DINABANDHU ANDREWS COLLEGE

AFFLIATED TO UNIVERSITY OF CALCUTTA

Department of Molecular Biology

UNDERGRADUATE SECTION

Model Reference: University of Calcutta, Syllabus for Molecular Biology General (CBCS)

[with effect from July 2018 (2018-19)] (Notification No. CSR/12/18)

The Programme Outcomes (PO) of B.Sc. General Molecular Biology Curriculum:

Programme Outcomes Nos	Programme Outcomes (PO)
PO A	To acquire a comprehensive understanding of fundamental concepts in molecular biology, including DNA structure and function, RNA processing, protein synthesis, and cellular signalling.
PO B	To explain the mechanisms of some of the major infectious and non-infectious diseases.
PO C	To explain the principles of a number of important and widely used laboratory diagnostic tests.
PO D	To develop individual and teamwork by functioning effectively as an individual or as a member in a group in laboratory classes.
PO E	To learn documentation and record keeping of laboratory notebooks in a logical and meticulous manner.
PO F	To develop an opportunity to work in interdisciplinary groups
PO G	To inculcate scientific temperament in young minds and outside the scientific community.

Programme Specific Outcomes Nos	Programme Specific Outcomes (PSO)
PSO 1	Develop a strong foundation in molecular biology while acquiring essential skills for both academic and professional pursuits in the field.
PSO 2	Develop proficiency in basic laboratory techniques used in molecular biology, such as DNA extraction, PCR (Polymerase Chain Reaction), gel electrophoresis, and gene cloning, and demonstrate the ability to analyse experimental results. Also to prepare the students to motivate them for higher education, to take up research as a career and a successful career in industry.
PSO 3	Integrate knowledge from molecular biology with other scientific disciplines, demonstrating the ability to connect molecular processes to broader biological phenomena and understand their significance in health and disease.

Mapping of PO & PSO for Molecular Biology (General) Syllabus (CBCS) of University of Calcutta

Programme Specific Outcomes (PSO) Nos	Programme Outcomes (PO)						
	A	B	C	D	E	F	G
PSO 1	✓	✓		✓	✓		✓
PSO 2	✓	✓		✓	✓	✓	
PSO 3	✓	✓		✓	✓	✓	✓

Programme Outcome mapping for Partial Semester wise CBCS Courses in Molecular Biology (General) under University of Calcutta

TABLE I (SEMESTER-1)

Paper	COURSE DURATION Semester 1 6 Months	COURSE DETAIL	PROGRAM OUTCOMES (PO)						
			A	B	C	D	E	F	G
Cell Biology - Principles and Techniques	MLB-G-CC1-1 (TH)	1) Cell Biology 2) Molecules of Life 3) Microscopy Techniques	√	√					√
	MLB-G – CC1-1 (P)	1) Determination of refractive index of a given biological sample by travelling microscope 2) Determination of relative sizes of nucleus and cytoplasm of squamous cells 3) Preparation of phosphate buffer and measurement of pH 4) Qualitative tests for reducing sugar, non-	√	√	√	√	√	√	√

		reducing sugar, polysaccharide, lipid 5) Quantitative estimation of glucose.							

TABLE II (SEMESTER-2)

Paper	COURSE DURATION Semester – 2 Six months	COURSE DETAIL	PROGRAM OUTCOMES (PO)						
			A	B	C	D	E	F	G
Basics of biomolecules	**MLB-G-CC-2-1 (TH)**	1) Molecules of life 2) Bioenergetics and metabolism of biomolecules	√		√			√	√
	MLB-G -CC-2-1 (P)	1) Qualitative tests for amino acid, protein. 2) Identification of unknown compounds (from sugars, polysaccharide, lipid, amino acid and protein) 3) Estimation of protein by Lowry method using UV-Visible spectrophotometer or colorimeter. 4) Calculation of Rf value and separation of unknown amino acid by TLC or paper chromatography. 5) Estimation of amino acid by formol titration.			√	√	√	√	√

TABLE III (SEMESTER-3)

Paper	COURSE DURATION Semester – 3 Six months	COURSE DETAIL	PROGRAM OUTCOMES (PO)						
			A	B	C	D	E	F	G
Concepts of Molecular Biology	**MLB-G-CC-3-1 (TH)**	1) Basic Concepts of genome and its organisation 2) Replication of DNA in prokaryotes 3) Gene expression 4) Damage, Repair and Mutation	√	√	√				√
	MLB-G-CC-3-1 (P)	1) Determination of absorption spectra of DNA and protein using UV-Visible spectrophotometer. 2) Estimation of DNA by diphenylamine reaction 3) Estimation of RNA by orcinol method 4) Using turbidometry (light scattering) to estimate microbial growth. 5) Measure the OD ratio at 260 and 280 nm for supplied DNA and protein samples 6) Estimate purity of DNA sample. 7) Observation of bacterial morphology by negative stain method (nigrosin) using light Microscope.	√	√	√	√	√	√	√

Paper	COURSE DURATION Semester – 3 Six months	COURSE DETAIL	PROGRAM OUTCOMES (PO)						
			A	B	C	D	E	F	G
SEC - A	**SEC 1**	Radiation Biology	√	√	√		√	√	√
	SEC 2	Biomedical instrumentation	√	√	√	√		√	√

TABLE IV (SEMESTER-4)

Paper	COURSE DURATION Semester – 4 Six months	COURSE DETAIL	PROGRAM OUTCOMES (PO)						
			A	B	C	D	E	F	G
Biophysical techniques	**MLB-G-CC- 4-1 (TH)**	1) Diffusion 2) Osmosis 3) Viscosity 4) Centrifugation 5) Spectrophotometry and other methods 6) Immunology	√	√	√				√
	CEMA – CC - 4-10(P)	1) Human blood group determination. 2) Measurement of relative viscosity/fluidity of DNA by Ostwald viscometer. 3) Light microscope observation of relative distribution of WBC in a fresh blood smear. 4) Gram staining of bacteria.	√	√	√	√	√	√	√

Paper	COURSE DURATION Semester – 4 Six months	COURSE DETAIL	PROGRAM OUTCOMES (PO)						
			A	B	C	D	E	F	G
SEC - B	**SEC 1**	Biostatistics	√			√	√	√	√
	SEC 2	Bioinformatics	√			√	√	√	√

TABLE V (SEMESTER-5)

Paper	COURSE DURATION Semester – 5 Six months	COURSE DETAIL	PROGRAM OUTCOMES (PO)						
			A	B	C	D	E	F	G
DSE - A (Any one)	DSE A-5-1 (TH)	Recombinant DNA Technology	√	√	√	√	√	√	√
	DSE A-5-1 (PR)	1. Isolation of plasmid DNA. 2. Restriction enzyme digestion of plasmid DNA. 3. Preparation of competent cells by calcium chloride method and transformation of *E. coli*with plasmid DNA. 4. Primer design for PCR.	√	√	√	√	√	√	√
	DSE A-5-2 (TH)	Genomics	√	√	√	√	√	√	√
	DSE A-5-2 (PR)	1. Comparison of two large DNA sequences using dot plot servers such as YASS or PipMaker 2. Detection of internal repeats in a genome using genomic dot plots 3. Prediction of the locations and exon-intron structures of genes in genomic sequences from a variety of organisms using web servers such as GENSCAN 4. Complete elucidation of the location, structure, transcripts of a given number of human genes using the Ensembl genome browser.	√	√	√	√	√	√	√

Paper	COURSE DURATION Semester – 5 Six months	COURSE DETAIL	PROGRAM OUTCOMES (PO)						
			A	B	C	D	E	F	G
SEC - A	SEC 1	Radiation Biology	√	√	√		√	√	√
	SEC 2	Biomedical instrumentation	√	√	√	√		√	√

TABLE VI (SEMESTER-6)

Paper	COURSE DURATION Semester – 6 Six months	COURSE DETAIL	PROGRAM OUTCOMES (PO)						
			A	B	C	D	E	F	G
DSE - B (Any one)	DSE-B-6-1 (TH)	Biophysics of Sensory Processes	√		√	√	√	√	√
	DSE-B-6-1 (PR)	1. Determination of blood pressure with the help of mercury or aneroid sphygmomanometer. 2. Determination of heart rate of a human being from the ECG records. 3. Interpretation of ECG. 4. Detection of colour blindness with the help of Ishihara chart. 5. Interpretation of visual acuity by Snellen's chart.	√	√	√	√	√	√	√
	DSE B-6-2 (TH)	Clinical Biochemistry	√	√	√	√	√	√	√
	DSE B-6-2 (PR)	1. Isolation of pure culture by streak plate technique. 2. Antibiotic sensitivity assay by paper disc method 3. Staining of *Aspergillus niger* by lactophenol cotton blue. [*A. niger* from rotten citrus fruit]	√	√	√		√	√	√

Paper	COURSE DURATION Semester – 6 Six months	COURSE DETAIL	PROGRAM OUTCOMES (PO)						
			A	B	C	D	E	F	G
SEC - B	SEC 1	Biostatistics	√			√	√	√	√
	SEC 2	Bioinformatics	√			√	√	√	√