Attainment of Programme Outcome

B.Sc Microbiology

CO, PO and PSO Mapping

Name of the Course: Introduction to Microbiology

Blueprint of the question paper	Section	Unit I	Unit II	Unit III	Unit IV	Unit V
	Section A	2	2	2	2	2
	Section B Any FIVE	2	2	1	1	1
	Section C Either OR	2	2	2	2	2
	Section D Any THREE	1	1	1	1	1

SEMESTER - I			
Core – I - Introduction to Microbiology			
Course Code: 21UMIC11	**Hrs/ Week: 6**	**Hrs/ Sem: 90**	**Credits: 6**

Objectives:

- To introduce the general public to microbiology and encourage interest in it, stressing its importance and possibilities for man and nature.
- To impart advanced level information in the field of techniques in general microbiology and diversity.

Unit -I: The scope of Microbiology

The History and contributions of Antony Van Leewenhoek, Joseph Lister, Louis Pasteur, Robert Koch, Edward Jenner, Winogradsky and Beijerinck and development of microbiology.Applied fields of Microbiology.

Unit II: Microscopy

Resolving power, Numerical aperture – Limit of resolution - Magnification Types of Microscopy – Dark field microscopy – Bright field microscopy – Phase contrast microscopy – Electron microscopy.

Unit III: Microbiological staining

Types – Simple, Differential staining, Gram's staining, Endospore staining, Capsule, Flagella, Cytoplasmic inclusion staining, Giemsa staining and their applications.

Unit IV: Structure of bacterial cells

Structure and functions of capsule, flagella, Fimbrae or pili: The cell wall- chemical composition , characteristics and functions of cell wall, Plasma membrane (Fluid mosaic model), mesosomes, cytoplasm: Subunits and chemical compositon, Nucleoids: Cytoplasmic inclusions, Spores and cysts.

Unit V: Sterilization

Principles – Dry heat, Moist heat, Filtration, Pasteurization, Radiation, Disinfectant – Development of Pure culture techniques – Basic component of growth media – Types of growth media, purpose General, selective&, differential-Nutrient and Mac Conkey agar, enrichment- blood agar, transport and preservation media. Isolation and purification of pure culture.

Text Books:

1. Rajan S., Selvi Christy R. Essentials of Microbiology. Chennai: CBS Publishers and Distributers. 2015
2. Rao A.S. Introduction to Microbiology. New Delhi: PHI Learning PVT Ltd. 19

Books for Reference:

1. Prescott L.M., Harley J.P., and Klein D.A., Microbiology New York: McGraw-Hill Inc, 7th edition, 2008
2. Tortora, Funke Case Addison, Microbiology – An Introduction Wesley Longman Inc. 7th edition, 2001
3. Dubey R.C., and Maheswari, S. A Text Book of Microbiology, New Delhi: S.Chand & Co,. 2003.
4. Pelczar Jr., M.J. Chan E.C.S., and Kreig N.R. Microbiology- , New York: McGraw- Hill Inc 1993.
5. Jogn L. Ingraham & Catherine A, Introduction to Microbiology, Newyork : Ingraham, Brooks / Cole,. 2ndEdition 2000
6. Jeffrey C. Pommerville., Alcamo’s Fundamentals of Microbiology
7. (Ninth edition). Jones & Bartlett learning. 2010

Course Outcome:

CO No	Upon completion of this course, students will be able to	PSO addressed	C L
CO-1	get an idea about the historical events in microbiology & scope of Microbiology	1	Un
CO -2	understand the diversity in microbiology.	1	Un
CO-3	know parts of microscope, type and its principle	1, 2	An
CO-4	distinguish different methods of staining techniques	2	Ev
CO-5	analyse nutritional requirements of microbes.	2	An
CO-6	understand the techniques involved in culturing microorganisms.	2	Un

COURSE CODE:2IUMIC11 COURSE NAME: Introduction to Microbiology

	PO									PSO								
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	Avg	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6	PSO-7	PSO-8	Avg
CO-1	2	2	3	3	3	3	2	3	2.6	3	2	3	3	3	3	2	3	2.8
CO-2	3	2	2	3	3	3	3	2	2.6	3	2	3	3	3	3	2	3	2.8
CO-3	2	3	2	3	2	2	3	3	2.5	3	3	3	3	3	3	2	3	2.9
CO-4	3	3	2	3	3	2	3	2	2.6	3	2	3	3	3	3	2	3	2.8
CO-5	3	2	2	3	3	2	3	2	2.5	3	2	3	3	3	3	2	3	2.8
CO-6	3	3	3	3	3	2	3	2	2.8	3	3	3	3	3	3	2	3	2.9
Average	2.7	2.5	2.3	3	2.8	2.3	2.8	2.3		3	2.3	3	3	3	3	2	3	
PO Mean									2.6	PSO Mean								2.8
Strength of PO Correlation				Strong						Strength of PSO Correlation						Strong		

Attainment of Course Outcomes of the BSc Microbiology Programme

UG 2021 - 2024

Course Code	Name of the Course	Course Outcomes															
		Programme Outcomes (PO)								Programme Specific Outcomes (PSO)							
		PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6	PSO-7	PSO-8
Course Code	**Course Name**	2.8	2.5	2.6	3	2.8	2.5	2.3	3	2.6	2.8	2.8	2.8	2.8	3	2.8	2.6
21ULTA11	Part-I Tamil	3	3	2.8	3	3	3	2.3	3	2.6	3	2.8	2.8	2.8	3	3	3
21ULFB11	Part-I French	2.5	2.5	2.5	2.5	2.5	2.5	2.6	2.5	2.5	2.5	2.5	2.5	2.6	2.5	2.6	2.5
21UGEN11	Part-II General English	2.7	2.5	2.3	3	2.8	2.3	2.8	2.3	3	2.3	3	3	3	3	2	3
21UMIC11	Introduction to Microbiology	2.5	2.3	2.2	3	2.7	2.3	2.8	2.3	3	2.3	2.5	2.8	2.8	2.8	2	2.7
21UMIA11	Dairy Technology	2.5	2.3	2.2	3	2.7	2.3	2.8	2.3	3	2.3	2.5	2.8	2.8	2.8	2	2.7
21ULTA21	Part-I Tamil	2.8	2.6	2.6	3	2.8	2.5	2.5	2.8	2.6	2.8	2.6	2.8	2.8	2.6	2.8	2.6
21ULFB21	Part-I French	2.8	3	3	3	3	3	2.3	3	3	3	3	2.8	3	3	2.8	3
21UGEN21	Part-II General English	2.6	2.5	2.6	2.5	2.6	2.5	2.5	2.5	2.6	2.5	2.6	2.5	2.6	2.5	2.6	2.5
21UMIC21	Microbial diversity	2.5	2.7	2.5	2.5	2.5	2.8	2.5	2.8	3	3	2.7	2.3	2.5	2.8	2.7	2.8
21UMIA21	Biochemistry	2.5	2.7	2.5	2.7	2.7	2.8	2.7	3	3	2.7	3	2.5	2.7	2.7	2.2	3
21ULTA31	Part-I Tamil	2.6	2.8	2.6	3	2.8	2.5	2.5	2.8	2.5	2.8	2.6	2.8	2.8	2.6	2.8	2.6
21ULFB31	Part-I French	2.8	3	2.8	3	3	3	2.7	3	2.7	3	3	2.8	3	3	2.8	3
21UGEN31	Part-II General English	2.8	2.6	2.5	3	2.5	2.8	2.6	2.5	2.5	2.8	2.6	2.8	2.8	2.3	2.8	2.5
21UMIC31	Microbial physiology and Metabolism	2.5	2.8	3	2.5	2.3	2.7	2.5	2.3	2.7	2.7	2.8	2.7	2.8	2.7	2.3	2.7
21UMIA31	Genetic Engineering	2.5	2.3	2.3	3	2.7	2.3	2.8	2.7	3	2.7	2.7	2.8	2.8	2.8	2.5	2.3
21ULTA41	Part-I Tamil	2.6	2.5	2.6	2.6	2.8	2.5	2.8	2.8	2.6	2.8	2.8	2.5	2.8	2.6	2.8	2.6
21ULFB41	Part-I French	3	2.8	3	3	3	3	2.3	3	2.8	2.8	3	3	3	3	3	3

21UGEN41	Part-II General English	2.8	3	2.6	3	2.6	2.8	2.8	2.6	2.6	2.8	2.6	2.8	3	2.6	2.8	2.6
21UMIC41	Molecular biology and Microbial Genetics	2.7	2.2	2.7	2.8	2.2	2.5	2.7	2.3	2.7	2.5	2.8	2.7	2.8	2.3	2.3	2.5
21UMIA41	Mushroom Technology	2.5	2.7	2.7	2.5	2.7	2.7	2.7	3	2.8	2.3	2.8	2.5	2.8	2.7	2.3	3
21UBCC51	Pshycology and Microbiology for healthcare	2.2	2.3	2.7	2.3	2.5	1.8	2.2	2	2.3	2.5	2.5	2.5	2.5	2.5	2.5	2.2
21UMIC51	Immunology	2.7	2.7	2.8	3	2.2	2.5	2.5	2.5	2.7	2.8	2.8	2.7	2.8	2.7	2.3	2.7
21UMIC52	Clinical Microbiology	2.5	2.7	2.5	2.7	2.5	2.7	2.5	2.3	2.7	2.8	2.7	2.5	2.7	2.5	2.7	2.5
21UMIC53	Biostatistics and Bioinformatics	2.8	2.7	2.5	2.5	2.2	2.7	2.7	3	2.8	2.3	2.8	2.5	2.8	2.7	2.3	3
21UMIE51	Microbial Nanotechnology	2.7	2.3	2.7	2.8	2.2	2.5	2.5	2.3	2.7	2.8	2.8	2.7	2.8	2.7	2.3	2.7
21UMIC61	Food Microbiology	2.7	2.7	2.7	2.5	2.5	2.8	2.7	2.8	3	3	2.8	2.3	2.5	2.8	2.7	2.8
21UMIC62	Industrial Microbiology	2.5	2.8	2.8	2.8	2.8	2.2	2.8	2.5	2.7	2.8	3	3	2.8	2.8	2.5	2.5
1UMIC63	Environmental and Agricultural Microbiology	2.5	2.3	2.5	3	2.7	2.7	2.8	2.7	3	2.8	2.7	2.8	2.8	2.8	2.7	2.5
21UMIC64	Microbial biotechnology	2.5	2.7	2.5	2.5	2.5	2.7	2.7	3	3	2.5	3	2.5	2.5	2.7	2	2.8
Average Correlation		2.6	2.5	2.5	2.7	2.5	2.5	2.5	2.6	2.7	2.6	2.7	2.6	2.7	2.6	2.5	2.6
Mean Overall Score		2.6	**The POs and PSOs are strongly correlated with the COs of the programme**														

SEMESTER - I			
Allied – I - Dairy Technology			
Course Code -21UMIA11	**Hrs/ Week: 4**	**Hrs/ Sem: 60**	**Credits: 3**

Objectives:

- To provide the leadership, voice and programs for a vibrant dairy industry where farm families, dairy businesses and associated organizations can thrive and be profitable.
- To create a sustainable environmentally and technologically advanced dairy farm.

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	C L
CO-1	understand the process involved in production of milk and milk products	1,2	Un
CO-2	classify and explain the different types of milk products	2	Un
CO-3	understand purpose and functions of hygiene in dairy industry	2	Un
CO-4	explain organization and operations involved in milk processing units	2	Co
CO-5	organize students to processing of milk and its products	2 ,3,4	Un
CO-6	understand the various agents causing food infection, toxi-infection and intoxication that can be transmitted through consumption of milk and milk products which be immensely useful in preventing the food borne illnesses ensuring the safety of the consumers.	2 ,3,4	Un

COURSE CODE: 21UMIA11 COURSE NAME: Dairy Technology

	PO									PSO								
	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**AVG.**	**PSO-1**	**PSO-2**	**PSO-3**	**PSO-4**	**PSO-5**	**PSO-6**	**PSO-7**	**PSO-8**	**AVG.**
CO-1	3	2	2	3	2	3	2	3	**2.5**	3	2	2	3	3	2	2	3	**2.5**
CO-2	2	3	2	3	3	3	3	2	**2.6**	3	2	2	3	3	3	2	2	**2.5**
CO-3	3	2	2	3	2	2	3	3	**2.5**	3	3	3	3	3	3	2	3	**2.9**
CO-4	2	2	2	3	3	2	3	2	**2.4**	3	2	2	3	3	3	2	2	**2.5**
CO-5	2	3	2	3	3	2	3	2	**2.5**	3	2	3	3	2	3	2	3	**2.6**
CO-6	3	2	3	3	3	2	3	2	**2.6**	3	3	3	2	3	3	2	3	**2.8**
Ave.	**2.5**	**2.3**	**2.2**	**3**	**2.7**	**2.3**	**2.8**	**2.3**		**3**	**2.3**	**2.5**	**2.8**	**2.8**	**2.8**	**2**	**2.7**	
PO Mean									**2.5**	**PSO Mean**								**2.6**
Strength of PO Correlation					**Strong**					**Strength of PSO Correlation**				**Strong**				

SEMESTER - II			
Core – II Microbial Diversity			
Course Code : 21UMIC21	**Hrs/ Week: 6**	**Hrs/ Sem: 90**	**Credits: 6**

Objectives:

- To illustrate the evolutionary approaches and diversified nature of microorganisms
- To demonstrate the students to be aware of ubiquitous nature of micro organisms and their detailed account on taxonomic approaches and survey of prokaryotic phylogeny and phylogenetic groups of eukaryotes.

Course Outcome:

CO .No	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	list out the general classification of microbes.	1,5	Kn
CO -2	distinguish the taxonomic ranks of micro organisms	2	An
CO-3	illustrate the Bergey's manual classification about bacteria	2,4	Co
CO-4	know the Alexopoulous classification of fungi and their general features	1	Kn
CO-5	interpret the general morphological characteristics and the algal diversity	1,2	Co
CO-6	demonstrates the morphology and genetic material of viruses	2	Co

Course code : 21UMIC21 Course name : Microbial Diversity

	PO									PSO								
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	AVG.	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6	PSO-7	PSO-8	AVG.
CO-1	2	3	3	2	3	3	2	2	2.5	3	3	3	2	2	3	3	3	2.8
CO-2	3	2	3	2	3	2	3	3	2.6	3	3	3	2	2	3	3	3	2.8
CO-3	2	3	2	3	2	3	3	3	2.6	3	3	2	3	2	3	3	2	2.6
CO-4	2	3	2	3	2	3	3	3	2.6	3	3	3	2	3	3	2	3	2.8
CO-5	3	3	2	3	2	3	2	3	2.6	3	3	2	3	3	2	3	3	2.8
CO-6	3	2	3	2	3	3	2	3	2.6	3	3	3	2	3	3	2	3	2.8
Ave.	2.5	2.7	2.5	2.5	2.5	2.8	2.5	2.8		3	3	2.7	2.3	2.5	2.8	2.7	2.8	
PO Mean									2.6	PSO Mean								2.8
Strength of PO Correlation				Strong						Strength of PSO Correlation			Strong					

SEMESTER – II			
Allied-II Biochemistry			
Course Code -21UMIA21	**Hrs/ Week: 4**	**Hrs/ Sem: 60**	**Credits: 3**

Objectives:

- To extend the fundamental knowledge of biochemistry and to provide the highest quality of translational biomedical research, education and service.
- To enhance the students with knowledge on various biochemical aspects of the bio- molecules.

Course Outcome:

CO No	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	develop fundamental knowledge about various bio-molecules.	2	Un
CO-2	compare and contrast the structure and function of the carbohydrates, protein, and lipid.	2	Ap
CO-3	summarize the functions of carbohydrates, proteins, lipids, enzymes and vitamins	2	Sy
CO-4	compare and contrast saturated, mono-saturated and poly-saturated fatty acids.	2	Un
CO-5	recognize the importance of the three dimensional shape of a protein on its function and its role.	2	An
CO-6	know the working principle of spectrophotometer and able to handle.	2 ,3	Kn

COURSE CODE: 21UMIA21 **COURSE NAME: Biochemistry**

	PO									PSO								
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	Avg	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6	PSO-7	PSO-8	Avg
CO-1	2	3	3	2	3	2	3	3	2.6	3	3	3	3	3	2	2	3	2.8
CO-2	3	2	2	3	3	3	3	3	2.8	3	3	3	3	2	3	2	3	2.8
CO-3	2	3	2	3	3	3	3	3	2.8	3	3	3	2	3	3	2	3	2.8
CO-4	3	2	3	2	3	3	2	3	2.6	3	3	3	2	3	3	2	3	2.8
CO-5	3	3	2	3	2	3	2	3	2.6	3	2	3	3	2	3	3	3	2.8
CO-6	2	3	3	3	2	3	3	3	2.8	3	2	3	2	3	2	2	3	2.5
Average	2.5	2.7	2.5	2.7	2.7	2.8	2.7	3		3	2.7	3	2.5	2.7	2.7	2.2	3	
PO Mean									2.7	PSO Mean								2.8
Strength of PO Correlation				Strong						Strength of PSO Correlation							Strong	

SEMESTER – III			
Core– III - Microbial Physiology and Metabolism			
Course Code: 21UMIC31	**Hrs/ Week:4**	**Hrs/ Sem: 60**	**Credits: 4**

Objectives

- To understand the basic concepts of aerobic and anaerobic metabolic pathway
- To analyse the role of individual components in overall cell function
- To provide information on sources of energy and its utilization by microorganisms
- To study about many different types of metabolic strategies

Course outcome

CO No	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	Know the basic knowledge about Microbial Metabolism	2	Kn
CO-2	Know the applications of the various culture and their pathways	4	Kn
CO-3	Interpret the techniques used in Clinical Microbiology	2	Co
CO-4	Determine the mechanism of nitrogen fixation by Microbes	4	An
CO-5	Demonstrate the mechanism involved in bio-Luminescence	1	Co
CO-6	Demonstrate the growth and sporulation process of microbes	4	Co

Course code : 21UMIC31 Course name : Microbial Physiology and Metabolism

	PO									PSO								
	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**AVG.**	**PSO-1**	**PSO-2**	**PSO-3**	**PSO-4**	**PSO-5**	**PSO-6**	**PSO-7**	**PSO-8**	**AVG.**
CO-1	3	3	3	2	2	3	3	3	**2.8**	3	3	2	3	3	2	2	3	**3**
CO-2	3	3	3	2	3	3	3	2	**2.8**	3	2	3	3	3	3	3	2	**3**
CO-3	2	3	3	2	3	2	2	2	**2.4**	2	3	3	3	3	2	2	3	**2**
CO-4	3	3	3	3	2	3	2	3	**2.8**	3	2	3	2	3	3	2	3	**3**
CO-5	2	3	3	3	2	3	2	2	**2.5**	3	3	3	3	3	3	3	3	**3**
CO-6	2	2	3	3	2	2	3	2	**2.4**	2	3	3	2	2	3	2	2	**2**
Ave.	**2.5**	**2.8**	**3**	**2.5**	**2.3**	**2.7**	**2.5**	**2.3**		**2.7**	**2.7**	**2.8**	**2.7**	**2.8**	**2.7**	**2.3**	**2.7**	**2.7**
PO Mean									**2.6**	**PSO Mean**								**2.7**
Strength of PO Correlation					**Strong**					**Strength of PSO Correlation**				**Strong**				

SEMESTER–III			
Allied–III–Genetic Engineering			
Course Code:21UMIA31	**Hrs/Week:4**	**Hrs/Sem:60**	**Credit:3**

Objectives:

- To understand the steps of gene cloning
- To understand significance of GMOs
- To know ethical values related to genetic modification
- To screen out various techniques involved in molecular cloning

Course Outcome:

CONO	Upon completion of this course, students will be able to	PSO Addressed	CL
CO-1	Infer basic knowledge about cloning	2	Un
CO-2	Identify the applications of genetic engineering in Various fields	4	Ap
CO-3	Explain cloning vectors	2	Un
CO-4	Interpret the techniques used in genetic engineering	2	Un
CO-5	Explain Genetically modified food	2	Un
CO-6	Demonstrate the hazardous and potential risk in Releasing transgenic into environment	6	Un

COURSE CODE: 21UMIA31 COURSE NAME: Genetic Engineering

	PO									PSO								
	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**AVG.**	**PSO-1**	**PSO-2**	**PSO-3**	**PSO-4**	**PSO-5**	**PSO-6**	**PSO-7**	**PSO-8**	**AVG.**
CO-1	3	2	3	3	2	2	2	3	**2.5**	3	3	3	3	3	2	3	3	**2.9**
CO-2	2	3	2	3	3	3	3	3	**2.8**	3	3	2	3	3	3	2	2	**2.6**
CO-3	3	2	2	3	2	2	3	3	**2.5**	3	3	3	3	3	3	3	3	**3.0**
CO-4	2	2	2	3	3	2	3	2	**2.4**	3	2	2	3	3	3	2	2	**2.5**
CO-5	2	3	2	3	3	3	3	2	**2.6**	3	2	3	3	2	3	3	2	**2.6**
CO-6	3	2	3	3	3	2	3	3	**2.8**	3	3	3	2	3	3	2	2	**2.6**
Ave.	**2.5**	**2.3**	**2.3**	**3**	**2.7**	**2.3**	**2.8**	**2.7**		**3**	**2.7**	**2.7**	**2.8**	**2.8**	**2.8**	**2.5**	**2.3**	
PO Mean									**2.6**	**PSO Mean**								**2.7**
Strength of PO Correlation					**Strong**					**Strength of PSO Correlation**				**Strong**				

SEMESTER – IV			
Core – IV– Molecular Biology and Microbial Genetics			
Course Code: 21UMIC41	**Hrs/Week- 4**	**Hrs/Sem: 60**	**Credit: 4**

Objectives:

1. To provoke excellence about various aspects of microbial genetics and molecular biology of microorganisms.
2. To enhance knowledge about genetic material of microbes and their mutations.

Course Outcome:

CO. No	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	explain the basic knowledge about the microbial genetic material and its functions.	6	U n
CO-2	compare various types of bacterial plasmids, their types, and its functions.	5	U n
CO-3	interpret the role and properties of transposons and IS elements.	7	U n
CO-4	illustrate classification of bacteriophage and their mode of replication and various mechanisms involved in bacteriophage cycle.	5	U n
CO-5	classify various mutations takes place in microbial genetics.	8	Un
CO- 6	recall transformation and transduction and their classification	5	Re

Course Code : 21UMIC41 Course Name : Molecular Biology and Microbial Genetics

	PO									PSO								
	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**AVG.**	**PSO-1**	**PSO-2**	**PSO-3**	**PSO-4**	**PSO-5**	**PSO-6**	**PSO-7**	**PSO-8**	**AVG.**
CO-1	3	3	3	3	2	3	3	3	**2.9**	3	2	2	3	3	2	2	3	**2.5**
CO-2	3	2	3	3	2	2	2	2	**2.4**	3	2	3	3	3	3	3	2	**2.8**
CO-3	2	2	2	3	3	2	2	2	**2.3**	2	3	3	3	3	2	2	3	**2.6**
CO-4	3	2	3	2	2	3	3	3	**2.6**	3	2	3	2	3	2	2	2	**2.4**
CO-5	3	2	2	3	2	3	3	2	**2.5**	3	3	3	3	3	2	3	3	**2.9**
CO-6	2	2	3	3	2	2	3	2	**2.4**	2	3	3	2	2	3	2	2	**2.4**
Ave.	**2.7**	**2.2**	**2.7**	**2.8**	**2.2**	**2.5**	**2.7**	**2.3**		**2.7**	**2.5**	**2.8**	**2.7**	**2.8**	**2.3**	**2.3**	**2.5**	
PO Mean									**2.5**	**PSO Mean**								**2.6**
Strength of PO Correlation					**Strong**					**Strength of PSO Correlation**				**Strong**				

SEMESTER – IV			
Allied – IV Mushroom Technology			
Course Code: 21UMIA41	**Hrs/Week: 4**	**Hrs/Sem: 60**	**Credit: 3**

Objectives:

- To facilitate the students with wide knowledge about the mushroom technology.
- To inculcate the deep knowledge on mushroom technology.

Course Outcome:

CO N0	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	explain about the detailed information of edible and non – edible mushroom.	4	Un
CO-2	compare the cultivation of various types of mushrooms.	5	Un
CO-3	construct the mushroom house.	6	Cr
CO-4	compare different types of mushroom cultivation techniques and pure culture preparation.	7	An
CO-5	explain about economics of mushroom cultivation and their precaution.	6	Un
CO-6	interpret about the different modes of storage of mushroom.	5	Un

COURSE CODE: 21UMIA41 COURSE NAME: Mushroom Technology

	PO									PSO								
	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**Avg**	**PSO-1**	**PSO-2**	**PSO-3**	**PSO-4**	**PSO-5**	**PSO-6**	**PSO-7**	**PSO-8**	**Avg**
CO-1	2	3	2	3	3	2	3	3	**2.6**	2	2	3	3	3	2	2	3	**2.5**
CO-2	3	2	3	3	3	3	3	3	**2.9**	3	3	3	3	2	3	2	3	**2.8**
CO-3	2	3	3	2	3	3	3	3	**2.8**	3	3	3	2	3	3	2	3	**2.8**
CO-4	3	2	3	2	3	3	2	3	**2.6**	3	2	2	2	3	3	2	3	**2.5**
CO-5	3	3	2	3	2	2	2	3	**2.5**	3	2	3	3	3	3	3	3	**2.9**
CO-6	2	3	3	2	2	3	3	3	**2.6**	3	2	3	2	3	2	3	3	**2.6**
Average	**2.5**	**2.7**	**2.7**	**2.5**	**2.7**	**2.7**	**2.7**	**3**		**2.8**	**2.3**	**2.8**	**2.5**	**2.8**	**2.7**	**2.3**	**3**	
PO Mean									**2.7**	**PSO Mean**								**2.7**
Strength of PO Correlation									**Strong**	**Strength of PSO Correlation**								**Strong**

SEMESTER-V			
Core V- Psychology and Microbiology for Healthcare			
Course Code: 21UBCC51	**Hrs/Week:6**	**Hrs/Sem:90**	**Credit:3**

Objectives:

1. To familiarize the concepts of psychological aspects in health.
2. To understand the complex interactions of biological, psychological, social factors of human health and disease.

Course Outcome:

CO.No	Upon completion of this course, students Will be able to	PSO addressed	CL
CO-1	Learn the nature of psychology and microbiology	1	Re
CO-2	Understand the importance of human system	1	Re
CO-3	Gain knowledge about the acute stressors.	2	Un
CO-4	Analyze the various problems in menstrual cycle	5	An
CO-5	Develop proper lifestyle	3	Cr
CO-6	Understand about sleep related disorders	6	Un

COURSE CODE 21UBCS51 COURSE NAME: Psychology and Microbiology for Healthcare

	PO									PSO								
	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**AVG.**	**PSO-1**	**PSO-2**	**PSO-3**	**PSO-4**	**PSO-5**	**PSO-6**	**PSO-7**	**PSO-8**	**AVG.**
CO-1	2	3	3	3	3	2	2	2	**2.5**	3	3	2	3	3	3	3	2	**2.8**
CO-2	2	3	2	2	3	1	2	2	**2.1**	2	3	3	3	3	2	2	2	**2.5**
CO-3	3	2	3	3	3	2	2	1	**2.4**	2	2	2	2	2	3	3	2	**2.3**
CO-4	2	2	3	2	2	1	2	2	**2.0**	2	3	3	2	2	2	3	2	**2.4**
CO-5	2	2	3	2	2	3	3	3	**2.5**	3	2	2	3	2	2	2	2	**2.3**
CO-6	2	2	2	2	2	2	2	2	**2.0**	2	2	3	2	3	3	2	3	**2.5**
Ave.	**2.2**	**2.3**	**2.7**	**2.3**	**2.5**	**1.8**	**2.2**	**2**		**2.3**	**2.5**	**2.5**	**2.5**	**2.5**	**2.5**	**2.5**	**2.2**	
PO Mean									**2.3**	**PSO Mean**								**2.5**
Strength of PO Correlation					**Strong**					**Strength of PSO Correlation**				**Strong**				

SEMESTER–V			
Core VI	**Immunology**		
Course code:21UMIC51	**Hrs/Week-4**	**Hrs/Sem–60**	**Credit–4**

Objectives:

- To discuss the role of immune system in maintaining health
- To identify cellular and molecular mechanism of immune response
- To understand the basis of self and non-self-immune reaction
- To study about various kinds of immune cells and organs

Course outcome

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	explain the structural features of the components of the immune System and functions.	4	Un
CO-2	compare humoral and cellular immunity and their relative significance.	4	Un
CO-3	interpret the characteristics of antigen and antibody reactions.	4	Ev
CO-4	influence of the roles of the immune system in both maintaining health and contributing disease.	4	Ev
CO-5	influence the immunological response and how it is triggered and regulated.	4	Ev
CO-6	analyze about the pathogenesis of disease, effect, treatment and maintenance to prevent disease.	4	An

Course code : 21UMIC51 Immunology

	PO									PSO								
	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**AVG.**	**PSO-1**	**PSO-2**	**PSO-3**	**PSO-4**	**PSO-5**	**PSO-6**	**PSO-7**	**PSO-8**	**AVG.**
CO-1	3	3	3	3	2	3	3	3	**2.9**	3	3	2	3	3	2	2	3	**2.6**
CO-2	3	3	3	3	2	2	3	2	**2.6**	3	3	3	3	3	3	3	2	**2.9**
CO-3	2	3	2	3	3	2	2	2	**2.4**	2	3	3	3	3	2	2	3	**2.6**
CO-4	3	3	3	3	2	3	2	3	**2.8**	3	2	3	2	3	3	2	3	**2.6**
CO-5	3	2	3	3	2	3	2	3	**2.6**	3	3	3	3	3	3	3	3	**3.0**
CO-6	2	2	3	3	2	2	3	2	**2.4**	2	3	3	2	2	3	2	2	**2.4**
Ave.	**2.7**	**2.7**	**2.8**	**3**	**2.2**	**2.5**	**2.5**	**2.5**		**2.7**	**2.8**	**2.8**	**2.7**	**2.8**	**2.7**	**2.3**	**2.7**	**2.6**
PO Mean									**2.6**	**PSO Mean**								**2.7**
Strength of PO Correlation					**Strong**					**Strength of PSO Correlation**				**Strong**				

SEMESTER- V			
Core VII - Clinical Microbiology			
Course Code : 21UMIC52	**Hrs/week: 4**	**Hrs/sem: 60**	**Credit:4**

Objectives

To impart the knowledge of medically important human diseases with respect to their causative agent, clinical symptoms, pathogenesis, mode of transmission, prevention and treatment.

Course Outcome:

CO No	Upon completion of this course, students will able to	PSO addressed	CL
CO-1	understand the laboratory practices and know how to maintain the laboratory instruments	4	An
CO-2	analyze and distinguish various types of blood cells	2	Un
CO-3	understand the pathological diseases and explain the test for hepatitis, aids, and intestinal parasites.	6	Ev
CO-4	evaluate critical thinking of biochemical test	5	Un
CO-5	demonstrate the proficiency in basic methods of instrumentation and quantitative analytical skills used to-conduct biological research.	4	An
CO-6	determines the applied microbiology aspects of clinical-technique	1	An

Mapping of Course Outcomes with Pos and PSOs

COURSE CODE: 21UMIC52 **COURSE NAME: Clinical Microbiology**

	PO									PSO								
	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**AVG.**	**PSO-1**	**PSO-2**	**PSO-3**	**PSO-4**	**PSO-5**	**PSO-6**	**PSO-7**	**PSO-8**	**AVG.**
CO-1	3	3	2	3	2	2	3	2	**2.5**	3	3	3	3	3	2	3	2	**2.8**
CO-2	2	3	3	3	3	3	2	2	**2.6**	2	3	3	2	2	3	2	3	**2.5**
CO-3	3	2	2	2	3	2	3	3	**2.5**	3	3	3	3	2	3	3	2	**2.8**
CO-4	2	3	3	3	2	3	2	3	**2.6**	3	3	2	3	3	2	2	2	**2.5**
CO-5	3	3	3	2	2	3	3	2	**2.6**	2	2	3	2	3	3	3	3	**2.6**
CO-6	2	2	2	3	3	3	2	2	**2.4**	3	3	2	2	3	2	3	3	**2.6**
Ave.	**2.5**	**2.7**	**2.5**	**2.7**	**2.5**	**2.7**	**2.5**	**2.3**		**2.7**	**2.8**	**2.7**	**2.5**	**2.7**	**2.5**	**2.7**	**2.5**	
PO Mean									**2.5**	**PSO Mean**								**2.6**
Strength of PO Correlation					**Strong**					**Strength of PSO Correlation**			**Strong**					

SEMESTER–V			
Core- VIII Biostatistics and Bioinformatics			
Course code:21UMIC53	**Hrs/Week–4**	**Hrs/Sem-60**	**Credit:4**

Objectives

1. To understand the collection of data
2. To learn measures of central tendency.
3. To understand symmetry, correlation and regression.
4. To realise tests of significance
5. To learn basic tools on bioinformatics and biological databases
6. To understand the construction phylogenetic trees for evolutionary analysis and apply theoreticalskill to practical application

Course Outcome:

CO No	Upon completion of this course, students Will be able to	PSO addressed	CL
CO-1	develop an understanding of the basic concepts of biostatistics	2	Cr
CO-2	explain the statistical methods	4	Un
CO-3	recall the collection, processing and Presentation of data	2	Re
CO-4	explain measures of central tendency	4	Un
CO-5	acquire knowledge on the application of bioinformatics in life sciences.	2	An
CO-6	realise the importance and application of biological database.	2	Ev

COURSE CODE: 21UMIC53 COURSE NAME: Biostatistics and Bioinformatics

	PO									PSO								
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	Avg	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6	PSO-7	PSO-8	Avg
CO-1	3	3	3	3	2	2	3	3	2.8	2	2	3	3	3	2	2	3	2.5
CO-2	3	2	2	3	2	3	3	3	2.6	3	3	3	3	2	3	2	3	2.8
CO-3	2	3	2	2	2	3	3	3	2.5	3	3	3	2	3	3	2	3	2.8
CO-4	3	2	3	2	3	3	2	3	2.6	3	2	2	2	3	3	2	3	2.5
CO-5	3	3	3	3	2	2	2	3	2.6	3	2	3	3	3	3	3	3	2.9
CO-6	3	3	2	2	2	3	3	3	2.6	3	2	3	2	3	2	3	3	2.6
Average	2.8	2.7	2.5	2.5	2.2	2.7	2.7	3		2.8	2.3	2.8	2.5	2.8	2.7	2.3	3	
PO Mean									2.6	PSO Mean								2.7
Strength of PO Correlation				Strong						Strength of PSO Correlation						Strong		

SEMESTER–V			
Core Elective	**Microbial Nanotechnology**		
Course Code:21UMIE51	**Hrs/Week:4**	**Hrs/Sem:60**	**Credit:4**

Objectives

- To impart knowledge on characterize the nanoparticles using standard methods
- To introduce advanced ideas and techniques required in emergent area of nanotechnology.
- To develop human resource with specialization in theoretical and experimental techniques.
- To apply the scientific knowledge of Physics, Mathematics, Chemistry, and Engineering for deeper understanding of the matter at nanoscale.

Couse outcome

CO No	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	acquire basic knowledge on nanotechnology	4	Un
CO-2	explain the basics of microbial applications of nanotechnology.	4	Un
CO-3	appreciate the structural and functional principles and synthesis of nano materials.	4	An
CO-4	acquire basic knowledge about biosensors and types.	2	Ap
CO-5	acquire knowledge on cancer diagnosis and treatment.	2,4	Ap
CO-6	get knowledge about drug designing and delivery	2,4	Ap

Course Code : 21UMIE51 Course Name : Microbial Nanotechnology

	PO									PSO								
	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**AVG.**	**PSO-1**	**PSO-2**	**PSO-3**	**PSO-4**	**PSO-5**	**PSO-6**	**PSO-7**	**PSO-8**	**AVG.**
CO-1	3	3	3	3	2	3	3	3	**2.9**	3	3	2	3	3	2	2	3	**2.6**
CO-2	3	3	3	3	2	2	2	2	**2.5**	3	3	3	3	3	3	3	2	**2.9**
CO-3	2	2	2	3	3	2	2	2	**2.3**	2	3	3	3	3	2	2	3	**2.6**
CO-4	3	2	3	2	2	3	2	3	**2.5**	3	2	3	2	3	3	2	3	**2.6**
CO-5	3	2	2	3	2	3	3	2	**2.5**	3	3	3	3	3	3	3	3	**3.0**
CO-6	2	2	3	3	2	2	3	2	**2.4**	2	3	3	2	2	3	2	2	**2.4**
Ave.	**2.7**	**2.3**	**2.7**	**2.8**	**2.2**	**2.5**	**2.5**	**2.3**		2.7	2.8	2.8	2.7	2.8	2.7	2.3	2.7	
PO Mean									**2.5**	**PSO Mean**								**2.7**
Strength of PO Correlation					**Strong**					**Strength of PSO Correlation**				**Strong**				

SEMESTER- VI			
Core IX - Food Microbiology			
Course Code: 21UMIC61	**Hrs/Week: 4**	**Hrs/Sem: 60**	**Credits:4**

Objectives:

- To highlight the basic concepts and principles about the techniques in food microbiology and advanced level information about food microbiology
- To enhance the students with the basic knowledge on various techniques involved in food production and preservation.

Course Outcome:

CO No	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	explain food as a substrate for microorganisms.	3	Ev
CO-2	determines microbial contamination of food	3	Ev
CO-3	explain food preservation- physical and chemical methods.	1	Ev
CO-4	evaluate the causes of food spoilage-fruits, vegetables, dairy products, meat and fish.	3	An
CO-5	determine food borne disease and food spoilage.	4	Ev
CO-6	importance of food laws and regulations.	3, 4 ,5	Ev

Course Code: 21UMIC61 **Cours Name: Food Microbiology**

	PO									PSO								
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	AVG.	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6	PSO-7	PSO-8	AVG.
CO-1	3	3	3	2	3	3	2	3	2.8	3	3	3	2	2	3	3	3	2.8
CO-2	3	2	3	2	3	2	3	3	2.6	3	3	3	2	2	3	3	3	2.8
CO-3	2	3	2	3	2	3	3	3	2.6	3	3	3	3	2	3	3	2	2.8
CO-4	2	3	3	3	2	3	3	3	2.8	3	3	3	2	3	3	2	3	2.8
CO-5	3	3	2	3	2	3	3	2	2.6	3	3	2	3	3	2	3	3	2.8
CO-6	3	2	3	2	3	3	2	3	2.6	3	3	3	2	3	3	2	3	2.8
Ave.	2.7	2.7	2.7	2.5	2.5	2.8	2.7	2.8		3	3	2.8	2.3	2.5	2.8	2.7	2.8	
PO Mean									2.7	PSO Mean								2.8
Strength of PO Correlation				Strong						Strength of PSO Correlation			Strong					

SEMESTER-VI			
Core X- Industrial Microbiology			
Course Code: 21UMIC62	**Hrs/Week: 5**	**Hrs/Sem: 75**	**Credits: 4**

Objectives:

1. To cover the principles of various processes associated with the production and recovery of different bio-products derived from microorganisms.
2. To provide theoretical and practical skills in industrial microbiology
3. To identify and explore industrially important microbes
4. To describe the environmental and nutritional factors affecting the production of various metabolites

Course Outcome:

CO No	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	Revise the idea about the usage of microorganisms in the field of industrial microbiology	3	Ap
CO-2	Analyse the knowledge of various industrial products and its impacts on the society.	4	Un
CO-3	Acquire knowledge in industrial fermentation	3	An
CO-4	Have an insight on industrial microbiological techniques	2	Cr
CO-5	Understands the in the field of industrial microbiology	1	Un
CO-6	Have knowledge on antibiotic production	2,4	Cr

Mapping of Course Outcomes with Pos and PSOs

COURSE CODE: 21UMIC62 COURSE NAME: Industrial Microbiology

	PO									PSO								
	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**AVG.**	**PSO-1**	**PSO-2**	**PSO-3**	**PSO-4**	**PSO-5**	**PSO-6**	**PSO-7**	**PSO-8**	**AVG.**
CO-1	2	3	3	3	3	2	3	3	**2.8**	3	3	3	3	3	3	3	3	**3.0**
CO-2	2	3	2	3	3	2	3	3	**2.6**	2	3	3	3	3	3	3	3	**2.9**
CO-3	3	3	3	2	3	2	3	2	**2.6**	3	3	3	3	2	3	3	2	**2.8**
CO-4	2	3	3	3	3	3	3	2	**2.8**	2	3	3	3	3	3	2	2	**2.6**
CO-5	3	2	3	3	3	2	3	3	**2.8**	3	2	3	3	3	2	2	2	**2.5**
CO-6	3	3	3	3	2	2	2	2	**2.5**	3	3	3	3	3	3	2	3	**2.9**
Ave.	**2.5**	**2.8**	**2.8**	**2.8**	**2.8**	**2.2**	**2.8**	**2.5**		**2.7**	**2.8**	**3**	**3**	**2.8**	**2.8**	**2.5**	**2.5**	
PO Mean									**2.7**	**PSO Mean**								**2.8**
Strength of PO Correlation					**Strong**					**Strength of PSO Correlation**				**Strong**				

SEMESTER- VI			
Core XI - Environmental and Agricultural Microbiology			
Course Code : 21UMIC63	**Hrs/week: 4**	**Hrs/sem: 60**	**Credit:4**

Objective

This course will introduce students to the field of environmental and agricultural microbiology, which is the study of microbes in natural environments such as soil, water and air. To enhance knowledge of various microbial activities and its impact on the environment and study about various beneficial as- pects of soil microbes. To study the control of pest using bio pesticide related to bacteria, fungi and virus- es.

Course Outcome:

CO No	Upon completion of this course, students will be able to	PSO addressed	CL
CO -1	analyze the soil microorganism and their properties.	1	An
CO- 2	determine the role of microbes on environment.	1	Ev
CO- 3	outline the interaction between microbes and soil.	4	Un
CO- 4	discuss about the types of waste and waste treat- ment	6	Cr
CO -5	determine the Biopesticide and Biofertilizer development	2	Ev
CO -6	evaluate the microbes used as Biopesticide and Biofertilizer	4	Ev

COURSE CODE : 21UMIC63 COURSE NAME: Environmental and Agricultural Microbiology

	PO									PSO								
	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**AVG.**	**PSO-1**	**PSO-2**	**PSO-3**	**PSO-4**	**PSO-5**	**PSO-6**	**PSO-7**	**PSO-8**	**AVG.**
CO-1	3	2	3	3	2	3	2	3	**2.6**	3	3	3	3	3	2	3	3	**2.9**
CO-2	2	3	2	3	3	3	3	3	**2.8**	3	3	2	3	3	3	3	2	**2.8**
CO-3	3	2	2	3	2	2	3	3	**2.5**	3	3	3	3	3	3	3	3	**3.0**
CO-4	2	2	2	3	3	2	3	2	**2.4**	3	3	2	3	3	3	2	2	**2.6**
CO-5	2	3	3	3	3	3	3	2	**2.8**	3	2	3	3	2	3	3	3	**2.8**
CO-6	3	2	3	3	3	3	3	3	**2.9**	3	3	3	2	3	3	2	2	**2.6**
Ave.	**2.5**	**2.3**	**2.5**	**3**	**2.7**	**2.7**	**2.8**	**2.7**		**3**	**2.8**	**2.7**	**2.8**	**2.8**	**2.8**	**2.7**	**2.5**	
PO Mean									**2.7**	**PSO Mean**								**2.8**
Strength of PO Correlation					**Strong**					**Strength of PSO Correlation**				**Strong**				

SEMESTER–VI			
Core-XII-Microbial Biotechnology			
Course Code:21UMIC64	**Hrs/Week:4**	**Hrs/Sem:60**	**Credits:4**

Objectives

1. To understand the molecular cloning- tools and strategies and methods in molecular cloning
2. To learn the methods of DNA sequencing in prokaryotic and eukaryotic genomes
3. To learn the construction and screening of genomic libraries
4. To gain theoretical knowledge in rDNA technology tools
5. Course Outcome:

CO No	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	Assess the intellectual propertyright & protection.	2	Ev
CO-2	Illustrate the knowledge on the production of Biotechnological products.	3	Un
CO-3	Interpret about the concepts and applications in enzyme biotechnology.	3	Un
CO-4	Assume the mechanisms involved in biodegradation of pollutants.	6	An
CO-5	Illustrate the cloning process	2	Un
CO-6	Recall the concept of biogas, bioleaching, biodegradation of petroleum.	4	Re

COURSE CODE: 21UMIC64 COURSE NAME: Microbial Biotechnology

	PO									PSO								
	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**AVG.**	**PSO-1**	**PSO-2**	**PSO-3**	**PSO-4**	**PSO-5**	**PSO-6**	**PSO-7**	**PSO-8**	**AVG.**
CO-1	2	3	3	2	3	2	3	3	**2.6**	3	3	3	3	3	3	2	3	**2.9**
CO-2	3	2	2	3	2	3	3	3	**2.6**	3	3	3	3	2	3	2	3	**2.8**
CO-3	2	3	2	3	3	3	3	3	**2.8**	3	2	3	2	2	2	2	3	**2.4**
CO-4	3	2	3	2	3	2	2	3	**2.5**	3	3	3	2	3	3	2	3	**2.8**
CO-5	3	3	2	2	2	3	2	3	**2.5**	3	2	3	3	2	3	2	2	**2.5**
CO-6	2	3	3	3	2	3	3	3	**2.8**	3	2	3	2	3	2	2	3	**2.5**
Ave.	**2.5**	**2.7**	**2.5**	**2.5**	**2.5**	**2.7**	**2.7**	**3**		**3**	**2.5**	**3**	**2.5**	**2.5**	**2.7**	**2**	**2.8**	
PO Mean									**2.6**	**PSO Mean**								**2.7**
Strength of PO Correlation					**Strong**					**Strength of PSO Correlation**				**Strong**				