

Maulana Azad College
8, Rafi Ahmed Kidwai Road, Kolkata - 700013

Department of Microbiology
Curriculum / Lesson Plan : 2025-26

Course Curriculum Framework: Major (Hons. with research/ Hons. without research) under University of Calcutta

Semester, [Major/MDC], [Period of Semester]	Course Code	Course Name	Brief Description of the Topics	Name of the Faculty	Teaching/ Learning Hours	
SEMESTER-I July to December 2025	MCB-IDC (Major/ Minor/ MDC) H+TU Credit 3+1	Introduction & Scope of Microbiology	Unit 1: History of Development of Microbiology	Dr. Aftab H. Mondal	7	
			Unit 2: Diversity of Microorganisms	Dr. Mazharul Abbasi	8	
				Mr. Bipasha Roy	6	
			Unit 3: Microscopy	Dr. Arpan Das	5	
			Unit 4: Sterilisation	Dr. Aftab H. Mondal	4	
			Unit 5: Microbes in Human Health & Environment	Dr. Debalina Bhattacharya	6	
				Dr. Suchitra Sarkar	4	
				Dr. Arpan Das	4	
			Unit 6: Industrial Microbiology	Dr. Arpan Das	4	
				Dr. Mazharul Abbasi	6	
	Unit 7: Food & Dairy Microbiology	Dr. Avishek Ghosh	6			
	Tutorial	Distributed accordingly amongst all	30			
	Total					90
	DSCC 1-TH Credit 3	INTRODUCTION TO MICROBIOLOGY AND MICROBIAL DIVERSITY	Unit 1 History of Development of Microbiology	Dr. Aftab H. Mondal	22	
			Unit 2 Diversity of Microbial World	Dr. Mazharul Abbasi	15	
Botany Dept.				33		
Mrs. Bipasha Roy			12			
Unit 3 Overview of Scope of Microbiology			Dr. Debalina Bhattacharya	8		
TH Total					90	

	DSCC 1-P Credit 1		Practical	Dr. Mazharul Abbasi	4
				Dr. Debalina Bhattacharya	8
				Dr. Aftab H. Mondal	6
				Mrs. Bipasha Roy	6
				Dr. Arpan Das	6
	P Total				30
	DSCC 1 Total				120
	SEC 1 4 Credit	FOOD FERMENTATION TECHNIQUES AND PACKAGING	Unit 1-3	Dr. Avishek Ghosh	45
			Unit 4: Vegetable-Based Fermented Foods	Dr. Aftab H. Mondal	16
			Unit 5: Fermented Meat & Fish	Dr. Debalina Bhattacharya	12
			Unit 6: Probiotics	Dr. Mazharul Abbasi	8
Unit 7: Controlling the Microbiological Quality of Foods			Dr. Arpan Das	25	
Unit 8: Food Packaging Techniques			Mrs. Bipasha Roy	14	
SEC 1 Total				120	
SEMESTER-II January to June 2026	DSCC-2-TH	BACTERIOLOGY	Unit 1: Cell organization	Dr. Arpan Das	7
				Dr. Samudra P. Banik	7
			Unit 2: Bacteriological Techniques	Dr. Debalina Bhattacharya	9
			Unit 3 Stains and staining techniques	Dr. Bikas K. Kundu	9
			Unit 4 Microscopy	Dr. Arpan Das	11
			Unit 5 Growth and Nutrition	Dr. Suchitra Sarkar	13
			Unit 6 Reproduction in Bacteria	Mrs. Bipasha Roy	11
			Unit 7 Important archaeal and eubacterial group	Dr. Avishek Ghosh	11
				Dr. Debalina Bhattacharya	2
			DSCC-2-P	Dr. Arpan Das	4
			Dr. Avishek Ghosh	4	

		AI FOR EVERYONE	Practical	Mrs. Bipasha Roy	4	
				Dr. Debalina Bhattacharya	4	
				Dr. Suchitra Sarkar	4	
	SEC -2		Unit 1- 5	Dr. Rajendra Saha, Dept of Chemistry	100	
SEMESTER- 3 July to December 2025	B-TH Credit 3	BIOMOLECULES AND BIOENERGETICS	Unit 1 Bioenergetics	Dr. Avishek Ghosh	14	
			Unit 2 Carbohydrates	Dr. Suchitra Sarkar	10	
			Unit 3 Lipids	Mrs. Bipasha Roy	18	
			Unit 4 Amino acids & Proteins	Dr. Avishek Ghosh	24	
			Unit 5 Enzymes	Dr. Arpan Das	10	
			Unit 6 Nucleic Acids	Dr. Mazharul Abbasi	8	
			Unit 7 Vitamins	Dr. Debalina Bhattacharya	6	
			TH Total			
	DSCC-3-P Credit 1			Practical	Dr. Aftab H. Mondal	8
					Dr. Avishek Ghosh	4
					Dr. Suchitra Sarkar	4
					Mrs. Bipasha Roy	6
					Dr. Mazharul Abbasi	5
					Dr. Debalina Bhattacharya	3
	P Total				30	
DSCC 3 Total					120	
DSCC-4-TH Credit 3	MICROBIAL PHYSIOLOGY AND METABOLISM	Unit 1 Microbial Growth and Effect of Environment on Microbial Growth	Dr. Mazharul Abbasi	16		
			Mrs. Bipasha Roy	12		
		Unit 2 Nutrient uptake and Transport			12	
		Unit 3 Chemoheterotrophic Metabolism - Aerobic Respiration	Dr. Suchitra Sarkar	10		
		Unit 4 Chemoheterotrophic Metabolism- Anaerobic respiration and fermentation	Dr. Aftab H. Mondal	18		

	DSCC-4-P Credit 1		Unit 5 Chemolithotrophic and Phototrophic Metabolism	Dr. Bikas K. Kundu	10		
			Unit 6 Nitrogen Metabolism - an overview	Dr. Arpan Das	12		
			TH Total				90
			PRACTICAL	Dr. Debalina Bhattacharya	8		
				Dr. Mazharul Abbasi	6		
				Dr. Aftab H. Mondal	6		
	Mrs. Bipasha Roy	6					
	Dr. Arpan Das	4					
	P Total				30		
	DSCC 4 Total					120	
	SEC-3 Credit 4	BIOFERTILIZERS AND BIOPESTICIDES	Unit 1 Basics of Biofertilizers	Dr. Arpan Das	22		
			Unit 2 Symbiotic N ₂ fixers		20		
Unit 3 Non-Symbiotic Nitrogen Fixers			16				
Unit 4 Phosphate Solubilizers			Dr. Mazharul Abbasi	12			
Unit 5 Mycorrhizal Biofertilizers			Dr. Bikas K. Kundu	12			
Unit 6 Basics of Biopesticides			Dr. Debalina Bhattacharya	20			
Unit 7 Bioinsecticides derived from microbes			Dr. Aftab H. Mondal	18			
SEC 3 Total					120		
SEMESTER-IV January to June 2026	DSCC-5-TH	MOLECULAR BIOLOGY	Unit 1 Genetic Material and its Features	Dr. Suchitra Sarkar	18		
			Unit 2 Replication of prokaryotic DNA	Dr. Mazharul Abbasi	18		
			Unit 3 Transcription in Prokaryotes and Eukaryotes	Dr. Aftab H. Mondal	10		
				Dr. Debalina Bhattacharya	10		
			Unit 4 Translation (Prokaryotes and Eukaryotes)	Dr. Debalina Bhattacharya	4		
				Mrs. Bipasha Roy	6		
			Unit 5 Regulation of gene	Dr. Debalina Bhattacharya	7		

			Expression in Prokaryotes and Eukaryotes	Mrs. Bipasha Roy	7	
	DSCC-5-P		PRACTICAL	Mrs. Bipasha Roy		
				Dr. Debalina Bhattacharya	10	
				Dr. Arpan Das	10	
	DSCC-6-TH	MICROBIOLOGICAL ANALYSIS OF AIR AND WATER	Unit 1 Aeromicrobiology	Dr. Bikas K. Kundu	15	
			Unit 2 Air Sample Collection and Analysis	Dr. Mazharul Abbasi	15	
			Unit 3 Control Measures	Dr. Suchitra Sarkar	15	
			Unit 4 Water borne pathogens, water borne diseases	Dr. Avishek Ghosh	15	
			Unit 5 Microbiological Analysis of Water	Dr. Arpan Das	20	
	DSCC-6-P		PRACTICAL	Mrs. Bipasha Roy	6	
				Dr. Mazharul Abbasi	10	
				Dr. Arpan Das	4	
	DSCC-7-TH	ENVIRONMENTAL MICROBIOLOGY	Unit 1 Microorganisms and their Habitats	Dr. Bikas K. Kundu	8	
				Mrs. Bipasha Roy	15	
			Unit 2 Microbial Interactions	Dr. Aftab H. Mondal	12	
			Unit 3 Biogeochemical Cycling	Dr. Bikas K. Kundu	15	
			Unit 4 Waste Management	Dr. Arpan Das	12	
	DSCC-7-P		PRACTICAL	Unit 5 Microbial Bioremediation	Dr. Mazharul Abbasi	8
				Dr. Avishek Ghosh	4	
				Mrs. Bipasha Roy	6	
				Dr. Mazharul Abbasi	4	
	DSCC-8-TH	FOOD AND DAIRY MICROBIOLOGY	Unit 1 Food as a substrate for microorganisms	Dr. Aftab H. Mondal	10	
			Unit 2 Microbial Spoilage of various foods		10	
			Unit 3 Principles of Food Preservation	Mrs. Bipasha Roy	14	

	DSCC-8-P		Unit 4 Fermented Dairy Foods		14	
			Unit 5 Prebiotics & Probiotics	Dr. Aftab H. Mondal	18	
			Unit 6 Food borne Diseases	Dr. Avishek Ghosh	12	
			Unit 7 Cultural & Rapid Detection Methods of Food borne Pathogens		12	
			PRACTICAL	Dr. Avishek Ghosh	8	
				Mrs. Bipasha Roy	12	
SEMESTER-V July to December 2025	DSCC-9-TH Credit 3	VIROLOGY	Unit 1: Nature and Properties of Viruses	Dr. Avishek Ghosh	22	
			Unit 2 Bacteriophages	Dr. Aftab H. Mondal	20	
			Unit 3 Replication Viral Transmission, Salient features of viral nucleic acids and	Dr. Avishek Ghosh	30	
			Unit 4 Viruses and Cancer	Dr. Mazharul Abbasi	18	
			TH Total			
	DSCC-9-P Credit 1		PRACTICAL	Dr. Avishek Ghosh	8	
				Mrs. Bipasha Roy	10	
				Dr. Mazharul Abbasi	4	
				Dr. Aftab H. Mondal	8	
	P Total				30	
	DSCC 9 Total					120
	DSCC-10-TH Credit 3	MICROBIAL GENETICS	Unit 1 Nucleic acid as genetic material	Dr. Debalina Bhattacharya	13	
			Unit 2 Mechanisms of Genetic Exchange	Dr. Arpan Das	18	
			Unit 3 Mutations, Repair and Recombination	Dr. Debalina Bhattacharya	15	
Mrs. Bipasha Roy				16		
Unit 4 Plasmids			Mrs. Bipasha Roy	16		
Unit 5 Transposable elements			Dr. Mazharul Abbasi	12		
TH Total				90		
SCC-10-P			Dr. Aftab H. Mondal	8		

	Credit 1		PRACTICAL	Dr. Debalina Bhattacharya	12	
				Dr. Mazharul Abbasi	10	
				P Total		30
	DSCC 10 Total					120
	DSCC-11-TH Credit 3	INDUSTRIAL MICROBIOLOGY	Unit 1 Introduction to Industrial microbiology	Dr. Bikas K. Kundu	8	
			Unit 2 Isolation of Industrial Strains and Fermentation	Dr. Arpan Das	14	
			Unit 3 Types of fermentation processes, bio-reactors and measurement of fermentation		22	
			Unit 4 Down-stream processing		10	
			Unit 5 Microbial production of industrial products (micro-organisms involved, media, fermentation conditions, downstream processing and uses)	Dr. Debalina Bhattacharya	22	
			Unit 6 Enzyme immobilization	Dr. Aftab H. Mondal	14	
			TH Total		90	
	DSCC-11-P Credit 1		PRACTICAL	Dr. Suchitra Sarkar	4	
				Dr. Arpan Das	8	
				Dr. Debalina Bhattacharya	10	
				HOD	8	
P Total		30				
DSCC 11 Total					120	
DSCC-12-TH Credit 3	RECOMBINANT DNA TECHNOLOGY	Unit 1 Molecular Cloning: Tools and Strategies	Dr. Suchitra Sarkar	16		
		Unit 2 Methods in Molecular Cloning	Dr. Debalina Bhattacharya	20		
		Unit 3 DNA Amplification and DNA sequencing	Dr. Mazharul Abbasi	20		

	DSCC-12-P Credit 1		Unit 4 Construction and Screening of Genomic and cDNA libraries	Mrs. Bipasha Roy	24		
			Unit 5 Applications of Recombinant DNA Technology	Dr. Aftab H. Mondal	12		
			TH Total				92
			PRACTICAL	Mrs. Bipasha Roy	10		
				Dr. Mazharul Abbasi	10		
				Dr. Avishek Ghosh	10		
P Total				30			
DSCC 12 Total					122		
SEMESTER-VI January to June 2027	CC305-TH	MICROBIAL BIOTECHNOLOGY AND ENZYMOLGY	Unit 1 Microbial Biotechnology and its Applications	Dr. Bikas K. Kundu	20		
			Unit 2 Therapeutic and Industrial Biotechnology	Mrs. Bipasha Roy	12		
			Unit 3 Applications of Microbes in Biotransformations	Dr. Suchitra Sarkar	13		
			Unit 5 Microbes for Bio-energy and Environment	Dr. Debalina Bhattacharya	15		
			Unit 6 Enzyme Kinetics	Dr. Arpan Das	20		
			CC305-P	PRACTICAL	Dr. Arpan Das	6	
	Mrs. Bipasha Roy	6					
	Dr. Suchitra Sarkar	8					
	CC306-TH	BACTERIAL PATHOGENESIS	Unit 1 Introduction to Bacterial Pathogenesis	Mrs. Bipasha Roy	12		
			Unit 2 Mechanisms of Bacterial Pathogenesis	Dr. Suchitra Sarkar	8		
				Mrs. Bipasha Roy	8		
Unit 3 Bacterial Diseases			Dr. Avishek Ghosh	20			

			Unit 4 Laboratory Techniques for Culture and Identification of Bacterial Pathogens	Dr. Suchitra Sarkar	16
			Unit 5 Antibiotics	Dr. Debalina Bhattacharya	16
	CC306-P		PRACTICAL	Dr. Samudra P. Banik	4
				Dr. Arpan Das	4
				Dr. Suchitra Sarkar	3
				Mrs. Bipasha Roy	3
				Dr. Debalina Bhattacharya	3
				Dr. Avishek Ghosh	3
	CC307-TH	CELL BIOLOGY	Unit 1 Structure and organization of Cell	Dr. Debalina Bhattacharya	18
			Unit 2 Nucleus	Dr. Bikas K. Kundu	5
			Unit 3 Protein Sorting and Transport and Targeting	Dr. Avishek Ghosh	18
			Unit 4 Cell Signaling	Dr. Bikas K. Kundu	15
				Dr. Samudra P. Banik	12
	Unit 5 Cell Cycle, Cell Death and Cell Renewal		Dr. Avishek Ghosh	12	
CC307-P	PRACTICAL		Dr. Avishek Ghosh	4	
		Dr. Mazharul Abbasi	16		
MCB-INT-TU : INTERNSHIP					

A literature review is to be conducted during the semester under the supervision of a teacher in the college where the student is enrolled. At the end of the semester, the student will have to submit a review paper and make a powerpoint presentation before a panel of examiners constituted entirely by the internal teachers for evaluation.