



V.V.VANNIAPERUMAL COLLEGE FOR WOMEN

(Belonging to Virudhunagar Hindu Nadars)

An Autonomous Institution Affiliated to Madurai Kamaraj University, Madurai

Re-accredited with 'A' Grade (3rd Cycle) by NAAC

VIRUDHUNAGAR - 626 001

PEOs, POs, PSOs and COs

B.Sc. MICROBIOLOGY

Programme Educational Objectives (PEOs)

PEOs are broad statements that describe the career and professional achievements, that the Programme is preparing the graduates to achieve within the first few years after graduation. PEOs are framed for each Programme and should be consistent with the Mission of the Institution.

Programme Outcomes (POs)

POs shall be based on Graduate Attributes (GAs) of the Programme. The GAs are the attributes expected of a graduate from a Programme in terms of knowledge, skills, attitude and values. The Graduate Attributes include Disciplinary Knowledge, Communication Skills, Critical Thinking, Problem Solving, Analytical Reasoning, Research Related Skills, Co-operation/Team Work, Scientific Reasoning, Reflective Thinking, Information/Digital Literacy, Multicultural Competence, Moral and Ethical Awareness/Reasoning, Leadership Qualities and Lifelong Learning.

On successful completion of the Programme, the students will be able to

- 1 Apply effectively the acquired knowledge and skill in the field of Arts, Physical Science, Life Science, Computer Science, Commerce and Management for higher studies and employment. (*Disciplinary Knowledge*)
- 2 Communicate proficiently and confidently with the ability to express original/complex ideas effectively in different situations. (*Communication Skills*)
- 3 Identify, formulate and solve problems in real life situations scientifically/systematically by adapting updated skills in using modern tools and techniques. (*Scientific Reasoning and Problem Solving*)

- 4 Critically analyse, synthesise and evaluate data, theories and ideas to provide valid suggestions for the betterment of the society. (*Critical Thinking and Analytical Reasoning*)
- 5 Use ICT in a variety of self-directed lifelong learning activities to face career challenges in the changing environment. (*Digital Literacy, Self - directed and Lifelong Learning*)
- 6 Self-manage and function efficiently as a member or a leader in diverse teams in a multicultural society for nation building. (*Co-operation/Team Work and Multicultural Competence*)
- 7 Uphold the imbibed ethical and moral values in personal, professional and social life for sustainable environment. (*Moral and Ethical Awareness*)

Programme Educational Objectives (PEOs)

The Programme Educational Objectives of B.Sc. Microbiology Programme are to prepare the students

PEO1: To undertake the concept of Microbiology for pursuing higher studies, successful career in medical laboratories, Medical coding sectors, pharmaceutical industries, Food industries and as successful teachers in schools and colleges.

PEO2: To employ their practical skills in Genetics, Molecular Biology, Immunology, Bioinformatics, Industrial, Food, Agricultural and Clinical Microbiology.

PEO3: To excel their capabilities through the use of new technologies to meet societal demands in research and effectively function as an entity in an environment with ethical values

Key Components of the Mission Statement	PEO1	PEO2	PEO3
Skilled graduates	✓	✓	-
theoretical and practical foundations	✓	✓	-
professional and ethical responsibilities.	-	-	✓

Programme Specific Outcomes (PSOs)

Based on the Programme Outcomes, Programme Specific Outcomes are framed for each UG Programme. Programme Specific Outcomes denote what the students would be able to do at the time of graduation. They are Programme specific. It is mandatory that each PO should be mapped to the respective PSO.

On completion of B.Sc. Microbiology Programme, the students will be able to

PO1 - Disciplinary Knowledge

PSO 1.a: acquired knowledge about the basic concepts in various disciplines of Microbiology incorporated with knowledge in related courses for higher studies and employment.

PSO 1.b: demonstrate the techniques, tools and scientific procedures, follow safety measures and interpret the results in the field of Microbiology / chemistry and biology.

PO2 – Communication Skills

PSO 2: communicate strategies in Microbiology for effectively upgrade their career as academicians, lab technicians, medical coders and quality control experts in various organizations.

PO3 – Scientific Reasoning and Problem Solving

PSO 3.a: explain and elaborate the sustainable development of microbes, their classification, metabolic processes and their molecular mechanisms in a systematic way.

PSO 3.b: make use of the knowledge and skill to handle various basic and analytical instruments used in microbiology laboratories for analyzing microbial diversity and molecular mechanisms.

PO4 – Critical Thinking and Analytical Reasoning

PSO 4.a: interpret the applications of biological sciences with molecular techniques to manipulate biological systems and produce novel products to meet the societal needs.

PSO 4.b: evaluate various diseases and their transmission, treatment, control and preventive methods with the help of modern techniques in the field of medical laboratory and pharmaceutical industries.

PO5 – Digital Literacy, Self - Directed and Lifelong Learning

PSO 5: make use of ICT in their career for self-directed and lifelong learning in newly emerging disciplines of Microbiology and their area of interest.

PO6 – Co-operation/Team Work and Multicultural Competence

PSO 6: work in a team with team spirit or lead with entrepreneurial aspects and recent updates in course contents.

PO7 –Moral and Ethical Awareness

PSO 7: uphold and develop scientific responsibility towards social and ethical in the laboratory works of Microbiology.



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Semester I	GENERAL MICROBIOLOGY	Hours/Week: 4	
Core Course-1		Credits: 4	
Course Code 20UMBC11		Internal 25	External 75

COURSE OUTCOMES

On Completion of the course, the students will be able to

CO1: recall the historical perspective of the microbial world and basic structural features of microscopic organisms. [K1]

CO2: discuss the contributions of microbiologists and functional features of microbial diversity. [K2]

CO3: explain the discovery, scope and relevance of microbiology and microorganisms. [K2]

CO4: interpret the cellular organization, life cycle and economic importance of prokaryotic and eukaryotic cells. [K3]

CO5: analyze the inclusion bodies and organelles to build the structural properties of prokaryotic and eukaryotic cells. [K4]

Course Code 20UMBC11	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2	PSO 3.a	PSO 3.b	PSO 4.a	PSO 4.b	PSO 5	PSO6	PSO7
CO1	H	M	H	L	L	L	L	L	-	-
CO2	H	L	H	M	L	L	L	L	-	-
CO3	H	M	H	M	L	M	L	L	-	-
CO4	H	M	M	M	L	L	M	L	-	-
CO5	H	L	M	M	L	L	L	H	-	-



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Semester I	BIOCHEMISTRY	Hours/Week: 4	
Core Course-2		Credits: 4	
Course Code 20UMBC12		Internal 25	External 75

COURSE OUTCOMES

On Completion of the course, the students will be able to

CO1: recall the fundamental structure, physical and chemical properties of biomolecules. [K1]

CO2: explain the chemistry of biomolecules and their biological significance. [K2]

CO3: illustrate the classification and structure of macromolecules, vitamins and hormones. [K2]

CO4: apply knowledge on structural organization and conformation of proteins and nucleic acids. [K3]

CO5: analyze the metabolic actions and diseases associated with hormonal imbalance. [K4]

Course Code 20UMBC12	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2	PSO 3.a	PSO 3.b	PSO 4.a	PSO 4.b	PSO5	PSO6	PSO7
CO1	H	L	H	L	L	M	L	L	-	-
CO2	H	L	H	L	M	M	L	L	-	-
CO3	H	L	M	H	M	M	L	L	-	-
CO4	M	H	L	L	L	M	M	L	-	-
CO5	M	M	L	H	L	M	M	H	-	-



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Semester I	ALLIED COURSE I- ORGANIC, INORGANIC AND PHYSICAL CHEMISTRY – I	Hours/Week: 4	
Allied Course -1		Credits: 4	
Course Code 20UCHA11		Internal 25	External 75

COURSE OUTCOMES

On Completion of the course, the students will be able to

CO1: define the basic principles, statements, laws and theories in chemistry. [K1]

CO2: understand the fundamental concepts in organic, inorganic and physical chemistry.
[K2]

CO3: illustrate the preparations, uses and applications of polymers, hydrogen and water, various metallurgical process, bonding theories, colloids, sols, emulsion and gels.
[K2]

CO4: predict the type of reactions involved in polymers preparation, utility of biomedical polymers, suitable process for metal extraction and water purification, shape of molecules using VSEPR, VB and MO theories, properties of gaseous and colloidal substances. [K3]

CO5: analyze different methodology of preparing polymers, separation of metals from their ores, water purification processes, various bonding theories, gas laws and properties of various colloids, applications of colloids and biomedical polymers.
[K4]

Course Code 20UCHA11	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO1	H	L	L	H	L	L	L
CO2	L	L	-	-	L	-	-
CO3	-	H	-	M	L	-	M
CO4	H	L	-	L	M	L	L
CO5	H	H	M	M	L	L	-



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Semester I	VALUE EDUCATION (2020 -21 onwards)	Hours/Week: 2	
Ability Enhancement Compulsory Course		Credits: 2	
Course Code 20UGVE11		Internal 100	External -

COURSE OUTCOMES

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

CO1: describe the general human values and their associated values that are essential to make them committed and responsible individuals. [K1]

CO2: indicate the importance and benefits of upholding human values. [K2]

CO3: explain the steps to be taken for upholding human values and human rights. [K2]

CO4: practice the individual values needed for maintaining harmonious relationship with members of family, institution, organization or society for preserving and transmitting its tradition and culture. [K3]

CO5: uphold the legal, moral, ethical and spiritual values for nurturing health and happiness leading to national integrity and peace and for the existence of human beings with humanity. [K3]

Course Code 20UGVE11	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	H	M	-	-	L	-	H
CO2	H	M	-	-	L	-	H
CO3	H	M	-	-	L	-	H
CO4	H	M	-	-	H	H	H
CO5	H	M	-	-	L	H	H



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Semester II	MICROBIAL TAXONOMY	Hours/Week: 4	
Core Course-4		Credits: 4	
Course Code 20UMBC21		Internal 25	External 75

COURSE OUTCOMES

On Completion of the course, the students will be able to

CO1: describe the standard rules governing diverse taxonomy with current classification of different microbial groups. [K1]

CO2: outline the classification system and taxonomic strategies to arrange microorganisms from kingdom to species. [K2]

CO3: explain the kingdom concepts to learn major characteristic features of microscopic community in different ecosystems. [K2]

CO4: Illustrate the nature of microorganisms according to Bergey's manual of systematic bacteriology in different volumes. [K3]

CO5: classify the Structural, genomic and nomenclature features of viruses that infects bacteria, plants and animals. [K4]

Course Code 20UMBC21	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2	PSO 3.a	PSO 3.b	PSO 4.a	PSO 4.b	PSO 5	PSO6	PSO7
CO1	H	H	M	M	L	M	M	L	-	-
CO2	H	M	M	M	L	M	L	L	-	-
CO3	H	L	M	M	L	L	M	M	-	-
CO4	H	M	H	H	M	L	M	M	-	-
CO5	H	L	M	H	L	M	M	H	-	L



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Semester II	MICROBIAL TAXONOMY	Hours/Week: 4	
Core Course-4		Credits: 4	
Course Code 20UMBC21N		Internal 25	External 75

COURSE OUTCOMES

On Completion of the course, the students will be able to

CO1: describe the standard rules governing diverse taxonomy with current classification of different microbial groups. [K1]

CO2: outline the classification system and taxonomic strategies to arrange microorganisms from kingdom to species. [K2]

CO3: explain the kingdom concepts to learn major characteristic features of microscopic community in different ecosystems. [K2]

CO4: Illustrate the nature of microorganisms according to Bergey's manual of systematic bacteriology in different volumes. [K3]

CO5: classify the Structural, genomic and nomenclature features of microorganisms. [K4]

Course Code 20UMBC21N	PO 1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2	PSO 3.a	PSO 3.b	PSO 4.a	PSO 4.b	PSO 5	PSO 6	PSO 7
CO1	H	H	M	M	L	M	M	L	-	-
CO2	H	M	M	M	L	M	L	L	-	-
CO3	H	L	M	M	L	L	M	M	-	-
CO4	H	M	H	H	M	L	M	M	-	-
CO5	H	L	M	H	L	M	M	H	-	L



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Semester II	MICROBIAL PHYSIOLOGY AND METABOLISM	Hours/Week: 4	
Core Course-5		Credits: 4	
Course Code 20UMBC22		Internal 25	External 75

COURSE OUTCOMES

On Completion of the course, the students will be able to

CO1: recall the basic concepts of various anabolic and catabolic pathways, microbial nutrition and growth. [K1]

CO2: outline the microbial metabolism of carbohydrates, proteins and fats, role of photoautotrophs and physiological changes during growth. [K2]

CO3: explain the biosynthesis and degradation pathways involved in the physiology and growth of microbes. [K2]

CO4: develop knowledge on bacterial photosynthesis and transport of nutrients. [K3]

CO5: analyze the impacts of environmental factors on microbial growth and metabolism. [K4]

Course Code 20UMBC22	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2	PSO 3.a	PSO 3.b	PSO 4.a	PSO 4.b	PSO 5	PSO 6	PSO 7
CO1	H	M	H	H	L	M	M	M	-	-
CO2	H	M	M	H	L	L	M	L	-	-
CO3	H	L	M	H	L	M	L	M	-	-
CO4	H	M	L	H	L	M	L	M	-	-
CO5	H	L	L	M	M	L	L	H	-	L



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Semester II	MICROBIAL PHYSIOLOGY AND METABOLISM	Hours/Week: 4	
Core Course-5		Credits: 4	
Course Code 20UMBC22N		Internal 25	External 75

COURSE OUTCOMES

On Completion of the course, the students will be able to

CO1: recall the basic concepts of various anabolic and catabolic pathways, microbial nutrition and growth. [K1]

CO2: outline the microbial metabolism of carbohydrates, proteins and fats, role of photoautotrophs and physiological changes during growth. [K2]

CO3: explain the biosynthesis and degradation pathways involved in the physiology and growth of microbes. [K2]

CO4: develop knowledge on transport of nutrients and growth characteristics of the microorganisms and the mechanisms of energy production for their survival. [K3]

CO5: analyze the concepts of central metabolic pathways and the impacts of environmental factors on microbial growth. [K4]

Course Code 20UMBC22N	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2	PSO 3.a	PSO 3.b	PSO 4.a	PSO 4.b	PSO 5	PSO 6	PSO 7
CO1	H	M	H	H	L	M	M	M	-	-
CO2	H	M	M	H	L	L	M	L	-	-
CO3	H	L	M	H	L	M	L	M	-	-
CO4	H	M	L	H	L	M	L	M	-	-
CO5	H	L	L	M	M	L	L	H	-	L



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Semester I/II	CORE PRACTICAL - I MAJOR PRACTICAL - I	Hours/Week: 2	
Core Course-3		Credits: 2	
Course Code 20UMBC21P		Internal 40	External 60

COURSE OUTCOMES

On Completion of the course, the students will be able to

CO1: apply the basic theoretical concepts & practical knowledge of Microscopy, staining, sterilization, characterization of microbes along with biomolecules estimation. [K3]

CO2: make use of aseptic techniques for isolating pure cultures, bacterial growth kinetics and to perform routine culture handling tasks safely, effectively and eco friendly. [K3]

CO3: identify the characteristic features of unknown microorganisms by using various morphological, ecological, biochemical and physiological analysis. [K3]

CO4: experiment with the presence of bio-molecules like enzymes, carbohydrates, proteins and Vitamins in known and unknown samples. [K3]

CO5: examine the use of tools, techniques and methodologies vital to practical skills in microbiology and Biochemistry. [K4]

Course Code 20UMBC21P	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2	PSO 3.a	PSO 3.b	PSO 4.a	PSO 4.b	PSO 5	PSO 6	PSO 7
CO1	H	H	M	M	M	L	L	M	L	-
CO2	H	H	M	M	M	L	L	M	M	M
CO3	H	H	H	M	M	M	L	L	H	-
CO4	H	M	H	L	M	L	M	L	M	-
CO5	H	H	H	H	M	L	M	L	M	-



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Semester II	ALLIED COURSE- I- ORGANIC, INORGANIC AND PHYSICAL CHEMISTRY – II	Hours/Week: 4	
Allied Course -I		Credits: 4	
Course Code 20UCHA21		Internal 25	External 75

COURSE OUTCOMES

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

CO1: know about the basic concepts in organic, inorganic and physical chemistry. [K1]

CO2: understand the chemical constituent in oils and fats, soaps and detergents, biomolecules, fuels, fertilizers and pollutants. [K2]

CO3: identify the methods of preparation for organic and inorganic compounds, sources, effects and control measures of pollutions, methods for removal of salt from water. [K2]

CO4: comprehend about the classification of biomolecules, fuels, fertilizers, catalyst and pollutions, application of adsorption and uses of biomolecules. [K3]

CO5: analyze the oil, fats and biomolecule functions, different sources of pollutions, characteristics and catalytic properties of chemicals and the effects with remedies for various pollution. [K4]

Course Code 20UCHA21	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO1	M	-	H	-	-	-	L
CO2	H	H	M	M	M	-	L
CO3	H	H	M	M	L	H	-
CO4	H	H	H	M	M	H	M
CO5	H	H	L	-	H	-	L



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Semester II	VOLUMETRIC ANALYSIS	Hours/Week: 2	
Allied Course I Practical		Credits:2	
Course Code 20UCHA21P		Internal 40	External 60

COURSE OUTCOMES

On Completion of the course, the students will be able to

CO1: apply the principles involved in the volumetric analysis. [K3]

CO2: find out the strength of standard solutions. [K3]

CO3: estimate the amount of the substance present in the given solution by
volumetric analysis. [K3]

CO4: determine the concentration of the unknown solutions. [K4]

CO5: analyse and evaluate the accuracy of the results. [K4]

Course Code 20UCHA21P	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	H	M	H	-	M	M	M
CO2	H	H	H	M	H	-	M
CO3	H	H	H	L	-	-	L
CO4	H	H	H	M	L	M	M
CO5	H	H	M	L	L	M	L



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Semester II	MICROBIOLOGICAL AND ANALYTICAL TECHNIQUES	Hours/Week: 2	
Skill Enhancement Course -1		Credits: 2	
Course Code 20UMBS21		Internal 40	External 60

COURSE OUTCOMES

On Completion of the course, the students will be able to

CO1: describe the facts, ideas, need of equipments in microbiological and biochemical analysis. [K1]

CO2: explain the theoretical skills behind the usage, working mechanism and its visualizing effect of the instruments. [K2]

CO3: relate the laboratory skills to detect the problem and rectification in an efficient way. [K2]

CO4: identify the separation techniques to recover the biomolecules from the experimental works. [K3]

CO5: compare the efficacy of the modern day equipments with the basic lab apparatus in recent days. [K4]

Course Code 20UMBS21	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2	PSO 3.a	PSO 3.b	PSO 4.a	PSO 4.b	PSO 5	PSO 6	PSO 7
	CO1	H	H	H	L	H	M	-	L	-
CO2	H	H	H	L	H	L	L	L	-	L
CO3	H	H	H	L	M	L	L	M	-	L
CO4	H	H	H	L	M	M	L	M	-	-
CO5	H	H	H	M	M	H	M	H	-	L



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Semester II	MICROBIOLOGICAL AND ANALYTICAL TECHNIQUES	Hours/Week: 2	
Skill Enhancement Course -1		Credits: 2	
Course Code 20UMBS21N		Internal 40	External 60

COURSE OUTCOMES

On Completion of the course, the students will be able to

CO1: Describe the facts, ideas, need of equipment's in microbiological and biochemical analysis. [K1]

CO2: Explain the theoretical skills behind the usage, working mechanism and its visualizing effect of the instruments. [K2]

CO3: Relate the laboratory skills to detect the problem and rectification in an efficient way. [K2]

CO4: Identify the separation techniques to recover the biomolecules from the experimental works. [K3]

CO5: Compare the efficacy of the modern day equipment with the basic lab apparatus in recent days. [K4]

Course Code 20UMBS21N	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1a	PSO 1b	PSO 2	PSO 3a	PSO 3b	PSO 4a	PSO 4b	PSO 5	PSO 6	PSO 7
CO1	H	H	H	L	H	M	-	L	-	L
CO2	H	H	H	L	H	L	L	L	-	L
CO3	H	H	H	L	M	L	L	M	-	L
CO4	H	H	H	L	M	M	L	M	-	-
CO5	H	H	H	M	M	H	M	H	-	L



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Semester III	MOLECULAR BIOLOGY	Hours/Week: 5	
Core Course - 6		Credits: 5	
Course Code 20UMBC31		Internal 25	External 75

COURSE OUTCOMES

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

CO1: relate the basics of gene related terms, structure and role of enzymes in molecular mechanisms of both prokaryotic & eukaryotic cells. [K1]

CO2: explain the theoretical concepts of molecular events like organization, replication, transcription, translation and gene regulation in living organisms. [K2]

CO3: find the sources, types of factors and its significance in maintaining all cellular activities. [K3]

CO4: analyze the molecular underpinnings of various post processes and the functional output of genes. [K4]

CO5: assess the knowledge about malfunction of genes due to environmental and biological factors in recent days. [K5]

Course Code 20UMBC31	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2	PSO 3.a	PSO 3.b	PSO 4.a	PSO 4.b	PSO 5	PSO 6	PSO 7
CO1	M	L	M	M	L	M	L	M	-	-
CO2	H	M	L	L	L	H	L	M	-	-
CO3	M	L	M	M	L	M	L	L	-	-
CO4	H	M	L	L	L	H	L	M	-	-
CO5	H	M	H	M	M	M	M	H	-	M



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Semester III	CELL BIOLOGY	Hours/Week:4+2(P)	
Allied Course		Credits:4	
Course Code 20UBIA31		Internal 25	External 75

COURSE OUTCOMES

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

- CO1 : state the basic cytological techniques. [K1]
- CO2 : explain the origin, structure and chemistry of each organelles. [K2]
- CO3 : interpret the functions of cell organelles. [K2]
- CO4 : identify the importance of cell as a basic unit of life. [K3]
- CO5 : distinguish the harmful viruses, cancer cells and living with hygienic Environment. [K4]

Course Code 20UBIA31	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	H	M	M	M	L	L	-
CO2	H	M	M	M	L	L	-
CO3	H	M	M	M	L	L	-
CO4	H	M	M	M	L	L	-
CO5	H	M	M	M	L	L	-



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VIRUDHUNAGAR - 626 001

Semester III	DIAGNOSTIC MICROBIOLOGY	Hours/Week: 2	
SEC - 2		Credits: 2	
Course Code 20UMBS31		Internal 40	External 60

COURSE OUTCOMES

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

CO1: Recall the role of Microbiology laboratory for the analysis of various clinical specimens. [K1]

CO2: Illustrate the collection and handling procedures need to analyze body fluids. [K2]

CO3: Explain the diagnosis of blood and various microbial infections. [K2]

CO4: Develop the laboratory examination of bacterial infections. [K3]

CO5: analyze the routine hematological tests and current diagnostic procedures for identifying diseases. [K4]

Course Code 20UMBS31	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1a	PSO 1b	PSO 2	PSO 3a	PSO 3b	PSO 4a	PSO 4b	PSO 5	PSO 6	PSO 7
CO1	H	M	M	-	M	L	L	L	-	-
CO2	H	H	H	-	M	-	L	L	-	-
CO3	M	L	H	L	H	L	M	L	-	-
CO4	M	H	M	L	M	L	M	M	-	-
CO5	H	H	H	-	M	L	M	H	-	L



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Semester III	MEDICAL LAB TECHNOLOGY	Hours/Week: 2	
Non Major Elective Course - 1		Credits: 2	
Course Code 20UMBN31		Internal 40	External 60

COURSE OUTCOMES

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

CO1: recall the components of blood, their functions and collection procedures. [K1]

CO2: describe the role of anticoagulants, composition of serum and plasma and blood bank guidelines. [K1]

CO3: explain the procedure to collect, handle and dispose of clinical specimens in the laboratory. [K2]

CO4: summarize the concepts of blood, procedures and preparations routinely followed in blood banks and medical laboratories. [K2]

CO5: apply the types of routine hematological tests and biochemical tests preferable for basic blood analysis. [K3]

Course Code 20UMBN31	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO1	H	M	L	L	L	-	-
CO2	H	M	L	L	-	-	-
CO3	H	M	L	L	-	-	-
CO4	M	H	M	M	L	-	-
CO5	H	L	H	M	L	-	L



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Semester III	HUMAN RIGHTS	Hours/Week: 1
Generic Elective Course - 1		Credit : 1
Course Code 20UGEH31		Internal 100

COURSE OUTCOMES

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

CO1: recall the importance of Human Rights as a citizen. [K1]

CO2: recognise the concepts, laws and violations of Human Rights. [K1]

CO3: summarise their knowledge on evolution and growth Human Rights. [K2]

CO4: paraphrase the historical values of Human Rights in Peace building. [K2]

CO5: identify the works of National and Human Rights. [K3]

Course Code 20UGEH31	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	H	M	-	-	-	-	-
CO2	H	M	-	-	-	-	-
CO3	H	M	-	-	-	M	-
CO4	H	M	-	-	M	M	H
CO5	H	M	-	-	M	M	H



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Semester IV	MICROBIAL GENETICS	Hours/Week: 5	
Core Course - 8		Credits: 5	
Course Code 20UMBC41		Internal 25	External 75

COURSE OUTCOMES

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

CO1: relate the basics of gene, mutated gene transfer and its identification techniques. [K1]

CO2: explain the concepts of genetics, mechanism of genetic exchanges, gene modification, damage and repair works in bacteria. [K2]

CO3: apply the gene transfer methods in bacteria, effects of mutagenic cells and its impact in genetics research. [K3]

CO4: apply the rectification of DNA damage, screening procedures along with gene manipulation techniques in biology to expand their experimental skills. [K4]

CO5: assess the knowledge about creating awareness among the public regards the effect of mutations. [K5]

Course Code 20UMBC41	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1a	PSO 1b	PSO 2	PSO 3a	PSO 3b	PSO 4a	PSO 4b	PSO 5	PSO 6	PSO 7
CO1	M	L	L	L	L	M	L	L	-	-
CO2	H	M	L	M	L	L	M	L	-	-
CO3	H	L	M	M	L	L	L	M	-	-
CO4	H	M	M	M	L	M	L	M	-	-
CO5	M	M	M	M	M	L	M	H	-	M



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Semester IV	MAJOR PRACTICAL –II	Hours/Week: 2	
Core Course - 7		Credits: 2	
Course Code 20UMBC41P		Internal 40	External 60

COURSE OUTCOMES

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

CO1: write the basic concepts and principles behind the techniques in the advanced lab techniques. [K3]

CO2: apply the methodologies involved in the isolation, estimation and mechanism of inheritance of genetic molecules. [K3]

CO3: make use of theoretical knowledge in an application oriented manner to carry out practical. [K3]

CO4: find the results with the already given protocol and in order to correlate the amount of biomolecules using formula, graphs and calculation methods. [K3]

CO5: analyze the use of apparatus, chemicals and the importance of these things in molecular biology & microbial genetics experiments. [K4]

Course Code 20UMBC41P	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1a	PSO 1b	PSO 2	PSO 3a	PSO 3b	PSO 4a	PSO 4b	PSO 5	PSO 6	PSO 7
CO1	M	M	M	L	M	L	L	L	-	-
CO2	H	M	M	L	M	M	M	L	M	-
CO3	H	H	L	L	H	M	L	L	M	-
CO4	M	H	M	M	H	M	L	L	M	-
CO5	M	M	H	L	M	L	M	M	-	M



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Semester IV	APPLIED BIOLOGY	Hours/Week: 4+2(P)	
Allied Course		Credits: 4	
Course Code 20UBIA41		Internal 25	External 75

COURSE OUTCOMES

On completion of the course, students will be able to

- CO1 : find the applied areas of Biology. [K1]
- CO2 : learnt skills related to laboratory as well as industries based work. [K2]
- CO3 : explain the applications areas of Biology in various industries and how to become an entrepreneur. [K2]
- CO4 : solve the issues related to the applied areas of Biology. [K3]
- CO5 : analyze the applied potential areas/branches of Biology. [K4]

Course Code 20UBIA41	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	H	M	L	L	L	L	-
CO2	H	M	M	M	L	L	-
CO3	H	M	M	M	L	L	-
CO4	M	M	M	M	L	L	-
CO5	M	M	M	M	M	L	-



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Semester IV	Allied Biology Practical – I Cell Biology and Applied Biology	Hours/Week: 2	
Allied Course		Credits: 1	
Course Code 20UBIA41P		Internal 40	External 60

COURSE OUTCOMES

On completion of the course, students will be able to

CO1: apply the basic concepts learnt in biology for the preparation of slides. [K3]

CO2: identify and dissect the biological specimens and to draw the anatomical features. [K3]

CO3: observe and comment on the biological specimens. [K3]

CO4: infer about the mitotic cell division stage and completion the record work. [K3]

CO5: analyze and categorize the functions of cell organelles and in the related area. [K4]

Course Code 20UBIA41P	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	H	M	H	M	L	M	L
CO2	H	M	H	M	L	M	L
CO3	H	M	H	M	L	M	L
CO4	H	M	H	M	L	M	L
CO5	H	M	H	M	L	M	L



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Semester IV	MUSHROOM TECHNOLOGY	Hours/Week: 2	
Skill Enhancement Course - 3		Credits: 2	
Course Code 20UMBS41		Internal 40	External 60

COURSE OUTCOMES

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

CO1: describe the structure, cultivation, diseases and importance of mushrooms. [K1]

CO2: demonstrate mushroom cultivation strategies, disorders and economics of mushroom production. [K2]

CO3: explain the various steps in the cultivation and management of edible mushrooms and its importance. [K2]

CO4: develop skills in the preparation of compost, spawn and Post harvest technology. [K3]

CO5: analyze various biotic and abiotic disorders of mushrooms. [K4]

Course Code 20UMBS41	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1a	PSO 1b	PSO 2	PSO 3a	PSO 3b	PSO 4a	PSO 4b	PSO 5	PSO 6	PSO 7
	CO1	H	M	L	L	L	L	L	L	-
CO2	M	H	M	L	M	L	L	L	-	-
CO3	H	M	M	M	M	L	L	M	L	-
CO4	H	H	M	L	M	M	L	M	L	-
CO5	M	L	M	L	L	H	M	H	-	-



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Semester IV	MUSHROOM TECHNOLOGY	Hours/Week: 2	
Skill Enhancement Course - 3		Credits: 2	
Course Code 20UMBS41N		Internal 40	External 60

COURSE OUTCOMES

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

CO1: describe the structure, cultivation, diseases and importance of mushrooms. [K1]

CO2: demonstrate mushroom cultivation strategies, disorders and economics of mushroom production. [K2]

CO3: explain the various steps in the cultivation and management of edible mushrooms and its impacts. [K2]

CO4: develop skills in the preparation of compost, spawn, disease management and recipes. [K3]

CO5: analyze various beneficial and harmful aspects of Mushrooms. [K4]

Course Code 20UMBS41N	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1a	PSO 1b	PSO 2	PSO 3a	PSO 3b	PSO 4a	PSO 4b	PSO 5	PSO 6	PSO 7
CO1	H	M	L	L	L	L	L	L	-	-
CO2	M	H	M	L	M	L	L	L	-	-
CO3	H	M	M	M	M	L	L	M	L	-
CO4	H	H	M	L	M	M	L	M	L	-
CO5	M	L	M	L	L	H	M	H	-	-



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Semester IV	APPLIED MICROBIOLOGY	Hours/Week: 2	
Non Major Elective Course - 2		Credits: 2	
Course Code 20UMBN41		Internal 40	External 60

COURSE OUTCOMES

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

CO1: define the historical perspective, scope and relevance of various applied fields in microbiology. [K1]

CO2: describe the beneficial and harmful aspects of microorganisms in human, agriculture, food and industries. [K1]

CO3: explain the factors affecting food, quality control techniques of food and quality analysis of milk and water. [K2]

CO4: outline about the mass production of biofertilizer, design of fermentor and fermentation products. [K2]

CO5: interpret the applied nature of microorganisms in various fields of Microbiology. [K3]

Course Code 20UMBN41	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO1	M	L	L	L	-	-	-
CO2	H	L	M	L	-	-	L
CO3	H	M	M	M	L	-	L
CO4	H	M	L	M	L	-	-
CO5	M	L	L	L	M	-	-



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Semester IV	Internship / Field Project (2020 -21 onwards)	Hours/Week: 0
PART IV		Credit: 1
Course Code 20UMBI41G		Internal 100

COURSE OUTCOMES

On completion of the Internship/Field Project, students will be able to

CO1: relate their theoretical insights with hands-on experience. [K3]

CO2: develop technical skills to their respective field of study. [K3]

CO3: demonstrate the attributes such as observational skills, team spirit and inter personal skills built through site visits. [K3]

CO4: exhibit the written communication skills acquired through internship/field project. [K3]

CO5: analyze the observations and results and communicate their academic and technological knowledge appropriately oral means. [K4]

Course Code 20UMBI41G	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	H	M	M	M	M	H	-
CO2	H	M	M	M	M	H	
CO3	H	M	-	-	-	H	
CO4	H	H	M	M	-	M	H
CO5	H	M	H	H	M	-	



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Semester IV	CONSTITUTION OF INDIA	Hours/Week: 1
Generic Elective Course		Credit : 1
Course Code 20UGEC41		Internal 100

COURSE OUTCOMES

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

CO1: identify the importance of Constitution in a State. [K1]

CO2: recognize the concepts and features of Indian constitutions. [K1]

CO3: discuss the forms and functions of Government and its political institutions. [K2]

CO4: trace the functions of legislative, executive and judiciary in the Constitution. [K2]

CO5: construct knowledge over the Indian Constitution. [K3]

Course Code 20UGEC41	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	H	M	-	-	-	-	M
CO2	H	M	-	-	-	-	M
CO3	H	M	-	-	-	M	M
CO4	H	M	-	-	-	-	M
CO5	H	M	-	-	M	M	M



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Semester V	CLINICAL MICROBIOLOGY	Hours/Week: 4	
Core Course – 7		Credits:4	
Course Code 20UMBC51		Internal 25	External 75

COURSE OUTCOMES

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

CO1: describe the conceptual basis of microorganisms by their pathogenic mechanisms in which they cause disease in human body. [K1]

CO2: categorize the association of medically important microorganisms with human host as normal and pathogenic flora. [K2]

CO3: apply the epidemiology of infectious agents with the identification of clinical Manifestations. [K3]

CO4: analyze the phases of infection, lifecycle and treatment strategies of infectious agents. [K4]

CO5: evaluate procedures for the therapeutic management and contemporary diagnosis of pathogenic microbes. [K5]

Course Code 20UMBC51	PO 1		PO 2	PO 3		PO 4		PO 5	PO 6	PO 7
	PSO 1.a	PSO 1.b	PSO 2	PSO 3.a	PSO 3.b	PSO 4.a	PSO 4.b	PSO 5	PSO 6	PSO 7
CO1	H	M	M	L	L	M	H	L	M	M
CO2	H	H	H	M	L	L	H	L	L	M
CO3	M	H	H	L	L	L	H	L	M	M
CO4	M	H	H	H	H	H	H	L	M	L
CO5	M	M	H	L	H	L	H	L	L	L



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Semester V	IMMUNOLOGY	Hours/Week: 4	
Core Course – 8		Credits:4	
Course Code 20UMBC52		Internal 25	External 75

COURSE OUTCOMES

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

CO1: recall the principles and concepts of Immunology. [K1]

CO2: demonstrate the basis of immune mechanism to infection, autoimmune disease, hypersensitivity, transplantation and tumor. [K2]

CO3: apply the knowledge underlying the components of immune system and its adverse effects. [K3]

CO4: analyze the key cellular and molecular components of immune system and how they interact to both prevent and cause diseases. [K4]

CO5: interpret the basic techniques for identifying antigen antibody interactions and various immunological disorders. [K5]

Course Code	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1a	PSO 1b	PSO 2	PSO 3a	PSO 3b	PSO 4a	PSO 4b	PSO 5	PSO 6	PSO 7
20UMBC52	1a	1b	2	3a	3b	4a	4b	5	6	7
CO1	H	L	H	M	M	L	H	M	M	L
CO2	H	M	M	M	L	L	M	M	L	-
CO3	H	M	M	L	L	L	H	L	-	-
CO4	H	L	H	L	L	L	H	M	M	L
CO5	M	H	H	L	H	H	H	M	M	H



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Semester V	BIOINFORMATICS	Hours/Week: 4	
Core course – 9		Credits:4	
Course Code 20UMBC53		Internal 25	External 75

COURSE OUTCOMES

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

CO1: relate the basic parts of computer and its significance in data abstraction from biological data bases. [K1]

CO2: Explain the type's biological database, tools used to integrate the alignments and data interpretation for macromolecules. [K2]

CO3: Predict the methodologies used in bioinformatics and its application in recent day's research activities. [K3]

CO4: Compare the structure related prediction as well as the evolutionary aspects of analysis for interpreting the results in an accurate and meaningful way. [K4]

CO5: Compile the overall techniques for the betterment of human survival and also develop skills about creating new bioinformatics tools. [K5]

Course Code	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1a	PSO 1b	PSO 2	PSO 3a	PSO 3b	PSO 4a	PSO 4b	PSO 5	PSO 6	PSO 7
20UMBC53	1a	1b	2	3a	3b	4a	4b	5	6	7
CO1	H	L	M	M	H	L	L	H	M	L
CO2	M	M	L	L	M	M	M	L	L	L
CO3	H	M	H	L	M	H	H	L	L	L
CO4	M	M	L	L	M	M	M	M	L	M
CO5	M	M	L	L	M	L	L	L	L	M



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Semester V	GENOMICS AND PROTEOMICS	Hours/Week: 4	
DSEC- 1		Credits: 4	
Course Code 20UBOE51		Internal 25	External 75

COURSE OUTCOMES

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

CO1: Recall the concept of genomes, proteomes and meta genomes. [K1]

CO2: Understand the methods used in the sequencing of genomes, proteomes and meta genome. [K2]

CO3: Apply the knowledge gained from the history and genome projects. [K3]

CO4: Analyse genome and proteome structure organization using tools and software. [K4]

CO5: Predict the structure of genomes, proteomes and meta genomes. [K5]

Course Code 20UBOE51	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2	PSO 3.a	PSO 3.b	PSO 4.a	PSO 4.b	PSO 5	PSO 6	PSO 7
	CO1	H	-	H	M	M	L	H	M	-
CO2	H	H	M	H	L	H	H	M	L	-
CO3	H	-	M	H	H	H	M	M	L	M
CO4	M	H	M	H	M	M	M	H	-	-
CO5	H	M	M	H	M	H	M	H	M	L



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Semester V	VIROLOGY	Hours/Week: 4	
DSEC – 1		Credits:4	
Course Code 20UMBE52		Internal 25	External 75

COURSE OUTCOMES

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

CO1: Describe the diversity of virus structures and various molecular techniques used by viruses to infect and replicate in host cell. [K1]

CO2: Explain the molecular details of the life cycle of pathogenic virus and identify the implications for human disease. [K2]

CO3: Demonstrate the interaction of virus-host and mechanism of diseases to develop antiviral and phage therapy. [K3]

CO4: Compare and contrast the replication mechanisms used by pathogenic viruses for understanding Immunization . [K4]

CO5: Evaluate the pharmacological importance of viruses in treating bacterial infections and vaccination. [K5]

Course Code 20UMBE52	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1a	PSO 1b	PSO 2	PSO 3a	PSO 3b	PSO 4a	PSO 4b	PSO 5	PSO 6	PSO 7
CO1	H	M	M	H	H	L	M	M	L	-
CO2	H	L	L	M	L	L	L	L	M	M
CO3	H	M	H	L	L	M	L	L	M	-
CO4	H	H	L	H	M	M	M	M	H	M
CO5	H	M	M	H	L	M	L	L	M	L



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Semester V	NANOBIOTECHNOLOGY	Hours/Week: 4	
DSEC – 1		Credits: 4	
Course Code 20UMBE53		Internal 25	External 75

COURSE OUTCOMES

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

CO1: Relate the basic concepts of Nanotechnology- Biotechnology for biomedical application. [K1]

CO2: Understand the production and Characterisation Techniques of nanomaterials and their influences on human health. [K2]

CO3: Apply the nanomedicine in drug delivery based on classification and assess their Environmental risks. [K3]

CO4: Analyse the characterized nanomaterials in treating diseases and their impact in Environment. [K4]

CO5: Interpret the application of classified nanomaterials and comment their toxic effects. [K5]

Course Code	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1a	PSO 1b	PSO 2	PSO 3a	PSO 3b	PSO 4a	PSO 4b	PSO 5	PSO 6	PSO 7
20UMBE53	1a	1b	2	3a	3b	4a	4b	5	6	7
CO1	H	L	H	L	M	H	M	M	L	M
CO2	H	L	M	L	H	M	L	M	-	-
CO3	H	M	M	H	M	H	L	L	-	-
CO4	M	M	M	L	M	M	L	L	-	-
CO5	L	L	M	M	L	H	M	L	L	-



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VIRUDHUNAGAR - 626 001

Semester V	PROJECT	Hours/Week: 0
Project		Credits: 1
Course Code 20UMBC5PR		Internal 100

COURSE OUTCOMES

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

CO1: Identify the problems which are related to microorganisms and frame objective of the study in consultation with mentor. [K3]

CO2: Make use of appropriate Microbiological methods and lab equipment. [K3]

CO3: Build the research skills involved in expectation of Microbiological proposal. [K3]

CO4: Analyze the relevant experiments, conduct experiments and record data. [K4]

CO5: Interpret the research report and its oral demonstrations. [K5]

Course Code 20UMBC5PR	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1a	PSO 1b	PSO 2	PSO 3a	PSO 3b	PSO 4a	PSO 4b	PSO 5	PSO 6	PSO 7
CO1	M	H	M	-	M	L	-	L	M	M
CO2	M	H	H	-	H	L	-	-	L	M
CO3	M	M	H	-	L	L	-	L	M	M
CO4	L	H	L	-	L	L	-	L	M	M
CO5	L	H	M	-	M	H	-	H	M	M



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VIRUDHUNAGAR - 626 001

Semester V	COSMETIC MICROBIOLOGY	Hours/Week: 2	
Skill Enhancement Course – 4		Credits:2	
Course Code 20UMBS51		Internal 40	External 60

COURSE OUTCOMES

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

CO1: relate the basic principles associated with cosmetic manufacturing using physical, chemical and biological properties of cosmetic agents. [K1]

CO2: understand the process from sanitation to dispensing along with monitoring regimes of cosmetic plant. [K2]

CO3: explain the methodologies to evaluate new and existing products quality by laboratory tests for maintaining the stability. [K2]

CO4: apply the knowledge of sources, cosmetic contamination and the method to overcome the impacts by using cosmetic regulations. [K3]

CO5: analyze new ideas to satisfy the needs of cosmetics by implementing eco-friendly approaches in cosmetic formulation. [K4]

Course Code	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1a	PSO 1b	PSO 2	PSO 3a	PSO 3b	PSO 4a	PSO 4b	PSO 5	PSO 6	PSO 7
20UMBS51	1a	1b	2	3a	3b	4a	4b	5	6	7
CO1	H	L	H	L	M	L	M	L	L	L
CO2	M	L	M	L	H	M	M	M	M	L
CO3	H	M	M	H	M	M	L	L	M	L
CO4	H	M	M	L	M	L	L	L	M	M
CO5	H	L	M	M	L	L	L	L	L	M



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VIRUDHUNAGAR - 626 001

Semester V	FOOD MICROBIOLOGY	Hours/Week: 2	
Skill Enhancement course - 5		Credits:2	
Course Code 20UMBS52		Internal 40	External 60

COURSE OUTCOMES

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

CO1: relate the basics of food spoilage and its effect in human as well as in food factory. [K1]

CO2: explain the significance of various factors involved in survival and retardation of food borne microbes. [K2]

CO3: understand the role of microbes and its' detection in food packaging process. [K2]

CO4: find the method of food quality and nutrient enhancement by controlling the Microbes. [K3]

CO5: analyze the methodology to overcome recent day's obstacles in food processing Industry. [K4]

Course Code	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1a	PSO 1b	PSO 2	PSO 3a	PSO 3b	PSO 4a	PSO 4b	PSO 5	PSO 6	PSO 7
CO1	H	L	M	H	H	H	L	M	L	M
CO2	H	M	M	H	H	M	L	M	L	M
CO3	H	M	H	M	M	L	M	L	L	L
CO4	M	L	L	L	L	M	L	L	L	L
CO5	L	M	M	M	M	M	L	L	L	M



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VIRUDHUNAGAR - 626 001

Semester V	BIOCONTROL	Hours/Week: 0
Extra Credit Course		Credits: 2
Course Code 20UMBO51		Internal 100

COURSE OUTCOMES

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

CO1: explain the history, theory, practice and science of biological control.

CO2: evaluate the scientific studies and concepts related to biological control.

CO3: assess the current and future roles of biological control with in context of agricultural and natural ecosystem.

CO4: understand the types of biological control agents of insects and their biology.

CO5: apply the ecological principles of plant pests by parasitoids, predators, and entomopathogenic nematodes to manage pest problems.



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VIRUDHUNAGAR - 626 001

Semester V	ENVIRONMENTAL STUDIES	Hours/Week: 2	
PART IV		Credits: 1	
Course Code 20UGES51		Internal 100	External -

COURSE OUTCOMES

On completion of the course, students will be able to

CO1 : State the social aspects of the environment, the present condition of the earth and the impact of human activities locally and globally. [K1]

CO2 : Explain the biodiversity conservation, environmental hazards and current possible disasters. [K2]

CO3 : Describe the need for sustainable development. [K2]

CO4 : Solve the environmental associated problems. [K3]

CO5 : Identify environmental legislations and management strategies. [K3]

Course Code 20UGES51	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO 1	H	H	L	L	L	-	L
CO 2	H	H	L	L	L	-	-
CO 3	H	H	L	L	L	-	-
CO 4	H	H	H	H	L	-	-
CO 5	H	H	H	H	L	-	H



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VIRUDHUNAGAR - 626 001

Semester VI	SOIL&AGRICULTURAL MICROBIOLOGY	Hours/Week: 5	
Core Course – 15		Credits: 4	
Course Code 20UMBC61		Internal 25	External 75

COURSE OUTCOMES

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

- CO1: Describe the distribution and multifarious role of soil microbes in agriculture improvement. [K1]
- CO2: discuss set of skills to recognize harmful and beneficial microbes to manipulate transgenic plants. [K2]
- CO3: interpret the inter relationship of soil with microbes in determining soil fertility, plant diseases and genetic manipulation. [K3]
- CO4: organize agricultural system by microbial communities and build pathway for sustainable agriculture. [K4]
- CO5: appraise the significance of biotechnological methods and current research in agriculture. [K5]

Course Code 20UMBC61	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1a	PSO 1b	PSO 2	PSO 3a	PSO 3b	PSO 4a	PSO 4b	PSO 5	PSO 6	PSO 7
	CO1	H	L	M	M	L	L	L	M	L
CO2	H	M	L	M	L	L	S	L	M	L
CO3	H	L	L	M	L	M	L	L	M	M
CO4	H	M	L	H	M	M	M	L	L	M
CO5	H	M	M	H	M	M	H	L	M	M



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VIRUDHUNAGAR - 626 001

Semester VI	INDUSTRIAL MICROBIOLOGY	Hours/Week: 5	
Core Course – 16		Credits: 4	
Course Code 20UMBC62		Internal 25	External 75

COURSE OUTCOMES

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

CO1: recall the basis of various fermentations and industrially important microbes. [K1]

CO2: demonstrate the bioreactor designs, various parameters, media formulation, upstream and downstream processing. [K2]

CO3: apply the knowledge underlying the components of various fermenter, large scale fermentation and screening strategies. [K3]

CO4: analyze the fermentation types and assess the nature and utility of fermented products. [K4]

CO5: interpret the techniques for identifying industrially useful microorganisms by various isolation, screening and strain improvement methods. [K5]

Course Code	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1a	PSO 1b	PSO 2	PSO 3a	PSO 3b	PSO 4a	PSO 4b	PSO 5	PSO 6	PSO 7
20UMBC62	1a	1b	2	3a	3b	4a	4b	5	6	7
CO1	H	L	H	H	M	M	L	H	H	M
CO2	M	H	H	H	H	M	L	M	M	M
CO3	H	H	M	M	H	H	L	L	L	L
CO4	L	M	L	L	M	H	L	L	-	-
CO5	L	H	M	L	M	M	L	L	M	L



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VIRUDHUNAGAR - 626 001

Semester VI	RECOMBINANT DNA TECHNOLOGY	Hours/Week: 5	
Core course 17		Credits:4	
Course Code 20UMBC63		Internal 25	External 75

COURSE OUTCOMES

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

CO1: recall the strategies and basic needs, requirements and ethics of gene cloning. [K1]

CO2: explain the theoretical as well as molecular techniques involved in gene transfer with proper guidelines. [K2]

CO3: identify process of gene modification in transgenic plants and animals for getting approval of patenting products. [K3]

CO4: correlate the impact of transfer of gene in the field of biotechnology and its protection by regulation act. [K4]

CO5: assess the novel activities of genetic modification in recent days and its effect in future. [K5]

Course Code 20UMBC63	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1a	PSO 1b	PSO 2	PSO 3a	PSO 3b	PSO 4a	PSO 4b	PSO 5	PSO 6	PSO 7
CO1	H	H	H	H	H	H	M	H	L	L
CO2	H	H	H	M	H	H	M	H	L	L
CO3	H	H	M	H	H	M	M	M	-	L
CO4	H	H	M	H	M	L	M	M	-	-
CO5	M	M	M	H	H	H	M	M	L	L



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VIRUDHUNAGAR - 626 001

Semester VI	PHARMACEUTICAL MICROBIOLOGY	Hours/Week: 5	
DSEC – 2		Credits:4	
Course Code 20UMBE61		Internal 25	External 75

COURSE OUTCOMES

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

CO1: Recall the principles of pharmacology, concept of drug discovery and identify the specific drugs belong to major drug classes for therapeutic use. [K1]

CO2: Explain the pharmacokinetics and mechanism of drug action at macromolecular levels and understand the tests involved in checking the quality of pharmaceutical product. [K2]

CO3: Apply the knowledge of systemic pharmacology, drug-receptor interactions and its resistance mechanisms to design a novel drug with the aid of computer. [K3]

CO4: Analyse the pharmacotherapy, adverse effects of specific drugs and also categorize the practices to be followed in pharmaceutical industry. [K4]

CO5: Evaluate the ways of specific drug action on microbes and illustrate the stages of drug development. [K5]

Course Code 20UMBE61	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1a	PSO 1b	PSO 2	PSO 3a	PSO 3b	PSO 4a	PSO 4b	PSO 5	PSO 6	PSO 7
CO1	H	L	H	H	M	M	L	H	H	M
CO2	H	H	H	H	H	M	L	M	M	M
CO3	H	H	M	M	H	H	L	L	L	M
CO4	L	M	L	M	M	H	L	L	H	L
CO5	L	H	M	L	M	M	L	L	M	L



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VIRUDHUNAGAR - 626 001

Semester VI	ENVIRONMENTAL MICROBIOLOGY	Hours/Week: 5	
DSEC - 2		Credits: 4	
Course Code 20UMBE62		Internal 25	External 75

COURSE OUTCOMES

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

CO1: Describe the diversity of microbes and microbial communities in soil habitats based on the beneficial as well as harmful aspects in the environment. [K1]

CO2: Understand the role of microbes in biogeochemical processes in different ecosystems for removal of selected pollutants in environment. [K2]

CO3: Apply the major principles of environmental microbiology and the relationship of microbes to environmental processes and other living organisms to understand and solving environmental problems. [K3]

CO4: Analyse the microbes in degradation of toxic organic compounds and heavy metals to reduce the natural pollution in our environment. [K4]

CO5: Evaluate the remedies regards creating awareness among the society. [K5]

Course Code 20UMBE62	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1a	PSO 1b	PSO 2	PSO 3a	PSO 3b	PSO 4a	PSO 4b	PSO 5	PSO 6	PSO 7
CO1	H	L	M	M	L	L	H	-	L	-
CO2	H	M	L	M	M	L	L	L	M	L
CO3	H	M	M	M	L	M	L	L	H	M
CO4	H	L	L	H	M	M	M	L	H	M
CO5	H	M	M	H	L	M	-	L	M	-



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VIRUDHUNAGAR - 626 001

Semester VI	IPR, BIOETHICS AND BIOSAFETY	Hours/Week: 5	
DSEC- 2		Credits: 4	
Course Code 20UBOE63		Internal 25	External 75

COURSE OUTCOMES

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

CO1: Define the various forms of intellectual property, bioethics, biosafety levels, and biohazards. [K1]

CO2: Describe the organizations involved in IPR, Bioethics and Biosafety in India and abroad. [K2]

CO3: Explain the process of patenting, animal welfare and risk assessment. [K3]

CO4: Compare the merits and demerits of IPR, Bioethics and GEOs. [K4]

CO5: Assess the role of IPR, Bioethics and Biosafety procedures in protection of humans and animal rights. [K5]

Course Code 20UBOE63	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2	PSO 3.a	PSO 3.b	PSO 4.a	PSO 4.b	PSO 5	PSO 6	PSO 7
	CO1	H	-	H	L	M	L	-	L	-
CO2	H	L	M	M	M	M	-	L	-	H
CO3	M	L	H	M	M	M	L	M	M	H
CO4	H	-	H	M	H	M	L	L	M	H
CO5	H	M	M	H	M	H	H	M	M	H



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VIRUDHUNAGAR - 626 001

Semester VI	VERMITECHNOLOGY	Hours/Week: 2	
SEC – 1		Credits: 2	
Course Code 20UMBS61		Internal 40	External 60

COURSE OUTCOMES

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

CO1: Relate the basics characteristics of earthworms and Vermiculture to identify their beneficial aspects in agriculture. [K1]

CO2: Explain the selection of earthworm species, different methods of vermicompost and its parameters for crop improvement. [K2]

CO3: Apply the vermicompost in soil and predict the nutrient content based on characterization to improve the soil fertility. [K3]

CO4: Analyse the plant growth based on standardization of vermicompost and point out their economic importance. [K4]

CO5: Interpret the value of microbes and earthworms in vermicompost for organic waste management and farming. [K5]

Course Code 20UMBS61	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1a	PSO 1b	PSO 2	PSO 3a	PSO 3b	PSO 4a	PSO 4b	PSO 5	PSO 6	PSO 7
CO1	H	M	M	H	H	L	M	M	L	-
CO2	H	L	L	M	L	L	L	L	M	M
CO3	H	M	H	L	L	M	L	L	M	-
CO4	H	H	L	H	M	M	M	M	H	M
CO5	H	M	M	H	L	M	L	L	M	L



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VIRUDHUNAGAR - 626 001

Semester - VI	MAJOR PRACTICAL - III	Hours/Week: 3	
Core course - 12		Credits: 3	
Course Code 20UMBC61P		Internal 40	External 60

COURSE OUTCOMES

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

- CO1: write the basic theoretical concepts and practical knowledge of pathogenic bacteria and immunological reactions. [K3]
- CO2: develop the principle behind antimicrobial susceptibility of pathogen and antigen antibody interactions. [K3]
- CO3: construct the procedure for isolation of infectious microorganisms, handling of clinical specimen effectively and safely. [K3]
- CO4: determine pathological conditions by the identification of causative agents and immune complexes. [K3]
- CO5: interpret the methodology and techniques used in Clinical Microbiology and Immunology. [K4]

Course Code 20UMBC61P	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1a	PSO 1b	PSO 2	PSO 3a	PSO 3b	PSO 4a	PSO 4b	PSO 5	PSO 6	PSO 7
	CO1	H	H	H	-	H	L	H	L	-
CO2	M	H	H	L	L	L	H	L	-	L
CO3	M	H	H	L	H	L	H	L	L	L
CO4	M	H	H	M	H	L	H	-	-	M
CO5	M	H	H	-	M	L	H	L	L	H



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VIRUDHUNAGAR - 626 001

Semester - VI	MAJOR PRACTICAL - IV	Hours/Week: 3	
Core course - 12		Credits: 3	
Course Code 20UMBC62P		Internal 40	External 60

COURSE OUTCOMES

On Completion of the course, the students will be able to

CO1: apply the basic theoretical concepts & practical knowledge of microbial communities inhabiting in multitude of habitats. [K3]

CO2: make use of aseptic techniques for isolating pure cultures and to perform routine culture handling tasks safely, effectively and ecofriendly. [K3]

CO3: identify the characteristic features of unknown microorganisms by using various morphological analysis and quality control techniques. [K3]

CO4: experiment with the protagonist of microbes in agriculture, food and industrial fields. [K3]

CO5: examine the use of tools, techniques and methodologies vital to practical skills in applied fields of Microbiology. [K4]

Course Code 20UMBC62P	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1a	PSO 1b	PSO 2	PSO 3a	PSO 3b	PSO 4a	PSO 4b	PSO 5	PSO 6	PSO 7
CO1	H	H	M	M	M	M	M	M	L	L
CO2	H	H	M	M	M	L	L	L	L	H
CO3	H	H	H	H	H	L	L	L	H	L
CO4	H	M	H	L	M	L	L	L	H	M
CO5	M	H	H	M	H	M	L	M	L	M



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VIRUDHUNAGAR - 626 001

Semester VI	MAJOR PRACTICAL- V	Hours/Week: 2	
Core Course – 12		Credits: 2	
Course Code 20UMBC63P		Internal 40	External 60

COURSE OUTCOMES

On Completion of the course, the students will be able to

CO1: Write the aims and principles behind the techniques in the advanced level practical works. [K3]

CO2: make use of theoretical knowledge and as well as experimental applications to carry out practical with effectively. [K3]

CO3: apply the methodologies involved in the retrieve the sequences compare with already known sequences and modify the genetic characters by modern techniques. [K3]

CO4: find out the results with already used protocol and to correlate the sequences by using computer programs or by experimental data. [K3]

CO5: analyze the features of programmes; chemicals and its significance in bioinformatics & biotechnology. [K4]

Course Code 20UMBC63P	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1a	PSO 1b	PSO 2	PSO 3a	PSO 3b	PSO 4a	PSO 4b	PSO 5	PSO 6	PSO 7
CO1	H	H	M	M	H	M	L	M	L	M
CO2	H	H	M	L	M	H	L	L	M	M
CO3	H	H	L	L	H	L	L	M	L	M
CO4	H	H	M	L	M	M	L	L	L	L
CO5	M	L	L	L	M	M	M	M	L	M