	Core Course– 1	Fundamentals of Microbiology and Microbial diversity	5	5	25	75	100
	25BEMB12	III	Elective Course-I	Basic & Clinical Biochemistry	4	3	25	75	100
	25BSMB13	IV	Skill Enhancement Course (SEC-I)	Social and Preventive medicine	2	2	25	75	100
	25BFMB14	IV	Foundation Course (FC)	Introduction to Microbial world	2	2	25	75	100
	25BPMB15	III	Core Course Practical– 1	Practical-I- Fundamentals of Microbiology And Microbial diversity	5	5	25	75	100
	Total				**30**	**23**			**700**
Semester II	URDU -25BLU20 / TAMIL - 25BLT20	I	Language–II (Tamil / Urdu)	General Tamil-II/Urdu-II	6	3	25	75	100
	25BLE20	II	English-II	General English-II	6	3	25	75	100
	25BMB21	III	Core Course–II	Microbial Physiology and Metabolism	5	5	25	75	100
	25BEMB22	III	Elective Course-II	Bioinstrumentation	4	3	25	75	100
	25BSMB23	IV	Skill Enhancement Course (SEC-II)	Nutrition & Health Hygiene	2	2	25	75	100
	25BSMB24	IV	Skill Enhancement Course (SEC-III)	Sericulture	2	2	25	75	100
	25BPMB25	III	Core Course Practical– 1I	Practical-II-Microbial Physiology and Metabolism	5	5	25	75	100
	Total				**30**	**23**			**700**

Semester	CourseCode	Course Category	Hours / Week	Credits	MarksforEvaluation		
					CIA	ESE	Total
I	25BMB11	Core Course–I	5	5	25	75	100
Course Title	Fundamentals of Microbiology and Microbial diversity						

Learning Objectives	
LO1	Learn the fundamental principles about different aspects of Microbiology including recent developments in the area.
LO2	Describe the structural organization, morphology and reproduction of microbes.
LO3	Compare and contrast the different methods of sterilization.
LO4	Explain the methods of cultivation of microbes and measurement of growth.
LO5	Understand the microscopy and other basic laboratory techniques – culturing, disinfection and sterilization in Microbiology.

SYLLABUS

Unit	Contents	Hours
I	History and Evolution of Microbiology, Classification – Three kingdom, five kingdom, six kingdom and eight kingdom. Microbial biodiversity: Introduction to microbial biodiversity-ecological niche. Basic concepts of Eubacteria, Archaebacteria and Eucarya. Conservation of Biodiversity.	15
II	General characteristics of cellular microorganisms (Bacteria, Algae, Fungi and Protozoa) and acellular microorganisms - (Viruses, Viroids, Prions), Differences between prokaryotic and eukaryotic microorganisms. Structure of Bacterial cell wall, cell membrane, capsule, flagella, pili, mesosomes, chrorosomes, phycobilisomes, spores, and gas vesicles. Structure of fungi (Mold and Yeast), Structure of microalgae.	15
III	Sterilization–moist heat - autoclaving, dry heat – Hot air oven, radiation – UV, Ionization, filtration – membrane filter and disinfection, antiseptic; Antimicrobial agents.	15
IV	Bacterial culture media and pure culture techniques. Mode of cell division, Quantitative measurement of growth. Anaerobic culture techniques.	15
V	Microscopy – Simple, bright field, dark field, phase contrast, fluorescent, electron microscope – TEM & SEM, Confocal microscopy, and Atomic Force Microscopy. Stains and staining methods.	15

Text Book(s):

1. *Pelczar.M.J.,ChanE.C.S.andNoel.R.K.(2007).Microbiology.7th Edition.,McGraw–Hill, New York.*
2. *WilleyJ.,SherwoodL.,andWoolvertonC.J.,(2017).Prescott'sMicrobiology.10th Edition., McGraw-Hill International edition*
3. *Tortora,G.J.,Funke,B.R.,Case,C.L.(2013).Microbiology.AnIntroduction11th Edition.,ALa Carte Pearson*
4. *Salle.A.J(1992). FundamentalPrinciples of Bacteriology. 7th Edition.,McGraw Hill Inc.NewYork*
5. *Boyd,R.F.(1998).GeneralMicrobiology,2nd Edition.,TimesMirror,MosbyCollegePublishing,St Louis.*

Reference Book(s):

1.JeffreyC.Pommerville.,Alcamo'sFundamentals of Microbiology (9th Edition).Jones &Bartlett learning 2010.

2.StanierR.Y,IngrahamJ.L.,WheelisM.L.,andPainterR.R.(2010).General Microbiology, 5th Edition., MacMillan Press Ltd

3.NesterE.,AndersonD.,RobertsC.E.,andNesterM.(2006).Microbiology-AHuman Perspective, 5th Edition., McGraw Hill Publications.

4..MadiganM.T.,MartinkoJ.M.,StahlD.A,andClarkD.P.(2010).Brock-Biologyof Microorganisms, 13th Edition Benjamin-Cummings Pub Co.

Web Resource(s):

1) https://www.cliffsnotes.com/study-guides/biology/microbiology/introduction-to- microbiology/a-brief-history-of-microbiology

2) https://bio.libretexts.org/@go/page/9188

3)https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6604941/#4

4).https://www.keyence.com/ss/products/microscope/bz-x/study/principle/structure.jsp

Course Outcomes		
Up on successful completion of this course, the student will be able to:		
CO No.	CO Statement	Cognitive Level (K-Level)
CO1	Explain the historical events that led to the discoveries and inventions and understand the Classification of Microorganisms.	K1,K2.K3
CO2	Build Knowledge of detailed structure and functions of prokaryotic cell organelles.	K1,K2,K3
CO3	Understand the concept of asepsis and modes of sterilization and disinfectants.	K1,K2.K3
CO4	Understand the various microbiological techniques, and make use to Distinguish types of media, and techniques involved in culturing microorganisms.	K1,K2.K3,K4
CO5	Explain the principles and working mechanism of different microscopes/Microscope, their function and scope of application.	K1,K2.K3,K4

RelationshipMatrix:

Course Outcomes (COs)	ProgramOutcomes (POs)							ProgramSpecificOutcomes(PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	2	2	2	1	2	3	3	3	3	2	1	2.25
CO2	3	2	2	2	1	2	3	3	3	3	2	2	2.33
CO3	3	2	2	2	2	2	3	3	3	3	3	2	2.50
CO4	3	2	3	3	3	2	3	3	3	2	2	2	2.58
CO5	3	3	3	3	2	2	3	3	2	3	2	2	2.58
											Mean Overall Score		2.44
											Correlation		High

3 – Strong, 2- Medium, 1- Low

MeanOverallScore	Correlation
<=1	Low
>1 &<=2	Medium
>2 &<=3	High

Semester	CourseCode	Course Category	Hours / Week	Credits	MarksforEvaluation		
					CIA	ESE	Total
I	25BPMB15	Core Course Practical–I -	5	5	25	75	100
Course Title	**Practical-I-** Fundamentals of Microbiology and Microbial diversity						

Learning Objectives	
LO1	Acquire knowledge on Cleaning of glass wares, GLP and sterilization.
LO2	Gain knowledge on media preparation and cultural characteristics.
LO3	Learn the pure culture technique
LO4	Learn the microscopic techniques and staining methods.
LO5	Acquire knowledge on stain and staining methods

SYLLABUS		
Unit	Contents	Hours
I	Cleaning of glass wares, Microbiological good laboratory practice and safety. Sterilization and assessment of sterility– Autoclave, hot air oven, and membrane filtration.	15
II	Media preparation: liquid media, solid media, semi-solid media, agar slants, agar deeps, agar plates.	15
III	Preparation of basal, differential, enriched, enrichment, transport, and selective media preparation- quality control of media, growth supporting properties, sterility check of media.Pure culture techniques: streak plate, pour plate, decimal dilution.	15
IV	Culture characteristics of microorganisms: growth on different media, growth characteristics, and description. Demonstration of pigment production. Microscopy: light microscopy and bright field microscopy.	15
V	Staining techniques: smear preparation, simple staining, Gram's staining, endospore staining, Capsular Staining and Acid fast Staining Study on Fungal Morphology- LPCB Staining Method Study on Microbial Diversity using Hay Infusion Broth-Wet mount to show different types of microbes, hanging drop (Bacterial Motility)	15

TextBook(s):

1. JamesG Cappucinoand N.ShermanMB(1996).Alabmanual Benjamin Cummins,NewYork 1996.

2 Kannan.N(1996).Laboratory manual in General Microbiology.Palani Publications.

3. SundararajT(2005).Microbiology Lab Manual(1st edition)publications.

4. Gunasekaran,P.(1996).Laboratory manual in Microbiology. NewAge International Ld., Publishers, New Delhi.

5. RC Dubey and DK Maheswari (2002). Practical Microbiology. S.Chand Publishing

ReferenceBook(s):

1. *Atlas.R(1997).Principles o fMicrobiology,2nd Edition,Wm.C.Brownpublishers.*
2. *AmitaJ,JyotsnaA and VimalaV(2018).MicrobiologyPracticalManual.(1st Edition). Elsevier India*
3. *TalibVH(2019).Hand book Medical Laboratory Technology.(2nd Edition).CBS*
4. *WheelisM,(2010).Principles of ModernMicrobiology,1stEdition.JonesandBartlett Publication.*
5. *LimD.(1998). Microbiology,2nd Edition,WCBMcGrawHill Publications.*

WebResource(s):

1) *http://www.biologydiscussion.com/micro-biology/sterilisation-and-disinfection-methods-and-principles-microbiology/24403*
2) *https://www.ebooks.cambridge.org/ebook.jsf?bid=CBO9781139170635*
3) 3)*https://www.grsmu.by/files/file/university/cafedry//files/essential_microbiology.pdf*
4) .*https://microbiologyinfo.com/top-and-best-microbiology-books/*
5). *https://www.cliffsnotes.com/studyguides/biology/microbiology/introduction-to-microbiology/a-brief-history-of-microbiology*

Course Outcomes

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

CO No.	CO Statement	Cognitive Level (K-Level)
CO1	Practice sterilization methods; learn to prepare media and their quality control.	K1,K2.K3,K4
CO2	Learn streak plate, pour plate and serial dilution and pigment production of microbes.	K1,K2,K3,K4,K5
CO3	Understand Microscopy methods, different Staining techniques and motility test.	K1,K2.K3,K4,K5
CO4	Observe culture characteristics of microorganisms.	K1,K2.K3,K4,K5,
CO5	Study on Microbial Diversity using Hay Infusion Broth-Wet mount	K1,K2.K3,K4

RelationshipMatrix:

Course Outcomes (COs)	ProgramOutcomes (POs)							ProgramSpecificOutcomes(PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	2	2	3	2	2	3	3	3	3	2	2	2.50
CO2	3	2	3	2	2	2	3	3	3	3	2	2	2.50
CO3	3	2	3	3	3	2	2	3	3	3	3	2	2.66
CO4	3	2	3	2	3	2	2	3	3	3	3	2	2.58
CO5	3	2	3	3	3	2	2	3	2	3	3	2	2.58
											Mean Overall Score		2.56
											Correlation		High

3 – Strong, 2- Medium, 1- Low

MeanOverallScore	Correlation
<=1	Low
>1 &<=2	Medium
>2 &<=3	High

Semester	CourseCode	Course Category	Hours / Week	Credits	MarksforEvaluation		
					CIA	ESE	Total
I	25BEMB12	Elective Course-I	4	3	25	75	100
Course Title	**Basic and Clinical Biochemistry**						

Learning Objectives	
LO1	Attain thorough knowledge on carbohydrates and lipids, their characteristic properties and organization in carrying out all the living functions which constitute the life.
LO2	Explain the biological activity of amino acids and proteins.
LO3	Identify the metabolic errors in enzymes of carbohydrates and lipids.
LO4	Describe the disorders in amino acid metabolism.
LO5	Interpret the consequences, biochemical, clinical features, diagnosis and treatment of metabolic diseases of day today life.

SYLLABUS		
Unit	Contents	Hours
I	Biomolecules -Carbohydrate – General properties, function, structure, classification– Monosaccharides (Glucose, Fructose, Galactose),Disaccharide & Oligosaccharides (Sucrose, Maltose, Lactose) and polysaccharides (Starch, Glycogen,) and biological significance. Lipids – General properties, functions, structure, classification (Simple, Derived and Complex), Cholesterol, LDL, HDL – biological significance.	12
II	Biomolecules - Amino acids – General properties, functions, structure, classification and biological significance. Proteins– General structure, Properties, functions, classification and biological significance. Nucleic Acid- Definition, bases, nucleotides and nucleosides, phosphodiester linkage. Structure of nucleosides, nucleotides	12
III	Disorders of Metabolism: Disorders of carbohydrate metabolism: diabetes mellitus,ketoacidosis, hypoglycemia, glycogen storage diseases, galactosemia and lactose intolerance. Disorders of lipid metabolism: hyperlipidemia, hyperlipoproteinemia, hypercholesterolemia, hypertriglyceridemia, sphingolipidosis.	12
IV	Disorders of Metabolism: Disorders of amino acid metabolism:alkaptonuria, phenylketonuria, phenylalaninemia, homocystineuria, tyrosinemia, aminoacidurias.	12
V	Evaluation of organ function tests: Assessment and clinical manifestations of renal, hepatic, pancreatic, gastric and intestinal functions. Diagnostic enzymes: Principles of diagnostic enzymology. Clinical significance of aspartate aminotransferase, alanine aminotransferase, creatine kinase, aldolase and lactate dehydrogenase.	12

TextBook(s):

1. *Satyanarayana,U.and Chakrapani,U(2014).Biochemistry,4th Edition, Made Simple Publisher.*

2 .*JainJL,SunjayJain and NitinJain(2016).Fundamentals of Biochemistry,7th Edition, S Chand Company.*

3. *Ambika Shanmugam's(2016).Fundamentals of Biochemistry for Medical Students,8thEdition. Wolters Kluwer India Pvt Ltd.*

4. *Vasudevan.D.M.Sreekumari.S,Kannan Vaidyanathan(2019).Textbook Of Biochemistry ForMedical Students. Kindle edition, Jaypee Brothers Medical Publishers*

5. *JeremyM.Berg,LubertStryer,JohnL.Tymoczko,GregoryJ.Gatto(2015).Biochemistry,8th edition. WH Freeman publisher*

ReferenceBook(s):

1. *AmitKessel&NirBen-Tal(2018).IntroductiontoProteins:structure,function and Motion. 2ndEdition, Chapman and Hall.*

2. *DavidL.Nelson and MichaelM.Cox(2017).Lehninger Principles of Biochemistry,7thEditionW.H. Freeman and Co., NY.*

3. *Lupert Styrer,Jeremy M.Berg, JohnL.Tymaczko,Gatto Jr.,Gregory J (2019).Biochemistry. 9thEdition ,W.H.Freeman& Co. New York.*

4. *DonaldVoet,JudithVoet,CharlottePratt(2016).Fundamentals of Biochemistry: Life at the Molecular Level, 5th Edition, Wiley.*

5. *JoyPP,SuryaS. and AswathyC(2015).Laboratory Manual of Biochemistry, Edition 1.,Publisher: Kerala agricultural university*

WebResource(s):

1. *https://www.abebooks.com › plp*
2. *https://kau.in/document/laboratory-manual-biochemistry*
3. *https://metacyc.org*
4. *https://www.medicalnewstoday.com*
5. *https://journals.indexcopernicus.com*

Course Outcomes		
Up on successful completion of this course, the student will be able to:		
CO No.	CO Statement	Cognitive Level (K-Level)
CO1	Explain the structure, classification , biochemical functions and significance of carbohydrates and lipids	K1,K2.K3
CO2	Differentiate essential and non-essential amino acids, biologically important modified amino acids and their functions, Illustrate the role, classification of Proteins and recognize the structural level organization of proteins, its functions and denaturation.	K1,K2,K3,K4
CO3	Assess defective enzymes and Inborn errors. Recognize diseases related to carbohydrate and lipid metabolism.	K1,K2.K3,K4
CO4	Discuss and evaluate the pathology of aminoacid metabolic disorders.	K1,K2.K3
CO5	Appraise the imbalances of enzymes in organ function and relate the role of Clinical Biochemistry in screening and diagnosis.	K1,K2.K3

RelationshipMatrix:

Course Outcomes (COs)	ProgramOutcomes (POs)							ProgramSpecificOutcomes(PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	2	3	2	2	2	3	3	3	3	2	2	2.50
CO2	3	3	3	2	2	2	3	3	3	3	2	2	2.58
CO3	3	2	3	3	3	3	3	3	3	3	3	3	2.91
CO4	3	3	3	3	3	3	3	3	3	3	3	3	3.00
CO5	3	2	3	2	2	2	2	3	2	2	2	3	2.33
											Mean Overall Score		2.66
											Correlation		High

3 – Strong, 2- Medium, 1- Low

MeanOverallScore	Correlation
<=1	Low
>1 &<=2	Medium
>2 &<=3	High

Semester	CourseCode	Course Category	Hours / Week	Credits	MarksforEvaluation		
					CIA	ESE	Total
I	25BSMB13	SEC-I	2	2	25	75	100
Course Title	**Social and Preventive Medicine**						

Learning Objectives	
LO1	Describe the concepts of health and disease and their social determinants.
LO2	Summarize the health management system
LO3	Know about the various health care services
LO4	Outline the goals of preventive medicine
LO5	Gain knowledge about alternate medicine

SYLLABUS		
Unit	Contents	Hours
I	Introduction to social medicine: History of social medicine-concepts of health and disease-social determinants of health and disease-Health and quality of life-Health information system- measures of population health-health policies.	6
II	Health management: Applications of behavioral sciences and psychology in health management- nutritional programs for health management-water and sanitation in human health-national programs for communicable and non-communicable diseases- environmental and occupational hazards and their control.	6
III	Health care and services: Health care of the community-information, education, communication and training in health-maternal & child health-school health services- Geriatrics-care and welfare of the aged-mental health-health services through general practitioners.	6
IV	Preventive medicine: Introduction- role of preventive medicine- levels of prevention-Risk assessment in communities and vulnerable population –surveillance, monitoring and reporting of disease outbreaks - forecasting and control measures in community setting – early detection methods.	6
V	Prevention through alternate medicine: Unani, Ayurveda, Homeopathy, Naturopathy systems in epidemic and pandemic outbreaks. International and National health regulations. Infectious disease outbreak case studies and precautionary response during SARS and MERS coronavirus, Ebola and novel SARS- COV2 outbreaks.	6

Text Book(s):

1.1.Park.K (2021). Textbook of preventive and social medicine, 26th edition. Banarsidas Bhanot publishers.

2.Mahajan&Gupta (2013).Textbook of preventive and social medicine,4th edition. Jaypee brothers medical publishers.

3. *Chun-Su Yuan,EricJ.Bieber,BrentBauer(2006).Textbook of Complementary and Alternative Medicine. Second Edition. Routledge publishers.*

4. *Vivek Jain (2020).Review of Preventive and Social Medicine: Including Biostatics. 12th edition, Jaypee Brothers Medical Publishers.*

5. *LalAdarsh Pankaj Sunder(2011).Textbook of Community Medicine: Preventive and Social Medicine, CBS publisher*

ReferenceBook(s):

1. *Howard Waitzkin,AlinaPérez,Matt Anderson(2021).Social Medicine and the coming Transformation. First Edition. Routledge publishers.*

2. *GN Prabhakara(2010).Short Textbook of Preventive and Social Medicine. Second Edition. Jaypee publishers.*

3. *JerryM. Suls,Karina W.Davidson,Robert M.Kaplan (2010).Handbook of Health Psychology and Behavioral Medicine. Guilford Press.*

4. *Marie Eloïse Muller, Marie Muller, Marthie Bezuidenhout, Karien Jooste (2006).Health Care Service Management.Juta and Company Ltd.*

5. *GeoffreyRose(2008).Rose's Strategy of Preventive Medicine: The Complete.OUP Oxford.*

WebResource(s):

1)https://www.omicsonline.org/scholarly/social--preventive-medicine-journals-articles-ppts-list.php

2)https://www.teacheron.com/online-md_preventive_and_social_medicine-tutors

3)https://www.futurelearn.com

4).https://www.healthcare-management-degree.net

5).https://www.conestogac.on.health-care-administration-and-service-management.

Course Outcomes		
Up on successful completion of this course,t he student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Identify the health information system	K1 K2 K3
CO2	Associate various factors with health management system	K1 K2 K3
CO3	Choose the appropriate health care services	K1 K2 K3 K4
CO4	Appraise the role of preventive medicine in community setting	K1 K2 K3 K4
CO5	Recommend the usage of alternate medicine during outbreaks	K1 K2 K3

RelationshipMatrix:

Course Outcomes (COs)	ProgramOutcomes (POs)							ProgramSpecificOutcomes(PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	2	2	2	1	3	3	3	3	3	2	2	2.41
CO2	3	2	2	3	2	3	3	3	3	3	2	3	2.66
CO3	3	2	2	2	1	2	3	3	2	3	2	3	2.33
CO4	3	2	3	3	2	3	2	3	3	3	2	3	2.66
CO5	3	1	3	3	3	2	2	3	3	3	2	3	2.58
											Mean Overall Score		2.52
											Correlation		High

3 – Strong, 2- Medium, 1- Low

MeanOverallScore	Correlation
<=1	Low
>1 &<=2	Medium
>2 &<=3	High

Semester	CourseCode	Course Category	Hours / Week	Credits	MarksforEvaluation		
					CIA	ESE	Total
I	25BFMB14	Foundation Course	2	2	25	75	100
Course Title	**Introduction to Microbial World**						

Learning Objectives	
LO1	Describe the discovery of microbial world and development of pure culture techniques.
LO2	Learn about distribution of microorganism in nature, diversity and types of microorganisms.
LO3	Know about the impact of microorganism in environment-Branches of microbiology
LO4	Outline the goals of pure culture techniques
LO5	Gain knowledge about microscopy and staining techniques.

SYLLABUS		
Unit	Contents	Hours
I	Discovery of microbial world: Establishment of theory of biogenesis, Discovery of viruses. Developments in pure culture techniques. Establishment of germ theory of diseases and fermentation. Work of Lister and principles of aseptic surgery. Discovery and developments of vaccines and modern chemotherapy. Work of Winogradsky and Beijerinck .Discovery of microorganisms as plant pathogens.	6
II	Distribution of microorganisms in nature. Diversity in microbial habitat .Types of microorganisms. Introduction to prokaryotic world, eukaryotic microorganisms. Viruses and other acellular microorganisms	6
III	Impact of microorganisms in environment and its impact on human life. Branches of microbiology Thrust areas of microbiology: genetic engineering and biotechnology	6
IV	Pure culture techniques Definition: Pure culture and axenic culture. Principles and methods of obtaining pure culture Preservation of pure culture, culture collection centers.	6
V	Techniques used to study microorganisms Staining Dyes and stains: Definition, acidic basic dyes and leuco compounds. Smear: Fixation use of mordent, intensifiers and decolorizer. Mechanism of staining. Types of staining: simple and differential staining. Application of stains and dyes in study of microbiology	6

TextBook(s):

1. *PelczarMJ,ChanE CS and Kreig NR Tata Microbiology McGrow Hill*
2. *RC Dubey and DK Maheswari (2002).Practical Microbiology. S. Chand Publishing.*
3. *WilleyJ.,SherwoodL.,and Woolverton C.J.,(2017). Prescott's Microbiology.10th Edition., McGraw-Hill International edition*
4. *Boyd,R.F.(1998).General Microbiology,2ndEdition.,TimesMirror,Mosby College Publishing, St Louis.*
5. *Salle.A.J(1992).Fundamental Principles of Bacteriology.7thEdition.,McGraw Hill Inc.New York.*

ReferenceBook(s):

1. *General Microbiology:RYStanier, Adelberg EA and JL Ingraham,MacMillan Press Inc*
2. *Introduction to Microbiology:IngrahamJL and Ingraham CA Thomson Brooks/ Cole*
3. *Principles of microbiology: RMAtlas WmC brown Publishers*
4. *Brock's biology of Microorganisms:MadiganMT and Martinko JM Pearson Education Inc*

WebResource(s):

1. *https://www.cliffsnotes.com/study-guides/biology/microbiology/introduction-tomicrobiology/ a-brief-history-of-microbiology*
2. *https://www.keyence.com/ss/products/microscope/bz-x/study/principle/structure.jsp*
3. *https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6604941/#*
4. *https://bio.libretexts.org/@go/page/9188*
5. *https://courses.lumenlearning.com/boundless-microbiology/chapter/microbialnutrition/*

Course Outcomes		
Up on successful completion of this course, the student will be able to:		
CO No.	CO Statement	Cognitive Level (K-Level)
CO1	Study the historical events that led to the discoveries and Inventions.	K1,K2.K3
CO2	Gain Knowledge of detailed habitat of microbes. Study the Prokaryotic and eukaryotic world.	K1,K2,K3,K4
CO3	Understand the impacts of microorganism in environment.	K1,K2.K3,K4
CO4	Learn about pure culture techniques.	K1,K2.K3
CO5	Explain the principles and working mechanism of different microscopes their function and scope of application	K1,K2.K3,K4

RelationshipMatrix:

Course Outcomes (COs)	ProgramOutcomes (POs)							ProgramSpecificOutcomes(PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	2	3	2	1	2	2	3	2	3	2	2	2.25
CO2	3	2	3	2	2	2	3	3	3	3	2	2	2.50
CO3	3	3	2	2	1	2	3	3	2	3	2	3	2.41
CO4	3	3	3	3	3	2	3	3	3	3	3	2	2.83
CO5	3	2	2	3	2	2	3	3	3	2	2	2	2.41
											Mean Overall Score		2.48
											Correlation		High

3 – Strong, 2- Medium, 1- Low

MeanOverallScore	Correlation
<=1	Low
>1 &<=2	Medium
>2 &<=3	High

Semester	CourseCode	Course Category	Hours / Week	Credits	MarksforEvaluation		
					CIA	ESE	Total
IT	25BMB21	Core Course–II	5	5	25	75	100
Course Title	**Microbial Physiology and Metabolism**						

Learning Objectives	
LO1	Study the basic principles of microbial growth.
LO2	Understand the basic concepts of aerobic and anaerobic metabolic pathways.
LO3	Analyze the role of individual components in overall cell function.
LO4	Provide information on sources of energy and its utilization by microorganisms.
LO5	Study the different types of metabolic strategies.

SYLLABUS

Unit	Contents	Hours
I	Physiology of microbial growth: Batch – continuous - synchronous cultures; Growth Curve and measurement method (turbidity, biomass, and cell count). Control of microbial growth.	15
II	Nutrition requirements - Photoautotrophs, Photoorganotrophs, Chemolithotrophs (Ammonia, Nitrite, Sulfur, Hydrogen, Iron oxidizing Bacteria), Chemoorganotrophs. Nutrition transport mechanisms – Passive diffusion and Active transport. Factors affecting microbial growth.	15
III	An overview of Metabolism - Embden Meyerhof Pathway, Entner-Doudoroff Pathway, Pentose Phosphate Pathway, Tricarboxylic Acid Cycle. Electron Transport Chain and Oxidative Phosphorylation. ATP synthesis. Fermentation-Homolactic Fermentation, Heterolactic Fermentation, Mixed Acid Fermentation, Butanediol Fermentation.	15
IV	Photosynthesis - An Overview of chloroplast structure. Photosynthetic Pigments, Light Reaction-Cyclic and non-cyclic Photophosphorylation. Dark Reaction - Calvin Cycle.	15
V	Bacterial reproduction - Binary fission, Budding, Reproduction through conidia, cyst formation, endospore formation. Fungi asexual and sexual reproduction, Microalgae reproduction. Asexual and sexual reproduction of protozoa.	15

TextBook(s):

1. *Schlegal,H.G.(1993).GeneralMicrobiology.,7thEdition,PresssyndicateoftheUniversityof Cambridge.*
2. *RajapandianK.(2010).Microbial Physiology,Chennai:PBS Book Enterprises India.*
3. *MeenaKumari.S.Microbia lPhysiology,Chennai 1s tEdition MJP Publishers2006.*
4. *DubeyR.C. and Maheswari,S.(2003).A textbook of Microbiology,NewDelhi:S.Chand & Co.*
5. *S.RamReddy,S.M.Reddy (2008).Microbial Physiology.Anmol Publications Pvt Ltd.*

ReferenceBook(s):

1. RobertK.Poole(2004).Advances inMicrobial Physiology,Elsevier Academic Press,NewYork, Volume 89.

2. KimB.H.,GaddG.M. (2008).Bacterial Physiology and Metabolism.Cambridge University Press, Cambridge. 5

3. DanielR.Caldwell.(1995).Microbial Physiology & Metabolism Wm.C.Brown Communications, Inc. USA.

4. Moat,A.G and J.WFoaster (1995).Microbial Physiology,3rdedition.Wiley –LISS,AJohn Wiley & Sons. Inc. Publications.

5. Bhanu Shrivastava.(2011).Microbial Physiology and Metabolism:Study of Microbial Physiology and Metabolism. Lambert academic Publication.

WebResource(s):

1 https://sites.google.com/site/microbialphysiologyoddsem/teaching-contents

2 https://courses.lumenlearning.com/boundless-microbiology/chapter/microbial-Nutrition

3 https://onlinecourses.swayam2.ac.in/cec20_bt14/preview

4 http://web.iitd.ac.in/~amittal/2007_Addy_Enzymes_Chapter.pdf

5 https://www..frontiersin.org.microbial-physiology-and-metabolism.

Course Outcomes

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

CO No.	CO Statement	Cognitive Level (K-Level)
CO1	Describe microorganisms based on nutrition.	K1 K2 K3
CO2	Know the concept of microbial growth and identify the factors affecting bacterial growth.	K1,K2,K3
CO3	Explain the methods of nutrient uptake.	K1,K2.K3
CO4	Describe anaerobic and aerobic energy production.	K1,K2.K3,K4
CO5	Elaborate on the process of bacterial photosynthesis and reproduction.	K1,K2.K3,K4

RelationshipMatrix:

Course Outcomes (COs)	ProgramOutcomes (POs)							ProgramSpecificOutcomes(PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	2	3	2	3	3	3	3	3	3	2	2	2.66
CO2	3	2	3	2	1	2	2	3	3	2	2	2	2.25
CO3	3	3	3	3	3	2	3	3	3	3	3	3	2.91
CO4	3	2	3	3	3	3	2	3	3	3	2	3	2.75
CO5	3	3	3	3	2	2	3	3	3	3	2	3	2.75
											Mean Overall Score		2.66
											Correlation		High

3 – Strong, 2- Medium, 1- Low

MeanOverallScore	Correlation
<=1	Low
>1 &<=2	Medium
>2 &<=3	High

Semester	CourseCode	Course Category	Hours / Week	Credits	MarksforEvaluation		
					CIA	ESE	Total
II	25BPMB25	Core Course Practical-II	5	5	25	75	100
Course Title	**Practical-II- Microbial Physiology and Metabolism**						

Learning Objectives	
LO1	Understand the principles of motility test.
LO2	Understand the basic concepts of staining methods.
LO3	Learn the bacterial count using different methods and anaerobic culture.
LO4	Study the morphological demonstration of microorganisms and identification.
LO5	Study the biochemical identification of the bacteria.

SYLLABUS		
Unit	Contents	Hours
I	Motility demonstration: hanging drop, wet mount preparation, semi-solid agar, Craigie's tube method. Staining techniques: Smear preparation, permanent specimen preparation.	15
II	Direct counts – Direct cell count (Petroff-Hausser counting chamber), Turbidometry. Viable count - pour plate, spread plate. Bacterial growth curve.	15
III	Anaerobic culture methods. Antibiotic sensitivity testing: Disc diffusion test- quality control with standard strains.	15
IV	Morphological variations in algae, fungi and protozoa. Micrometry: Demonstration of the size of yeast, fungal filaments and protozoa.	15
V	Methods of bacterial identification- morphological, physiological, and biochemical methods - IMViC test, H2S, TSI, Oxidase, catalase, urease test, and Carbohydrate fermentation test. Maintenance of pure culture, paraffin method, stab culture, maintenance of mold culture.	15

TextBook(s):

1.JamesG Cappucino and N. ShermanMB(1996). A lab manual Benjamin Cummins, NewYork.

2.Kannan.N(1996).Laboratory manual in General Microbiology. Palani Publications.

3.SundararajT(2005).Microbiology Lab Manual (1stedition) publications.

4.Gunasekaran.P(2007).Laboratory manual in Microbiology. New age international publisher.

5.ElsaCooper(2018). Microbial Physiology: A Practical Approach. Callisto Reference publisher.

ReferenceBook(s):

1.DavidWhite., James Drummond., Clay Fuqua (2012) Physiology and Biochemistry of Prokaryotes. 4th Ed. Oxford University Press, New York.

2.Robert K. Poole (2004). Advances in Microbial Physiology, Elsevier Academic Press, New York,Volume 49.

3.Kim B.H., Gadd G.M. (2008). Bacterial Physiology and Metabolism. Cambridge University Press, Cambridge.

4..Dawes,I.WandSutherlandL.W(1992).Microbial Physiology (2ndedition),Oxford Blackwell Scientific Publications.

5.Moat, A.G and J.W Foaster, (1995). Microbial Physiology, 3rd edition. Wiley – LISS, A John Wiley & Sons. Inc. Publications.

WebResource(s):

1 https://sites.google.com/site/microbialphysiologyoddsem/teaching-contents

2 https://courses.lumenlearning.com/boundless-microbiology/chapter/microbial-Nutrition

3 https://onlinecourses.swayam2.ac.in/cec20_bt14/preview

4 https://www.studocu.com/microbial-physiology-practicals

5 https://www.agr.hokudai.ac.jp/microbial-physiology.

Course Outcomes

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

CO No.	CO Statement	Cognitive Level (K-Level)
CO1	Describe hanging drop, wet mount preparation, semi-solid agar, Craigie's tube method.	K1,K2.K3,K4
CO2	Demonstrate Smear preparation, permanent specimen preparation, Capsular, and Acid-fast staining.	K1,K2,K3,K4, K5
CO3	Explain antibiotic sensitivity testing: Disc diffusion test- quality control with standard strains.	K1,K2.K3,K4 ,K5
CO4	Describe demonstration of the size of yeast, fungal filaments and protozoa.	K1,K2.K3,K4, K5,
CO5	Elaborate on the bacterial identification- morphological, physiological, and biochemical methods.	K1,K2.K3,K4

RelationshipMatrix:

Course Outcomes (COs)	ProgramOutcomes (POs)							ProgramSpecificOutcomes(PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	3	3	3	3	3	3	3	3	3	2	3	2.91
CO2	3	3	3	3	3	2	3	3	3	3	2	3	2.83
CO3	3	3	3	3	2	2	3	3	3	3	2	3	2.75
CO4	3	2	3	3	3	2	3	3	3	2	2	2	2.58
CO5	3	3	3	3	3	3	3	3	3	3	3	2	2.91
											Mean Overall Score		2.79
											Correlation		High

3 – Strong, 2- Medium, 1- Low

MeanOverallScore	Correlation
<=1	Low
>1 &<=2	Medium
>2 &<=3	High

Semester	CourseCode	Course Category	Hours / Week	Credits	MarksforEvaluation		
					CIA	ESE	Total
II	25BEMB22	Elective Course-II	4	3	25	75	100
Course Title	**Bioinstrumentation**						

Learning Objectives	
LO1	Understand the analytical instruments and study the basic principles in the field of sciences.
LO2	To gain knowledge about principles of spectroscopy
LO3	Understand the analytical techniques of Chromatography and electrophoresis
LO4	To understand the principles of different types of Molecular biology techniques
LO5	To gain information about the principles of radioactivity and its measurements

SYLLABUS		
Unit	Contents	Hours
I	Basic instruments: pH meter, Buffer of biological importance, Centrifuge- Preparative, Analytical and Ultra, Laminar Air Flow, Autoclave, Hot Air Oven and Incubator. Biochemical calculations-preparations of Molar solutions - Buffers- Phosphate, Acetate, TE, TAE- calculation of Normality ,PPM- Ammonium sulphate precipitation.	12
II	Spectroscopic Techniques: Spectroscopic Techniques: Colorimeter, Ultraviolet and visible, Infra red and Mass Spectroscopy.	12
III	Chromatographic and Electrophoresis Techniques: Chromatographic Techniques: Paper, Thin Layer, Column, HPLC and GC. Electrophoresis Techniques: Starch Gel, AGE, PAGE.	12
IV	Molecular biology Techniques-Principle, Instrumentation and Application of PCR,LC-MS and MALDI	12
V	Fluorescence and radiation based techniques:Spectrofluorimeter, Flame photometer, Scintillation counter, Geiger Muller counter, Autoradiography.	12

TextBook(s):

1. *Jayaraman J (2011).Laboratory Manual in Biochemistry,2nd Edition.Wiley Eastern Ltd., New Delhi.*
2. *Ponmurugan.P and Gangathara PB (2012).Biotechniques. 1st Edition.MJP publishers.*
3. *Veerakumari,L (2009).Bioinstrumentation-5thEdition-.MJP publishers.*
4. *Upadhyay, Upadhyay and Nath (2002). Biophysical chemistry – Principles and techniques 3rd Edition. Himalaya publishing home.*
5. *Chatwal Gand Anand(1989).Instrumental Methods of Chemical Analysis.S.Himalaya Publishing House, Mumbai.*

ReferenceBook(s):

1..Rodney.F.Boyer(2000).Modern Experimental Biochemistry,3rd Edition. Pearson Publication.

2.SkoogA.,WestM (2014). Principles of Instrumental Analysis – 14th Edition W.B.SaundersCo.,Philadephia.

3 .N.Gurumani. (2006). Research Methodology for biological sciences- 1st Edition – MJP Publishers .

4. Wilson K, and Walker J (2010). Principles and Techniques of Biochemistry and Molecular Biology.7thEdition. Cambridge University Press .

5..Webster,J.G.(2004).Bioinstrumentation-4thEdition-JohnWiley&Sons(Asia)Pvt.Ltd,Singapore.

WebResource(s):

1. http://www.biologydiscussion.com/biochemistry/centrifugation/centrifugeintroduction- types-uses-and-other-details-with-diagram/12489
2. https://www.watelectrical.com/biosensors-types-its-working-andapplications/
3. http://www.wikiscales.com/articles/electronic-analytical-balance/Page24of75
4. https://study.com/academy/lesson/what-is-chromatography-definition-typesuses.html
5. http://www.rsc.org/learn-chemistry/collections/spectroscopy/introduction.

Course Outcomes

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

CO No.	CO Statement	Cognitive Level (K-Level)
CO1	Gain knowledge about the basics of instrumentation.	K1,K2.K3,K4
CO2	Exemplify the structure of atoms and molecules by using the principles of spectroscopy.	K1,K2,K3,K4
CO3	Evaluate by separating and purifying the components.	K1,K2.K3,K4
CO4	Understand the need and applications of Molecular biology techniques.	K1,K2.K3
CO5	Categorize the working principle and applications of fluorescence and radiation.	K1,K2.K3,K4

RelationshipMatrix:

Course Outcomes (COs)	ProgramOutcomes (POs)							ProgramSpecificOutcomes(PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	3	2	2	2	2	3	3	3	3	2	1	2.41
CO2	3	3	2	3	2	3	2	3	3	3	3	2	2.66
CO3	3	2	3	3	2	3	3	3	3	3	3	3	2.83
CO4	3	2	3	3	3	2	3	3	3	3	3	3	2.83
CO5	3	3	3	2	3	3	2	3	3	3	3	2	2.75
											Mean Overall Score		2.69
											Correlation		High

3 – Strong, 2- Medium, 1- Low

MeanOverallScore	Correlation
<=1	Low
>1 &<=2	Medium
>2 &<=3	High

Semester	CourseCode	Course Category	Hours / Week	Credits	MarksforEvaluation		
					CIA	ESE	Total
II	25BSMB23	SEC-II	2	2	25	75	100
Course Title	Nutrition and Health Hygiene						

Learning Objectives	
LO1	Learn about nutrition and their importance
LO2	Make student understand the nutritional facts for a better life.
LO3	Learn information to optimize our diet
LO4	Impart knowledge on different health care programs taken up by India
LO5	Learn knowledge on different health indicators and types of hygiene methods

SYLLABUS		
Unit	Contents	Hours
I	Nutrition – definition, importance, Good nutrition, and mal nutrition; Balanced Diet: Basics of Meal Planning. Carbohydrates, Lipids, Proteins and Vitamins –functions, dietary sources, effects of deficiency. Macro and micro minerals –functions, effects of deficiency; food sources of Calcium, Potassium, and Sodium; food sources of Iron, Iodine, and Zinc. Importance of water– functions, sources, requirements and effects of deficiency	6
II	Nutrition for Life Cycle: Balanced diet - Normal, Pregnant, lactating women, Infancy, young children Adolescents, Adults, and the Elderly; Diet Chart; Nutritive value of Indian foods	6
III	Improper diets: Definition, Identification, Signs and Symptoms - malnutrition, under-nutrition, over-nutrition, Protein Energy Malnutrition, obesity; Nutritional Disease and Disorder - hypertension, diabetes, anemia, osteomalacia, cardiovascular disease	6
IV	Health - Determinants of health, Key Health Indicators, Environment health & Public health; Health-Education: Principles and Strategies. Health Policy & Health Organizations: Health Indicators and National Health Policy of Govt. of India; Functioning of various nutrition and health organizations in India and Nutrition health regulations of ICMR	6
V	Hygiene – Definition; Personal, Community, Medical and Culinary hygiene; WASH (Water, Sanitation and Hygiene) programme. Rural Community Health: Village health sanitation & Nutritional committee. Community & Personal Hygiene: Environmental Sanitation and Sanitation in Public places.	6

TextBook(s):

1. *Bamji, M.S., K. Krishnaswamy& G.N.V. Brahmam (2009) Textbook of Human Nutrition(3rdedition) Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi*
2. *Swaminathan(1995)Food & Nutrition(VolI,Second Edition)The Bangalore Printing &Publishing Co Ltd., , Bangalore*

3 .SK. Haldar(2022).Occupational Health and Hygiene in Industry.CBSPublishers.

4 .Acharya,SankarKr,RamaDas,MinatiSen(2021).Health Hygiene and Nutrition Perception and Practices.Satish Serial Publishing House

5 .Dass(2021).Public Health and Hygiene, Notion Press

.

ReferenceBook(s):

1. VijayaKhader(2000)Food,nutrition & health, Kalyan Publishers,New Delhi

2. Srilakshmi,B.,(2010)FoodScience,(5thEdition)New Age International Ltd.,New Delhi

3. Arvind KumarGoel (2005).A College Textbook of Health & Hygiene ,ABD Publishers

4. SharmaD. (2015).Textbook on Food Science and Human Nutrition.Daya Publishing House.

5. Revilla M. K. F., TitchenalA. and Draper J. (2020).Human Nutrition. University of Hawaii,Mānoa.

WebResource(s):

1. *https://nhm.gov.in/index1.php?lang=1&level=1&sublinkid=969&lid=492*
2. *https://nhm.gov.in/index1.php?lang=1&level=1&sublinkid=970&lid=137*
3. *https://nhm.gov.in/index1.php?lang=1&level=1&sublinkid=149&lid=225*
4. *https://www.who.int/hia/about/faq/en/https://www.nhp.gov.in/healthylivingViewall*

Course Outcomes

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

CO No.	CO Statement	Cognitive Level (K-Level)
CO1	Learn the importance of nutrition for a healthy life	K1,K2.K3,K4
CO2	Study the nutrition for life cycle	K1,K2,K3
CO3	Know the health care programmes of India	K1,K2.K3,K4
CO4	Learn the importance of community and personal health & hygiene measures	K1,K2.K3,K4
CO5	Create awareness on community health and hygiene	K1,K2.K3

RelationshipMatrix:

Course Outcomes (COs)	ProgramOutcomes (POs)							ProgramSpecificOutcomes(PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	2	3	2	2	2	3	3	3	2	2	3	2.50
CO2	3	2	2	2	1	2	3	3	3	2	1	3	2.25
CO3	3	3	3	2	1	3	3	3	3	2	2	3	2.58
CO4	3	2	3	3	3	2	3	3	3	2	2	3	2.66
CO5	3	3	2	2	2	3	3	3	3	3	2	3	2.66
											Mean Overall Score		2.53
											Correlation		High

3 – Strong, 2- Medium, 1- Low

MeanOverallScore	Correlation
<=1	Low
>1 &<=2	Medium
>2 &<=3	High

Semester	CourseCode	Course Category	Hours / Week	Credits	MarksforEvaluation		
					CIA	ESE	Total
II	25BSMB24	SEC-III	2	2	25	75	100
Course Title	**Sericulture**						

Learning Objectives	
LO1	Acquire knowledge on the concepts of origin, growth and study of Sericulture as science and scientific approach of mulberry plant.
LO2	Describe the morphology and physiology of silkworm.
LO3	Discuss effective management of silkworm diseases.
LO4	Demonstrate field skills in mulberry cultivation and silkworm rearing with an emphasis on technological aspects.
LO5	Demonstrate entrepreneurship abilities, innovative thinking, planning, and setting up small-scale enterprises.

SYLLABUS		
Unit	Contents	Hours
I	General introduction to Sericulture, its distribution in India. Botanical distribution and taxonomical characters of mulberry varieties and species. Biology of Mulberry plant and Mulberry crop cultivation and protection.	6
II	Silkworm- biology-morphology of silkworm. Life cycle of silkworm- egg, larva, pupa, and moth.	6
III	Silkworm pathology: Introduction to Parasitism, Commensalism, Symbiosis and Parasite relationship - Mulberry Silkworm Diseases: Introduction, types, Pebrine, Grasserie, Muscardine, Flacherie, Symptoms and Pathogens, Mode of Infection, Prevention and Control -Non – mulberry silkworm diseases: Pebrine, Bacterial and viral diseases. Brief Account of Pests and Predators of Silkworms, Nature of damage and control measures.	6
IV	Rearing of silkworm. Cocoon assessment and processing technologies. Value added products of mulberry and silkworms.	6
V	Entrepreneurship and rural development in sericulture: Planning for EDP, Project formulation, Marketing, Insectary facilities and equipments: Location, building specification, air conditioning and environmental control, furnishings and equipment, sanitation and equipment, subsidiary facilities.	6

TextBook(s):

1. Ganga, G. and SulochanaChetty (2010). Introduction to Sericulture,, J., Oxford and IBH Pub. Co. Pvt. Ltd., New Delhi.

2. Dr.R.K.Rajan&Dr.M.T.Himantharaj (2005).Silkworm Rearing Technology,Central Silk Board, Bangalore.

3. DandinSB, Jayant Jayaswal andGiridharK(2010).Handbook of Sericulture technologies,Central Silk Board, Bangalore.

4.M.C.Devaiah,K.C.Narayanaswamy and V.G.Maribashetty(2010).Advances in Mulberry Sericulture,,CVG Publications, Bangalore

5.T.V.SatheandJadhav.A.D.(2021).Sericulture and Pest Management, Daya Publishing House

ReferenceBook(s):

1. S.Morohoshi(2001).Development Physiology of Silkworms 2ndEdition,Oxford & IBHPublishing Co. Pvt. Ltd. New Delhi

2. Hamamura, Y (2001). Silkworm rearing on Artificial Diet. Oxford &IBH publishing Co., Pvt. Ltd. NewDelhi.

3. M.Johnson,M.Kesary (2019).Sericulture,5th.Edition.Saras Publications.

4. Manisha Bhattacharyya(2019).Economics of Sericulture,Rajesh Publications.

5. MuzafarAhmadBhat,SurakshaChanotra,ZafarIqbalBuhroo,AbdulAzizandMohd.Azam(2020).A Textbook on Entrepreneurship Development Programme in Sericulture, IP Innovative Publication

WebResource(s):

1. https://egyankosh.ac.in›bitstream
2. https://archive.org›details› Sericulture Handbook
3. https://www.academic.oup.com
4. https://www.sericulture.karnataka.gov.in
5. https://www.silks.csb.gov.in

Course Outcomes

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

CO No.	CO Statement	Cognitive Level (K-Level)
CO1	Discuss the overall aspects of Sericulture and the biology and varieties of mulberry plant. Creates awareness among students about the economic importance and suitability of Sericulture in Indian conditions.	K1,K2,K3,K4
CO2	Familiarize with the lifecycle of silk worm.	K1,K2,K3,K4
CO3	Explain common diseases of silkworm encountered during rearing, sources of infection, disease symptoms, pre-disposing factors and their management practices.	K1,K2.K3,K4
CO4	Attain thorough knowledge about the cultivation of mulberry, maintenance of the farm, seed technology, silkworm rearing, post cocoon techniques like stifling, reeling, and utilization of by-products.	K1,K2.K3,K4
CO5	Plan the facilities required for establishment of insectary. Competent to transfer the knowledge and technical skills to the Seri-farmers.Analyze the importance of sericulture in entrepreneurship development and emerge as potential entrepreneur.	K1,K2.K3,K4,K5

RelationshipMatrix:

Course Outcomes (COs)	ProgramOutcomes (POs)							ProgramSpecificOutcomes(PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	3	3	2	1	3	3	3	3	3	2	3	2.66
CO2	3	2	3	2	1	3	3	3	2	2	2	3	2.41
CO3	3	3	3	3	3	2	3	3	3	3	3	3	2.91
CO4	3	3	3	3	2	3	3	3	3	3	2	3	2.83
CO5	3	3	3	3	3	3	3	3	3	3	3	3	3.00
											Mean Overall Score		2.76
											Correlation		High

3 – Strong, 2- Medium, 1- Low

MeanOverallScore	Correlation
<=1	Low
>1 &<=2	Medium
>2 &<=3	High