



स्वामी राम हिमालयन विश्वविद्यालय
Swami Rama Himalayan University

Criterion 1 - Curricular Aspects

1.1.1 Outcome Analysis of POs, COs

M.Sc. Microbiology (2021-2023)

Himalayan School of Bioscience

Swami Rama Nagar, Jolly Grant, Dehradun 248016, Uttarakhand, India

A. Program Outcomes

After successful completion of the program, graduating students/graduates will able to:

PO1	Knowledge	To Learn theoretical and practical knowledge of fundamental and applied aspects of life sciences.
PO2	Analysis	To understand the finer intricacies of diversified fields of subject involved in the interdisciplinary aspect of Microbiology.
PO3	Use of Technology	To develop subject based analytical skills, practical knowledge and competency for applied research and development.
PO4	Ethics	To learn effective scientific communication, research design and interpret experiments to undertake challenging and new opportunities in academia and industry.
PO5	Learning	To apply multidisciplinary skills and knowledge for higher studies or applied research in a global, economic, environmental, and societal context.




B. Course-wise CO-PO Mapping

Mapping factor or Correlational level between Course Outcome (CO) and Program Outcomes (PO) indicates to what extent the teaching and assessment method of CO correlates/contributes the PO at the level defined below:

Correlation Level	Particulars
3	Substantial/high contribution of CO towards PO
2	Moderate contribution of CO towards PO
1	Slight/low contribution of CO towards PO

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)				
MMBC 101	General Microbiology					
CO#	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5
CO1	Describe and comprehend the fundamental concepts of general microbiology	2	3	3	3	2
CO2	Understand the classification and diversity of microbes	2	3	1	2	2
CO3	Understand and analyze the structure of various microbes, methods of cultivation and control	2	2	2	2	2
CO4	Demonstrate the knowledge and critical understanding on the diverse microbial community structure in different ecosystems		2	3	3	2
CO5	The student will be well versed in theoretical and practical aspects of general microbiology as well as its application in industry and academics		2	2	2	3
	AVERAGE PO	1.20	2.40	2.20	2.40	2.20




Course Code	Course Title	CO-PO Mapping (Articulation Matrix)				
MMBC 102	Microbial Taxonomy, Diversity and Ecology					
CO#	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5
CO1	Describe and comprehend the fundamental concepts of microbial taxonomy, diversity and ecology	2	3	3	3	3
CO2	Understand and analyze the basis of microbial taxonomy and classification	2	3	2	2	1
CO3	Demonstrate the knowledge and understanding on the diversity of microbes in maintaining and enhancing the quality of ecosystem	2	2	3	3	1
CO4	Well versed in theoretical and practical aspects of microbial taxonomy, diversity and ecology as well as its application in industry and academics		2	1	2	2
CO5	Learn about the polyphasic taxonomy of microbes		2	2	2	3
	AVERAGE PO	1.20	2.40	2.20	2.40	2.00

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)				
MBCC 101	Biochemistry					
CO#	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5
CO1	Describe and comprehend the fundamental concepts of general biochemistry	2	2	3	2	2
CO2	Understand and analyze the structure of various biomolecules, and their regulation	2	2	1	2	1
CO3	Demonstrate the knowledge and critical understanding on the role of biomolecules in cell function		3	3	3	2
CO4	Well versed in theoretical and practical aspects of general biochemistry as well as its application in industry, research and academics	2	3	2	2	2
CO5	Learn about the biosynthesis and catabolism of biomolecules	1	2	2	2	3
	AVERAGE PO	1.40	2.40	2.20	2.20	2.00

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Course Code	Course Title	CO-PO Mapping (Articulation Matrix)				
MBCC 102	Biochemical & Analytical Techniques					
CO#	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5
CO1	Describe and comprehend the fundamental concepts of general instruments	3	2	3	3	3
CO2	Understand and analyze the functioning of different instruments		3	1	2	1
CO3	Demonstrate the knowledge and understanding on the role of various scientific instruments in the field of biological sciences	2	2	3	3	2
CO4	Well versed in theoretical and practical aspects of various scientific instruments as well as their applications in industry and academics	3	3	2	3	3
CO5	Know about the various, electrophoresis, chromatographic, spectroscopic and radiotracer techniques	2	3	2	2	3
	AVERAGE PO	2.00	2.60	2.20	2.60	2.40

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)				
MMBP 101	Practical - I					
CO#	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5
CO1	Learn basic techniques used in microbiology laboratory.	1	1	3	1	1
CO2	Apply knowledge of staining to study microbes.	2	2	1	2	1
CO3	Learn media preparation for microbial cultivation.	2	2	3	3	2
CO4	Isolate from microbes from various sources	3	3	3	3	3
CO5	Biochemical characterization of bacteria	3	3	2	3	3
	AVERAGE PO	2.20	2.20	2.40	2.40	2.00

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Course Code	Course Title	CO-PO Mapping (Articulation Matrix)				
MMBP 102	Practical – II					
CO#	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5
CO1	Learn basic techniques used in Cell biology laboratory.	1	1	3	1	1
CO2	Apply knowledge of preparing slides and staining to study different type of cells.	2	2	1	2	1
CO3	Subcellular fractionation of organelles from various tissues	2	2	3	3	2
CO4	prepare genomic DNA from various sources	3	3	3	3	3
CO5	Able to quantify DNA concentrations	3	3	2	3	3
	AVERAGE PO	2.20	2.20	2.40	2.40	2.00

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)				
MBTC 201	Immunology					
CO#	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5
CO1	Understand fundamental concepts of immunology	1	3	3	2	2
CO2	Predict about nature of immune response that develops against bacterial, viral or parasitic infection, and prove it by designing new experiments	3	3	2	2	2
CO3	Well versed in theoretical and practical aspects of immunology as well as its application in industry and academics	3	2	3	2	3
CO4	Understand about Transplantation immunology & Immunogenetics		2	2	1	2
CO5	Understand about various aspects of vaccines	2	2	2	2	3
	AVERAGE PO	1.80	2.40	2.40	1.80	2.40




Course Code	Course Title	CO-PO Mapping (Articulation Matrix)				
MMBC 201	Bacteriology					
CO#	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5
CO1	Describe and comprehend the fundamental concepts of bacteriology	3	3	3	2	3
CO2	To understand and analyze the structure and function of various bacteria, identification and their metabolism	2	3	3	2	3
CO3	To demonstrate the knowledge and critical understanding on the bacterial morphotypes and their ecological significance	2	2	3	2	2
CO4	The student will be well versed in theoretical and practical aspects of bacteriology as well as its application in industry and academics	2	2	1	3	2
CO5	To demonstrate the knowledge and critical understanding on the bacterial morphotypes and their ecological significance.		2	2	2	3
	AVERAGE PO	1.80	2.40	2.40	2.20	2.60

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)				
MMBC 202	Virology					
CO#	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5
CO1	At the end of the program, the student will be able to describe and comprehend the fundamental concepts of virology	3	3	3	3	3
CO2	To understand and analyze the structure of various viruses, identification their role in ecosystem	2	3	1	2	1
CO3	To demonstrate the knowledge and understanding on the role of viruses in maintaining and enhancing the knowledge about their transmission and control	2	2	3		2
CO4	The student will be well versed in theoretical and practical aspects of virology as well as its application in research and academics		2	1	1	2
CO5	The students will understand about plant and animal viruses	2	2	2	2	3
	AVERAGE PO	1.80	2.40	2.00	1.60	2.20

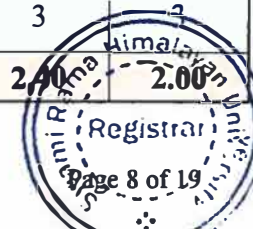
Course Code	Course Title	CO-PO Mapping (Articulation Matrix)				
MBCC 202	Molecular Biology & Microbial Genetics					
CO#	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5
CO1	Describe and comprehend the fundamental concepts of molecular biology and molecular genetics	3	3	3	3	3
CO2	To understand and analyze the structure of various biomolecules, methods of isolation	2	3	1	2	1
CO3	To demonstrate the knowledge and understanding on the role of various biomolecules in cell function	2	2	3		2
CO4	Well versed in theoretical and practical aspects of molecular biology and molecular genetics as well as their application in research and academics		2	1	1	2
CO5	Well versed in theoretical and practical aspects of microbial genetics	2	2	2	2	3
	AVERAGE PO	1.80	2.40	2.00	1.60	2.20

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)				
MBTC 202	Recombinant DNA Technology & Genomics					
CO#	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5
CO1	Describe and comprehend the fundamental concepts of RDT and genomics	3	3	3	3	3
CO2	To understand and analyze the structure of various biomolecules, techniques related to biomolecules study	2	2	1	2	1
CO3	To demonstrate the knowledge and understanding on the role of RDT and genomics in enhancing the prokaryotic and eukaryotic ecosystem	2	2	3	2	2
CO4	The student will be well versed in theoretical and practical aspects of RDT and genomics as well as their application in industry and academics		1	1	2	2
CO5	Explain the general principles of generating transgenic plants, animals and microbes.		2	2	1	2
CO6	Understand application of genetic engineering techniques in basic and applied experimental biology	2	2	2	1	3
	AVERAGE PO	1.50	2.00	2.00	1.83	2.17



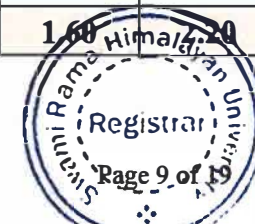
Course Code	Course Title	CO-PO Mapping (Articulation Matrix)				
MMBP201	Practical - III					
CO#	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5
CO1	Develop the knowledge of the structure and function of the major organ systems, including the molecular, biochemical and cellular mechanisms for maintaining homeostasis.	1	1	3	1	1
CO2	Develop the knowledge of the pathogenesis of diseases, interventions for effective treatment, and mechanisms of health maintenance to prevent disease.	2	2	1	2	1
CO3	Conceptualize how the innate and adaptive immune responses coordinate to fight invading pathogens.	2	2	3	3	2
CO4	Determine what immunomodulatory strategies can be used to enhance immune responses or to suppress unwanted immune responses such as might be required in hypersensitivity reactions, transplantations or autoimmune diseases.	3	3	3	3	3
CO5	Explore strategies to improve existing vaccines and how to approach these.	3	3	2	3	3
	AVERAGE PO	2.20	2.20	2.40	2.40	2.00

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)				
MMBP 202	Practical - IV					
CO#	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5
CO1	Describe and comprehend the fundamental concepts of viral transmission and control	1	1	3	1	1
CO2	Well versed in theoretical and practical aspects of virology as well as its application in research and academics	2	2	1	2	1
CO3	Describe and comprehend the fundamental concepts of bacteriology	2	2	3	3	2
CO4	To understand and analyze the structure and function of various bacteria, identification and their metabolism	3	3	3	3	3
CO5	To demonstrate the knowledge and critical understanding on the bacterial morphotypes and their ecological significance	3	3	2	3	3
	AVERAGE PO	2.20	2.20	2.40	2.40	2.00



Course Code	Course Title	CO-PO Mapping (Articulation Matrix)				
MMBC 301	Industrial Microbiology					
CO#	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5
CO1	Describe and comprehend the fundamental concepts of industrial microbiology	3	3	3	2	2
CO2	To understand and analyze the structure of various microbes, methods of cultivation and control	2	3	2	2	2
CO3	To demonstrate the knowledge and understanding on the role of fungi and algae in maintaining and enhancing the quality of ecosystem	2	2	2	2	2
CO4	Well versed in theoretical and practical aspects of general microbiology as well as its application in industry and academics		1		1	2
CO5	Well versed in theoretical and practical aspects of general microbiology as well as its application in industry and academics	2	2	2	2	3
	AVERAGE PO	1.80	2.20	1.80	1.80	2.20

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)				
MMBC 302	Microbial Physiology And Metabolism					
CO#	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5
CO1	Describe and comprehend the fundamental concepts of microbial physiology and metabolism	3	3	3	3	3
CO2	To understand and analyze the various biochemical cycles of microbes	2	3	1	2	1
CO3	To demonstrate the knowledge and understanding of bacterial fermentation, respiration and energy generation	2	2	3		2
CO4	Well versed in theoretical and practical aspects of microbial physiology and metabolism as well as its application in industry and academics		2	1	1	2
CO5	Well versed in theoretical and practical aspects of microbial physiology and metabolism as well as its application in industry and academics	2	2	2		2
	AVERAGE PO	1.80	2.40	2.00	1.00	2.00



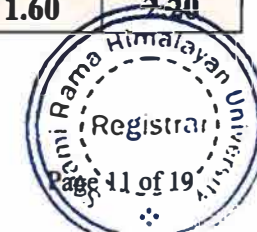
Course Code	Course Title	CO-PO Mapping (Articulation Matrix)				
MMBC 303	Medical Microbiology					
CO#	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5
CO1	Describe and comprehend the fundamental concepts of medical microbiology.	3	3	3	2	2
CO2	To understand and analyze the structure of various pathogenic microbes, methods of cultivation and control.	2	3	1	2	1
CO3	To demonstrate the knowledge and understanding on the role of microbes in pathogenesis	2	2	3	1	2
CO4	Well versed in theoretical and practical aspects of medical microbiology as well as its application in research and academics		2	1	3	3
	AVERAGE PO	1.75	2.50	2.00	2.00	2.00

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)				
MMBE 303	Pharmaceutical Microbiology					
CO#	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5
CO1	Describe and comprehend the fundamental concepts of pharmaceutical microbiology.	2	2	3	1	2
CO2	To understand and analyze the structure of various microbes, methods of cultivation, antimicrobial agents and drug production.	2	2	2	1	1
CO3	To demonstrate the knowledge and understanding on the drugs and their quality parameters.	2	3	3	2	3
CO4	Well versed in theoretical and practical aspects of pharmaceutical microbiology as well as its application in industry, research and academics.		1	3	2	2
CO5	Well versed in theoretical and practical aspects of pharmaceutical microbiology as well as its application in industry, research and academics.		2	2	2	3
	AVERAGE PO	1.20	2.00	2.60	1.60	2.00



Course Code	Course Title	CO-PO Mapping (Articulation Matrix)				
MMBE 307	Bioinformatics & System Biology					
CO#	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5
CO1	Describe and comprehend the fundamental concepts of bioinformatics and system biology.	3	3	3	2	3
CO2	To understand and analyze the genome and protein structure of prokaryotes and eukaryotes.	2	3	1	1	1
CO3	To demonstrate the knowledge and understanding of the gene analysis and molecular modelling.	2	2	3	3	2
CO4	Well versed in theoretical and practical aspects of bioinformatics & system biology as well as its application in industry and academics.		2	1	3	2
CO5	Describe and comprehend the fundamental concepts of bioinformatics and system biology.	3	3	3	2	3
	AVERAGE PO	1.75	2.50	2.00	2.25	2.00

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)				
MMBE 308	Food And Dairy Microbiology					
CO#	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5
CO1	Describe and comprehend the fundamental concepts of food and dairy microbiology	2	3	3	1	2
CO2	To understand and analyze the role of different microbes in food preparation and food spoilage and intoxication	2	3	2	2	2
CO3	To demonstrate the knowledge and understanding on the diverse microbial community in food preparation and fermentation	2	2	2	2	3
CO4	Well versed in theoretical and practical aspects of food and dairy microbiology as well as its application in industry and academics			1	2	1
CO5	Describe and comprehend the fundamental concepts of industrial microbiology		2	1	1	1
	AVERAGE PO	1.20	2.00	2.00	1.60	2.20



Course Code	Course Title	CO-PO Mapping (Articulation Matrix)				
MMBP 301	Practical - V					
CO#	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5
CO1	Describe and comprehend the fundamental concepts of pharmaceutical microbiology.	3	2			
CO2	To understand and analyze the structure of various microbes, methods of cultivation, antimicrobial agents and drug production.	1		1	2	1
CO3	To demonstrate the knowledge and understanding on the drugs and their quality parameters.		2	2		2
CO4	Gain knowledge about regulatory and legislative aspects of pharmaceutical microbiology			2	2	2
CO5	The student will be well versed in theoretical and practical aspects of pharmaceutical microbiology as well as its application in industry, research and academics.		2	2	3	3
	AVERAGE PO	0.80	1.20	1.40	1.40	1.60

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)				
MMBP 302	Practical - VI					
CO#	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5
CO1	Describe and comprehend the fundamental concepts of industrial microbiology	3	2			
CO2	To understand and analyze the structure of various microbes, methods of cultivation and control	1		1	2	1
CO3	To understand the finer details regarding the mutations and its applications for industrial strains		2	2		2
CO4	To demonstrate the knowledge and understanding on the role of fungi and algae in maintaining and enhancing the quality of ecosystem			2	2	3
CO5	Well versed in theoretical and practical aspects of general microbiology as well as its application in industry and academics		2	2	3	3
	AVERAGE PO	0.80	1.20	1.40	1.40	1.60



Course Code	Course Title	CO-PO Mapping (Articulation Matrix)				
MBTC 401	Biostatistics, Research Methodology & IPR					
CO#	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5
CO1	Plan, execute and understand their research and complex outcome of their results using bio-statistical approaches in the testing of hypothesis, designing of experiments, analyzing experimental data and interpretation of the results.	3	3	3	3	3
CO2	Understand the fundamental methodology to carry our research.	2	2	3	3	2
CO3	Learn about experimental design and its importance		2	1	3	2
CO4	Understand IPR and Patents.		2	2	2	3
	AVERAGE PO	1.25	2.25	2.25	2.75	2.50

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)				
MMBS 401	Seminars					
CO#	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5
CO1	Carry out literature survey and compile existing data and information.	2	2	1	3	3
CO2	Formulate a research problem in research laboratory.	2	2	1	1	1
CO3	Design experiments to solve research problem.	2	1	2	2	2
CO4	Make a presentation of compiled data and its interpretation to a meaningful conclusion.		3	3	3	2
CO5	Acquire presentation and oral communication skills of scientific information and data		3	3	3	3
	AVERAGE PO	1.20	2.20	2.00	2.40	2.20

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Course Code	Course Title	CO-PO Mapping (Articulation Matrix)				
MMBE 401	Research Project / Dissertation					
CO#	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5
CO1	Identify a problem in microbiology based industry.	2	3	3	3	2
CO2	Formulate a research problem in research laboratory	2	3	3	2	2
CO3	Design experiments to solve the industrial/research problem.	2	3	3	3	3
CO4	Compile and/or interpret the industrial data.	2	2	2	3	3
CO5	Analyze and interpret the experimental data	3	2	2	3	3
	AVERAGE PO	2.20	2.60	2.60	2.80	2.60

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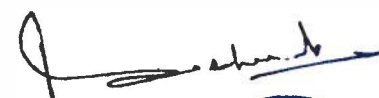
C. Program Outcome Reference Values:

Following table calculates the overall average of all POs of the Courses and is referred as Course-wise Average of POs Reference values.

SR. No.	Course Code	Course Title	PO1	PO2	PO3	PO4	PO5
1	MMBC 101	General Microbiology	1.200	2.400	2.200	2.400	2.200
2	MMBC 102	Microbial Taxonomy, Diversity and Ecology	1.200	2.400	2.200	2.400	2.000
3	MBCC 101	Biochemistry	1.400	2.400	2.200	2.200	2.000
4	MBCC 102	Biochemical and Analytical Techniques	2.000	2.600	2.200	2.600	2.400
5	MMBP 101	Practical I	2.200	2.200	2.400	2.400	2.000
6	MMBP 102	Practical II	2.200	2.200	2.400	2.400	2.000
7	MBTC 201	Immunology	1.800	2.400	2.400	1.800	2.400
8	MMBC 201	Bacteriology	1.800	2.400	2.400	2.200	2.600
9	MMBC 202	Virology	1.800	2.400	2.000	1.600	2.200
10	MBCC 202	Molecular Biology & Microbial Genetics	1.800	2.400	2.000	1.600	2.200
11	MBTC 202	Recombinant DNA Technology	1.500	2.000	2.000	1.833	2.167
12	MMBP 201	Practical III	2.200	2.200	2.400	2.400	2.000
13	MMBP 202	Practical IV	2.200	2.200	2.400	2.400	2.000

1.1.1 Outcome Analysis of POs, COs – M.Sc. Microbiology (2021-2023)

14	MMBC 301	Industrial Microbiology	1.800	2.200	1.800	1.800	2.200
15	MMBC 302	Microbial Physiology And Metabolism	1.800	2.400	2.000	1.600	2.200
16	MMBC 303	Medical Microbiology	1.750	2.500	2.000	2.000	2.000
17	MMBE 303	Pharmaceutical Microbiology	1.200	2.000	2.600	1.600	2.200
18	MMBE 307	Bioinformatics & System Biology	1.750	2.500	2.000	2.250	2.000
19	MMBE 308	Food And Dairy Microbiology	1.200	2.000	2.000	1.600	2.200
20	MMBP 301	Practical V	0.800	1.200	1.400	1.400	1.600
21	MMBP 302	Practical VI	0.800	1.200	1.400	1.400	1.600
22	MBTC 401	Biostatistics, Bioinformatics, Research Methodology & IPR	1.250	2.250	2.250	2.750	2.500
23	MMBS 401	Seminars	1.200	2.200	2.000	2.400	2.200
24	MMBE 401	Research Project / Dissertation	2.200	2.600	2.600	2.800	2.600
Combined Course-wise Average of POs Reference values			1.726	2.305	2.189	2.057	2.156




D. Assessment of CO and PO Attainment Value

The attainment of the course outcome is measured at the level of 3 as follows:

Attainment Levels	Criteria
3	If 80% of student achieves marks greater than threshold percentage of the total score of assessment
2	If 70% of student achieves marks greater than threshold percentage of the total score of assessment
1	If 60% of student achieves marks greater than threshold percentage of the total score of assessment
0	If 60% of student achieves marks less than threshold percentage of the total score of assessment

Attainment level of COs is measured through direct attainment of COs depending on the performance of the students in Internal Assessment (IA) and End Semester Examination (ESE) individually. For the program the threshold percentage is set at 50% for ESE and 60% for IA assessments. The weightage of attainments for IA and ESE is in proportion of 40:60.

Sr. No.	Course Code	Course Title	Attainment of COs	Derived Attainment of POs Course-wise				
				PO1	PO2	PO3	PO4	PO5
1	MMBC 101	General Microbiology	3.00	1.20	2.40	2.20	2.40	2.20
2	MMBC 102	Microbial Taxonomy, Diversity and Ecology	1.80	0.72	1.44	1.32	1.44	1.20
3	MBCC 101	Biochemistry	1.80	0.84	1.44	1.32	1.32	1.20
4	MBCC 102	Biochemical and Analytical Techniques	1.20	0.80	1.04	0.88	1.04	0.96
5	MMBP 101	Practical I	3.00	2.20	2.20	2.40	2.40	2.00
6	MMBP 102	Practical II	3.00	2.20	2.20	2.40	2.40	2.00
7	MBTC 201	Immunology	3.00	1.80	2.40	2.40	1.80	2.40

8	MMBC 201	Bacteriology	3.00	1.80	2.40	2.40	2.20	2.60
9	MMBC 202	Virology	3.00	1.80	2.40	2.00	1.60	2.20
10	MBCC 202	Molecular Biology & Microbial Genetics	3.00	1.80	2.40	2.00	1.60	2.20
11	MBTC 202	Recombinant DNA Technology	3.00	1.50	2.00	2.00	1.83	2.17
12	MMBP 201	Practical III	3.00	2.20	2.20	2.40	2.40	2.00
13	MMBP 202	Practical IV	3.00	2.20	2.20	2.40	2.40	2.00
14	MMBC 301	Industrial Microbiology	3.00	1.80	2.20	1.80	1.80	2.20
15	MMBC 302	Microbial Physiology And Metabolism	2.40	1.44	1.92	1.60	1.28	1.76
16	MMBC 303	Medical Microbiology	3.00	1.75	2.50	2.00	2.00	2.00
17	MMBE 303	Pharmaceutical Microbiology	1.20	0.48	0.80	1.04	0.64	0.88
18	MMBE 307	Bioinformatics & System Biology	2.40	1.40	2.00	1.60	1.80	1.60
19	MMBE 308	Food And Dairy Microbiology	3.00	1.20	2.00	2.00	1.60	2.20
20	MMBP 301	Practical V	3.00	0.80	1.20	1.40	1.40	1.60
21	MMBP 302	Practical VI	3.00	0.80	1.20	1.40	1.40	1.60
22	MBTC 401	Biostatistics, Bioinformatics, Research Methodology & IPR	3.00	1.25	2.25	2.25	2.75	2.50
23	MMBS 401	Seminars	2.40	0.96	1.76	1.60	1.92	2.00



24	MMBE 401	Research Project / Dissertation	3.00	2.20	2.60	2.60	2.80	2.60
Course-wise Average of POs Achievement Through Results				1.46	1.96	1.89	1.84	1.91
Course-wise Average of POs Reference values				1.726	2.305	2.189	2.057	2.156
Percentage Attainment of PO's				85%	85%	86%	90%	89%

From the Attainment level of CO, the Derived PO's value for course is calculated as follows:

$$\text{Derived PO Value} = \frac{\text{CO attainment} \times \text{respective PO average}}{3}$$

Depending on derived PO values of the courses, calculate the Course-wise Average of POs achievement for each PO.

Calculate the percentage attainment of PO's as follows:

$$\text{Percentage attainment of PO's} = \frac{\text{Average PO Attainment through}}{\text{average PO refrence value}} \times 100$$