Bhavan's Vivekananda College of Science, Humanities and Commerce Sainikpuri, Secunderabad – 500 094 Autonomous College, Affiliated to Osmania University Accredited with 'A' grade by NAAC

#### M.Sc Microbiology

#### **Program Outcomes**

**PO1:** Knowledge: Apply the knowledge of basic concepts, fundamental principles and scientific theories and processes related to the fields of life sciences with their relevance in day-to-day life.

**PO2: Analytical Skills:** Select and implement the analytical skills acquired, in design of experiments followed by its effective execution in scientific research, industry and entrepreneurship.

**PO3: Investigations and Problem analysis:** Identify and investigate socially relevant issues using knowledge of Science and technology by design of experiments, analysis, interpretation of data and provide valid conclusions.

**PO4: Design and development of solutions**: Design innovative solutions for various societal needs like health care, food, water and energy through research and development with appropriate consideration for cultural, societal, environmental, public health and safety.

**PO5: Communication:** Communicate effectively on problems, issues and solutions with community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

**PO6: Ethics & Environment:** Apply ethical principles and commit to professional ethics and responsibilities and norms in research and the functional areas, understand the issues of environmental context and sustainable development.

**PO7: Individual and Team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

**PO8: Self-directed and Life-long Learning**: Acquire the ability to engage in independent and lifelong learning in the broadest context of socio, economic and technological changes.

Program Specific Outcomes	
<b>PSO1:</b> Apply the knowledge of Microbiology, Immunology, Virology, Molecular biology, Biochemistry, Nanobiotechnology and Bioinformatics as per the demands of research and Industry	7
<b>PSO2:</b> Design, perform and analyse the procedures as per laboratory standards in the areas of medical, food, agriculture, pharma, environmental, industrial microbiology in production, down streaming and Quality control and Quality assurance of microbial products.	
<b>PSO3:</b> Integrate the knowledge of Microbiology, Molecular biology, Nanobiotechnology and Computational Biology to solve research problem which has societal relevance.	

## **Course Outcomes:**

Name of the Course	General Microbiology and Microbial physiology
Course Code	PMB 101
CO1	Apply concepts of microscopy for identifying various microbes
CO2	Experiment different microbial culturing techniques
C03	Distinguish bacteria based on taxonomy
C04	Summarize factors on microbial growth
Name of the Course	Virology
Course Code	PMB102
CO1	Classify the virus based on structure, and replication
CO2	Distinguish lytic and lysogenic viruses
C03	Interpret concepts of recombination in phages
C04	Summarize applications of viruses in various areas

Name of the Course	Research Methodology & Techniques (Core)
Course Code	PMB 103
CO1	Select the right method for probing a given property of a sample molecule
CO2	Apply the most appropriate method for separation of molecules in a given mixture.
C03	Use Excel and apply appropriate statistical analysis.
CO4	Write an organized scientific manuscript for a project.

Name of the Course	Microbial Biochemistry
Course Code	PMB 104
CO1	Determine pH of solutions and prepare Buffers for laboratory work
CO2	Analyze the biomolecules by qualitative analysis
C03	Perform enzyme assay and calculate enzyme activity
C04	Identify enzymes from various sources and purify them

Name of the Course	Communicative English
Course Code	PMB 105
CO1	The students are able to understand that effective communication is important to express their views, thoughts and opinions
CO2	The students improve their listening, speaking' reading and writing skills. The students are confident enough to participate in group discussion and debate

Name of the Course	Molecular Biology & Microbial Genetics
Course Code	PMB 201
CO1	Compare the structural variations of DNA and genome organization
CO2	Illustrate Replication, Transcription, translation and gene regulation
C03	Differentiate the types of mutations, DNA damage and repair mechanisms
C04	Solve problems in genetic recombination for genetic mapping

Name of the Course	<b>Environmental and Agricultural Microbiology</b>
Course Code	PMB 202
CO1	Construct a mind map on role of microbes in air and water pollution
CO2	Summarize the role of microbes in bioremediation technologies
C03	Interpret the role of microbes in decomposition
CO4	Apply the concepts of biofertilizers for better and sustainable agricultural practice.

Name of the Course	Immunology
Course Code	PMB 203
CO1	Illustrate the Antibody structure and diversity
CO2	Summarize the types of immunity and immunological responses to various antigens
C03	Apply immunological techniques practically
CO4	Relate between cancer and immunology

Name of the Course	Pharmaceutical Microbiology
Course Code	PMB 204
CO1	Analyze microbial spoilage, prevention and preservation of pharmaceutical products, GMP
CO2	Discriminate the mode of actions of various anti microbial agents
C03	Use Practical skills in preservation and testing of various industrial products
CO4	Perform microbiological assays in pharmaceutical industry

Name of the Course	Computer Skill
Course Code	PMB 205
CO1	Understand the applications of word processing using
	MS Word) and data analysis using MS. excel
CO2	Able to learn basics of poster designing and computer
	graphics

Name of the Course	Food Microbial Technology
Course Code	PMB 301
CO1	Discuss the significance of fermented foods in daily
	lives and describe the overall role of microbes
	involved in food processing.
CO2	Explain Dairy Microbiology and measure the role of
	different types of microbes and their significance.
CO3	Validate the concept and importance of Probiotics and
	Prebiotics.
CO4	Comprehend the overall concept involved in Microbial
	Intoxication (Bacterial and Fungal) and review
	detoxification measures.

Name of the Course	Medical Bacteriology
Course Code	PMB302
CO1	Explain the clinically important microorganisms and Normal flora of human body
CO2	Describe the nature and basic concepts of pathogenic microorganisms, infection and process of diagnosis and perform the requisite diagnostic protocols
C03	Discuss of air borne and sexually transmitted bacterial pathogens bacterial pathogens.
C04	Illustrate water borne bacterial pathogens and wound infections of bacteria.

Name of the Course	Microbial Biotechnology
Course Code	PMB303
CO1	Understand the industrial important microorganisms and Basic awareness on fermentor design .Perform practical procedures to screen industrial important microorganisms & analyze their fermentative products.
CO2	Understand the nature and basic concepts of. optimization of fermentation media, process of fermentation and perform the requisite experiments on scale up & down stream processes
C03	Awareness of fermentative production of microbial products and Understand production and commercial application of microbial enzymes
C04	Update knowledge in new frontiers of industrial microbiology – steroid transformation, microbial biopesticides, genetically modified microbes and immobilization

Name of the Course	Microbial Ecology and Plant Microbe Interactions								
Course Code	PMB 304								
CO1	Describe microbial diversity and calculate statistical indices for diversity and explain molecular methods of diversity analysis								
CO2	Explain direct and indirect mechanisms of plant growth promotion by PGPR and develop microbial formulations for field application								
C03	Detect different bacterial and fungal pathogens based on signs and symptoms of plant diseases and their management using integrated pest control								
C04	Explain molecular mechanism of pathogen recognition, induced and systemic resistance in plants and describe different quorum sensing circuits of microbes								

Name of the Course	Microbiological Quality Control and Quality Assurance in Food & Pharma Industry								
Course Code	PMB 305								
CO1	Equip with fundamentals of GMP, GLP and SOP and understand the validation principles in food and pharma industry and Quality control. Awareness on procedures in quality assurance (QA) of finished product.								
CO2	Practical knowledge in Microbial Standards for Different Foods and Water and sterility testing methods. Acquire practical knowledge in Microbial quality testing of Milk and Water. Understand importance of Quality control and Quality assurance in Food and Pharma products								

Name of the Course	Personality Development				
Course Code	PMB 305				
CO1	Students are confident enough to use interpersonal skills.				
CO2	Students developed self-confidence and empathetic				

Name of the Course	Cell and Molecular Biotechnology							
Course Code	PMB 401							
CO1	Describe the mechanism of cell cycle regulation, apoptosis and Cancer induction & inheritance, Signal transduction pathways							
CO2	Choose appropriate cloning vectors, sequencing methods for DNA /Protein, molecular library construction and cloning techniques in prokaryotes an eukaryotes							
C03	Identify the Molecular Techniques like-PCR, RT PCR, RAPD, RFLP,SSR for application in molecular diagnostics and Discuss or Site directed mutagenesis, Reverse genetics, Gene knock and Gene Silencing, Gene therapy.							
C04	Categorize Transgenic Plants and Animals with their applications; Explain the significance of Stem Cell technology and Genome Engineering applications in biology.							

Course Code	PMB 402
CO1	Explain the process of diagnosis and perform
	the requisite diagnostic procedures for
	identification of viruses and list out air borne
	viral pathogens
CO2	Classify water borne viral pathogens and
	Zoonotic viral pathogens
C03	Describe sexually transmitted viral pathogens
C04	Categorize parasitic and mycotic infections

Name of the Course	Tax Planning for Individuals
Course Code	PMB 403 A
CO1	The subject will enable the students to understand
	basic concepts of tax the Income Tax Act 1961
CO2	Relevance of tax planning while computing the tax
	liability of individuals.

Name of the Course	Elements of Marketing
Course Code	PMB 403 A
CO1	Understand marketing concepts and techniques
CO2	Apply marketing concepts in the pharmaceutical industry.

Name of the Course	Bioinformatics								
<b>Course Code</b>	PMB 403 B								
CO1	Understand and find sequences for nucleic acid and protein of interest, and explain evolutionary relationships between sequences. Understand to design primers to amplify genes of interest								
CO2	Understand and find alternatively spliced transcripts, tissue-specific expression levels and gene-editing technologies								

Name of the Course	Nanobiotechnology
Course Code	PMB 404
CO1	Review the origin, properties and types of nanoparticles
CO2	Describe the methods of synthesis and characterization of nanoparticles
C03	Discuss the applications of nanoparticles in the field of environmental Nanobiotechnology
CO4	Explain the therapeutic role of nanoparticles in human health.

Name of the Course	Seminar
Course Code	PMB 406
CO1	Understand and present the scientific literature
CO2	Develop presentation skills

Name of the Program: MSc Microbiology											
Name of t Microbial			neral N	Aicrobio	logy and	d	Corse	Code:	PMB 1	01	
Semester: I					Year:2018 (First year )						
Academic	Year:2	2018-19					Batch	:2018-2	20		
	Program Outcomes								_	gram Spe Outcome	
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	3	3	3	3	3	3
CO2	3	3	3	3	3	3	3	3	3	3	3
CO3	3	3	3	3	3	3	3	3	3	3	3
CO4	3 3 3 3 3 3 3 3 3							3			
AVG	3	3 3 3 3 3 3 3 3 3 3									

Name of the	Progra	m: MS	Sc Mic	robiolo	gy						
N7 0.41		<b>T7.</b>					Course co	de: PMI	B 102		
Name of the	Course	e: Viro	logy								
Semester: I							Year:2018	3 (First	year )		
Academic Y	ear:201	8-19					Batch:201	8-20			
									Prog	ram Spe	ecific
				Progra	am Outo	comes				Outcom	ies
Course/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	2	2	2	1	2	3	3	1	1
CO2	3	1	3	2	1	1	2	2	3	1	2
CO3	3	1	2	2	1	1	2	3	3	1	3
CO4	3	2	3	2	2	2	2	3	3	1	2
AVG	3	1.5	2.5	2	1.5	1.25	2	2.75	3	1	2

Name of the	Progra	m: MS	Sc Mic	robiolo	gy						
Name of the Techniqu		e: Res	earch ]	Method	lology &	k	Course Co	de: PM	B 103		
Semester: I							Year:2018	( First y	year )		
Academic Y	ear: 20	18-201	9				Batch: 201	18-2020			
				Progra	comes			Prog	ram Spe Outcom		
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	2	3	3	3	1	1	2	2	3	3	2
CO2	2	3	3	3	1	1	2	2	3	3	2
CO3	3	3	3	3	3	2	3	2	3	3	2
CO4	04 3 3 3 2 3 2							2	3	3	2
AVG	2.5	3	3	2.75	2	1.5	2.5	2	3	3	2

Name of the	ne Prog	ram: N	ISc Mi	crobiol	ogy						
Name of th	ne Cour	se: Mi	icrobia	l Bioch	emistry	7	Cours	se Code: Pl	MB104		
Semester:	I						Year:	2018 ( Firs	t year )		
Academic	Year: 2	2018-20	19				Batch	: 2018-202	0		
									_	am Spec	
	Program Outcomes					mes			•	Outcome	S
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	2	3	3	3	3	3	3	2
CO2	3	3	3	2	3	3	3	3	3	3	2
CO3	3	3	3	2	3	3	3	3	3	3	2
CO4	3	3	3	2	3	3	3	3	3	3	2
AVG	3	3	3	2	3	3	3	3	3	3	2

Name of the Prog	ram: N	MSc M	icrobiolo	ogy							
Name of the Cour	se: Co	mmun	icative E	English	<u> </u>				Course C	ode: PN	<b>IB</b> 105
Semester: I									Year:201	8 ( First	year)
Academic Year: 2	2018-20	019							Batch: 20	18-2020	)
									Program S	Specific	
	Progr	am Ou	tcomes		ı	ı	ı	Ī	Outcon	nes	
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	2	3	3	3	3	3	3	2
CO2	3 3 3 2 3 3 3 3									3	2
AVG	3	3	3	2	3	3	3	3	3	3	2

Name of the Prog Name of the Cou Genetics					Iicrobi	al	Cours	se Code	e: PMB20	)1	
Semester: II							Year:	2018 (	First year	r)	
Academic Year:	2018-1	9					Batch	:2018-2	20		
			Pr	ogram (	Outcom	nes			_	ram Spec	
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	2	3	3	3	3	3	3	2
CO2	3	3	3	2	3	3	3	2	3	3	2
CO3	3	3	3	3	3	3	3	3	3	3	2
CO4	3	3	3	2	3	3	3	3	3	3	2
AVG	3	3	3	2.25	3	3	3	2.75	3	3	2

Name of the Prog	gram: l	MSc M	icrobio	logy							
Name of the Cou Microbiology	rse: Er	vironn	nental a	and Ag	ricultu	ral	Cours	se Code	e: PMB 2	02	
Semester: II							Year:	2018 (	First yea	r )	
Academic Year:	2018-1	9					Batch	:2018-	20		
			Pr	ogram (	Outcon	nes				ram Spec	
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	3	2	3	2	2	3	3	3
CO2	3	3	3	3	2	3	3	3	3	3	3
CO3	3	3	3	3	2	3	2	2	3	3	3
CO4	1O4 3 3 3 3 2 3							3	3	3	3
AVG	3	3	3	3	2	3	2.5	2.5	3	3	3

Name of the Prog	gram: I	MSc M	icrobio	logy								
Name of the Cou	rse: Im	munol	ogy				Cours	se Code	e: PMB 2	03		
Semester: II							Year:2018 (First year)					
Academic Year:	2018-1	9					Batch	:2018-	20			
			Pr	ogram			ram Spec					
Course/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	
CO1	3	2	2	1	3	1	2	3	3	1	1	
CO2	3	2	2	1	2	1	2	3	3	1	2	
CO3	3	3	3	3	2	3	3	3	3	1	3	
CO4	3	2	2	1	2	3	1	3	3	1	1	
AVG	3	2.25	2.25	1.5	2.25	2	2	3	3	1	1.75	

Name of the Pro	gram: ]	MSc M	icrobio	ology							
Name of the Cou	rse: Pl	narmac	eutical	Micro	biology	7	Cours	se Code	e: PMB2	04	
Semester: II							Year:	2018 (	First yea	r)	
Academic Year:	2018-1	9					Batch	:2018-	20		
		18-19 Batch:2018-20 Program Specific Outcomes Outcomes									
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	2	3	3	3	3	3	3	2
CO2	3	3	3	2	3	3	3	3	3	3	2
CO3	3	3	3	2	3	3	3	3	3	3	2
CO4	3	3	3	2	3	3	3	3	3	3	2

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Name of the Prog	gram: I	MSc M	icrobio	logy								
Name of the Cou	rse: Co	mpute	r Skill				Cours	se Code	e: PMB 2	05		
Semester: II							Year:2018 (First year)					
Academic Year:	2018-1	9					Batch:2018-20					
									Progr	ram Spec	cific	
			Pr	ogram	Outcon	nes			C	utcomes		
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	
CO1	3	3	3	2	3	3	3	3	3	3	2	
CO2	3	3 3 3 2 3 3						3	3	3	2	
AVG	3							3	3	3	2	

Name of the	Course: I	Food Mic	robial T	<b>Technol</b>	ogy		Cours	se Cod	e: PMB	301	
Semester: II	I						Year:	2019	( second	l year )	
Academic Y	ear: 2019-	2020					Batch	: 2018	-2020		
										gram Spe	
	Program Outcomes								(	Outcome	es
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	3	2	3	3	3	3	3	3
CO2	3	3	3	3	2	2	2	2	3	3	3
CO3	3	3	3	3	2	2	2	2	3	3	3
CO4	3 3 3 2 2							2	3	3	3
AVG	3	3	3	3	2	2.25	2.25	2.25	3	3	3

Name of the	Program	: MSc M	licrobio	ology									
Name of the	Course:	Medical	Bacteri	ology			Cours	se Code	e Code: PMB 302				
Semester: II	I						Year:	2019	( second	year)			
Academic Y	ear: 2019	-2020					Batch	: 2018	2020				
			Prog	ram Ou	itcomes	}			_	gram Spe Outcome			
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3		
CO1	3	2	2	3	2	3	3	3	3	2	3		
CO2	3	3	3	3	3	3	3	3	3	3	3		
CO3	3	2	3	2	2	3	3	3	3	2	3		
CO4	3	2	3	2	3	3	3	3	2	3			
AVG	3	2.25	2.75	2.5	2.25	3	3	3	3	2.25	3		

Name of the	Program	MSc MI	CROB	IOLOG	FY						
Name of the	Course: N	<b>Aicrobial</b>	Biotecl	hnology	7		Corse	Code:	PMB-3	803	
Semester: III	[						Year:	2019	( second	l year )	
Academic Ye	ar: 2019-	2020					Batch	: 2018	-2020		
									Prog	gram Spe	ecific
			Prog	ram Ou	tcomes				(	Outcome	es
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	2	3	3	3	3	3	3	2
CO2	3	3	3	2	3	3	3	3	3	3	2
CO3	3	3	3	2	3	3	3	3	3	3	2
CO4	3	3	3	2	3	3	3	3	3	3	2
AVG	3	3	3	2	3	3	3	3	3	3	2

Name of the	Program	MSc Mi	crobiol	ogy							
Name of the Microbe Inte			Ecolog	y and I	Plant		Cours	se Cod	e: PMB	304	
Semester: III	[						Year:	2019	( second	l year )	
Academic Ye	ear: 2019-	2020					Batch	: 2018	-2020		
									Prog	gram Spe	ecific
			Prog	ram Ou	tcomes				(	Outcome	S
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	2	3	3	3	3	3	3	3
CO2	3	3	3	3	3	3	3	3	3	3	3
CO3	3	3	3	3	3	3	3	3	3	3	2
CO4	3	3	3	2	3	3	3	3	3	3	2
AVG	3	3	3	2.5	3	3	3	3	3	3	2.5

Name of the	Program	: MSc Mi	crobiol	ogy							
Name of the Quality Assu			_	-		ol and	Cours	se Cod	e: PMB	305	
Semester: II	I						Year:	2019	( second	l year )	
Academic Y	ear: 2019	-2020					Batch	: 2018	-2020		
			Duo		4					ram Spe	
			Prog	ram Ou	icomes	1			(	Outcome	es
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	2	3	3	3	3	3	3	2
CO2	3	3	3	2	3	3	3	3	3	3	2
AVG	3	3	3	2	3	3	3	3	3	3	2

Name of the Program: MSc Microbiology	
Name of the Course: Personality Development	Course Code: PMB 305

Semester: I	П						Year:	2019	( second	l year )	
Academic Y	ear: 2019	-2020					Batch	: 2018	-2020		
									Prog	gram Spe	ecific
			Prog	ram Ou	tcomes				(	Outcome	es
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	2	3	3	3	3	3	3	2
CO2	3	3	3	2	3	3	3	3	3	3	2
AVG	3	3	3	2	3	3	3	3	3	3	2

Name of the Prog	ram: N	/Sc Mi	crobiol	ogy							
Name of the Cour	rse: Ce	ll and N	Molecul	lar Bio	techno	logy	Cour	se Cod	le: PMB4	01	
Semester: IV							Year	: 2020	( Second	year )	
Academic Year: 2	2019-20	)					Batcl	n:2018	-20		
			Pro	gram C	Outcom	es				ram Spec Outcomes	ific
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	2	3	3	3	3	3	3	2
CO2	3	3	3	2	3	3	3	3	3	3	2
CO3	3	3	3	2	3	3	3	3	3	3	2
CO4	3	3	3	2	3	3	3	3	3	3	2
AVG	3	3	3	2	3	3	3	3	3	3	2

Name of the Prog	gram: N	<b>1.</b> S c M	icrobio	ology							
Name of the Cour	rse: Me	edical V	irology	and I	Parasit	ology	Corse	e Code	: PMB 4	02	
Semester: IV							Year	: 2020	( Second	year )	
Academic Year:	cademic Year: 2019-20							n:2018	-20		
			Pro	gram C	Outcom	es			· ·	gram Spec Outcomes	ific
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	2	3	2	3	3	3	3	2	3
CO2	3	3	3	3	3	3	3	3	3	3	3
CO3	3	2	3	2	2	3	3	3	3	2	3
CO4	3	2	3	2	2	3	3	3	3	2	3
AVG	3	2.25	2.75	2.5	2.25	3	3	3	3	2.25	3

Name of the Pro	gram: M	ISc Mic	robiolo	gy							
Name of the Cou	ırse: Tax	Planni	ng for	Indivi	duals		Cou	rse Cod	e: PMB 4	03 A	
Semester: IV							Year	: 2020	( Second y	year)	
Academic Year:	2019-20						Batc	h:2018-	20		
									Prog	ram Spec	ific
			Prog	gram (	Outcon	nes				Outcomes	
				PO	PO	PO	PO				PSO
COs/POs	PO1	PO2	PO3	4	5	6	7	PO8	PSO1	PSO2	3
CO1	3	3	3	2	3	3	3	3	3	3	2
CO2	3	3	3	2	3	3	3	3	3	3	2
AVG	3	3	3	2	3	3	3	3	3	3	2

Name of the Prog	ram: M	Sc Mic	robiolo	gy							
Name of the Cour	rse: Elei	nents o	f Mark	eting			Cou	rse Cod	e: PMB 4	03A	
Semester: IV							Year	r: 2020	(Second y	year )	
Academic Year: 2	2019-20						Batc	h:2018-	20		
									Prog	ram Speci	fic
			Prog	gram (	Outcon	nes				Outcomes	
				PO	PO	PO	PO				PSO
COs/POs	PO1	PO2	PO3	4	5	6	7	PO8	PSO1	PSO2	3
CO1	3	3	3	2	3	3	3	3	3	3	2
CO2	3	3	3	2	3	3	3	3	3	3	2
AVG	3	3	3	2	3	3	3	3	3	3	2

Name of the Prog	ram: M	Sc Mici	robiolo	gy							
Name of the Cou	rse : Bio	oinform	atics				Cou	rse cod	e : PMB 4	103	
Semester: IV							Year	:: 2020	(Second y	year )	
Academic Year: 2	019-20						Batc	h:2018-	20		
									Program	Specific	
	Progra	ım Outc	omes						Outcom	es	
				PO	PO	PO	PO				PSO
Course/POs	PO1	PO2	PO3	4	5	6	7	PO8	PSO1	PSO2	3
CO1	3	3	2	3	2	0	2	3	3	3	3
CO2	3	3	2	3	2	0	2	3	3	2	3
AVG	3	3	2	3	2	0	2	3	3	2.5	3

Name of the Progr	ram:										
Name of the Cour	rse : Na	nobiote	chnolo	gy			Co	urse co	de : PM	B 404	
Semester: IV							Yea	ar: 2020	0 ( Secon	d year )	)
Academic Year: 2	019-20						Bat	tch:201	8-20		
									Progr	am Spe	cific
			Pro	ogram O	utcome	S			O	utcomes	3
							P				
							O			PSO	PSO
Course/POs	PO1	PO2	PO3	PO4	PO5	PO6	7	PO8	PSO1	2	3
CO1	3	2	2	3	1	3	1	2	3	3	3
CO2	3	1	2	2	2	2	1	1	3	3	3
CO3	3	3	2	2	1	3	1	1	3	3	3
CO4	3	3	2	2	1	3	1	1	3	3	3
AVG	3	2.25	2	2.25	1.25	2.75	1	1.25	3	3	3

Name of the C	Course: Sem	inars					Cou	rse Cod	e: PMB 4	06	
Semester: IV							Year	:: 2020	Second y	year)	
Academic Yea	r: 2019-20						Batc	h:2018-	20		
									Prog	gram Spec	ific
			Prog	gram (	Outcon	nes			(	Outcomes	
				PO	PO	PO	PO				PSO
COs/POs	PO1	PO2	PO3	4	5	6	7	PO8	PSO1	PSO2	3
CO1	3	3	3	2	3	3	3	3	3	3	2
CO2	3	3	3	2	3	3	3	3	3	3	2
AVG	3	3	3	2	3	3	3	3	3	3	2.

## **Program Target Matrix**

MSC Micro	obiology 2018-2020	Program Outcomes									Program Specific Outcomes		
	Course/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	
PMB 101	General Microbiology And Microbial Physiology	3	3	3	3	3	3	3	3	3	3	3	
PMB 102	Virology	3	1.5	2.5	2	1.5	1.25	2	2.75	3	1	2	
PMB 103	Research Methodology & Techniques	2.5	3	3	2.75	2	1.5	2.5	2	3	3	2	
PMB 104	Microbial Biochemistry	3	3	3	2	3	3	3	3	3	3	2	
PMB 105	Communicative English	3	3	3	2	3	3	3	3	3	3	2	
PMB 151	General Microbiology & Virology	3	3	3	3	3	3	3	3	3	3	3	
PMB 152	Research Methodology & Techniques	2.5	3	3	2.75	2	1.5	2.5	2	3	3	2	
PMB 153	Microbial Biochemistry	3	3	3	2	3	3	3	3	3	3	2	
PMB 201	Molecular Biology & Microbial Genetics	3	3	3	2.25	3	3	3	2.75	3	3	2	
PMB 202	Environmental And Agricultural Microbiology	3	3	3	3	2	3	2.5	2.5	3	3	3	
PMB 203	Immunology	3	2.25	2.25	1.5	2.25	2	2	3	3	1	1.75	
PMB 204	Pharmaceutical Microbiology	3	3	3	2	3	3	3	3	3	3	2	
PMB 205	Computer Skill	3	3	3	2	3	3	3	3	3	3	2	
PMB 251	Molecular Biology And Microbial Genetics	3	3	3	2.25	2	3	3	2.75	3	3	2	
PMB 252	Environmental & Agriculture Microbiology	3	3	3	3	3			2.75				
PMB 253	Immunology & Pharmaceutical Microbiology					2	3	2.5	2.5	3	3	3	
PMB 301		3	3	3	2	3	3	3	3	3	3	2	
PMB 302	Food Microbial Technology  Medical Bacteriology	3	3	3	3	2	2.25	2.25	2.25	3	3	3	
PMB 303		3	2.25	2.75	2.5	2.25	3	3	3	3	2.25	3	
PMB 304	Microbial Biotechnology Microbial Ecology And Plant	3	3	3	2	3	3	3	3	3	3	2	
	Microbe Interactions	3	3	3	2.5	3	3	3	3	3	3	2.5	
PMB 305	Microbiological Quality Control And Quality Assurance In Food & Pharma Industry	3	3	3	2	3	3	3	3	3	3	2	
	Personality Development	3	3	3	2	3	3	3	3	3	3	2	
PMB 351	Food Microbial Technology	3	3	3	3	2	2.25	2.25	2.25	3	3	3	
PMB 352	Medical Bacteriology	3	2.25	2.75	2.5	2.25	3	3	3	3	2.25	3	
PMB 353	Applied Microbiology	3	3	3	2.5	3	3	3	3	3	3	2.5	
PMB 401	Cell And Molecular Biotechnology	3	3	3	2	3	3	3	3	3	3	2	
PMB402	Medical Virology And Parasitology	3	2.25	2.75	2.5	2.25	3	3	3	3	2.25	3	
PMB 403	Bioinformatics	3	3	2	3	2	0	2	3	3	2.5	3	
PMB 404	Nanobiotechnology	3	2.25	2	2.25	1.25	2.75	1	1.25	3	3	3	
PMB 405	Project	3	3	3	3	3	3	3	3	3	3	3	
PMB 406	Seminar	3	3	3	3	3	3	3	3	3	3	3	
PMB 451	Cell And Molecular Biotechnology & Bioinformatics	3	3	3	2	3	3	3	3	3	3	2	
PMB 452	Medical Virology And												
1.110 432	Parasitology & Nanobiotechnology	3	2.25	2.75	2.5	2.25	3	3	3	3	2.25	3	
	Average Value	2.96	2.81	2.87	2.42	2.57	2.68	2.74	2.78	3	2.7	2.44	

## **Attainment Matrix**

MSC Mi	icrobiology 2018-2020			Pre	ogram	Outcon	nes			Program Specific Outcomes			
	Course/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	
PMB 101	General Microbiology And Microbial Physiology	3	3	3	3	3	3	3	3	3	3	3	
PMB 102	Virology	3	1.5	2.5	2	1.5	1.25	2	2.75	3	1	2	
PMB 103	Research Methodology & Techniques	0.83	1	1	0.91	0.6	1.5	0.83	0.6	1	1	0.6	
PMB 104	Microbial Biochemistry	3	3	3	2	3	3	3	3	3	3	2	
PMB 105	Communicative English	3	3	3	2	3	3	3	3	3	3	2	
PMB 151	General Microbiology & Virology	3	3	3	3	3	3	3	3	3	3	3	
PMB 152	Research Methodology & Techniques	2.5	3	3	2.75	2	1.5	2.5	2	3	3	2	
PMB 153	Microbial Biochemistry	3	3	3	2	3	3	3	3	3	3	2	
PMB 201	Molecular Biology & Microbial Genetics	3	3	3	2.25	3	3	3	2.75	3	3	2	
PMB 202	Environmental And Agricultural Microbiology	3	3	3	3	2	3	2.5	2.5	3	3	3	
PMB 203	Immunology	3	2.25	2.25	1.5	2.25	2	2	3	3	1	1.75	
PMB 204	Pharmaceutical Microbiology	3	3	3	2	3	3	3	3	3	3	2	
PMB 205 PMB 251	Computer Skill Molecular Biology And Microbial	3	3	3	2	3	3	3	3	3	3	2	
PMB 252	Genetics Environmental & Agriculture	3	3	3	2.25	3	3	3	2.75	3	3	2	
1 10110 202	Microbiology	3	3	3	3	2	3	2.5	2.5	3	3	3	
PMB 253	Immunology & Pharmaceutical Microbiology												
DMD 201		3	3	3	2	3	3	3	3	3	3	2	
PMB 301	Food Microbial Technology	3	3	3	3	2	2.25	2.25	2.25	3	3	3	
PMB 302	Medical Bacteriology	3	2.25	2.75	2.5	2.25	3	3	3	3	2.25	3	
PMB 303	Microbial Biotechnology	3	3	3	2	3	3	3	3	3	3	2	
PMB 304	Microbial Ecology And Plant Microbe Interactions	3	3	3	2.5	3	3	3	3	3	3	2.5	
PMB 305	Microbiological Quality Control And Quality Assurance In Food & Pharma Industry	3	3	3	2	3	3	3	3	3	3	2	
PMB 351	Personality Development Food Microbial Technology	3	3	3	2	3	3	3	3	3	3	2	
T NID 331	Food Wicrobiai Technology	3	3	3	3	2	2.25	2.25	2.25	3	3	3	
PMB 352	Medical Bacteriology	3	2.25	2.75	2.5	2.25	3	3	3	3	2.25	3	
PMB 353	Applied Microbiology	3	3	3	2.5	3	3	3	3	3	3	2.5	
PMB 401	Cell And Molecular Biotechnology	3	3	3	2	3	3	3	3	3	3	2	
PMB402	Medical Virology And Parasitology	3	2.25	2.75	2.5	2.25	3	3	3	3	2.25	3	
PMB 403	Bioinformatics	3	3	2	3	2	0	2	3	3	2.5	3	
PMB 404	Nanobiotechnology	3	2.25	2	2.25	1.25	2.75	1	1.25	3	3	3	
PMB 405	Project	3	3	3	3	3	3	3	3	3	3	3	
PMB 406	Seminar	3	3	3	3	3	3	3	3	3	3	3	
PMB 451	Cell And Molecular Biotechnology & Bioinformatics	3	3	3	2	3	3	3	3	3	3	2	
	- Diomormano												
PMB 452	Medical Virology And Parasitology & Nanobiotechnology	3	2.25	2.75	2.5	2.25	3	3	3	3	2.25	3	
	Average Value	2.91	2.75	2.81	2.36	2.53	2.68	2.69	2.74	2.93	2.71	2.40	

MSc Microbiology 20	18-2020	) Batch									
Prog Target Matrix Avg	2.96	2.81	2.87	2.41	2.57	2.68	2.74	2.787879	3	2.77	2.44
Attainment Matrix											
Attainment Matrix Avg	2.91	2.75	2.81	2.36	2.53	2.68	2.69	2.74	2.93	2.71	2.4
Gap values	0.05	0.06	0.06	0.05	0.04	0	0.04	0.04	0.07	0.06	0.04

### Bhavan's Vivekananda College of Science, Humanities and Commerce Sainikpuri, Secunderabad – 500 094 Autonomous College Affiliated to Osmania University Accredited with 'A' grade by NAAC

#### M.Sc Microbiology

#### **Program Outcomes**

**PO1: Knowledge**: Apply the knowledge of basic concepts, fundamental principles and scientific theories and processes related to the fields of life sciences with their relevance in day-to-day life.

**PO2:** Analytical Skills: Select and implement the analytical skills acquired, in design of experiments followed by its effective execution in scientific research, industry and entrepreneurship.

**PO3:** Investigations and Problem analysis: Identify and investigate socially relevant issues using knowledge of Science and technology by design of experiments, analysis, interpretation of data and provide valid conclusions.

**PO4: Design and development of solutions**: Design innovative solutions for various societal needs like health care, food, water and energy through research and development with appropriate consideration for cultural, societal, environmental, public health and safety.

**PO5: Communication:** Communicate effectively on problems, issues and solutions with community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

**PO6: Ethics & Environment:** Apply ethical principles and commit to professional ethics and responsibilities and norms in research and the functional areas, understand the issues of environmental context and sustainable development.

**PO7: Individual and Team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

**PO8: Self-directed and Life-long Learning**: Acquire the ability to engage in independent and life-long learning in the broadest context of socio, economic and technological changes.

Progra	m Specific Outcomes
<b>PSO1:</b> Nanobi	Apply the knowledge of Microbiology, Immunology, Virology, Molecular biology, Biochem otechnology and Bioinformatics as per the demands of research and Industry
food, a	Design, perform and analyse the procedures as per laboratory standards in the areas of med griculture, pharma, environmental, industrial microbiology in production, down streaming control and Quality assurance of microbial products.
	Integrate the knowledge of Microbiology, Molecular biology, Nanobiotechnology tational Biology to solve research problem which has societal relevance.

## **Course Outcomes**

Name of the Course	General Microbiology and Microbial physiology
Course Code	PMB 101
CO1	Apply concepts of microscopy for identifying various microbes
CO2	Experiment different microbial culturing techniques
CO3	Distinguish bacteria based on taxonomy
CO4	Summarize factors on microbial growth

Name of the Course	Virology
Course Code	PMB102
CO1	Classify the virus based on structure, and replication
CO2	Distinguish lytic and lysogenic viruses
CO3	Interpret concepts of recombination in phages
CO4	Summarize applications of viruses in various areas

Name of the Course	Research Methodology & Techniques (Core)
Course Code	PMB 103
CO1	Select the right method for probing a given property of a sample molecule
CO2	Apply the most appropriate method for separation of molecules in a given mixture.
CO3	Use Excel and apply appropriate statistical analysis.
CO4	Write an organized scientific manuscript for a project.

Name of the Course	Microbial Biochemistry
Course Code	PMB 104
CO1	Determine pH of solutions and prepare Buffers for laboratory work
CO2	Analyze the biomolecules by qualitative analysis
CO3	Perform enzyme assay and calculate enzyme activity
CO4	Identify enzymes from various sources and purify them

Name of the Course	Communicative English
Course Code	PMB 105
CO1	The students are able to understand that effective communication is important to express their views, thoughts and opinions
CO2	The students improve their listening, speaking' reading and writing skills. The students are confident enough to participate in group discussion and debate

Name of the Course	Molecular Biology & Microbial Genetics
Course Code	PMB 201
CO1	Compare the structural variations of DNA and genome organization
CO2	Illustrate Replication, Transcription, translation and gene regulation
CO3	Differentiate the types of mutations, DNA damage and repair mechanisms
CO4	Solve problems in genetic recombination for genetic mapping

Name of the Course	Environmental and Agricultural Microbiology
Course Code	PMB 202
CO1	Construct a mind map on role of microbes in air and water pollution
CO2	Summarize the role of microbes in bioremediation technologies
CO3	Interpret the role of microbes in decomposition
CO4	Apply the concepts of biofertilizers for better and sustainable agricultural practice.

Name of the Course	Immunology
Course Code	PMB 203
CO1	Illustrate the Antibody structure and diversity
CO2	Summarize the types of immunity and immunological responses to various antigens
CO3	Apply immunological techniques practically
CO4	Relate between cancer and immunology

Name of the Course	Pharmaceutical Microbiology
Course Code	PMB 204
CO1	Analyze microbial spoilage, prevention and preservation of pharmaceutical products, GMP
CO2	Discriminate the mode of actions of various anti microbial agents
CO3	Use Practical skills in preservation and testing of various industrial products
CO4	Perform microbiological assays in pharmaceutical industry

Name of the Course	Computer Skill
Course Code	PMB 205
CO1	Understand the applications of word processing using MS Word) and data analysis using MS. excel
CO2	Able to learn basics of poster designing and computer graphics

Name of the Course	Food Microbial Technology
<b>Course Code</b>	PMB 301
CO1	Discuss the significance of fermented foods in daily
	lives and describe the overall role of microbes
	involved in food processing.
CO2	Explain Dairy Microbiology and measure the role of
	different types of microbes and their significance.
CO3	Validate the concept and importance of Probiotics and
	Prebiotics.
CO4	Comprehend the overall concept involved in Microbial
	Intoxication (Bacterial and Fungal) and review
	detoxification measures.

Name of the Course	Medical Bacteriology
Course Code	PMB302
CO1	Explain the clinically important microorganisms and
	Normal flora of human body
CO2	Describe the nature and basic concepts of pathogenic
	microorganisms, infection and process of diagnosis and
	perform the requisite diagnostic protocols
CO3	Discuss of air borne and sexually transmitted bacterial
	pathogens bacterial pathogens.
CO4	Illustrate water borne bacterial pathogens and wound
	infections of bacteria.

Name of the Course	Microbial Biotechnology
Course Code	PMB303
CO1	Understand the industrial important microorganisms and Basic awareness on fermentor design .Perform practical procedures to screen industrial important microorganisms & analyze their fermentative products.
CO2	Understand the nature and basic concepts of. optimization of fermentation media, process of fermentation and perform the requisite experiments on scale up & down stream processes
CO3	Awareness of fermentative production of microbial products and Understand production and commercial application of microbial enzymes
CO4	Update knowledge in new frontiers of industrial microbiology – steroid transformation, microbial biopesticides, genetically modified microbes and immobilization

Name of the Course	Microbial Ecology and Plant Microbe Interactions
Course Code	PMB 304
CO1	Describe microbial diversity and calculate statistical indices for diversity and explain molecular methods of diversity analysis
CO2	Explain direct and indirect mechanisms of plant growth promotion by PGPR and develop microbial formulations for field application
CO3	Detect different bacterial and fungal pathogens based on signs and symptoms of plant diseases and their management using integrated pest control
CO4	Explain molecular mechanism of pathogen recognition, induced and systemic resistance in plants and describe different quorum sensing circuits of microbes

Name of the Course	Microbiological Quality Control and Quality Assurance in Food & Pharma Industry
Course Code	PMB 305
CO1	Equip with fundamentals of GMP, GLP and SOP and understand the validation principles in food and pharma industry and Quality control. Awareness on procedures in quality assurance (QA) of finished product.
CO2	Practical knowledge in Microbial Standards for Different Foods and Water and sterility testing methods. Acquire practical knowledge in Microbial quality testing of Milk and Water. Understand importance of Quality control and Quality assurance in Food and Pharma products

Name of the Course	<b>Personality Development</b>
<b>Course Code</b>	PMB 305
CO1	Students are confident enough to use interpersonal skills.
CO2	Students developed self-confidence and empathetic

Name of the Course	Cell and Molecular Biotechnology
Course Code	PMB 401
CO1	Describe the mechanism of cell cycle regulation, apoptosis and Cancer induction & inheritance, Signal transduction pathways
CO2	Choose appropriate cloning vectors, sequencing methods for DNA /Protein, molecular library construction and cloning techniques in prokaryotes and eukaryotes
CO3	Identify the Molecular Techniques like-PCR, RT PCR, RAPD, RFLP,SSR for application in molecular diagnostics and Discuss on Site directed mutagenesis, Reverse genetics, Gene knock and Gene Silencing, Gene therapy.
CO4	Categorize Transgenic Plants and Animals with their applications; Explain the significance of Stem Cell technology and Genome Engineering applications in biology.

Name of the Course	Medical Virology and Parasitology
Course Code	PMB 402
CO1	Explain the process of diagnosis and perform the requisite diagnostic procedures for identification of viruses and list out air borne viral pathogens
CO2	Classify water borne viral pathogens and Zoonotic viral pathogens
CO3	Describe sexually transmitted viral pathogens
CO4	Categorize parasitic and mycotic infections

Name of the Course	Tax Planning for Individuals
Course Code	PMB 403 A
CO1	The subject will enable the students to understand
	basic concepts of tax the Income Tax Act 1961
CO2	Relevance of tax planning while computing the tax
	liability of individuals.

Name of the Course	Elements of Marketing
Course Code	PMB 403 A
CO1	Understand marketing concepts and techniques
CO2	Apply marketing concepts in the pharmaceutical industry.

Name of the Course	Bioinformatics
Course Code	PMB 403 B
CO1	Understand and find sequences for nucleic acid and protein of interest, and explain evolutionary relationships between sequences. Understand to design primers to amplify genes of interest
CO2	Understand and find alternatively spliced transcripts, tissue-specific expression levels and gene-editing technologies

Name of the Course	Nanobiotechnology
Course Code	PMB 404
CO1	Review the origin, properties and types of nanoparticles
CO2	Describe the methods of synthesis and characterization of nanoparticles
CO3	Discuss the applications of nanoparticles in the field of environmental Nanobiotechnology
CO4	Explain the therapeutic role of nanoparticles in human health.

Name of the Course	Seminar
<b>Course Code</b>	PMB 406
CO1	Understand and present the scientific literature
CO2	Develop presentation skills

Name of t	the Progran	n: MSc M	icrobiol	ogy							
Name of t	the Course:	General 1	Microbio	ology and	Micro	bial					
Physiology								Code	: PMB	101	
Semester	Semester: I									(ear	
Academic	: Year:2017	-18					Batch	:2017-	19		
									Progr	ram Sp	ecific
			Progra	am Outco	mes		Outcomes				es
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	3	3	3	3	3	3
CO2	3	3	3	3	3	3	3	3	3	3	3
CO3	3	3	3	3	3	3	3	3	3	3	3
CO4	3	3	3	3	3	3	3	3	3		
AVG	3	3	3	3	3	3	3	3	3	3	3

Name of the	Program:	MSc Mic	robiolog	gy							
Name of the	Course: V	irology					Course	e code:	PMB	102	
Semester: I							Year:	2017 (	First y	ear)	
Academic Y	Academic Year:2017-18 Batch:20								19		
									Progr	ram Sp	ecific
			Progr	am Outc	omes		Outcomes				es
Course/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO 1	3	2	2	2	2	1	2	3	3	1	1
CO2	3	1	3	2	1	1	2	2	3	1	2
CO3	3	1	2	2	1	1	2	3	3	1	3
CO4	3	2	3	3	1	2					
AVG	3	1.5	2.5	2	1.5	1.25	2	2.75	3	1	2

Name of	the Progran	n: MSc M	icrobiol	ogy								
Name of	the Course:	Research	Method	lology &	Techn	iques	Course Code: PMB 103					
Semester: I								2017 ( I	First ye	ear)		
Academic	Academic Year: 2017-2018											
					_	ram Spo Outcome						
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	
CO1	2	3	3	3	1	1	2	2	3	3	2	
CO2	2	3	3	3	1	1	2	2	3	3	2	
CO3	3	3	3	3	3	2	3	2	3	3	2	
CO4	3 3 2 3 2 3 2									3	2	
AVG	2.5	3	3	2.75	2	1.5	2.5	2	3	3	2	

Name of	the Progran	n: MSc M	licrobiol	logy							
Name of	the Course:	Microbia	al Bioch	emistry			Cours	e Code	: PMB1	04	
Semester	Year:2	2017 ( I	First yea	ar)							
Academic	Batch	2017-1	9								
									Progr	am Spe	ecific
			Progr	am Outco	mes				O	utcome	S
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	2	3	3	3	3	3	3	2
CO2	3	3	3	2	3	3	3	3	3	3	2
CO3	3	3	3	2	3	3	3	3	3	3	2
CO4	3	3	3	3	3	3	3	2			
AVG	3	3	3	2	3	3	3	3	3	3	2

Name of	Name of the Program: MSc Microbiology												
Name of	me of the Course: Communicative English							Course Code: PMB 105					
Semester	: I		Year:2	2017 ( I	irst yea	r)							
Academic	c Year: 2017	7-18					Batch	2017-1	9				
								Progra	am Spe	ecific			
			Progra	am Outco	omes		Outcomes						
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3		
CO1	3	3	3	2	3	3	3	3	3	3	2		
CO2	3	3	3	3	3	3	3	3	2				
AVG	3	3	3	2	3	3	3	3	3	3	2		

Name of the	Program	: MSc N	Microbi	ology							
Name of the	Course:	Molecul	lar Biol	ogy & N	<b>Iicrobia</b>	ıl					
Genetics								rse C	ode: PM	B201	
Semester: II							Year	r: 201	7 (first y	ear )	
Academic Ye	ar: 2017	-18					Bato	h:201	7-19		
									Pro	gram Spe	cific
			Prog	gram Ou	tcomes		Outcomes				
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	2	3	3	3	3	3	3	2
CO2	3	3	3	2	3	3	3	2	3	3	2
CO3	3	3	3	3	3	3	3	3	3	3	2
CO4	3	3	3	2	3	3	3	3	3	3	2
AVG	3	3	3	2.25	3	3	3	2.75	3	3	2

Name of the l	Program	: M.Sc I	Microbi	ology								
Name of the	Course: 1	Environ	mental	and Agr	icultura	al						
Microbiology	Microbiology							rse C	ode: PM	B 202		
Semester: II							Year	r: 201	7 (first y	year )		
Academic Ye	ar: 2017	-18					Batc	h:201	7-19			
									Prog	gram Spe	cific	
			Prog	gram Ou	tcomes			Outcomes				
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	
CO1	3	3	3	3	2	3	2	2	3	3	3	
CO2	3	3	3	3	2	3	3	3	3	3	3	
CO3	3	3	3	3	2	3	2	2	3	3	3	
CO4	3	3	3	3	3	3	3	3	3	3		
AVG	3	3	3	3	2	3	2.5	2.5	3	3	3	

Name of th	e Prog	ram: N	ASc M	icrobi	ology							
Name of th	e Cour	se :Im	munol	logy			Cours	se Cod	e: PMB 203			
Semester: II							Year:	2017 (	(first year )			
Academic Year: 2017-18							Batch	:2017-	19			
			Pro	ogram	Outcor	nes		Program Specific Outcome				
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	
CO 1	3	2	2	1	3	1	2	3	3	1	1	
CO2	3	2	2	1	2	1	2	3	3	1	2	
CO3	3	3	3	3	2	3	3	3	3	1	3	
CO4	3	2	2	1	2	3	1	3	3	1	1	
AVG	3	2.25	2.25	1.5	2.25	2	2	3	3	1	1.75	

Name of the	Progra	m: MS	MICE	ROBIO	LOGY							
Name of the	Course	: Pharr	naceuti	cal Mic	robiolo	ogy	Course Code: PMB204					
Semester: II							Year	: 2017	(first yea	ar)		
Academic Yo	ear: 201	7-18					Batc	h:201′	7-19			
			Pro	gram O	utcomes	S	Program Specific Outcomes					
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	
CO1	3	3	3	2	3	3	3	3	3	3	2	
CO2	3	3	3	2	3	3	3	3	3	3	2	
CO3	3	3	3	2	3	3	3	3	3	3	2	
CO4	3	3	3	3	3	3	3	3	2			
AVG	3	3	3	2	3	3	3	3	3	3	2	

Name of th	e Prog	ram: N	MSc M	icrobi	ology						
Name of th	e Cour	se: Co	mpute	er Skill			Cours	se Cod	e: PMB 205	j	
Semester: 1	I	Year: 2017 (first year )									
Academic Year: 2017-18 Batch:2017-19											
			Pro	ogram	Outcor	nes	Program Specific Outcomes				
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	2	3	3	3	3	3	3	2
CO2	3	3	3	2	3	3	3	3	3	3	2
AVG	3     3     3     2     3     3     3     3     3     3     2										

Name of the	Progra	m: MS	c Micr	obiolog	<b>y</b>									
Name of the	Course	: Food	Microl	bial Te	chnolog	gy	Cour	se Co	de: PMB	301				
Semester: II	I						Year	: 2018	( second	year )				
Academic Y	ear: <b>20</b> 1													
	Program Outcomes Program Specific Outcomes													
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3			
CO1	3	3	3	3	2	3	3	3	3	3	3			
CO2	3	3	3	3	2	2	2	2	3	3	3			
CO3	3	3	3	3	2	2	2	2	3	3	3			
CO4	4 3 3 3 3 2 2 2 2 3 3 3													
AVG	3	3	3	3	2	2.25	2.25	2.25	3	3	3			

Name of th	e Progr	am: M	Sc Mi	crobio	logy									
Name of th	e Cour	se: Me	dical B	acterio	ology		Cour	se Cod	le: PMB 30	)2				
Semester: 1	II						Year	2018	( second ye	ear)				
Academic Y	Year: 2	ear: 2018-2019 Batch: 2017-2019												
	Program Outcomes Program Specific Outcom													
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3			
CO1	3	2	2	3	2	3	3	3	3	2	3			
CO2	3	3	3	3	3	3	3	3	3	3	3			
CO3	3	2	3	2	2	3	3 3 3 2 3							
CO4	3	2	3	2	2	3	3	3	3	2	3			
AVG	3     2.25     2.75     2.5     2.25     3     3     3     2.25     3													

Name of the	e Progra	am: M	Sc MIC	CROBI	OLOG	Y								
Name of the	e Cours	e: Micı	robial l	Biotech	nology		Corse	e Code	e: PMB-30	3				
Semester: I	Π						Year	: 2018	( second y	rear)				
Academic Y	ear: 20	:: 2018-2019 Batch: 2017-2019												
			Pro	gram C	utcome	es	Program Specific Outcomes							
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3			
CO1	3	3	3	2	3	3	3	3	3	3	2			
CO2	3	3	3	2	3	3	3	3	3	3	2			
CO3	3	3	3	2	3	3	3	3	3	3	2			
CO4	3	3	3	2	3	3	3	3	3 3 2					
AVG	3	3	3	2	3	3	3	3	3	3	2			

Name of the P	rogram	MSc M	licrobiol	ogy							
Name of the C Interactions D		Aicrobia	ıl Ecolog	gy and P	lant Mi	crobe	Cou	rse C	ode: PM	IB304	
Semester: III							Year	:: 201	8 ( seco	nd year	)
Academic Yea	r: 2018-	2019					Batc	h: 20	17-2019	)	
			Prog	gram Ou	tcomes				_	gram Spe Outcome	
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	2	3	3	3	3	3	3	3
CO2	3	3	3	3	3	3	3	3	3	3	3
CO3	3	3	3	3	3	3	3	3	3	3	2
CO4	3 3 3 2 3 3 3 3 2										2
AVG	3	3	3	2.5	3	3	3	3	3	3	2.5

Name of the Pi	ogram :	MSc Mi	crobiolo	ogy								
Name of the Co			_	-		ınd	C	C	. J DX	/D 205		
<b>Quality Assura</b>	ince in F	000 & F	'narma	ınaustry	7		Cou	rse C	ode: PN	1B 305		
Semester: III							Year	r: 201	8 ( seco	nd year	r)	
Academic Year	r: 2018-2	2019					Bato	h: 20	17-2019	)		
							Prog	ram Spe	ecific			
			Prog	gram Out	comes		Program Specific Outcomes				es	
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	
CO1	3	3	3	2	3	3	3	3	3	3	2	
CO2	3	3	3	2	3	3	3 3 3 2					
AVG	3	3	3	2	3	3	3	3	3	3	2	

Name of the	Progra	am: MS	Sc Mici	robiolo	gy							
Name of the	Course	e: Pers	onality	Develo	pment	t	Cour	se Co	de: PMB 3	05		
Semester: II	ester: III Year: 2018 ( second year )											
Academic Year: 2018-2019 Batch: 2017-2019												
			Pro	gram O	utcome	es	Program Specific Outcomes					
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	
CO1	3	3	3	2	3	3	3	3	3	3	2	
CO2	3	3	3	2	3	3	3	3	3	3	2	
AVG	3	3	3	2	3	3	3	3	3	3	2	

Name of the	e Progi	ram: M	ISc Mi	crobiol	ogy							
Name of the	Cours	e: Cell	and M	Iolecul	ar Biot	echnol	ogy	Course	Code:	PMB401		
Semester: I	V							Year: 2	019 ( S	econd year	)	
Academic Year: 2018-19 Batch:2017-19												
			P	rogram		Program Specific Outcomes						
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	
CO1	3	3	3	2	3	3	3	3	3	3	2	
CO2	3	3	3	2	3	3	3	3	3	3	2	
CO3	3	3	3	2	3	3	3	3	3	3	2	
CO4	3	3 3 3 2 3 3 3 3 3 2										
AVG	3	3	3	2	3	3	3	3	3	3	2	

Name of the	e Progra	am: M	Sc Mic	robiol	ogy							
Name of the	e Cours	e: Med	lical Vi	rology	and							
<b>Parasitolog</b>	y							Corse (	Code: P	PMB 402		
Semester: I	${f V}$							Year: 2	019 ( S	econd year	)	
Academic Y	/ear: 20	18-19						Batch:2	2017-19	)		
										Program S	Specific	
			P	rogram	Outco	mes				Outco	mes	
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	
CO1	3	2	2	3	2	3	3	3	3	2	3	
CO2	3	3	3	3	3	3	3	3	3	3	3	
CO3	3	3 2 3 2 2 3 3 3 3 2 3										
CO4	3 2 3 2 2 3 3 3 3 3 3 3											
AVG	3	2.25	2.75	2.5	2.25	3	3	3	3	2.25	3	

Name of the	Name of the Program: MSc Microbiology													
Name of the	e Cour	se: Ta	x Plan	ning fo	or Indi	vidual	s Co	Course Code: PMB 403 A						
Semester: I				Ye	Year: 2019 ( Second year )									
Academic Y	Year: 2	018-19	)			Ba	Batch:2017-19							
			P	rogram	Outco	omes			Pr	ogram Specif	ic Outcomes			
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3			
CO1	3	3	3	2	3	3	3	3	3	3	2			
CO2	3	3	3	2	3	3	3	3	3	3	2			
AVG	3	3     3     3     2     3     3     3     3     3     3     3     2       3     3     3     3     3     3     3     3     3     2												

Name of th	Name of the Program :MSc Microbiology													
Name of the	Name of the Course: Elements of Marketing								Course Code: PMB 403A					
<b>Semester:</b>				7	Year: 2019 ( Second year )									
Academic	Year:	2018-	19				В	Batch:2017-19						
			I	Prograi	m Out	comes		Program S				ic Outcomes		
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO	7 PO8	PSC	10	PSO2	PSO3		
CO1	3	3	3	2	3	3	3	3	3		3	2		
CO2	3	3	3	2	3	3	3	3	3		3	2		
AVG	3	3 3 3 2 3 3 3 3 3 2												

Name of the	Prog	ram:	MSc I	Micro	biolo	gy									
Name of the	Cour	se : B	ioinf	ormat	ics		(	Course code: PMB 403							
Semester: IV	Semester: IV										Year: 2019 ( Second year )				
Academic Y	ear: 2	018-1	9				]	Batch:2017-19							
	Progr	ram O	utcon	nes				Program Specific Outcomes							
Course/POs	PO1	PO2	PO3	PO4	PO5	PO6	РО	7	PO8	PSO	PSO2	PSO3			
CO1	3	3	2	3	2	0	2		3	3	3	3			
CO2	3	3	2	3	2	0	2		3	3	2	3			
AVG	3	3	2	3	2	0	2		3	3	2.5	3			

Name of the Program: MSc Microbiology														
Name of the Course : Nanobiotechnology							(	Course code : PMB 404						
Semester: IV								Year: 2019 ( Second year )						
Academic Year: 2018-19							]	Batch:2017-19						
	Program Outcomes								ic Outcomes					
Course/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO	7	PO8	PS	01	PSO2	PSO3	
CO1	3	2	2	3	1	3	1		2	3	3	3	3	
CO2	3	1	2	2	2	2	1		1	3	}	3	3	
CO3	3	3	2	2	1	3	1		1	(1)	}	3	3	
CO4	3	3	2	2	1	3	1		1	3	}	3	3	
AVG	3	2.25	2	2.25	1.25	2.75	1		1.25	3	}	3	3	

Name of the Program: MSc Microbiology															
Name of the Course: Seminars							C	Course Code: PMB 406							
Semester: IV							Y	Year: 2019 ( Second year )							
Academic Year: 2018-19 Batch:2017-19															
	Program Outcomes							Program Specific Outcomes							
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3				
CO1	3	3	3	2	3	3	3	3	3	3	2				
CO2	3	3	3	2	3	3	3	3	3	3	2				
AVG	3	3	3	2	3	3	3	3	3	3	2				

# **Program Average Matrix**

MSC M	licrobiology 2017-2019	Program Outcomes									Program Specific Outcomes		
	Course/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	
PMB 101	General Microbiology and Microbial Physiology	3	3	3	3	3	3	3	3	3	3	3	
PMB 102	Virology	3	1.5	2.5	2	1.5	1.25	2	2.75	3	1	2	
PMB 103	Research Methodology & Techniques	2.5	3	3	2.75	2	1.5	2.5	2	3	3	2	
PMB 104	Microbial Biochemistry	3	3	3	2	3	3	3	3	3	3	2	
PMB 105	Communicative English	3	3	3	2	3	3	3	3	3	3	2	
PMB 151	General Microbiology & Virology	3	3	3	3	3	3	3	3	3	3	3	
PMB 152	Research Methodology & Techniques	2.5	3	3	2.75	2	1.5	2.5	2	3	3	2	
PMB 153	Microbial Biochemistry	3	3	3	2	3	3	3	3	3	3	2	
PMB 201	Molecular Biology & Microbial Genetics	3	3	3	2.25	3	3	3	2.75	3	3	2	
PMB 202	Environmental and Agricultural Microbiology	3	3	3	3	2	3	2.5	2.73	3	3	3	
PMB 203	Immunology	3	2.25	2.25	1.5	2.25	2	2.3	3	3	1	1.75	
PMB 204	Pharmaceutical Microbiology	3	3	3	2	3	3	3	3	3	3	2	
PMB 205	Computer Skill	3	3	3	2	3	3	3	3	3	3	2	
PMB 251	Molecular Biology And Microbial Genetics	3	3	3	2.25	3	3	3	2.75	3	3	2	
PMB 252	Environmental & Agriculture Microbiology	3	3	3	3	3	3	3	2.13	3	3	2	
PMB 253	Immunology & Pharmaceutical Microbiology					2	3	2.5	2.5	3	3	3	
PMB 301		3	3	3	2	3	3	3	3	3	3	2	
PMB 302	Food Microbial Technology Medical Bacteriology	3	3	3	3	2	2.25	2.25	2.25	3	3	3	
PMB 303	Treated Bacteriology	3	2.25	2.75	2.5	2.25	3	3	3	3	2.25	3	
PMB 304	Microbial Biotechnology	3	3	3	2	3	3	3	3	3	3	2	
PMB 305	Microbial Ecology and Plant Microbe Interactions Microbiological Quality Control and Quality Assurance in	3	3	3	2.5	3	3	3	3	3	3	2.5	
	Food & Pharma Industry	3	3	3	2	3	3	3	3	3	3	2	
DMD 251	Personality Development	3	3	3	2	3	3	3	3	3	3	2	
PMB 351	Food Microbial Technology	3	3	3	3	2	2.25	2.25	2.25	3	3	3	
PMB 352	Medical Bacteriology	3	2.25	2.75	2.5	2.25	3	3	3	3	2.25	3	
PMB 353	Applied Microbiology	3	3	3	2.5	3	3	3	3	3	3	2.5	
PMB 401	Cell and Molecular Biotechnology	3	3	3	2	3	3	3	3	3	3	2	
PMB402	Medical Virology and Parasitology	3	2.25	2.75	2.5	2.25	3	3	3	3	2.25	3	
PMB 403	Bioinformatics	3	3	2	3	2	0	2	3	3	2.5	3	
PMB 404	Nanobiotechnology	3	2.25	2	2.25	1.25	2.75	1	1.25	3	3	3	
PMB 405	Project	3	3	3	3	3	3	3	3	3	3	3	
PMB 406	Seminar	3	3	3	3	3	3	3	3	3	3	3	
PMB 451	Cell And Molecular Biotechnology & Bioinformatics	3	3	3	2	3	3	3	3	3	3	2	
PMB 452	Medical Virology And Parasitology & Nanobiotechnology	3	2.25	2.75	2.5	2.25	3	3	3	3	2.25	3	
	Average Value	2.96	2.81	2.87	2.41	2.57	2.68	2.74	2.78	3	2.77	2.44	

## **Attainment Matrix**

MSC Mici	robiology 2017-2019		]	Prog	ram	Program Specific Outcomes						
	Course/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
PMB 101	General Microbiology And Microbial Physiology	3	3	3	3	3	3	3	3	3	3	3
PMB 102	Virology	3	1.5	2.5	2	1.5	1.25	2	2.75	3	1	2
PMB 103	Research Methodology & Techniques	1.6	2	2	1.8	1.3	1	1.6	1.3	2	2	1.3
PMB 104	Microbial Biochemistry	3	3	3	2	3	3	3	3	3	3	2
PMB 105	Communicative English	3	3	3	2	3	3	3	3	3	3	2
PMB 151	General Microbiology & Virology	3	3	3	3	3	3	3	3	3	3	3
PMB 152	Research Methodology & Techniques	2.5	3	3	2.75	2	1.5	2.5	2	3	3	2
PMB 153	Microbial Biochemistry	3	3	3	2	3	3	3	3	3	3	2
PMB 201	Molecular Biology & Microbial Genetics	3	3	3	2.25	3	3	3	2.75	3	3	2
PMB 202	Environmental And Agricultural Microbiology	3	3	3	3	2	3	2.5	2.5	3	3	3
PMB 203	Immunology	3	2.25	2.25	1.5	2.25	2	2	3	3	1	1.75
PMB 204	Pharmaceutical Microbiology	3	3	3	2	3	3	3	3	3	3	2
PMB 205	Computer Skill	1	1	1	0.6	1	1	1	1	1	1	0.6
PMB 251	Molecular Biology And Microbial Genetics	3	3	3	2.25	3	3	3	2.75	3	3	2
PMB 252	Environmental & Agriculture Microbiology	3	3	3	3	2	3	2.5	2.73	3	3	3
PMB 253	Immunology & Pharmaceutical Microbiology	3	3	3	2	3	3	3	3	3	3	2
PMB 301	Food Microbial Technology	3	3	3	3	2	2.25	2.25	2.25	3	3	3
PMB 302	Medical Bacteriology	3	2.25	2.75	2.5	2.25	3	3	3	3	2.25	3
PMB 303	Microbial Biotechnology	3	3	3	2	3	3	3	3	3	3	2
PMB 304	Microbial Ecology And Plant Microbe Interactions	2	2	2	1.6	2	2	2	2	2	2	1.6
PMB 305	Microbiological Quality Control And Quality Assurance In Food & Pharma Industry	3	3	3	2	3	3	3	3	3	3	2
	<b>Personality Development</b>	3	3	3	2	3	3	3	3	3	3	2
PMB 351	Food Microbial Technology	3	3	3	3	2	2.25	2.25	2.25	3	3	3
PMB 352	Medical Bacteriology	3	2.25	2.75	2.5	2.25	3	3	3	3	2.25	3
PMB 353	Applied Microbiology	3	3	3	2.5	3	3	3	3	3	3	2.5
PMB 401	Cell And Molecular Biotechnology	3	3	3	2	3	3	3	3	3	3	2
PMB402	Medical Virology And Parasitology	3	2.25	2.75	2.5	2.25	3	3	3	3	2.25	3
PMB 403	Bioinformatics	3	3	2	3	2	0	2	3	3	2.5	3
PMB 404	Nanobiotechnology	3	2.25	2	2.25		2.75	1	1.25	3	3	3
PMB 405	Project	3	3	3	3	3	3	3	3	3	3	3
PMB 406	Seminar	3	3	3	3	3	3	3	3	3	3	3
PMB 451	Cell And Molecular Biotechnology & Bioinformatics	3	3	3	2	3	3	3	3	3	3	2
PMB 452	Medical Virology And Parasitology & Nanobiotechnology	3	2.25	2.75	2.5	2.25	3	3	3	3	2.25	3
	Average Value	2.95	2.77	2.83	2.39	2.54	2.67	2.70	2.77	2.96	2.72	2.44

# GAP

MSC Micro	MSC Microbiology 2017-2019													
			Program Specific Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	<b>PO7</b>	PO8	PSO1	PSO2	PSO3			
ProgTarge														
t Matrix														
Avg	2.96	2.81	2.87	2.41	2.57	2.68	2.74	2.78	3	2.77	2.44			
Attainmen														
t Matrix														
Avg	2.95	2.77	2.83	2.39	2.54	2.67	2.70	2.77	2.96	2.72	2.44			
Gap values	0.01	0.04	0.04	0.02	0.02	0.004	0.03	0.01	0.03	0.046	0.00			

