स्वामी राम हिमालयन विश्वविद्यालय
Swami Rama Himalayan University

Criterion 1 - Curricular Aspects

1.1.1 Outcome Analysis of POs, COs

M.Sc. Biotechnology (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 Biotechnology.
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 various microbes, methods of media preparation and cultivation	2	3	3	3	2
CO2	To understand the classification and diversity of microbes	2	3	1	2	2
CO3	To demonstrate the knowledge and critical understanding on the diverse microbial structure and morphology	2	2	2	2	2
CO4	Versed in theoretical and practical aspects of fungal, algal and protozoan microbiology		2	3	3	2
CO5	Plan basic experiments on microbial cultivation, microbial genetics and numeration		2	2	2	3
	AVERAGE PO	**1.20**	**2.40**	**2.20**	**2.40**	**2.20**

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Course Code	**Course Title**	**CO-PO Mapping (Articulation Matrix)**				
MBTC 101	**Molecular Cell Biology**					
CO#	At the end of the course the students will be able to:	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1	Understand cell biology mechanisms on a molecular level, and of the regulation of such mechanisms.	2	3	3	3	3
CO2	Understand types of tissues and specialized membrane structures and functions	2	3	2	2	1
CO3	Understand how cells can communicate and the central intracellular signal transduction pathways.	2	2	3	3	1
CO4	Understand cell motility and regulation of cell form and movement; including cytoskeleton organization and generation of force and cell motility.		2	1	2	2
CO5	Understand physical and chemical mutagens and its role in mutation.		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	Gain considerable knowledge on structure and function of different molecular constituents present in the living systems.	2	2	3	2	2
CO2	Learn about metabolic pathways, they will understand how the molecules are getting converted to various products within the cell through intermediates mediated by biocatalysts.	2	2	1	2	1
CO3	Gain knowledge on biochemistry which is a fundamental prerequisite to excel in the area of modern biotechnology.		3	3	3	2
CO4	Describe the biochemistry of a variety of well-characterized human physiological processes.	2	3	2	2	2
CO5	Grasp key concepts of metabolic disorders and their therapeutic interventions.	1	2	2	2	3
	AVERAGE PO	**1.40**	**2.40**	**2.20**	**[illegible]**	**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	Explain mechanistically isolation, purification, quantification techniques of biomolecules	3	2	3	3	3
CO2	Perform procedure to characterize the biomolecules.		3	1	2	1
CO3	Perform of characterization of cells and cellular components	2	2	3	3	2
CO4	Know about the various, electrophoresis, chromatographic, spectroscopic and radiotracer techniques.	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)				
MBCP 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	Isolate from microbes from various sources	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

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Course Code	Course Title	CO-PO Mapping (Articulation Matrix)				
MBCP 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 biochemistry and biotechnology	1	1	3	1	1
CO2	Apply knowledge of analytical techniques in applied research.	2	2	1	2	1
CO3	Learn about qualitative and quantitative analysis of biomolecules	2	2	3	3	2
CO4	Apply chromatographic techniques in advanced research	3	3	3	3	3
	AVERAGE PO	**2.00**	**2.00**	**2.50**	**2.25**	**1.75**

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	Demonstrate the basic knowledge of immunological processes at a cellular and molecular level	1	3	3	2	2
CO2	Define central immunological principles and concepts outline, compare and contrast the key mechanisms and cellular players of innate and adaptive immunity and how they relate	3	3	2	2	2
CO3	Understand the principles of central (antibody-based) immunological methods to an extent that he/she can set up a theoretical experiment elucidate the genetic basis for immunological diversity and the generation of adaptive immune responses	3	2	3	2	3
CO4	Outline key events and cellular players in antigen presentation, and how the nature of the antigen will shape resulting effector responses		2	2	1	2
CO5	Identify the main mechanisms of inflammation understand the principles governing vaccination and the mechanisms of protection against disease	2	2	2	2	3
	AVERAGE PO	**1.80**	**2.40**	**2.40**	**1.80**	**2.40**

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Course Code	Course Title	CO-PO Mapping (Articulation Matrix)				
MBCC 201	Enzymology					
CO#	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5
CO1	The structure, functions and the mechanisms of action of enzymes.	3	2			
CO2	The student will learn kinetics of enzyme catalyzed reactions and enzyme inhibitory and regulatory process.	2	2		2	1
CO3	The student will be able to perform immobilization of enzymes.	1	2			
CO4	The student will get exposure of wide applications of enzymes and their future potential			2	2	2
CO5	Explain how proteins can be used for different industrial applications, carry out mutagenesis approaches to improve protein stability and to confer on them new functions	1		3	2	1
	AVERAGE PO	1.40	1.20	1.00	1.20	0.80

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)				
MBTC 203	Protein Engineering & Proteomics					
CO#	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5
CO1	Implement the notions of molecular biology, proteomics and genetic engineering for the production and improvement of proteins and enzymes.	3	3	3	3	3
CO2	The student will be able to analyze the structure of proteins and their post-translational modifications; review the main factors that are significant for protein folding processes and stability;	2	3	1	2	1
CO3	Explain how proteins can be used for different industrial applications, carry out mutagenesis approaches to improve protein stability and to confer on them new functions.	2	2	3	3	2
CO4	Explain how proteins can be used for different industrial applications , carry out mutegensis approaches to improve protein stability and to confer them on new functions.		2	1	3	2
CO5	Understand the applied aspects of protein engineering and proteiomics		2	2		2
	AVERAGE PO	1.40	2.40	2.00	2.60	2.20

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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 the structure and function of DNA and RNA in a cell	3	3	3	3	3
CO2	Elucidate central cell biological processes and how they are regulated (for example: replication and protein synthesis and gene expression)	2	3	1	2	1
CO3	Explain DNA repair and recombination in terms of mutation and evolution.	2	2	3	3	2
CO4	Understand how molecular cell biology forms the foundation of biotechnology.		2	1	3	2
CO5	The design of different techniques based on utilizing the genetic mechanisms of microbes		2	2	2	3
	AVERAGE PO	1.40	2.40	2.00	2.60	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	Understand the difference between old biotechnology and modern biotechnology.	3	3	3	3	3
CO2	Design an experiment with step-by-step instructions to address a research problem.	2	2	1	2	1
CO3	Provide examples of current applications of biotechnology and advances in the different areas like medical, microbial, environmental, bioremediation, agricultural, plant, animal, and forensic.	2	2	3	2	2
CO4	Provide examples on how to use microbes and mammalian cells for the production of pharmaceutical products		1	1	2	2
CO5	Explain the general principles of generating transgenic plants, animals and microbes.		2	2	1	2
CO6	Technical know-how on versatile techniques in recombinant DNA technology	2	2	2	1	3
	AVERAGE PO	**1.50**	**2.00**	**2.00**	**1.83**	**2.17**

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Course Code	Course Title	CO-PO Mapping (Articulation Matrix)				
MBCP 201	Practical - III					
CO#	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5
CO1	Skillful handling and estimating blood samples.	1	1	3	1	1
CO2	Practically learn and understand the antigen-antibody interaction by Double Immunodiffusion method, Ouchterlony's method, Immuno-electrophoresis, Western Blotting and ELISA	2	2	1	2	1
CO3	Learning techniques involved to determine enzyme activity and kinetics; purification of enzyme for further research and applications	2	2	3	3	2
CO4	Explain the principle and working of basic instruments in analytical laboratory.	3	3	3	3	3
CO5	Concept and techniques for various immunological assays.	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)				
MBCP 202	Practical - IV					
CO#	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5
CO1	Understand the practical aspects of cell injury and the proteins involved, the immunology of wound healing and tissue repair, methods of pathogen attack.	1	1	3	1	1
CO2	Understand the isolation techniques of pathogenic strains	2	2	1	2	1
CO3	Basics of Antigen-antibody interaction, diagnostic aspects.	2	2	3	3	2
CO4	Become familiar with stem cells, types, their therapeutic role and transplantation.	3	3	3	3	3
CO5	Understand the basics of tissue engineering, antibody engineering, techniques like biomedical imaging and targeted drug delivery along with advances in therapy and diagnosis.	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)				
MBTC 301	Pharmaceutical Biotechnology					
CO#	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5
CO1	Understand the general Principles of Pharmacology	3		1		
CO2	Learn about Drug targeting and drug delivery system	1	1	2		2
CO3	Explain the vaccines and novel vaccine delivery systems.	2	2	1	2	1
CO4	Understand about monoclonal antibodies, transplantation, and other bioactive compounds in therapeutics..	1		2	2	2
CO5	Student capable of explaining the general principles of Nano biotechnology, quantum dot technology and biosensors.		1	2	3	3
	AVERAGE PO	1.40	0.80	1.60	1.40	1.60

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)				
MBTC 302	Bioprocess Technology					
CO#	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5
CO1	Apply the concepts of basic chemical engineering principles in a bioprocess	3		1		
CO2	Produce bio-products on an industrial scale using fermenters	1	1	2	2	2
CO3	Operate and optimize process parameters for producing industrial products.	2	2	1	3	1
CO4	Understand Mass energy transfer and down streaming process	1		2	2	2
CO5	Understand the various applications of bioprocess in industrial processes		1	2		3
	AVERAGE PO	1.40	0.80	1.60	1.40	1.60

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Course Code	Course Title	CO-PO Mapping (Articulation Matrix)				
MBTC 303	Environmental Biotechnology					
CO#	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5
CO1	Recognize the various global and regional environmental concerns due to natural causes and/or human activities, and the impact of these on various forms of life including native biodiversity.	3	3	3	3	3
CO2	Investigate some examples of different types of environmental pollution and their impacts	2	3	1	2	1
CO3	Describe the applications of various fields including chemistry, biochemistry, molecular biology and/or microbiology, in understanding and addressing the above issues, as well as exploring environmental resources for new technologies.	2	2	3	3	2
CO4	Demonstrate an awareness of emerging concerns such as climate change, waste management or reductions in fossil fuels, and new technologies for addressing these.		2	1	3	2
	AVERAGE PO	1.40	2.40	2.00	2.60	2.20

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)				
MBTE 301	Animal Biotechnology					
CO#	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5
CO1	Understand the structure of animal cell and organization.	3		1		
CO2	Understand how animal cell culture is prepared and the methods of tissue disaggregation.	1	1	2	2	2
CO3	Understand basic principles and techniques in genetic manipulation and genetic engineering.	2	2	1	3	1
CO4	Understand gene transfer technologies for animals and animal cell lines.	1		2	2	2
CO5	Understand the techniques and problems both technical and ethical in animal cloning		1	2		3
	AVERAGE PO	1.40	0.80	1.60	1.40	1.60

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Course Code	Course Title	CO-PO Mapping (Articulation Matrix)				
MBTE 302	Cancer Biology					
CO#	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5
CO1	Understand modern aspects of RNA and protein biology, the cell cycle, angiogenesis and apoptosis.	3		1		
CO2	Be familiar with basic facets of carcinogenesis and methods to study the process.	1	1	2	2	2
CO3	Be familiar with basic principles and applications of cell culture and animal models to study cancer.	2	2	1	3	1
CO4	Understand how genetics contributes to predisposition and progression of cancer and differences and overlap of cancers by tissue type.	1		2	2	2
CO5	Understand how immunotherapy is, and can be, used to treat human illness: strategies, advantages, and hurdles to overcome to realize its potential		1	2		3
	AVERAGE PO	**1.40**	**0.80**	**1.60**	**1.40**	**1.60**

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)				
MBTE 305	Food Technology					
CO#	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5
CO1	Create a basic understanding of the relation between food and microorganisms, food quality characteristics, composition and nutritive value of food, undesirable constituents in food.	2			1	
CO2	Identify and group microbes in food industry, harmful and beneficial effects of microbes, food spoilage, poisoning and intoxication, cereal and cereal products etc., canned food, alcohol and alcohol beverages etc.	1	3			
CO3	Understand the biotechnology of food and feed, cultures and fermentation, SCP, amino acid, food additives, Koumis, kefir, cheese etc along with sauerkraut and oriental fermented food.	1		2	2	
CO4	Become familiar with basic principles of food preservation and processing, addition of chemicals, storage, technological processes for industrial manufacture of selected foods of commercial importance, food packaging.		1		1	2
	AVERAGE PO	**1.00**	**1.00**	**0.50**	**1.00**	**0.50**

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Course Code	Course Title	CO-PO Mapping (Articulation Matrix)				
MBTP 301	Practical - V					
CO#	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5
CO1	Hands-on experiences on analyses of food samples for nutrients, microbiological tests and testing for spoilage.	1	1	3	1	1
CO2	In depth knowledge on the diagnostic parameters, methods, analyses and interpretations of human clinical samples..	2	2	1	2	1
CO3	Estimation of different physiological parameters from human samples and clinical interpretation.	2	2	3	3	2
CO4	To learn techniques involved in genomic DNA isolation and PCR amplification for it's use in molecular research.	3	3	3	3	3
CO5	Understanding of how the DNA modifying enzymes work..	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)				
MBTP 302	Practical - VI					
CO#	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5
CO1	Fundamental knowledge of basic sciences of pathogen and vaccine development.	2			1	
CO2	Comprehensive knowledge about the immunology for designing of vaccine.	1	3			
CO3	Recognize the basics of pharmaceutical biotechnology, drug system, bioprocess technology for vaccine production.	1		2	2	
CO4	Demonstrate knowledge in research methodology, ethics and guidelines of vaccine production.		1		1	2
	AVERAGE PO	**1.00**	**1.00**	**0.50**	**1.00**	**0.50**

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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	This course will help students to 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	The students will be able to understand the fundamental methodology to carry our research.	2	3	1	2	1
CO3	To learn about experimental design and its importance	2	2	3	3	2
CO4	To understand IPR and Patents.		2	1	3	2
CO5	To understand IPR and Patents.		2	2	2	3
	AVERAGE PO	1.40	2.40	2.00	2.60	2.20

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)				
MBCS 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)				
MBCE 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	MMBC101	General Microbiology	1.200	2.400	2.200	2.400	2.200
2	MBTC 101	Molecular Cell Biology	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	MBTP 101	Practical-I	2.200	2.200	2.400	2.400	2.000
6	MBTP 102	Practical-II	2.000	2.000	2.500	2.250	1.750
7	MBTC 201	Immunology	1.800	2.400	2.400	1.800	2.400
8	MBCC 201	Enzymology	1.400	1.200	1.000	1.200	0.800
9	MBTC 203	Protein Engineering & Proteomics	1.400	2.400	2.000	2.600	2.200
10	MBTC 202	RDT & Genomics	1.500	2.000	2.000	1.833	2.167
11	MBTP 201	Practical-III	2.200	2.200	2.400	2.400	2.000
12	MBTP 202	Practical-IV	2.200	2.200	2.400	2.400	2.000
13	MBTC 301	Pharmaceutical Biotechnology	1.400	0.800	1.600	1.400	1.600

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14	MBTC 302	Bioprocess Technology	1.400	0.800	1.600	1.400	1.600
15	MBTC 303	Environmental Biotechnology	1.400	2.400	2.000	2.600	2.200
16	MBTE 301	Animal Biotechnology	1.400	0.800	1.600	1.400	1.600
17	MBTE 302	Cancer Biology	1.400	0.800	1.600	1.400	1.600
18	MBTE 305	Food Technology	1.000	1.000	0.500	1.000	0.500
19	MBTP 301	Practical-V	2.200	2.200	2.400	2.400	2.000
20	MBTP 302	Practical-VI	1.000	1.000	0.500	1.000	0.500
21	MBTC 401	Biostatistics, Research Methodology & IPR	1.400	2.400	2.000	2.600	2.200
22	MBTS 401	Seminars	1.200	2.200	2.000	2.400	2.200
23	MBTE 401	Research Project / Dissertation	2.200	2.600	2.600	2.800	2.600
Combined Course-wise Average of POs Reference values			**1.587**	**1.887**	**1.926**	**2.038**	**1.849**

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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	MMBC101	General Microbiology	**3.00**	1.20	2.40	2.20	2.40	2.20
2	MBTC 101	Molecular Cell Biology	**3.00**	1.20	2.40	2.20	2.40	2.00
3	MBCC 101	Biochemistry	**3.00**	1.40	2.40	2.20	2.20	2.00
4	MBCC 102	Biochemical and Analytical Techniques	**1.20**	0.80	1.04	0.88	1.04	0.96
5	MBTP 101	Practical-I	**3.00**	2.20	2.20	2.40	2.40	2.00
6	MBTP 102	Practical-II	**3.00**	2.00	2.00	2.50	2.25	1.75
7	MBTC 201	Immunology	**3.00**	1.80	2.40	2.40	1.80	2.40

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8	MBCC 201	Enzymology	**2.40**	1.12	0.96	0.80	0.96	0.64
9	MBTC 203	Protein Engineering & Proteomics	**2.60**	1.21	2.08	1.73	2.25	1.91
10	MBTC 202	RDT & Genomics	**3.00**	1.50	2.00	2.00	1.83	2.17
11	MBTP 201	Practical-III	**3.00**	2.20	2.20	2.40	2.40	2.00
12	MBTP 202	Practical-IV	**3.00**	2.20	2.20	2.40	2.40	2.00
13	MBTC 301	Pharmaceutical Biotechnology	**2.60**	1.21	0.69	1.39	1.21	1.39
14	MBTC 302	Bioprocess Technology	**3.00**	1.40	0.80	1.60	1.40	1.60
15	MBTC 303	Environmental Biotechnology	**3.00**	1.40	2.40	2.00	2.60	2.20
16	MBTE 301	Animal Biotechnology	**2.40**	1.12	0.64	1.28	1.12	1.28
17	MBTE 302	Cancer Biology	**3.00**	1.40	0.80	1.60	1.40	1.60
18	MBTE 305	Food Technology	**3.00**	1.00	1.00	0.50	1.00	0.50
19	MBTP 301	Practical-V	**3.00**	2.20	2.20	2.40	2.40	2.00
20	MBTP 302	Practical-VI	**3.00**	1.00	1.00	0.50	1.00	0.50
21	MBTC 401	Biostatistics, Research Methodology & IPR	**1.20**	0.56	0.96	0.80	1.04	0.88
22	MBTS 401	Seminars	**3.00**	1.20	2.20	2.00	2.40	2.20
23	MBTE 401	Research Project / Dissertation	**3.00**	2.20	2.60	2.60	2.80	2.60

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Course-wise Average of POs Achievement Through Results	**1.46**	**1.72**	**1.77**	**1.86**	**1.69**
Course-wise Average of POs Reference values	**1.587**	**1.887**	**1.926**	**2.038**	**1.849**
Percentage Attainment of PO's	**92%**	**91%**	**92%**	**91%**	**91%**

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

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

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:

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