DEPARTMENT PROFILE:

The Under Graduate Microbiology course was started in the year 1994. Ever since its inception, the Department has been constantly concentrating to stay updated with the latest developments. The Department has well equipped laboratory and library to cater the requirements of the syllabi. 24 batches have successfully completed their graduation and many of them have been well placed in the various fields of Microbiology.

VISION:

- To train our students both in theory and practical in the field of Microbiology to succeed in their careers.

MISSION:

- To encourage the students to work towards innovations in the field of microbiology.
- To train our students to disseminate their knowledge and applications to solve societal challenges related to microbiology.
- To prepare students to improve their skills in all the areas of microbiology
- To train our students to meet the changing needs in the field of microbiology.

DISTRIBUTION OF CREDITS (UG PROGRAMME)

PART	SEM	COURSES	NO.OF COURSES	HOURS	CREDITS	TOTAL CREDITS
I	I-IV	LANGUAGE	4	6	3	12
II	I-IV	ENGLISH	4	6	3	12
III	I-VI	CORE	15(11T+4P)	4-5T; 3-5P	4-5T;2-4P	60
III	I-IV	ALLIED	4	4T;2P	4T;2P	20
III	V,VI	ELECTIVE	3	5	5	15
IV	I-IV	SKILL BASED SUBJECT(SBS)	6	2	3	12
IV	I	VALUE EDUCATION	1	2	2	2
IV	II	ENVIRONMENTAL STUDIES	1	2	2	2
IV	III,IV	NON-MAJOR ELECTIVE(NME)	2	2	2	4
V	IV	EXT.ACTIVITY	1	0	1	1
TOTAL CREDITS						**140**

Signature of the Chairman/HOD

Passed in the BOS Meeting held on 18-03-2020

Undergraduate (UG) Programme Outcomes (POs)

Undergraduate (B.A., B.Sc., B.Com., B.C.A., B.B.A., etc.,) is a 3-year degree Programme with 6 semesters consisting the following Programme Outcomes (POs) under various criteria including critical thinking, problem solving, effective communication, societal/ citizenship/ ethical credibility, sustainable growth and employable abilities.

PO 1	**Critical Thinking**: Intellectual exploration of knowledge towards actions in clear and rational manner by understanding the logical connections between ideas and decisions.
PO 2	**Problem Solving**: Understanding the task/ problem followed by planning and narrow execution strategy that effectively provides the solution.
PO 3	**Effective Communication**: Knowledge dissemination by oral and verbal mechanisms to the various components of our society.
PO 4	**Societal/ Citizenship/ Ethical Credibility**: Realization of various value systems/ moral dimensions and demonstrate the empathetic social concern as well as equity in all the decisions, executions and actions.
PO 5	**Environmental Concern and Sustainable Growth**: Understanding the emerging environmental challenges and provide the possible contribution in sustainable development that integrates environment, economy and employment.
PO 6	**Skill Development and Employable Abilities**: Adequate training in relevant skill sector and creating employable abilities among the under graduates.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

On completion of B.Sc. Microbiology Programme, the students are expected to

PSO 1	explore the biological diversity of microbial forms and various aspects of basic microbiology and able to address broad range of fields such as microbial taxonomy, microbial genetics, molecular biology, biocontrol, biochemistry, food and industrial microbiology and systems biology.
PSO 2	understand the microbial metabolism, concepts of molecular biology, microbial pathogenicity, the role of microorganisms in the human welfare and helps to address the specific solutions for the problems associated with human society.
PSO 3	develop high proficiency in good laboratory practices in microbiological laboratory and able to explain the theoretical basis and practical skills of the tools and techniques common to microbiology.
PSO 4	able to innovate and develop the skills necessary for effective communication of experimental results and scientific principles with the community related to microbiology field and non-microbiology fields.
PSO 5	acquire skills, assess and approach with ethical principles in the current social health issues and the ability to participate in a team.
PSO 6	able to develop employability skills in the various fields of microbiology and ability to engage in life-long learning on life skills.

Passed in the BOS Meeting held on 18-03-2020

B.Sc. MICROBIOLOGY – COURSE STRUCTURE
I SEMESTER

S. No.	Sub. Code	Subject Title	Hrs./ Week	Exam (Hrs.)	CA	SE	Total Marks	Credits
1.	21UACT11/ H11/ S11	Part-I : Tamil/ Hindi/Sanskrit	6	3	25	75	100	3
2.	21UACE11	Part-II : English	6	3	25	75	100	3
3.	21UMBC11	Part-III : Core: General Microbiology	5	3	25	75	100	4
4.	21UMBA11	Part-III : Allied : Allied Chemistry for Life Sciences I	4	3	25	75	100	4
5.		Part-III : Core: Core Practical I*	3	-	-	-	-	-
6.		Part-III : Allied: Titrimetric Analysis*	2	-	-	-	-	-
7.	21UMBS11	Part-III: SBS: Microbial Techniques	2	3	25	75	100	2
8.	21UACVE1	Part-IV: Value Education	2	3	25	75	100	2
		TOTAL	30				600	18

***Practical Examinations at the end of the II Semester**

II SEMESTER

S. No.	Sub. Code	Subject Title	Hrs./ Week	Exam (Hrs.)	CA	SE	Total Marks	Credits
1.	21UACT21/ H21/ S21	Part-I : Tamil/ Hindi/Sanskrit	6	3	25	75	100	3
2.	21UACE21	Part-II : English	6	3	25	75	100	3
3.	21UMBC21	Part-III: Core: Microbial Physiology & Taxonomy	5	3	25	75	100	4
4.	21UMBA21	Part-III : Allied: Allied Chemistry for Life Sciences II	4	3	25	75	100	4
5.	21UMBCP1	Part-III : Core: Core Practical I	3	3	40	60	100	2
6.	21UMBAP1	Part-III : Allied: Titrimetric Analysis	2	3	40	60	100	2
7.	21UMBS21	Part-III: SBS: Diagnostic Microbiology and Haematology	2	3	25	75	100	2
8.	21UACES1	Part-IV : Environmental Studies	2	3	25	75	100	2
		TOTAL	30				800	22

Passed in the BOS Meeting held on 18-03-2020

III SEMESTER

S. No.	Sub. Code	Subject Title	Hrs./ Week	Exam (Hrs.)	CA	SE	Total Marks	Credits
1.		Part-I : Tamil/ Hindi/Sanskrit	6	3	25	75	100	3
2.		Part-II : English	6	3	25	75	100	3
3.		Part-III : Core: Molecular Microbiology	5	3	25	75	100	5
4.		Part-III : Allied: Cell Biology	4	3	25	75	100	4
5.		Part-III : Core: Core Practical II*	3	3	-	-	-	-
6.		Part-III : Allied: Allied Biology Practical *	2	3	-	-	-	-
7.		Part-III : SBS: Mushroom Technology	2	3	25	75	100	2
8.		Part-IV : NME: Food and Dairy Microbiology	2	3	25	75	100	2
		TOTAL	30				600	19

***Practical Examinations at the end of the IV Semester**

IV SEMESTER

S. No.	Sub. Code	Subject Title	Hrs./ Week	Exam (Hrs.)	CA	SE	Total Marks	Credits
1.		Part-I : Tamil/ Hindi/Sanskrit	6	3	25	75	100	3
2.		Part-II: English	6	3	25	75	100	3
3.		Part-III: Core: Microbial Genetics	5	3	25	75	100	5
4.		Part-III: Allied: Biodiversity and Biostatistics	4	3	25	75	100	4
5.		Part-III :Core: Core Practical II	3	3	40	60	100	2
6.		Part-III : Allied: Allied Biology Practical	2	3	40	60	100	2
7.		Part-III :SBS: Cosmetic Microbiology	2	3	25	75	100	2
8.		Part-IV: NME: Diagnostic Microbiology	2	3	25	75	100	2
9.		Part V :Extension Activity						1
		TOTAL	30				800	24

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V SEMESTER

S. No.	Sub. Code	Subject Title	Hrs./ Week	Exam (Hrs.)	CA	SE	Total Marks	Credits
1.		Part-III: Core: Clinical Microbiology	5	3	25	75	100	5
2.		Part-III :Core: Agricultural and Environmental Microbiology	4	3	25	75	100	4
3.		Part-III :Core: Immunology	5	3	25	75	100	4
4.		Part-III: Core: Food and Industrial Microbiology	4	3	25	75	100	4
5.		Part-III: Elective- 1**: Computer Applications in Biology	5	3	25	75	100	5
6.		Part-III :Elective – 2**: Bioremediation	5	3	25	75	100	5
7.		Part-III : SBS: Biocontrol	2	3	25	75	100	2
8.		Part-III :Core: Lab- Core Practicals III	5	3	40	60	100	4
9.		Soft Skills	-	-			100	
		TOTAL	30					28

****One paper has to be chosen out of two elective papers**

VI SEMESTER

S. No.	Sub. Code	Subject Title	Hrs./ Week	Exam (Hrs.)	CA	SE	Total Marks	Credits
1.		Part-III: Core: Virology	5	3	25	75	100	5
2.		Part-III : Core: Biochemistry and Enzymology	4	3	25	75	100	4
3.		Part-III: Core: RDNA Technology	4	3	25	75	100	4
4.		Part-III: Elective- 3**:: Bioinformatics	5	3	25	75	100	5
5.		Part-III : Elective- 4**: Analytical Microbiology	5	3	25	75	100	5
6.		Part-III :Elective – 5**: Fermentation and Bioprocess Technology	5	3	25	75	100	5
7.		Part-III: SBS: Pharmaceutical Microbiology	2	3	25	75	100	2
8.		Part-III : Core: Lab- Core Practical-IV	5	3	40	60	100	4
		TOTAL	**30**					**29**

****Two papers have to be chosen out of three elective papers**

Passed in the BOS Meeting held on 18-03-2020

B.Sc. MICROBIOLOGY – COURSE STRUCTURE
I SEMESTER

S. No.	Sub. Code	Subject Title	Hrs./ Week	Exam (Hrs.)	CA	SE	Total Marks	Credits
1.	21UACT11/ H11/ S11	Part-I : Tamil/ Hindi/Sanskrit	6	3	25	75	100	3
2.	21UACE11	Part-II : English	6	3	25	75	100	3
3.	21UMBC11	Part-III : Core: General Microbiology	5	3	25	75	100	4
4.	21UMBA11	Part-III : Allied : Allied Chemistry for Life Sciences I	4	3	25	75	100	4
5.		Part-III : Core: Core Practical I*	3	-	-	-	-	-
6.		Part-III : Allied: Titrimetric Analysis*	2	-	-	-	-	-
7.	21UMBS11	Part-III: SBS: Microbial Techniques	2	3	25	75	100	2
8.	21UACVE1	Part-IV: Value Education	2	3	25	75	100	2
		TOTAL	30				600	18

***Practical Examinations at the end of the II Semester**

Course code	Course Title	Category	L	T	P	Credits
21UMBC11	GENERAL MICROBIOLOGY	PART- III Core	4	1	-	4

L – Lecture T – Tutorial P – Practical

Year	Semester	Internal	External	Total
I	I	25	75	100

COURSE DESCRIPTION:

This course helps to provide the fundamental knowledge of the microbiology, development of microbiology, microscopy and the diversity of microorganisms.

COURSE OBJECTIVES:

- To inculcate the knowledge on the basics of microbiology.
- To know the principles of microscopy
- To learn the diversity of microorganisms.

COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

No.	Course Outcome	Knowledge Level (According to Bloom's Taxonomy)
CO 1	acquire the knowledge on the basic concepts, scope and development of microbiology.	K1
CO 2	understand the principles of microscopy and different types of microscope and its applications.	K2, K3
CO 3	gain the knowledge on the structural organization of bacteria, analyze the differences between the structural organization of prokaryotes and eukaryotes.	K1, K2
CO 4	acquire the knowledge on the structural features and life cycle of algae and fungi.	K1, K2
CO 5	acquire the knowledge on the structural features of bacteria and virus .	K1

K1- KNOWLEDGE (REMEMBERING), K2-UNDERSTANDING, K3-APPLICATION

GENERAL MICROBIOLOGY

UNIT - I

Introduction, Definition, scope and history of Microbiology; Theory of Abiogenesis, Contributions of Leeuwenhoek, Louis Pasteur, Robert Koch, Edward Jenner , Joseph lister , Elie Metchnikoff , Paul Ehrilch, Alexander Fleming ,Waksman , Beijerinck, James Watson and Francis crick.

UNIT - II

Microscopy : Parts and function of a Microscope – Magnification Power, Numerical aperture, Resolving power ;Types of Microscopes - Simple, Compound, Light and Dark field Microscope, Phase Contrast Microscope, Fluorescent Microscope, Electron Microscope-Scanning and Transmission Electron Microscope–Functions and its applications.

UNIT - III

Prokaryotes - Ultra structure and function; Cellular Organization of Bacteria: Structure and functions of cell wall, Bacterial cytosol, S-Layer, Capsule, Pili, Flagella , Nucleoid, Ribosome, Plasmid and other cytoplasmic inclusions. Differences between prokaryotes and Eukaryotes.

UNIT - IV

Characteristics of Microbes: Characteristics of Bacteria, Types- *E. coli, Bacillus,* Clostridium and Cyanobacteria, Actinomycetes and Streptomyces. Characteristics of Viruses –TMV and HIV. Bacteriophage- T4 and Lambda.

UNIT - V

Characteristics features of Algae – Structure and reproduction of Chlorella, Euglena, Chlamydomonas and Diatoms – Characteristics of Fungi - Structure and reproduction of *Saccharomyces sp., Aspergillus and Penicillium.*

TEXT BOOKS:

1. Pelczar, M.J.,Chan, E.C.S and Kreig ,N.R. 1993. Microbiology. Tata McGraw Hill Publishing Co., Ltd., New Delhi.
2. Schlegel H. G., 1993, General Microbiology, 6th Ed., Tata McGraw Hill Publications.
3. Sullia S. B and Santharam S., General Microbiology, 2000 Ed., Oxford and IBH Publishing Co., Pvt., Ltd.
4. Dr. Dubey R.C and Dr. Maheshwari. D.K . Revised Edition, A text book of Microbiology. S. Chand & Company Ltd.

REFERENCE BOOKS:

1. Prescott, Harley and Klein, 2006, Microbiology, 6th Ed., Tata McGraw Hills.
2. Alexopoulus C. J and Mims C. W., Introductory Mycology, 3rd Ed., Wiley Eastern Publications.

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	S	S	S	S	L	S
CO2	S	S	S	M	L	S
CO3	S	L	L	M	L	M
CO4	M	L	M	L	L	M
CO5	M	L	S	L	L	L

S – STRONG **M – MEDIUM** **L - LOW**

COURSE DESIGNERS: Prof. N.B. SHARMILA & Dr. V. SELVI

Passed in the BOS Meeting held on 18-03-2020

Course code	Course Title	Category	L	T	P	Credits
21UMBA11	**ALLIED CHEMISTRY FOR LIFE SCIENCES - I**	Allied	3	1	-	4

L – Lecture T – Tutorial P – Practical

Year	Semester	Internal	External	Total
I	I	25	75	100

COURSE OBJECTIVES:

- To provide a deep insight about the atomic structure.
- To be acquainted with the types and characteristics of chemical bonds and intermolecular forces.
- To apprehend the concepts of acids & bases and biological applications of buffer solutions.
- To understand the principles of surface chemistry and various ways of articulating the concentration of solutions**.**
- To understand the applications of surface chemistry and the types and role of catalysts.

COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

No.	Course Outcome	Knowledge Level (According to Bloom's Taxonomy)
CO 1	figure out the inclusive account of atomic structure and the applications of radioisotopes.	K1,K2,K3
CO 2	identify with the kinds and characteristics of chemical bonds, molecular interactions and dipole interactions.	K1,K2
CO 3	discern the concepts of acids& bases and to be acquainted with the biological importance of buffer solutions.	K1,K2, K3
CO 4	categorize the means of expressing the concentration of solutions and to appreciate the applications of osmosis & isotonic solutions.	K1, K2
CO 5	appreciate the principles and applications of surface chemistry.	K2, K3

K1- KNOWLEDGE (REMEMBERING), K2-UNDERSTANDING, K3-APPLICATION

Passed in the BOS Meeting held on 18-03-2020

ALLIED CHEMISTRY FOR LIFE SCIENCES – I

UNIT I : ATOMIC STRUCTURE :: [12 Hrs]
Constituents of atom – atomic number – mass number – isotopes – isobars – shapes of orbitals – quantum numbers – Aufbau principle – Hund's rule – Pauli's exclusion principle - electronic configuration of atoms – salient features of modern periodic table . Radio isotopes: Tracer technique – application in the field of medicine, industry, agriculture and biology.

UNIT II: CHEMICAL BONDING: : [12 Hrs]
Ionic, covalent, polar covalent and co-ordinate bonds (definition , characteristics and examples) – Intermolecular forces : vanderwaal's forces – dipole-dipole , dipole-induced dipole, induced dipole- induced dipole interactions – Hydrogen bonding : definition, conditions for formation, types and characteristics of hydrogen bonded compounds .

UNIT III : CONCEPT OF ACIDS AND BASES : : [12Hrs]
Arrhenius concept , Bronsted-Lowry concept , conjugate acid- base pairs, Lewis concept – relative strength of acid and bases – ionic product of water – pH and pOH - pH meter – buffer solutions and its types – Henderson equation – biological applications of buffer solutions – acid-base titrations – indicators – theory of indicators .

UNIT IV: SOLUTIONS:: [12 Hrs]
Definition – types of solutions – concentration – solute – solvent – molecular weight – equivalent weight – various ways of expressing concentration of solutions : molarity, molality, normality, ppm, w/w, w/v, v/v (problems involving direct substitution only) – osmosis and its applications – isotonic solutions and its biological importance – hypertonic and hypotonic solutions – reverse osmosis and its application .

UNIT V : SURFACE CHEMISTRY : : [12 Hrs]
1) Adsorption : Definition – mechanism of adsorption – types of adsorption – physical and chemical adsorption – factors influencing adsorption - application of adsorption – ion-exchange adsorption and its application .
2) Catalysis : Definition – general characteristics of catalytic reactions – types of catalysts (positive, negative, auto and induced) – types of catalysis (homogeneous and heterogeneous) – acid- base catalysis – theories of catalysis (adsorption and intermediate compound formation theory) – catalytic poisons – catalytic promoters – enzyme catalysis – characteristics .

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TEXT BOOK(S):

1) Essentials of physical chemistry by ArunBahl, B.S. Bahl and G.D. Tuli., S. Chand &co
2) Principles of physical chemistry by Puri , Sharma and pathania

REFERENCE BOOKS:

1) Principles of Inorganic Chemistry by Puri, Sharma &Kalia, Milestone.publisher& distributor (2009).
2) Modern Inorganic Chemistry by R.D. Madan S. Chand and Co. Ltd. (2012).

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	--	L	-	--
CO2	S	--	M	-	--
CO3	S	M	-	L	L
CO4	S	M	S	L	M
CO5	S	-	M	L	M

S – STRONG M – MEDIUM L – LOW

PERCENTAGE OF REVISION: 30%

Passed in the BOS Meeting held on 18-03-2020

Course code	Course Title	Category	L	T	P	Credits
21UMBCP1	**CORE PRACTICAL – I**	**PART- III Core-1**	4	1	-	4

L – Lecture T – Tutorial P – Practical

Year	Semester	Internal	External	Total
I	I & II	-	-	-

COURSE DESCRIPTION:

To develop skills and competencies in standard microbiological laboratory techniques. They include methods to study of microbes, culture, stain and identification of microbes.

COURSE OBJECTIVES:

- To train the students in the Practical basics of Microbiology

COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

No.	Course Outcome	Knowledge Level (According to Bloom's Taxonomy)
CO 1	understand the sterilisation techniques, media preparation, staining techniques, identification and culturing of microbes.	K1, K3
CO 2	identify and observe the various types of bacteria, fungi, viruses and algae.	K1
CO 3	identify the bacteria by using various biochemical tests.	K1, K2, K3

K1- KNOWLEDGE(REMEMBERING), K2-UNDERSTANDING, K3-APPLICATION

CORE PRACTICALS- I

Basic Microbiology:

1. Preparation of media and media components.
2. Sterilization Methods: Physical and Chemical methods.
3. Isolation and enumeration of bacteria and fungi from environmental samples.
4. Measurement of Cell size by Micrometry.
5. Pure culture techniques – Streak, Spread and Pour Plate methods.
6. Observation of bacterial motility by Hanging drop Method.
7. Staining Techniques – Simple, Gram's Staining- Positive and Negative Staining – Capsule Staining, Fungal Staining and Endospore Staining.

Microbial Taxonomy:

A. Observation of Permanent Specimen:

Bacteria : E. coli, Bacillus, Clostridium
Algae : Chlorella, Euglena, Chlamydomonas, Diatoms.
Fungi : Rhizopus, Mucor, Aspergillus, Penicillium and Yeast.
Viruses : T_4, Lambda, HIV and TMV.

B. Biochemical tests for bacterial identification:

1. Carbohydrate fermentation and acid- gas production.
2. IMViC tests.3. Catalase test. 4. Oxidase test. 5. TSI.
6. Starch, Lipid and protein hydrolysis

Microbial Physiology:

Measurement of Cell count - Direct and Viable Count.

REFERENCE BOOKS:

1. Laboratory Manual in Microbiology by P. Gunasekaran. 1995. New Age International (P) Ltd.
2. Microbiology A Laboratory Manual. Sixth Edition. Cappuccino and Sherman.2005. Pearson Education.
3. Practical Microbiology by Cappuccino Aneja. 2007.
4. Practical Microbiology - A Laboratory Manual. Panima Publishing Corporation, New Delhi, India.
5. Laboratory Manual in General Microbiology by Kannan. First Edition. 1996. Palani Paramount Publications.

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	S	M	S	S	S	S
CO2	S	S	S	S	S	S
CO3	S	S	S	S	S	S

S – STRONG, M – MEDIUM, L – LOW

COURSE DESIGNER: Dr. V.SELVI

Passed in the BOS Meeting held on 18-03-2020

Course code	Course Title	Category	L	T	P	Credits
21UMBAP1	**TITRIMETRIC ANALYSIS**	Allied	-	-	2	2

L – Lecture T – Tutorial P – Practical

Year	Semester	Internal	External	Total
I	I & II	-	-	-

Practical Examinations at the end of the II Semester

COURSE DESCRIPTION

To practice the quantitative estimation of substances by titration methods.

COURSE OBJECTIVES

A double titration involving the making up of the solution to be estimated and the preparation of a primary standard solution.

COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

No.	Course Outcome	Knowledge Level (According to Bloom's Taxonomy)
CO	illustrate the estimation of substance by various types of titration method	K2,K3,K4, K5

K1- KNOWLEDGE (REMEMBERING) , K2 - UNDERSTANDING , K3 -APPLYING , K4- ANALYZING, K5-EVALUATING,K6 – CREATING

TITRIMETRIC ANALYSIS

LIST OF EXPERIEMENTS:

I. **ACIDMETRY AND ALKALIMETRY**

1. Titration between a strong acid and strong base
2. Titration between a strong acid and weak base
3. Titration between a weak acid and strong base

II. PERMANGANIMETRY

4. Titration between potassium permanganate and oxalic acid
5. Titration between potassium permanganate and ferrous sulphate
6. Titration between potassium permanganate and Mohr's salt

III. EDTA TITRATIONS (DEMONSTRATION ONLY)

7. Estimation of Ca^{2+} ions in water using EDTA
8. Estimation of Mg^{2+} ions in water using EDTA

Distribution of Marks: **Internal - 40 Marks External - 60 Marks**

External examination:		**Internal examination:**	
Record notebook	10 marks	Test	25marks
Procedure writing	10 marks	Assignment	5 marks
Experiment	40 marks	Observation notebook	10 marks
Total	**60 marks**	**Total**	**40 marks**

For analysis, if the student has

< 2% error - 40marks
2 – 3% error – 30marks
3-5% error - 20marks
>5% error - 10marks

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Passed in the BOS Meeting held on 18-03-2020

Course code	Course Title	Category	L	T	P	Credits
21UMBS11	MICROBIAL TECHNIQUES	PART - IV SKILL	2	1	-	2

L – Lecture T – Tutorial P – Practical

Year	Semester	Internal	External	Total
I	I	25	75	100

COURSE DESCRIPTION:

This course helps to provide the fundamental knowledge of the microbial techniques to understand the requirements for the growth of bacteria and control of microbes.

COURSE OBJECTIVES :

- To understand various accessories for microbiology practicals and to illustrate the basic techniques in microbiology.
- To develop the basic skill in sterilization techniques and to acquaint with various aseptic techniques.
- To use the various methods to control microbes.
- To understand nutritional requirements of bacteria.
- To cultivate the bacteria with different cultivation techniques.
- To understand the kinetics of growth and the factors affecting it.

COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

No.	Course Outcome	Knowledge Level (According to Bloom's Taxonomy)
CO 1	understand the lab safety and aseptic techniques	K1
CO 2	know the types of media	K1, K3
CO 3	understand the methods to cultivate the bacteria.	K1, K2
CO 4	understand the process of the growth and kinetics of bacteria and factors affecting it.	K1, K2
CO 5	acquire the knowledge on the different methods to preserve and maintenance of the bacterial culture.	K1, K3

K1- KNOWLEDGE (REMEMBERING), K2-UNDERSTANDING, K3-APPLICATION

MICROBIAL TECHNIQUES

UNIT –I : Sterilization Techniques:
Role of Microbiology Lab; Safety regulations; Sterilization, disinfection, antiseptic, tyndallisation, pasteurization: Physical- dry heat, moist heat, UV light, ionizing radiation, filtration- HEPA filter, Chemical- alcohol, phenol and formaldehyde (brief account only).

UNIT -II: Culture Media:
Components of culture media-Types - natural and synthetic media, chemically defined media, complex media, selective, differential and enriched media (one example each).

UNIT -III: Cultivation of bacteria:
Pure culture methods - streak plate, spread plate, pour plate, stab culture and slant culture. Anaerobic - thioglycolate, liquid shake culture of aerobic bacteria.

UNIT - IV: Growth of bacteria:
Definition, growth phases, measurement of growth phases -- direct and indirect, Turbidity, factors affecting bacterial growth (pH, temperature, oxygen).

UNIT -V: Preservation and maintenance of Microbial culture:
Methods- short term preservation (storage by drying method and deep freeze- -80° C,-120° C,160° C) and long term preservation (Glycerol stock), Lyophilization and cryopreservation.

TEXT BOOKS:

1. Mukherjee, K.L., Medical Laboratory Technology Vol –I, III, Tata McGraw-Hill publishing company LTd., New Delhi.
2. Ananthanarayanan. R., and JayaramPanicker, C.K., 2005, Text book of Microbiology, Orient Longman.

REFERENCE BOOKS:

1. Chakraborty, P., A text book of Microbiology. New central agency private Ltd.
2. General Microbiology. Roger Y Stanier, John L.Ingraham, Mark L.Wheelis and Page R.Painter. Fifth Edition. 1995. Macmillan.

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	S	S	S	S	L	S
CO2	S	S	S	M	L	S
CO3	S	L	L	M	L	M
CO4	M	L	M	L	L	M
CO5	M	L	S	L	L	L

S – STRONG, M – MEDIUM, L – LOW

COURSE DESIGNER: Prof. N.B.SHARMILA

Passed in the BOS Meeting held on 18-03-2020

II SEMESTER

S. No.	Sub. Code	Subject Title	Hrs./ Week	Exam (Hrs.)	CA	S E	Total Marks	Credits
1.	21UACT21/ H21/ S21	Part - I: Tamil/ Hindi/Sanskrit	6	3	25	75	100	3
2.	21UACE21	Part-II : English	6	3	25	75	100	3
3.	21UMBC21	Part-III: Core: Microbial Physiology & Taxonomy	5	3	25	75	100	4
4.	21UMBA21	Part-III : Allied: Allied Chemistry for Life Sciences II	4	3	25	75	100	4
5.	21UMBCP1	Part-III : Core: Core Practical I	3	3	40	60	100	2
6.	21UMBAP1	Part-III : Allied: Titrimetric Analysis	2	3	40	60	100	2
7.	21UMBS21	Part-III: SBS: Diagnostic Microbiology and Haematology	2	3	25	75	100	2
8.	21UACES1	Part-IV : Environmental Studies	2	3	25	75	100	2
		TOTAL	30				800	22

Course code	Course Title	Category	L	T	P	Credits
21UMBC21	MICROBIAL PHYSIOLOGY AND TAXONOMY	PART - III CORE-III	5	1	-	4

L –Lecture T – Tutorial P – Practical

Year	Semester	Internal	External	Total
I	II	25	75	100

COURSE DESCRIPTION:

This course helps to inculcate the concepts of anabolism and catabolism with an elaborate coverage on the Classification System of Microorganisms.

COURSE OBJECTIVES:

- To make the students understand the physiology of microbes.
- To develop understanding about microbial metabolism, growth and energy generation.
- To gain knowledge of various fermentation pathways, microbial communication and energetics.
- To familiarize the students with concepts of nitrogen and phosphate assimilation, electron transport chain and transfer of genetic information among microbial communities

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COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

No.	Course Outcome	Knowledge Level (According to Bloom's Taxonomy)
CO 1	get acquainted with basics of generation of Energy, Entropy	K1
CO 2	understand Photosynthetic pathways and Inorganic Metabolism	K2, K3
CO 3	know the process of Bacterial Cell division and Differentiation	K1, K2
CO 4	acquire the knowledge on the Taxonomy and major characteristic features in Taxonomy	K1, K2
CO 5	acquire the knowledge on the classification of fungi, virus and algae	K1

K1- KNOWLEDGE(REMEMBERING), K2-UNDERSTANDING, K3-APPLICATION

MICROBIAL PHYSIOLOGY AND TAXONOMY

UNIT - I

Bioenergetics-Laws of thermodynamics, Generation of ATP, Substrate Level Phosphorylation, Oxidative Phosphorylation, ETC. Respiration: Aerobic and Anaerobic.

UNIT - II

Photosynthesis and Inorganic Metabolism: Photosynthesis in bacteria – Electron Transport : Green bacteria, Cyanobacteria and Purple Photosynthetic bacteria. Inorganic metabolism in bacteria – Nitrogen, Phosphorous and Sulfur.

UNIT - III

Bacterial Cell division and Differentiation: Sporulation in *Bacillus*: Endospore formation, activation, germination and outgrowth. Differentiation in *Caulobacter* and Dictyostelium.

UNIT - IV

Taxonomy: Major characteristics features- Morphological, Physiological, Biochemical and Molecular characteristics and their role. Principles of Chemotaxonomy and Numerical taxonomy. Classification of Bacteria- Bergey's classification.

UNIT - V

Classification of fungi - Alexopolus and Mims, Classification of Algae - Fritsch's, Classification of Viruses -Baltimore, Classification of Plant and animal viruses– Major families with suitable examples.

TEXT BOOKS:

1. Albert G. Moat John W. Foster and Michael P. Spector, Microbial Physiology, 4th Ed., Library of Congress Cataloguing In Publications.

REFERENCE BOOKS:

1.Daniel R. Caldwell, Microbial Physiology and Metabolism, Library of Congress Cataloguing In Publications.
2. Alexopolus C. J and Mims C. W., Introductory Mycology, 3rd Ed., Wiley Eastern Publications.

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	L	S	L	M	L	L
CO2	S	S	L	M	L	L
CO3	S	L	L	L	L	M
CO4	M	L	L	L	L	L
CO5	S	L	L	L	L	L

S – STRONG **M – MEDIUM** **L - LOW**

COURSE DESIGNER: Dr. S. JEYAPARVATHI

Passed in the BOS Meeting held on 18-03-2020

Course code	Course Title	Category	L	T	P	Credits
21UMBA21	**ALLIED CHEMISTRY FOR LIFE SCIENCES – II**	Allied	3	1	-	4

L – Lecture T – Tutorial P – Practical

Year	Semester	Internal	External	Total
I	II	25	75	100

COURSE OBJECTIVES:

- To comprehend the elementary means of organic chemistry.
- To be acquainted with the classification, properties and applications of carbohydrates, aminoacids, proteins and nucleic acids.
- To appreciate the occurrence, extraction course, classification, structure and biological importance of alkaloids and terpenoids.
- To realize the categorization, properties and magnitude of analgesics, antipyretics, anaesthetics and antibiotics.

COURSE OUTCOMES(COs):

After the completion of the course, the students will be able to

No.	Course Outcome	Knowledge Level (According to Bloom's Taxonomy)
CO 1	realize the vital notions of organic chemistry.	K1,K2
CO 2	understand the organization, chemical properties and applications of carbohydrates.	K2 ,K3
CO 3	recognize the classification, structure and biological significance of aminoacids, proteins and nucleic acids.	K1,K2, K3
CO 4	discern the occurrence, structural and biological significance of alkaloids and terpenoids.	K1, K2
CO 5	appreciate the classification, structure and therapeutic uses of analgesic, antipyretic, anaesthetic and antibiotic drugs.	K1, K2, K3

K1- KNOWLEDGE (REMEMBERING), K2-UNDERSTANDING, K3-APPLICATION

ALLIED CHEMISTRY FOR LIFE SCIENCES – II

UNIT- I : FUNDAMENTAL CONCEPTS OF ORGANIC CHEMISTRY :[12Hrs]
Characterisation, classification and purification of organic compounds (crystallization, sublimation, fractional distillation , steam distillation, extraction with solvents and chromatography) – functional groups and its characteristics – organic reagents and its classification – organic reactions and its types : addition, substitution, elimination, rearrangement and polymerization (examples only) .

UNIT – II: CARBOHYDRATES:**[12Hrs]**
Definition – classification – monosaccharides : chemical properties of glucose and fructose - uses – disaccharides: sucrose- manufacture and properties-Polysaccharides: study of starch and cellulose (structure) – applications – colour reactions .

UNIT- III : AMINOACIDS, PROTEINS AND NUCLEIC ACIDS:[12Hrs]
1) AMINOACIDS : Definition **–** essential and non-essential aminoacids – classification – properties: zwitterion and isoelectric point .
2) PROTEINS :Definition – various classification – structure of proteins – biological functions – colour reactions
3) Nucleic acids **:**Types – DNA and RNA – differences between them – elementary idea about their biological functions .

UNIT - IV : ALKALOIDS AND TERPENOIDS :[12Hrs]
1) ALKALOIDS : Definition – occurence – extraction – functions – general properties – classification – structure and biological importance of cocaine, nicotine, morphine, piperine and atropine .
2) TERPENOIDS : Definition – occurrence – isolation – isoprene rule – classification – general properties – structure and biological importance of citral, geraniol, menthol and camphor .

UNIT- V : DRUGS : [12Hrs]

1) ANALGESICS AND ANTIPYRETICS : Definition – types - Narcotic analgesics : morphine, pethidine and methadone – non-norcotic analgesics : aspirin, methyl salicylate, paraacetamol – structure and uses .

2) ANAESTHETICS : Definition – characteristics – classification – general anaesthetics : chloroform, nitrous oxide, cyclopropane – local anaesthetics: cocaine, procaine , amethocaine – structure and uses .

3) ANTIBIOTICS : Definition – condition - classification – structure and therapeutic uses of penicillin, streptomycin, chloramphenicol and tetracycline.

TEXT BOOK(S):

1) A Text Book of Organic Chemistry by B.S.Bahl & ArunBahl., S.Chand & Co. Ltd., 1996.
2) Textbook of organic chemistry by P.L.Soni & H.M. Chawla, Sultan chand &sons
3) A Textbook of pharmaceutical chemistry by JayashreeGhosh, S.Chand&co.Ltd

REFERENCE BOOKS:

1) Advanced organic chemistry byArunBahl and B.S.Bahl
2) Organic chemistry of natural products (vol – I) by GurdeepChatwal., Himalaya publishing house
3) Organic chemistry of natural products (vol – II) by GurdeepChatwal., Himalaya publishing house

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	L	-	--
CO2	S	M	-	-	L
CO3	S	-	-	L	-
CO4	S	-	-	-	L
CO5	S	-	-	L	L

S – STRONG M – MEDIUM L – LOW

PERCENTAGE OF REVISION: 15%

Course code	Course Title	Category	L	T	P	Credits
21UMBS21	**DIAGNOSTIC MICROBIOLOGY AND HAEMATOLOGY**	**PART IV SKILL BASED**	**2**	**1**	**-**	**2**

L – Lecture T – Tutorial P – Practical

Year	Semester	Internal	External	Total
I	II	25	75	100

COURSE DESCRIPTION:

This course helps to train the students in the fields of Basic Clinical and Diagnostic Microbiology.

COURSE OBJECTIVES:

- To identify the infectious organism that causes tissue damage.
- To analyze the clinical specimens in laboratory in cases when an infectious disease is suspected.
- To make the students to understand the haematology.

COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

No.	Course Outcome	Knowledge Level (According to Bloom's Taxonomy)
CO 1	acquire the knowledge on the Laboratory Identification of Infectious agents and staining Techniques.	K1
CO 2	understand the principles of Blood components, Blood cells and collection methods.	K2, K3
CO 3	gain the knowledge on the structural organization of bacteria, analyze the differences between the structural organization of prokaryotes and eukaryotes.	K1, K2
CO 4	acquire the knowledge on the determinations of Haemoglobin content and counting of Blood Cells.	K1, K2
CO 5	acquire the knowledge on the microbial analysis of clinical samples.	K1

K1- KNOWLEDGE(REMEMBERING), K2-UNDERSTANDING, K3-APPLICATION

DIAGNOSTIC MICROBIOLOGY AND HAEMATOLOGY

UNIT - I

Laboratory management-Safety regulations; Collection, handling and transport of clinical sample. Laboratory Identification of Infectious agents. Staining Techniques - Simple, Gram's, Acid-Fast and Spore Staining.

UNIT – II

Microbial analysis of clinical samples –Urine, Stool, Blood, Pus and Throat Swab. Minimal Inhibitory Concentration(MIC) of antibiotics. Antimicrobial Susceptibility tests.

UNIT - III

Anti – Coagulants; diluting fluids. Blood - Components and their functions; Blood cells - RBC, WBC-Types, Lymphocytes and Thrombocytes. Blood collections methods - Vein puncture and Capillary Puncture; Bleeding time, Clotting time.

UNIT - IV

Routine Hematological tests – Determinations of Hemoglobin content, Counting of Blood Cells – Total RBC count, Total WBC count, Differential Leucocyte count, Eosinophil count, Platelet count and Reticulocyte; ESR.

UNIT - V

Clinical Pathology –Analysis and Examination of Urine and Stool. Separation of Serum and Plasma. Routine procedure in Blood Bank: ABO Blood grouping and Rh typing. Cross matching.

TEXT BOOKS:

1. Mukherjee, K.L., Medical Laboratory Technology Vol –I, III, Tata McGraw-Hill publishing company Ltd, New Delhi.
2. Ananthanarayanan. R., and Jayaram Panicker, C. K., 2005, Text book of Microbiology, Orient Longman.

TEXT BOOKS:

1. Practical Haematology. Seventh EDITION. John V. Dacie , S.M. Lewis. 1991ELBS. Churchill Livingstone.

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	S	S	S	S	S	S
CO2	L	L	S	S	S	S
CO3	S	S	L	M	L	S
CO4	L	M	S	S	S	S
CO5	S	S	S	S	S	S

S – STRONG, M – MEDIUM, L – LOW

COURSE DESIGNER: Dr. S. JEYAPARVATHI

Passed in the BOS Meeting held on 18-03-2020

Course code	Course Title	Category	L	T	P	Credits
21UMBCP1	CORE PRACTICAL – I	PART- III Core-1	4	1	-	4

L – Lecture T – Tutorial P – Practical

Year	Semester	Internal	External	Total
I	I & II	40	60	100

COURSE DESCRIPTION:

To develop skills and competencies in standard microbiological laboratory techniques. They include methods to study of microbes, culture, stain and identification of microbes.

COURSE OBJECTIVES:

- To train the students in the Practical basics of Microbiology

COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

No.	Course Outcome	Knowledge Level (According to Bloom's Taxonomy)
CO 1	understand the sterilisation techniques, media preparation, staining techniques, identification and culturing of microbes.	K1, K3
CO 2	identify and observe the various types of bacteria, fungi, viruses and algae.	K1
CO 3	identify the bacteria by using various biochemical tests.	K1, K2, K3

K1- KNOWLEDGE(REMEMBERING), K2-UNDERSTANDING, K3-APPLICATION

CORE PRACTICALS- I

Basic Microbiology:

8. Preparation of media and media components.
9. Sterilization Methods: Physical and Chemical methods.
10. Isolation and enumeration of bacteria and fungi from environmental samples.
11. Measurement of Cell size by Micrometry.
12. Pure culture techniques – Streak, Spread and Pour Plate methods.
13. Observation of bacterial motility by Hanging drop Method.
14. Staining Techniques – Simple, Gram's Staining- Positive and Negative Staining – Capsule Staining, Fungal Staining and Endospore Staining.

Microbial Taxonomy:

C. Observation of Permanent Specimen:

Bacteria : E. coli, Bacillus, Clostridium
Algae : Chlorella, Euglena, Chlamydomonas, Diatoms.
Fungi : Rhizopus, Mucor, Aspergillus, Penicillium and Yeast.
Viruses : T_4, Lambda, HIV and TMV.

D. Biochemical tests for bacterial identification:

3. Carbohydrate fermentation and acid- gas production.
4. IMViC tests.3. Catalase test. 4. Oxidase test. 5. TSI.
6. Starch, Lipid and protein hydrolysis

Microbial Physiology:

Measurement of Cell count - Direct and Viable Count.

REFERENCE BOOKS:

1. Laboratory Manual in Microbiology by P. Gunasekaran. 1995. New Age International (P) Ltd.
2. Microbiology A Laboratory Manual. Sixth Edition. Cappuccino and Sherman.2005 Pearson Education.
3. Practical Microbiology by Cappuccino Aneja. 2007.
4. Practical Microbiology - A Laboratory Manual. Panima Publishing Corporation, New Delhi, India.
5. Laboratory Manual in General Microbiology by Kannan. First Edition. 1996. Pa Paramount Publications.

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	S	M	S	S	S	S
CO2	S	S	S	S	S	S
CO3	S	S	S	S	S	S

S – STRONG, M – MEDIUM, L – LOW

COURSE DESIGNER: Dr. V.SELVI

Passed in the BOS Meeting held on 18-03-2020

Course code	Course Title	Category	L	T	P	Credit
21UMBAP1	**TITRIMETRIC ANALYSIS**	Allied	-	-	2	2

L – Lecture T – Tutorial P – Practical

Year	Semester	Internal	External	Total
I	I & II	40	60	100

COURSE DESCRIPTION

To practice the quantitative estimation of substances by titration methods.

COURSE OBJECTIVES

A double titration involving the making up of the solution to be estimated and the preparation of a primary standard solution.

COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

No.	Course Outcome	Knowledge Level (According to Bloom's Taxonomy)
CO	illustrate the estimation of substance by various types of titration method	K2,K3,K4, K5

K1- KNOWLEDGE (REMEMBERING) , K2 - UNDERSTANDING , K3 -APPLYING , K4- ANALYZING, K5-EVALUATING,K6 – CREATING

TITRIMETRIC ANALYSIS

LIST OF EXPERIEMENTS:

I. **ACIDMETRY AND ALKALIMETRY**

1. Titration between a strong acid and strong base
2. Titration between a strong acid and weak base
3. Titration between a weak acid and strong base

II. PERMANGANIMETRY

4. Titration between potassium permanganate and oxalic acid
5. Titration between potassium permanganate and ferrous sulphate
6. Titration between potassium permanganate and Mohr's salt

III. EDTA TITRATIONS (DEMONSTRATION ONLY)

7. Estimation of Ca^{2+} ions in water using EDTA
8. Estimation of Mg^{2+} ions in water using EDTA

Distribution of Marks: Internal - 40 Marks External - 60 Marks

External examination:		**Internal examination:**	
Record notebook	10 marks	Test	25marks
Procedure writing	10 marks	Assignment	5 marks
Experiment	40 marks	Observation notebook	10 marks
Total	**60 marks**	**Total**	**40 marks**

For analysis, if the student has

< 2% error - 40marks
2 – 3% error – 30marks
3-5% error - 20marks
>5% error - 10marks

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Passed in the BOS Meeting held on 18-03-2020