SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – MICROBIOLOGY - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

I SEMESTER

S. No	Subject Code	Nature	Subject Title	Hours/ Week	Exam Hrs	CA	SE	Tot	Crd
1.	17UACT11	Part-I	Tamil	6	3	25	75	100	3
	17UACH11		Hindi						
	17UACS11		Sanskrit						
2	1UAC E11	Part-II	English	6	3	25	75	100	3
3	17UMBC11	Part-III Core	General Microbiology	5	3	25	75	100	4
4	17UMBS11	Part-IV SBS	Diagnostic Microbiology And Haemotology	3	3	25	75	100	3
5	17UCYA11	Part-III Allied	General Chemistry-I	4	3	25	75	100	4
6		Part-III Core	*Core Practical- I	2	-	-	-	-	-
7		Part-III Allied	*Allied Practical- I Chemistry	2	-	-	-	-	-
8	14UACVE1	Part-IV	Value Education	2	3	25	75	100	2
			Total	30					19

***Core Practical - I and Allied lab - I – Practical exams at the end of the II semester**

Passed in the BOS Meeting held on 15-3-2017

Signature of Chairman/HOD

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – MICROBIOLOGY - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - III CORE	**Title : GENERAL MICROBIOLOGY**	**Subject Code : 17 UMBC11**
Semester : I	**HOURS : 5 hours / Week**	**CREDITS : 4**

OBJECTIVES:

To introduce the basic concepts in Microbiology with an exposure to various microorganisms at the elementary level.

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, Twort,d'Herelle , James Watson and Francis crick.

UNIT II: Microscopy –Parts and function of a Microscope – Terms –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 –Functions and application.

UNIT III: Prokaryotes - Ultra structure and function- Cellular Organization of Bacteria - Structure and functions of cell wall, Cytoplasmic membrane, S-Layer, Capsule, Pili, Flagella , Nucleoid, Ribosome, Plasmid, mesosomes, Endospore, cytoplasmic inclusions. Differences between prokaryotes and eukaryotes.

UNIT IV: Salient features of Bacteria – *E. coli, Bacillus, Clostridium and Blue Green Algae, Actinomycetes, Streptomyces* – Salient features, Structure and reproduction- *Yeast, Aspergillus and Penicillium* as examples.

UNIT V: Salient features of Algae – Structure and reproduction of Chlorella, Chlamydomonas and Diatoms – Salient features of Viruses – HIV, TMV. Bacteriophage- T4 (structure only).

TEXT BOOK(S):

1. Pelczar, M.J., Chan, E.C.S and Kreig, N.R. 1995. Microbiology, 5th Ed, Tata McGraw Hill Publishing Co., Ltd., New Delhi.
2. Schlegel, H. G. 1993. General Microbiology, 7th Ed., Tata McGraw Hill Publications.
3. Sullia, S.B and Santharam, S. 2000. General Microbiology, Oxford and IBH Publishing Co., Pvt., Ltd.

REFERENCE BOOKS:

1. Prescott, Harley and Klein, 2006, Microbiology, 6th Ed., Tata McGraw Hills.
2. Alexopoulus C. J and Mims C. W. 2000 Introductory Mycology, 3rd Ed., Wiley Eastern Publications.
3. Dimmock, N. J., Easton, A.J and Leppard, K. N. 2001.Introduction to Modern Virology, 5th Ed., Blackwell Publications.

Passed in the BOS Meeting held on 15-3-2017

Signature of Chairman/HOD

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – MICROBIOLOGY - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - IV SKILL BASED	**Title : DIAGNOSTIC MICROBIOLOGY AND HAEMATOLOGY**	**Subject Code : 17 UMBS11**
Semester : I	**HOURS : 3 hours / Week**	**CREDITS : 3**

OBJECTIVES:

To train the students in the fields of Basic Clinical and Diagnostic Microbiology.

UNIT I: Role of Microbiology Lab; Safety regulations -Types, Collection and handling of Specimens, Preparations of Serum and Plasma. – Laboratory Identification of Infectious agents. Staining Techniques - Simple, Gram's and Acid-Fast.

UNIT II: Components of Blood and their functions-Erythrocytes, Leukocytes, Lymphocytes, Monocytes and Thrombocytes. Anti-Coagulants-Blood Collecting containers with anti coagulants. Blood collections by Vein puncture and Capillary Puncture.

UNIT III: Routine Hematological tests – Determinations of Hemoglobin content, RBC, WBC, and Platelet counts. Study of Stained Blood Smear – Differential count. Reticulocyte count – ESR- Eosinophil count.

UNIT IV: Clinical Pathology –Urine analysis and Stool Examinations- Routine Procedure in Blood Bank- ABO Blood grouping and Rh typing – Compatibility testing or Cross – matching.

UNIT V: Microbial analysis of different types of Clinical specimens –Blood, Pus and Throat Swab. Antimicrobial Susceptibility tests, Minimal Inhibitory Concentration (MIC) of Antibiotics (Definition only).

TEXT BOOK(S):

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.

Passed in the BOS Meeting held on 15-3-2017

Signature of Chairman/HOD

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – MICROBIOLOGY - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

II SEMESTER

S. No	Subject Code	Nature	Subject Title	Hrs/ Week	Exam Hrs	CA	SE	Tot	Crd
1	17UAC T21	Part-I	Tamil	6	3	25	75	100	3
	17UACH21		Hindi						
	17UACS21		Sanskrit						
2	17UAC E21	Part-II	English	6	3	25	75	100	3
3	17 UMB C21	Part-III Core	Microbial Physiology & Taxonomy	5	3	25	75	100	4
4	17 UMB S21	Part-IV SBS	Cosmetic Microbiology	3	3	25	75	100	3
5	17 UCY A21	Part-III Allied	General Chemistry-II	4	3	25	75	100	4
6	17 UMBCP1	Part-III Core	*Core Practical- I	2	3	40	60	100	2
7	17 UCY AP1	Part-III Allied	*Allied Practical-I Chemistry	2	3	40	60	100	2
8	14 UAS ES1	Part-IV	EVS	2	3	25	75	100	2
			Total	30					23

***Core Practical - I and Allied lab - I – Practical exams at the end of the II semester**

Passed in the BOS Meeting held on 15-3-2017

Signature of Chairman/HOD

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – MICROBIOLOGY - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - III CORE	**Title : MICROBIAL PHYSIOLOGY AND TAXONOMY**	**Subject Code : 17 UMBC21**
Semester : II	**HOURS : 5 hours / Week**	**CREDITS : 4**

OBJECTIVES:

To inculcate the concepts of anabolism and catabolism with an elaborate coverage on the Classification System of Microorganisms.

UNIT I: Bioenergetics- Laws of thermodynamics. Generation of energy, Generation of ATP, Substrate Level Phosphorylation, Oxidative Phosphorylation, ETC – Respiration – Aerobic and Anaerobic mechanisms.

UNIT II: Photosynthesis and Inorganic Metabolism- Photosynthesis in bacteria – Structural aspects of Electron Transport in Green bacteria - Cyanobacteria and Purple Photosynthetic bacteria. Inorganic metabolism in bacteria – Nitrogen, Phosphorous and Sulfur.

UNIT III: Bacterial Cell division and Differentiation – Events of Sporulation in *Bacillus* – Endospore formation, activation, germination and outgrowth. Differentiation in *Caulobacter*, *Dictyostelium*.

UNIT IV: Taxonomy – Major characteristics used in Taxonomy – Morphological, Physiological, biochemical and Molecular characteristics and their role. Principles of Chemotaxonomy and Numerical taxonomy.

UNIT V: Classification of fungi by Alexopoulos and Mims, Fritsch classification of Algae, Baltimore classification of Viruses. Major families with suitable examples.

TEXT BOOK(S):

Albert G. Moat John W. Fosterand Michael P. Spector, 2003, Microbial Physiology, 4th Ed., Library of Congress Cataloguing In Publications.

REFERENCE BOOKS:

1. Daniel R. Caldwell, 1995.Microbial Physiology and Metabolism, Library of Congress Cataloguing In Publications.
2. Alexopoulos C. J and Mims C. W. 2000 Introductory Mycology, 3rd Ed., Wiley Eastern Publications.

Passed in the BOS Meeting held on 15-3-2017

Signature of Chairman/HOD

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – MICROBIOLOGY - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - IV SKILL BASED	**Title : COSMETIC MICROBIOLOGY**	**Subject Code : 17 UMB S21**
Semester : II	**HOURS : 3 hours / Week**	**CREDITS : 3**

OBJECTIVES: To enlighten the students in the applications of Microbiology in Cosmetics**.**

UNIT I: History of Cosmetic Microbiology – Need for cosmetic microbiology, Scope of cosmetic microbiology, - Role of microbes in cosmetics preparation.

UNIT II: Quality control measures in cosmetics preparation – Microbial resistance – Critical Control point

UNIT III: Microorganisms in cosmetics – Preservation of cosmetics – Mechanisms of action of Cosmetic preservatives – Enzymes in cosmetics.

UNIT IV: Validation of Method – Equipment Cleansing and Sanitization – Validation in Microbiology Laboratory – Media, microbial Content Test, Identification, Sterilizers, Decontamination.

UNIT V- Antimicrobial properties of natural cosmetic products – Garlic, Neem, Turmeric, Aloe vera and Tulsi.

TEXT BOOK(S):

Philip, A.G. 2006. Cosmetic Microbiology. A Practical approach. 2nd Ed., Taylor & Francis group.

Daniel K. Brannan. 1997, Cosmetic Microbiology: A practical handbook, CRC Press.

Online References:

www.pharmatutor.com

Passed in the BOS Meeting held on 15-3-2017

Signature of Chairman/HOD

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – MICROBIOLOGY - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - III CORE	**Title : CORE PRACTICAL – I**	**Subject Code : 17 UMB CP1**
Semester : II	**HOURS : 2 hours / Week**	**CREDITS : 2**

OBJECTIVES: To train the students in the Practical basics of Microbiology**.**

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 Staining, Gram's Staining, 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 growth by Direct Count and Viable Count.

Reference Books:

1. Practical Microbiology by P. Gunasekaran.
2. Practical Microbiology by Kannan.
3. Microbiology by Cappuccino.
4. Practical Microbiology by Aneja.

Passed in the BOS Meeting held on 15-3-2017

Signature of Chairman/HOD

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – MICROBIOLOGY - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

III SEMESTER

S. No	Subject Code	Nature	Subject Title	Hours/ Week	Exam Hrs	CA	SE	Tot	Crd
1	17UAC T31	Part-I	Tamil	6	3	25	75	100	3
	17UACH31		Hindi						
	17UACS31		Sanskrit						
2.	17 UAC E31	Part-II	English	6	3	25	75	100	3
3.	17UMBC31	Part-III Core	Molecular Biology	5	3	25	75	100	4
4.	17UMBA31	Part-III Allied	Allied II– Cell Biology	4	3	25	75	100	4
5.	17 UMBS31	Part-III SBS	Mushroom Technology	3	3	25	75	100	3
6.	17UMBN31	Part-IV NME	Food & Dairy Microbiology	2	3	25	75	100	2
7		Part-III Core	*Core Practical - II	2	-	-	-	-	-
8.		Part-III Allied	*Allied Practical II-Biology	2	-	-	-	-	-
			Total	**30**					**19**

***Core Practical - II and Allied lab - II – Practical exams at the end of the IV semester**

Passed in the BOS Meeting held on 15-3-2017

Signature of Chairman/HOD

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – MICROBIOLOGY - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - III CORE	**Title : MOLECULAR BIOLOGY**	**Subject Code : 17 UMB C31**
Semester : III	**HOURS : 5 hours / Week**	**CREDITS : 4**

Objectives: To train the students in the basic concepts of Molecular Biology and its importance.

Unit I:

Structural aspects of DNA – the double helical model- Different forms of DNA- A, B, Z & rare forms of DNA -melting curve- Structure of RNA- mRNA, tRNA, rRNA.

Unit-II

DNA replication – modes of DNA replication – Enzymology of DNA replication – Replication in prokaryotes – DNA polymerase in prokaryotes – Replication in eukaryotes- Bidirectional method.

Unit III:

Transcription – RNA polymerase – RNA Processing in Prokaryotes and Eukaryotes – their functions, Process of transcription in prokaryotes - Initiation, Elongation and Termination

Unit IV:

Genetic code –properties – wobble hypothesis-Translation – Stages in Prokaryotic and Eukaryotic translation-Initiation, Elongation and Termination.

Unit V:

Transposable Elements – IS Elements – Transposons – Tn10, Tn5, Tn3 – Operon Concept – Lac & Trp operons

.

Text Books:

1. Turner, P. C., McLennan, A. G., Bates, A. D and White, M. R. H. 1998. Instant Notes in Molecular Biology, Viva Books Pvt. Ltd.,
2. David Freifelder. 2006. Essentials of Molecular Biology, 4nd Ed. Narosa Publishing House,

Reference Books:

1. Twyman, R. M. 1999. Advanced Molecular Biology. 1st Ed., Viva Books Pvt Ltd.,
2. Harvey Lodish, Arnold Berk, Lawrence Zipursky S., Paul Matsudaira, David Baltimore and James Darnell. 2000. Molecular Cell Biology, 4th Ed., W. H. Freeman & Co.
3. David Freifelder. 1993. Essentials of Molecular Biology, 2nd Ed., Panima Publishing Co.

Passed in the BOS Meeting held on 15-3-2017

Signature of Chairman/HOD

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – MICROBIOLOGY - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - III ALLIED	**Title : CELL BIOLOGY**	**Subject Code : 17 UMB A31**
Semester : III	**HOURS : 4 hours / Week**	**CREDITS : 4**

Objectives: To expose the students to eukaryotic cell structures, their functions with an introduction to Applied Microbiology.

Unit I:

Cell Structure – prokaryotic and eukaryotic (comparison)-plant and animal cells – structural features. Plasma membrane – Chemistry and ultra-structure – Fluid Mosaic model-functions. Protoplasm – Chemistry and organization – microtubules and microfilaments.

Unit II

Membrane systems in eukaryotes: Endoplasmic reticulum and Golgi complex – structure, chemistry, origin and functions. Organelles in Eukaryotes: Lysosomes – ultra structure and functions, types. Ribosomes – ultra structure and functions.

Unit III:

Chloroplast – ultra structure and chemistry, function – mechanism of photosynthesis and generation of ATP to be explained briefly. Mitochondria – ultra structure and functions – semi autonomy of cell organelles. Nucleus – Nuclear envelop –nucleolus-structure and function. chromosomes –structure-euchromatin & heterochromatin-nucleosomes.

Unit IV:

Cell Cycle – G1, S & G2 phases, Cell division: Mitosis and Meiosis – stages and their significance.

Unit V:

Microscopy-light and electron microscopy-principle and onstruction-resolving power.Centrifugation-principle-Sub cellular fractionations, differential and density centrifugation. Cytochemical staining methods: Lipids (Sudan Black), Polysaccharides – (Periodic Acid Schiff's reagent), DNA (Feulgen), Nucleic acids – (Methyl Green Pyronin).

Text Books:

1. Verma, P.S. and Agarwal, V.K. 1995. Cell Biology, Genetics and Evolution, S Chand & Co., New Delhi.

References:

1. Albert, B., Bray, D., Lewis, J., Raff, M., Roberts K and Watson. J.D. 1983. Molecular Biology of Cell. Garland Publishing Co., Inc., New York, USA.
2. De Robertis, E.D.P and De Robertis, E.M.F.1990. Cell and Molecular Biology 3rd Ed, McGraw – Hill Publications.
3. Cooper. 1997. The Cell-A Molecular Approach. ASM.

Passed in the BOS Meeting held on 15-3-2017

Signature of Chairman/HOD

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – MICROBIOLOGY - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - IV Skill Based	**Title : MUSHROOM TECHNOLOGY**	**Subject Code : 17 UMB S31**
Semester : III	**HOURS : 3 hours / Week**	**CREDITS : 3**

Objectives: To educate the students the basic concepts in Mushroom Cultivation and their economics.

UNIT: 1

History and Classification of mushroom .Nutritive value of mushrooms – Components of mushroom.

UNIT: 2

Morphology, life cycle of mushroom- Isolation methods and maintenance of mushroom cultures - Spawn production.

UNIT: 3

Methods of mushroom cultivation – Cultivation of white button mushroom, oyster mushroom , shittake and wood ear mushroom.

UNIT: 4

Mushroom recipes –Medicinal value of mushrooms – Mushroom diseases – Bacteria, fungi, Insect and Pests (with one example each) – Control measures.

UNIT: 5

Mushroom Research Stations in India – Economics of mushroom production – Environmental impact.

Reference Books:

1. Sivakumar, N., Kumaresan, V and Satheesh, S .2009. Principles of Mushroom Cultivation .1st Ed., Chandra Publications.
2. Cultivation of Edible Mushroom –ICAR Publications.

Passed in the BOS Meeting held on 15-3-2017

Signature of Chairman/HOD

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – MICROBIOLOGY - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - IV NME	**Title : FOOD AND DAIRY MICROBIOLOGY**	**Subject Code : 17 UMB N31**
Semester : III	**HOURS : 2 hours / Week**	**CREDITS : 2**

Objectives: To inculcate the importance of various microorganisms in the spoilage of food and their implications on human health.

UNIT: I

Importance of Food and Diary Microbiology – Food as substrate for microbial growth - intrinsic and extrinsic factors affecting growth and survival of microorganism in foods .

UNIT: II

Features of food spoilage like, vegetables, milk and milk products – Milk sterilization techniques. Phosphatase test

UNIT: III

Microbial Spoilage of bread and cereals and meat.

UNIT: IV

Food preservation physical (any 3) and chemical methods (any 3).

UNIT: V

Food borne infection-*Salmonella*, *Shigella*.food borne intoxications-Botulism, Mycotoxin.Detection of food-borne pathogens.

Text Books:

1. Adams, M.R and Moss, M.O. 2000. Food Microbiology. 2nd Ed., New age International Pvt, Ltd publication
2. Frazier, W.C and Westhoff D.C. 2003. Food Microbiology, 4th edition, McGraw Hill, New York

References:

1. Jay, J. M. 2000. Modern Food Microbiology, Aspen Publishers.
2. Robinson. R.K.1990. Dairy Microbiology, Elsevier Applied Science, London.

Passed in the BOS Meeting held on 15-3-2017

Signature of Chairman/HOD

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – MICROBIOLOGY - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

IV SEMESTER

S. No	Subject Code	Nature	Subject Title	Hrs/ Week	Exam Hrs	CA	SE	Tot	Crd
1.	17 UAC T41	Part-I	Tamil	6	3	25	75	100	3
	17UACH41		Hindi						
	17UACS41		Sanskrit						
2.	17 UAC E41	Part-II	English	6	3	25	75	100	3
3.	17UMBC41	Part-III Core	Microbial Genetics	5	3	25	75	100	4
4.	17UMBA41	Part-III Allied	Biodiversity and Biostatistics	4	3	25	75	100	4
5.	17UMBS41	Part-III SBS	Biocontrol	3	3	25	75	100	3
6.	17UMBN41	Part-IV NME	Diagnostic Microbiology	2	3	25	75	100	2
7.	17UMBCP2	Part-III Core	*CorePracticals– II	2	3	40	60	100	2
8.	17UMB AP2	Part-III Allied	*Allied Practical II -Biology	2	3	40	60	100	2
9.		PART-V	Extension Activity	-	-	25			1
			Total	**30**					**24**

***Core Practical - II and Allied lab - II – Practical exams at the end of the IV semester**

Passed in the BOS Meeting held on 15-3-2017

Signature of Chairman/HOD

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – MICROBIOLOGY - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - III CORE	**Title : MICROBIAL GENETICS**	**Subject Code : 17 UMB C41**
Semester : IV	**HOURS : 5 hours / Week**	**CREDITS : 4**

Objectives: To enlighten the students by educating the basic concepts in Genetics at Microbial level.

UNIT: I

Genetics –Bacterial Genetics –History-Experimental Evidences – DNA as genetic material – concept of gene.

UNIT: II

Mutation –Phenotypes in bacteria-Inheritance experiments- Types of mutation-Mutagens – Physical (UV) and chemical (NTG and Hydroxylamine) – mode of action – Isolation of auxotroph and drug resistance mutants – fluctuation & complementation test

.

UNIT: III

Methods of Genetic exchange in bacteria – Transformation-Natural –Discovery-Competance- Methods of uptake of DNA-Natural-Induced-Calcium ion induction-Electroporation- Role of transformation in gene mapping

UNIT: IV

Plasmid-Properties -types-F,R,Col-Gene transfer -Conjugation.-F^+ X F^-, HFR X F^-, F'X– F^- -Role of conjugation in gene mapping

UNIT: V

Phage genetics- Lytic-Lysogenic cycle (brief account)-Gene transfer-Transduction-Methods -Generalized- specialized– Role in genetic mapping (Brief account) .

TEXT BOOKS:

1. David Freifelder. 1998. Microbial Genetics.Narosa Publishing House.
2. Gardner, E.J., Michael, J., Simmons, D. Snustad, P. 2001. Principles of Genetics 8th Ed , John wiley & sons, Inc.,

REFERENCES:

1. Stanley R. Maloy, John E.Cronan, Jr. David Freifelder. 1994. Text Book of Microbial Genetics 2nd Ed., Narosa Publishing house.
2. Robert F. Weaver and Philip W. Hedrick.1992. Text Book of Genetics 2nd Ed., Wm. C. Brown Publishers.

Passed in the BOS Meeting held on 15-3-2017

Signature of Chairman/HOD

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – MICROBIOLOGY - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - III ALLIED	**Title : BIODIVERSITY AND BIOSTATISTICS**	**Subject Code : 17 UMB A41**
Semester : IV	**HOURS : 4 hours / Week**	**CREDITS : 4**

Objectives: To make the students appreciate the importance of Biodiversity in Biological Science along with the basic concepts in Biostatistics.

Unit I : Biodiversity – Introduction, Concept and Scope of Biodiversity. Levels of Biodiversity – Genetic, species & Ecosystem diversity. Megadiverse Centres & Hotspots of Biodiversity(a brief account).

Unit II: Threats to Biodiversity –causes &consequences- IUCN categories of threat. Conservation of Biodiversity – Methods of conservation - *in situ* conservation - National parks, Sanctuaries, Biosphere Reserves, Sacred Groves and *ex situ* conservation - Cryopreservation and Germplasm conservation.

Unit III: Biostatistics: Introduction – definition – Collection of Data – primary & secondary data-explanation and comparison. Methods of collecting primary data. Sampling design- random and non-random.

Unit IV: Classification of data-objectives-types. Tabulation of data-objectives-components of a table- Representation of Data- Diagrammatic (simple bar diagram and pie diagram) & graphic (Histogram, frequency polygon frequency curve, cumulative frequency curve) representation.

Unit V: Measures of Central Tendency- Explanation- types of averages- 1. Arithmetic mean. 2. Median. 3. Mode (problems related to individual, discrete and continuous series). Measures of Dispersion- Explanation and definition – Types. 1. Range. 2. Mean deviation. 3. Standard deviation and variance(problems related to individual and discrete series). Correlation: Explanation – types – methods of studying correlation using Karl Pearson's coefficient of correlation (simple problems related to correlation).

TEXT BOOKS:

1. CPR Manual of Biodiversity. 2003. Environmental Education Centre**,** Chennai.
2. Krishnamurthy, K.V.2003. An Advanced book on Biodiversity - Principles and Practice, Oxford SIBH publishing Co. Pvt. Ltd., New Delhi.
3. Palanichamy, S and Manoharan.1990. Statistical Methods for Biologists. Palani Paramount Publications.

REFERENCES

1. Belsare, D.K. 2007. Introduction to Biodiversity, APH Publishing Corporation, New Delhi.
2. Gupta, S. 1995. Elementary Statistical Methods 11th Ed., Sultan chand and sons Educational Publishers, New Delhi.

Passed in the BOS Meeting held on 15-3-2017

Signature of Chairman/HOD

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – MICROBIOLOGY - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - IV SKILL BASED	**Title : BIO CONTROL**	**Subject Code : 17 UMB S41**
Semester : IV	**HOURS : 3 hours / Week**	**CREDITS : 3**

Objectives: To educate the students to make them appreciate the advantages of Biocontrol and its applications.

UNIT I: Outline of Pest Management Programme – insect pest management and rodent pest management – need of biocontrol agents. Advantages of biocontrol over chemical pesticides.

UNIT II: Biology and ecology of organisms for Biocontrol – predators and Parasitolds - Nematodes.

UNIT III: Biopesticides – bacteria & fungi used as biopesticides, *Bacillus thuringensis, B.sphaericus, Metarizyum Verticillium and Trichoderma* – potentials and limitations.

UNIT IV: Virus as biopesticides – Nuclear Polyhedro virus, Granulosis virus (GV) and CPV, potentials and limitations.

UNIT V: Biological control of weeds – Production, Methods of application – Mycoherbicides – *Phytopthora palmivora* – Plant extracts – Neem, Tobacco, and Pudina.

TEXT BOOKS:

1. Roy G. Van Driesche and Bellows Jr. TS. 1996. Biological Control – Guide to its applications, Springer.
2. Kumerasan. V.Boptechnology, Saras publications.

ONLINE REFERENCES:

www. Epa.govt.nz

REFERENCES:

1. Helmut Fritz Van Embden. 2004. Pest and vector Control, Cambridge University Press.
2. Atlas, R and Bartha, R. 1987. Microbial ecology, 2nd ED., Benjami Cummings Publications.

Passed in the BOS Meeting held on 15-3-2017

Signature of Chairman/HOD

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – MICROBIOLOGY - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - IV NME	**Title : DIAGNOSTIC MICROBIOLOGY**	**Subject Code : 17 UMBN41**
Semester : IV	**HOURS : 2 hours / Week**	**CREDITS : 2**

Objectives: To introduce the students to the basic principles in the field of Medical Microbiology.

UNIT: I

Role of Microbiology Lab; safety regulations. Types, collection and handling of specimens. Preparation of serum and plasma.

UNIT: II

Laboratory identification of infectious agents. Staining techniques; simple, Gram, acid-fast, spore staining.

UNIT: III

Microbiological analysis of different types of clinical specimens: Urine, Blood, Stool, Pus and Throat swab.

UNIT IV: Routine Procedures in Blood Bank – ABO Blood Grouping and Rh typing.

UNIT V: Diagnosis of Mycotic and Parasitic infection. Determination of minimal inhibitory concentration (MIC) of antibiotics. Antimicrobial susceptibility test.

REFERENCES:

1. Mukerjee, K.L., Medical Laboratory Technology Vol. I-III. Tata McGraw – Hill Publishing company ltd., New Delhi.

Passed in the BOS Meeting held on 15-3-2017

Signature of Chairman/HOD

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – MICROBIOLOGY - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - III CORE	**Title : CORE PRACTICAL - II**	**Subject Code : 17 UMB CP2**
Semester : IV	**HOURS : 2 hours / Week**	**CREDITS : 2**

Objectives: To train the students in the field of Genetics.

Major Practicals – II

1. Mutagenesis of *E. coli* using UV and chemical mutagen.
2. Isolation of spontaneous mutants – Gradient plate technique.
3. Isolation of auxotrophic and drug-resistant mutants
4. Induction of *Lac Operon*.
5. Transformation – Selection of blue / white colonies.
6. Isolation of bacteriophage.
7. Isolation and Separation of chromosomal DNA by AGE.

References:

1. Janarthanan, S and Vincent S. 2007. Practical Biotechnology Methods & Protocols, University Press
2. Palanivelu, P. 2004. Analytical Biochemistry and Separation Techniques, 3rd Ed., Twenty first Century Publications, Palkalainagar, Madurai.
3. Jeffrey H. Miller. 1992. A Short Course in Bacterial Genetics, Cold Spring Harbour Laboratory Press.

Passed in the BOS Meeting held on 15-3-2017

Signature of Chairman/HOD

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – MICROBIOLOGY - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - III ALLIED	**Title : ALLIED PRACTICAL II - BIOLOGY**	**Subject Code : 17 UMB AP2**
Semester : IV	**HOURS : 2 hours / Week**	**CREDITS : 2**

Objectives: To educate the students by hands-on training in applied Biology.

LAB IN ALLIED BIOLOGY - Cell Biology, Biodiversity and Biostatistics

1. Study of Parts and functions of compound microscope
2. Study of Cell inclusions: Starch grains – smear of potato, banana or rice, Cystolith– Sections of *Ficus* leaves,
3. Study of cell organelles by photomicrographs
4. Study of various stages of mitosis and meiosis using *Allium cepa* roots and *Rheo* flower buds
5. By using world and Indian map mark important Biodiversity Regions.
6. Measuring Biodiversity – Species diversity index (Simpson's Index) of vegetation.
7. Analysis of the vegetation for frequency, density and abundance using quadrat method.
8. Collection of endemic plants and animals photos with information by using websites, journals, newspapers etc.
9. Problems in measures of Central tendency- Mean, Median and Mode
10. Problems in measures of Dispersion- Standard Deviation & Variance.

References

1. Arumugam, N. 2010. Cell and Molecular Biology, Saras Publications
2. Agarwal,V.K. 2000. Cell Biology, S. Chand & Co., New Delhi.
3. Krishnamurthy, K.V. 2003. An Advanced book on Biodiversity - Principles and Practice, Oxford SIBH publishing Co. Pvt. Ltd., New Delhi.
4. Belsare, D. K. 2007. Introduction to Biodiversity. APH Publishing Corporation, New Delhi.
5. Gupta, S. 1995. Elementary Statistical Methods 11th Ed., Sultan chand and sons educational publishers, New Delhi.
6. Palanichamy, S and Manoharan. 1990. Statistical Methods for Biologists. Palani Paramount Publications.

Passed in the BOS Meeting held on 15-3-2017

Signature of Chairman/HOD

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – MICROBIOLOGY - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

V SEMESTER

S. No	Subject Code	Nature	Subject Title	Hrs / Week	Exam Hrs	CA	SE	Tot	Crd
1	17UMBC51	Part-III Core	Clinical Microbiology	5	3	25	75	100	5
2	17UMBC52	Part-III Core	Agricultural and Environmental Microbiology	5	3	25	75	100	5
3	17UMBC53	Part-III Core	Immunotechnology	5	3	25	75	100	4
4	17UMBC54	Part-III Core	Food and Industrial Microbiology	5	3	25	75	100	4
5	17UMBE51	Part-III *Elective	Computer Applications in Biology	5	3	25	75	100	5
6	17UMBE52	Part-III *Elective	Bioremediation	5	3	25	75	100	5
7	17UMBCP3	Part-III Core	Core Practical-III	5	3	40	60	100	4
8	16USS S51		Soft Skills	-	-	-	-	100	-
			Total	**30**					**27**

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

Passed in the BOS Meeting held on 15-3-2017

Signature of Chairman/HOD

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – MICROBIOLOGY - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - III CORE	**Title : CLINICAL MICROBIOLOGY**	**Subject Code : 17 UMB C51**
Semester : V	**HOURS : 5 hours / Week**	**CREDITS : 5**

Objectives: To inculcate clinical microbiology knowledge among students.

Unit: I

History of Infectious diseases -Koch's postulates. Human-microbe Interactions, Virulence factors – Adhesins, Aggresins, Invasins and Impedins, Host defence mechanisms.

Unit: II

Bacteriology: Transmission, Diagnosis, Clinical symptoms, Control, Treatment and Prophylaxes of bacterial member's - *Staphylococcus*, *Streptococcus*, *E. coli*, *Salmonella*, *Bacillus*, *Vibrio* & *Mycobacteria*.

Unit: III

Virology: Etiology, Prophylaxis, Clinical symptoms and Treatment for Human Viral Diseases: SARS, Rabies, Hepatitis & AIDS, Viruses and Cancer.

Unit:IV

Mycology & Protozoan diseases: Classification of Mycoses with example– Superficial, Cutaneous, Systemic & Opportunistic types and Subtypes – Life cycle of Candidiosis. Life cycle, Diagnosis and Treatment of Protozoan diseases – Amoebiasis & Malaria.

Unit: V

Anti microbial chemotherapy – Antibacterial – Penicillin, Streptomycin, Antifungal - Nystatin and Antiviral drugs – Azidothymidine, Modes of action with examples – Drug resistance – MDR, XDR, XXDR and TDR, Mechanisms of Drug Resistance – Enzymatic, Chemical, MDR Pumps, Metabolic Bypass and R-Plasmids.

Text Books:

1. Murray, Rosenthal and Pfaller, Medical Microbiology, 7th Ed., Elsevier Publications.
2. Kenneth J. Ryan and George Ray C., Sherris Medical Microbiology, 4th Ed., McGraw Hill Publications.

References:

1. Paniker, C. K. J. Ananthanarayanan and Paniker's Textbook of Microbiology, 7th Ed., Orient Longman Publications.

Passed in the BOS Meeting held on 15-3-2017

Signature of Chairman/HOD

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – MICROBIOLOGY - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - III CORE	**Title : AGRICULTURAL AND ENVIRONMENTAL MICROBIOLOGY**	**Subject Code : 17 UMB C52**
Semester : V	**HOURS : 5 hours / Week**	**CREDITS : 5**

Objectives: To expose the students to the concepts of Agricultural and Environmental Microbiology.

Unit I:

Soil Microbes – Bacteria, Fungi and Actinomycetes (Distribution), Microbial Interaction – Mutualism, Amensalism and Commensalism – Soil enzymes – N_2 fixation – Symbiotic and free living. Rhizosphere and phyllosphere – Mycorrhizal Associations – Ecto and Endomycorrhizae – Actinorhyzae.

Unit II:

Plant-Microbe Interactions – Pathogenesis, Mechanisms of Pathogen Establishment and Symptoms. Plant Diseases caused by Bacteria – Xanthomonas& Mycoplasma, Fungi – Pyricularia and Fusarium and Viruses – TMV & CMV, Disease Control – Chemical Fungicides and Pesticides, Disadvantages.

Unit III:

PGPR – *Pseudomonas fluorescence* and Siderophores and HCN.Biofertilizers – Bacterial(*Rhyzobium*) &Fungal(VAM) - Production and Methods of Application –Biopesticides – Bacterial(*Bacillus thuringensis*), Fungal(*Beauveria bassiana*) and Viral(NPV) – Microbial Nematicides and MicrobialHerbicides – Biotechnology in Agriculture - Bt Cotton and herbicide tolerant plants.

Unit IV:

Role of Microorganisms in Biogeochemical cycles N_2-cycle, P-cycle and C-cycle, Aquatic Microbiology - Microbes in fresh water & Marine water.

Unit V:

Biodegradation of Xenobiotics (Chlorinated Pesticides) – MEOR – Bioleaching of Metals(Copper and Gold). Bioremediation-Microbes in Waste treatment - Solid waste (Sanitary land fill and Composting) and liquid waste – Sewage treatment –BOD,Pollution indicating microbes.

Text Books:

1. Prescott, Harley and Klein. 2006. Microbiology.6th Ed., McGraw Hill companies.
2. Subba Rao, N.S. 2002, Soil Microbiology, 4th Ed., Oxford& IBH publication.
3. Sathyanarayana, U. 2008. Biotechnology, 2nd Ed., Arunabha Sen Books an allied Publications Ltd.

References:

1. Rangasami, G and Bagyaraj, D.J. 1993. Agricultural Microbiology, Prentice –Hall Publications.
2. Atlas, R and Bartha, R. 1987. Microbial ecology, 2nd Ed., Benjami Cummings Publications.

Passed in the BOS Meeting held on 15-3-2017

Signature of Chairman/HOD

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – MICROBIOLOGY - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - III CORE	**Title : IMMUNOTECHNOLOGY**	**Subject Code : 17 UMB C53**
Semester : V	**HOURS : 5 hours / Week**	**CREDITS : 4**

Objectives: To enlighten the students with the concepts in Immunology.

Unit: I

Elements of Immunity: Overview of the Immune system – Basic concepts in immunology - (History), Principles of innate and acquired immunity – Cells and organs of the Immune System –Antigens and their Characteristics.

Unit: II

Antibody –Structure, Classification and Characterization, Antigen-Antibody reactions-Agglutination, Precipitation and Flocculation. Immunoelectrophoresis-Complement system, Immune tolerance.

Unit III:

Humoral and Cell Mediated Immune response – B-Cell Maturation - Activation and Differentiation, Major Histocompatibility Complex (MHC)- Antigen Processing and presentation and T-cell Maturation, Activation and Differentiation.

Unit IV:

Hypersensitivity Reactions – Autoimmunity - Autoimmune Diseases, T cell, B cell, Phagocytic and NK cell associated diseases.Vaccines and types with example.

Unit v:

Transplantation Immunology – Autograft, Allograft, Isograft and Xenograft, Basics of Graft Rejection, Tissue typing, Clinical Transplantation of Kidney and Bone Marrow. Tumor antigen, Immune response to tumor, Cancer immune therapy.

Text Books:

1. Travers, J. 1997. Immunobiology, The immune system in health and disease, 3rd Ed., Garland publishers, NY.
2. Klasus, E and Elegert. 1996. Immunology Understanding the immune system. Wiley Liss, NY.
3. Abbas , A.K, Lichtman, A. H and Pober, J.S. 1997. Cellular and Molecular Immunology.3rd Ed., W.B.Saunders company.

References:

1. Roitt, I.M. 1998. Essentials of Immunology, 8th Ed., Blackwell scientific Publication.
2. Kuby, 2000. Immunology, 4th Ed., W.H.Freeman and company, NY.

Passed in the BOS Meeting held on 15-3-2017

Signature of Chairman/HOD

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – MICROBIOLOGY - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - III CORE	**Title : FOOD AND INDUSTRIAL MICROBIOLOGY**	**Subject Code : 17 UMBC54**
Semester : V	**HOURS : 5 hours / Week**	**CREDITS : 4**

Objectives: To educate the students, the concepts in Food Microbiology and Industrial Microbiology and to make them appreciate their importance in life.

Unit I: Importance of Food Microbiology – Intrinsic and Extrinsic Factors affecting microbial growth in food, Features of Food Spoilage in Vegetables, Cereals and Milk.

Unit II: Food Preservation Techniques – Asepsis, Low temperature, High temperature and Irradiation – Radicidation, Radappertization and Radurization, Chemicals, Food Borne Infections –Botulism, Food borne intoxications – Mycotoxicosis, Fermented foods – Sauerkraut – Short account.

Unit III: Fermentor – Basic design and parts –types – Air lift, CSTR, tower and packed bed bioreactors. Upstream process – inoculum preparation – buildup production – Fermentation types – batch, fed batch and continuous.

Unit IV: Production process – Antibiotic (Penicillin) Amino acids (Glutamic Acid) Vitamin(Vitamin B12), Solvent (Ethanol).Detection and Assay of Fermentation products (Biological Assay).

Unit V: Bio Safety levels, Guidelines and Regulations. Quality Assurance and Quality Control of Fermented Products-HACCP.

Text Books:

1. William C. Frazier, Dennis C.Westhoff. 1997. Text Book Of Food Microbiology 4th Ed., Tata McGraw-Hill companies, New York.
2. James M. Jay. 1996. Text Book of Modern Food Microbiology 4th Ed., Champman & Hall, Inc., New York.

References:

1. Patel A. H. 1996. Text Book of Industrial Microbiology, Macmillan Publisher India.
2. Crueger, W. and Cruger, A. 2000. Biotechnology- A Text Book of Industrial Microbiology, Panima Publishers, New Delhi.

Passed in the BOS Meeting held on 15-3-2017

Signature of Chairman/HOD

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – MICROBIOLOGY - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - III ELECTIVE	**Title : COMPUTER APPLICATIONS IN BIOLOGY**	**Subject Code : 17 UMB E51**
Semester : V	**HOURS : 5 hours / Week**	**CREDITS : 5**

Objectives: To introduce the students to the concept of Computers and their applications in Microbiology.

Unit: I Computers – History – Development of computers – Generation of computers – Types of computers – Desktops, Laptops, Notebooks, Netbooks & Tablets – Recent advancements - Data representation – Bit, Nibble, Byte, Kb, Mb, Gb, Tb and Pb, Binary number system.

Unit: II Software, Package and hardware - Computer languages –Development of languages – BASIC, COBOL, JAVA, - Definition and applications only. Computer Program – Definition and Program Execution.

Unit: III Structural components of computer and their uses, Role of Computers in Biological research – Internet & Email, Reference collection.

Unit: IV Phylogenetic analysis – Steps in Phylogenetic analysis – Phylogenetic Tree Construction Methodologies – Distance Matrix and Character Based Methods – Types – Definition Only - Structural Prediction – Softwares for Biomolecular Structure Prediction – MFOLD, Vienna RNA Package – Methods of Protein Structure Prediction - Chou-Fasman Method, GOR Method, Neural Networks and PhD – Brief descriptions only, Digital Biostatistical analysis - Basic, Intermediate and Advance level Biostatistical Packages - examples.

Unit: V Genomics on the world wide web – NCBI, Sequence analysis – Introduction, Sequence Alignment – Pairwise and Multiple Alignments, Global Vs. Local Alignments, Sequence Comparison – Database Search - BLAST and Types -BLAST N,BLAST P and WU-BLAST – PSI –BLAST-Brief descriptions only.

Text Books:

1. Peter Norton .Introduction to Computers, 6th Ed., Tata McGraw Hill Publications.
2. Ignacimuthu .S. 2005.Basic Bioinformatics, Narosa Publishing house Pvt,Ltd.
3. Attwood.T.K and Parry Smith.D.J.1999.Introduction to Bioinformatics, Pearson Education Asia.

References:

1. Rajadurai M., Bioinformatics – A Practical Manual, PSB Book Enterprises.
2. Martin J. Bishop, Genetics Databases, 2nd Ed. Academic Press Publications.

Passed in the BOS Meeting held on 15-3-2017

Signature of Chairman/HOD

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – MICROBIOLOGY - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - III Elective	**Title : BIOREMEDIATION**	**Subject Code : 17 UMB E52**
Semester : V	**HOURS : 5 hours / Week**	**CREDITS : 5**

Objectives:

To provide a deeper insight of the concepts in Bioremediation technology for the students.

Unit 1: Pollutions-Types of pollutants,water (fresh water and marine water) and soil-Sources of pollution and their impact on environment.

Unit 2: Bioremediation- Definition, applications-advantages-Techniques-Biodegradation-Biotranformation-Brief description only.

Unit 3: Environmental Pollution and environmental contamination-Recalcitrant Compounds and Pollutants – Brief Classification of Contaminants – Carbon contents and densities – Effect of contaminants on Environment.

Unit 4: Bioremediation of Contaminants – (a) Organic wastes – Nature and decomposition – Mineralization and Immobilization – Microbes involved – Anaerobic decomposition of organic matter (b) Waste Water – Environmental Impact – Treatment – Primary, Secondary and Tertiary (c) Industrial Waste Water – Types and Components, Effects, Conventional Strategies for waste-water management – Microbes in waste water treatment.

Unit 5: Treatment and disposal of waste waters – Domestic sewage – Primary, Secondary and Tertiary treatment – Microbes for waste water treatment.

References:

1. Atlas, R and Bartha, R. 2003. Microbial ecology. 2nd Ed., Pearson Education Publications.

2. Rajendran, P and Gunasekaran, P. 2006. Microbial Bioremediation, MIP publications.

Passed in the BOS Meeting held on 15-3-2017

Signature of Chairman/HOD

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – MICROBIOLOGY - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - III CORE	**Title : CORE PRACTICAL - III**	**Subject Code : 17 UMB CP3**
Semester : V	**HOURS : 5 hours / Week**	**CREDITS : 4**

Objectives: To provide practical training to the students in the fields of Medical Microbiology, Immunology, Soil and Agricultural Microbiology.

Medical Microbiology

1. Antibiotic susceptibility test: Kirby Bauer Disc Diffusion method
2. Isolation of pathogenic bacteria from clinical specimens: *Staphylococcus, Streptococcus, Salmonella, Vibrio*

Soil and Agricultural Microbiology

3. Isolation and enumeration of soil microbes .
4. Identification of bacterial pathogen in paddy and vegetable crops(field study)
5. Isolation of nitrogen fixing bacteria-*Rhizobium,Azotobacter*
6. Isolation of phosphate solubilizing bacteria- *Pseudomonas*
7. Examination of mycorrhizae-VAM
8. Potability testing of water(MPN test)

Immunology

9. Lymphoid organs in experimental animals-mouse/rat/rabbit – Theoretical explanation only.
10. Bleeding techniques – Capillary puncture and Vein puncture.
11. Separation of serum/plasma
12. Erythrocyte Sedimentation Rate
13. Blood cell count: RBC count, WBC count-total and differential
14. Blood typing: ABO, Rh
15. Agglutination tests: Widal test
16. Precipitation: Ouchterlony Double immunoDiffusion

Food and Industrial Microbiology

17. Examination of Different Food samples.
18. MBRT
19. Alcohol (Ethanol) production using *Vitis vinifera.*
20. Immobilization of Yeast.

Text Books:

1. Anantha Narayanan and Paniker, C.K.J. Text Book of Microbiology, Orient Longmann.

References

1. P.Palanivelu, 2000.Analytical Biochemistry and Separation Techniques, 3rd Ed., 21st century Publications.
2. Rangasamy, G and Bagyaraj, D.J. 1993. Agricultural Microbiology, 2nd Ed., Prentice- Hall Publications.
3. Hleyn Bicknell and Gilstrap. Microbiological experiments: A Health Science perspective Wm. C. Brown Publishers.

Passed in the BOS Meeting held on 15-3-2017

Signature of Chairman/HOD

SOURASHTRA COLLEGE, MADURAI– 625004
(An Autonomous Institution Re-accredited with 'B' grade by NAAC)
B.Sc., – MICROBIOLOGY - SYLLABUS
(Under CBCS w.e.f. 2017 – 2018 onwards)

VI SEMESTER

S. No	Subject Code	Nature	Subject Title	Hrs/ Week	Exam Hrs	CA	SE	Tot	Crd
1	17UMBC61	Part-III Core	Virology (Core)	5	3	25	75	100	5
2	17UMBC62	Part-III Core	Biochemistry and Enzymology (Core)	5	3	25	75	100	5
4	17UMBC63	Part-III Core	Recombinant DNA Technology (Core)	5	3	25	75	100	4
5	17UMBE61	Part-III **Elective	Bioinformatics	5	3	25	75	100	5
6	17UMBE62	Part-III **Elective	Analytical Microbiology	5	3	25	75	100	5
7	17UMBE63	Part-III **Elective	Fermentation and Bioprocess Technology	5	3	25	75	100	5
6	17UMBCP4	Part-III Core	Core Practicals-IV	5	3	40	60	100	4
7	16UGKB61		General Knowledge	-	-	-	-	100	-
			Total	**30**					**28**

****Two papers has to be chosen out of Three elective papers**

Passed in the BOS Meeting
held on 15-3-2017

Signature of Chairman/HOD

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – MICROBIOLOGY - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - III CORE	**Title : VIROLOGY**	**Subject Code : 17 UMBC61**
Semester : VI	**HOURS : 5 hours / Week**	**CREDITS : 5**

Objectives: To enlighten the students with the concepts in Virology

Unit: I Introduction - History,Structure & Composition of Viruses, Cultivation of Viruses – Methods, Assay and Purification Methods.

Unit: II Bacteriophages – Replication, One Step Growth Curve, Lytic (T4 and Lambda), and Lysogenic (P1 & Lambda) replication of bacteriophages. Filamentous phages – M13 and Qβ, Structure, Replication and applications.

Unit: III Animal viruses –Structure and Replication of Simion Virus 40, Herpes Simplex Virus, Adenoviruses, Poxviruses and Retroviruses.

Unit: IV Plant viruses –Structure and Replication of Tobacco Mosaic Virus , Cauliflower Mosaic Virus and Cucumber Mosaic Virus, Prions and Viroids.

Unit: V Human Viruses: Symptoms and Pathogenesis of Common cold, Influenza, Rubella, Mumps, Measles, and Chicken pox, Interferon's and Phage therapy.

Text Books:

1. Dimmock, N. J., Easton, A.J and Leppard, K. N. 2001.Introduction to Modern Virology, 5th Ed., Blackwell Publications.

References:

1. David O. White and Frank J. Fenner. Medical Virology, 4th Ed., Academic Press.

Passed in the BOS Meeting held on 15-3-2017

Signature of Chairman/HOD

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – MICROBIOLOGY - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - III CORE	**Title : BIOCHEMISTRY AND ENZYMOLOGY**	**Subject Code : 17 UMBC62**
Semester : VI	**HOURS : 5 hours / Week**	**CREDITS : 5**

Objectives: To make the students appreciate the importance of Biochemistry to life.

Unit I: Water and Life – pH and Buffers, Laws of Thermodynamics, Oxidation and Reduction reactions – Redox potential, Free energy – Exothermic and Endothermic reactions.

Unit II: Carbohydrates – Biological significance, Classification, Glycolysis, TCA Cycle, Oxidative Phosphorylation, Lipids – Fatty acids – Classification – Physical and Chemical properties, Fatty acid Biosynthesis and Oxidation (β-Oxidation).

Unit III: Proteins – Structure and Classification- Primary, Secondary, Tertiary and Quaternary Structure of proteins- Properties of amino acids, Biosynthesis of Glutamic acid and Lysine.

Unit IV: Nomenclature, Classification and Properties of Enzymes, Steady State Kinetics and derivation of Michaelis-Menton and Lineweaver Burk Equation plot. Mechanism and action of enzymes-Lock and Key model.

Unit V: Allosteric enzymes –Aspartate transcarbamylase – Multienzyme Complex – Pyruvate Dehydrogenase, Extraction and Purification of Enzymes, Applications of Enzymes (Clinical & Industrial).

Text Books:

1. Lehninger, A. L.2000. Principles of Biochemistry, 3rd Ed., Macmillan Publications.
2. Stryer, L.1997. Biochemistry, 4th Ed., W. H. Freeman and Company, NY.

References:

1. Palanivelu, P. 2000. Analytical Biochemistry and Separation Techniques, 3rd Ed., 21st Century Publications.

Passed in the BOS Meeting held on 15-3-2017

Signature of Chairman/HOD

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – MICROBIOLOGY - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - III CORE	**Title : RECOMBINANT DNA TECHNOLOGY**	**Subject Code : 17 UMBC63**
Semester : VI	**HOURS : 5 hours / Week**	**CREDITS : 4**

Objectives: To teach the basics of Cloning to the Students.

UNIT I:

Introduction to Gene Manipulation, Restriction-Modification System- Nomenclature, Properties and Applications.

UNIT II:

Cloning Vectors-Plasmids – pBR 322 and pUC vectors, Cosmids, Bacteriophages, Prokaryotic Expression Vectors, Broad-Host Range and Shuttle vectors, Eukaryotic – YAC vectors.

UNIT III:

Cloning -*Escherichia coli* and *Bacillus* as host. Construction and Screening of Genomic library and cDNA library.

UNIT IV:

Recombinant Selection - Blue/White, Plaque Forming Assay and Blotting – Southern and Colony Hybridization.

UNIT V:

Application of Recombinant DNA Technology in A) Agricultural - Ti Plasmid and their uses B) Pharmaceutical Industries: Production of Insulin, Interferon, Growth Hormone from microorganisms. C) Protein Engineering and Drug Design. D) Transgenic Plants, animals and Genetically Modified Microorganisms (with one example). Biohazards and Biosafety.

Text Books:

Brown .T.A.2001. Genecloning and DNA analysis an Introduction .4th Ed., Black well Science.

References:

1. Bourgaize jewell. Buiser Biotechnology-Demistifying the concepts- Pearson Education.
2. Watson. J.D, Gilman .M, Witkowski. J and Zoller. M. 1992.Recombinant DNA 2nd Ed., Scientific American Books.

Passed in the BOS Meeting held on 15-3-2017

Signature of Chairman/HOD

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – MICROBIOLOGY - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - III ELECTIVE	**Title : BIOINFORMATICS**	**Subject Code : 17 UMBE61**
Semester : VI	**HOURS : 5 hours / Week**	**CREDITS : 5**

Objectives: To inculcate the concepts in the applications of Information Technology in Microbiology to the students.

Unit: I

Block Diagram of Computers, Hardware - Input/output devices, Storage devices, Graphic devices, Operating Systems – Layers of an OS, types and functions of OS, Networks – LAN, WAN, MAN, Internet and Intranet.

Unit: II

Web Browsers – Examples, Search Engines – General purpose and Scientific search engines, Meta Search engines, Use of Commercial software: Microsoft Word, Power Point, Excel and Photoshop – Brief Descriptions only.

Unit: III

Databases - Biological databases – Primary, Secondary and Composite Databases with examples.

Unit: IV

Biological websites – PubMed, MedLine, Science daily, Microbiology online, Science Journals – ISSN and Impact factor.

Unit: V

Accessing information through internet – CCOD and Bionet Newsgroups- WWW Software - HTTP and HTML.

Text Books:

1. Hooman H. Rashidi and Lukas K. Buehler, Bioinformatics Basics – Applications in Biological Science and Medicine, CRC Press, Washington D. C.
2. Ignacimuthu .S. 2005.Basic Bioinformatics, Narosa Publishing house Pvt,Ltd.
3. Attwood.T.K and Parry Smith.D.J.1999.Introduction to Bioinformatics, Pearson Education Asia

References:

1. Arthur M. Lesk, Introduction to Bioinformatics, Oxford University Press.

Passed in the BOS Meeting held on 15-3-2017

Signature of Chairman/HOD

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – MICROBIOLOGY - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - III ELECTIVE	**Title : ANALYTICAL MICROBIOLOGY**	**Subject Code : 17 UMB E62**
Semester : VI	**HOURS : 5 hours / Week**	**CREDITS : 5**

Objectives: To provide an insight to analytical concepts to the students for research purposes.

UNIT I:

Separation Techniques-centrifuge-principle-Types of centrifuges -Applications.

UNIT II:

Separation of Nucleic acids-DNA, RNA-Agarose gel electrophoresis Principle-methodology-Applications.

UNIT III:

Separation of proteins-Principle native PAGE-SDS PAGE- Principle-Methodology-application.

UNIT IV:

Chromatography –Types –Thin Layer Chromatography, Paper Chromatography. High Performance Liquid Chromatography.

UNIT V:

Pharmaceuticals quality tests-pyrogen tests, sterility test, microbial limit test (MLT) Minimum inhibitory concentration (MIC and MLC).

Text Books:

1. Dubey, R.C.1999.Text Book of Biotechnology, S Chand and company Ltd.
2. Palanivelu,P. 2004. Analytical Biochemistry and Separation technology

References:

1. Keith wilson and John walker.1994.Practical biochemistry- Principles & techniques, 4th Ed.,Cambridge University Press.
2. Hans Peter Schmauder. 2003. Methods in Biotechnology, Taylor & Francis.

Passed in the BOS Meeting held on 15-3-2017

Signature of Chairman/HOD

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – MICROBIOLOGY - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - III ELECTIVE	**Title : FERMENTATION AND BIOPROCESS TECHNOLOGY**	**Subject Code : 17 UMB E63**
Semester : VI	**HOURS : 5 hours / Week**	**CREDITS : 5**

Objective:

To enlighten the concepts in Fermentation Technology among the students.

UNIT I: Concepts of basic modes of Fermentation – Batch, Fed batch and continuous fermentation.

UNIT II: Bioreactor – Designs, types – Airlift, CSTR.

UNIT III: Large scale fermentation- Penicillin, Ethanol.

UNIT IV: Bioprocess for the production of biomass, Primary and Secondary metabolites, Enzymes and Microbial Cells.

UNIT V: Instrumentation and Control Bioprocess, Computer applications in the control of bioprocess.

References:

1. Young, M.M. 2004. Comprehensive Biotechnology, Principles, applications and Regulations of Biotechnology in Industry, Agriculture and Medicine, Vol 1,2 ,3 and 4 Reed Elsevier India Pvt. Ltd.,
2. Stanbury, P.F., Whitaker, A and Hall, S. J. 1995. Principles of Fermentation Technology.2nd Ed., Elsevier India Pvt. Ltd.,
3. Cassida, 1994. Fermentation Technology
4. Patel, A.H. 1985. Industrial Microbiology. MacMillan India Pvt. Ltd.

Passed in the BOS Meeting held on 15-3-2017

Signature of Chairman/HOD

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – MICROBIOLOGY - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - III CORE	**Title : CORE PRACTICAL – IV**	**Subject Code : 17 UMB CP4**
Semester : VI	**HOURS : 5 hours / Week**	**CREDITS : 4**

Objectives: To provide hands-on teaching experience for the students in Biochemistry, rDNA technology and Virology.

1. Estimation of Carbohydrates DNS Method.
2. Estimation of Proteins – Lowry's Method.
3. Separation of aminoacids by Paper Chromatography.
4. Transformation (Blue/White Selection).
5. Restriction Digestion Analysis
6. Biological Databases – GenBank and PIR –. Theoretical explanation only.
7. Egg Inoculation Technique - Theoretical explanation only.
8. Isolation and separation of plasmid DNA

References:

1. Palanivelu, P. 2000. Analytical Biochemistry and Separation Techniques. 3rd Ed., 21st Century Publications.
2. Jeffrey H. Miller. A Short Course in Bacterial Genetics, Cold Spring Harbour Laboratory Press.
3. Lesk, M. Introduction to Bioinformatics, Oxford University Press.

Passed in the BOS Meeting held on 15-3-2017

Signature of Chairman/HOD