Academic Year : 2023-2024   Institute/ Branch Name: Symbiosis School of Biological Sciences   Programme Name: Master of Science (Biochemistry)

Color Code Description:		
Global	National / Local	Regional / National

Sr. No.	GA No.	Graduate Attributes	PO No.	Programme Outcomes
1	GA1	Scholarship: research, inquiry and lifelong learning	PO1	Knowledge & communication skills: Gain knowledge on subjects and topics in biotechnology domain & express thoughts in an effective manner using different modes of communication.
2	GA1	Scholarship: research, inquiry and lifelong learning	PO2	Critical thinking: Apply the knowledge of biotechnology to analyse and evaluate current gaps
3	GA1	Scholarship: research, inquiry and lifelong learning	PO3	Innovation: Discover new concepts to bridge gaps in our understanding of the biotechnology field. Invent new methods and techniques. Provide biotechnological solutions to the challenges faced at local and global levels
4	GA2	Global citizenship: ethical, social and professional understanding	PO4	Human values: Understand and appreciate the human diversity. Develop professional ethics of working in biotechnology industry. Learn to work in teams and groups
5	GA3	Eco-literate: sensitivity towards a sustainable environment	PO5	Environment and sustainability: Sense the impact of human development on environment. Develop biotechnological solutions to mitigate environmental deterioration. Identify means for sustainable development.
6	GA4	Employability: equipped with skills, attributes, leadership and entrepreneurial qualities that society needs; being capable of making a contribution to society through earning a living	PO6	Employability: Gain skills that will fetch jobs in biotechnology industry. Gain entrepreneurial skills to create jobs

Sr. No.	Semester	Institute Course Code	Catalog Course Code	Title	Course Outcome No	Course Outcome Statement	PO1	PO2	PO3	PO4	PO5	PO6
1	SEM III	0403470301 - PP	TH4282	Drug Discovery and Pharmacology	CO1	Understand the role and significance of the different disciplines involved in the various phases of drug discovery, development and pharmacology	Strong-H	Strong-H	Moderate-M	Strong-H	Weak-L	Weak-L
1					CO2	Assess the biological significance of small molecules	Strong-H	Strong-H	Moderate-M	Strong-H	Moderate-M	Weak-L
1					CO3	Review the preclinical and clinical pharmaceutical trials in Industries, Hospital Research Centers and Academia	Moderate-M	Moderate-M	Strong-H	Strong-H	Weak-L	Weak-L
1					CO4	Work collaboratively with researchers from pharmacology, medicine, chemistry and biology to address problems of pharmacological significance	Strong-H	Strong-H	Moderate-M	Strong-H	Weak-L	Weak-L
1					CO5	Experiment translation research among Researchers from diversified scientific backgrounds at Industries and Academia	Strong-H	Strong-H	Moderate-M	Strong-H	Weak-L	Weak-L
2	SEM III	0403470302 - PP	TH4279	Genetic and Metabolic Engineering	CO1	Explain the the principles and tools of recombinant DNA technology	Strong-H	Strong-H	Moderate-M	Strong-H	Weak-L	Weak-L
2					CO2	Explain various ways of altering the microbial genome	Strong-H	Strong-H	Moderate-M	Strong-H	Moderate-M	Weak-L
2					CO3	Describe usefulness of genetic and metabolic engineering in environmental sustainability	Moderate-M	Moderate-M	Strong-H	Strong-H	Weak-L	Weak-L

#	SEM	Code	ID	Course	CO	Description						
2					CO4	Demonstrate an interest in metabolic engineering from learning the success stories of the international organizations in this field	Strong-H	Strong-H	Moderate-M	Strong-H	Weak-L	Weak-L
2					CO5	Plan the genetic engineering methodology for heterologous expression of proteins	Strong-H	Strong-H	Moderate-M	Strong-H	Weak-L	Weak-L
3	SEM III	0403470303 - PR	TH4109	Practicals in Bioanalytical techniques	CO1	Understand and practice the principles of Bioanalytical Techniques	Strong-H	Strong-H	Moderate-M	Strong-H	Weak-L	Weak-L
3					CO2	Display proficiency in handling analytical instruments in academic set-up	Strong-H	Strong-H	Moderate-M	Strong-H	Moderate-M	Weak-L
3					CO3	Demonstrate the analysis of compounds related to health (Drugs and Metabolites)	Moderate-M	Moderate-M	Strong-H	Strong-H	Weak-L	Weak-L
3					CO4	Demonstrate the interpretation of chromatograms and spectra	Strong-H	Strong-H	Moderate-M	Strong-H	Weak-L	Weak-L
4	SEM III	0403470304 - PR	TH4281	Practicals in Clinical Biochemistry	CO1	Demonstrate analytical skills in the students.	Strong-H	Strong-H	Moderate-M	Strong-H	Weak-L	Weak-L
4					CO2	Evaluate the risk profile of metabolic disorders due to life style	Strong-H	Strong-H	Moderate-M	Strong-H	Moderate-M	Weak-L
4					CO3	Discuss about the reliability of laboratory methods and results.	Moderate-M	Moderate-M	Strong-H	Strong-H	Weak-L	Weak-L
4					CO4	Discuss professional ethics related to work in the laboratory.	Strong-H	Strong-H	Moderate-M	Strong-H	Weak-L	Weak-L
5	SEM III	0403470305 - PP	TH4280	Clinical Biochemistry	CO1	Discuss the concept of metabolic disorders.	Strong-H	Strong-H	Moderate-M	Strong-H	Weak-L	Weak-L
5					CO2	Evaluate the risk of metabolic disorders due to life style.	Strong-H	Strong-H	Moderate-M	Strong-H	Moderate-M	Weak-L
5					CO3	Demonstrate analytical skills in the students through case studies.	Moderate-M	Moderate-M	Strong-H	Strong-H	Weak-L	Weak-L
5					CO4	Explain towards ethics related to issues in the Clinical Biochemistry Laboratory	Strong-H	Strong-H	Moderate-M	Strong-H	Weak-L	Weak-L
6	SEM III	0403470306 - PP	T1656	Intellectual Property Rights	CO1	Define and discuss keyIntellectual Property Rights concepts.	Strong-H	Strong-H	Moderate-M	Strong-H	Weak-L	Weak-L
6					CO2	Discuss distinct contribution ofintellectual property law to the protection of human creativity, innovation, and efforts	Strong-H	Strong-H	Moderate-M	Strong-H	Moderate-M	Weak-L
6					CO3	Identify and differentiate basictypes of intellectual property defined by law.	Moderate-M	Moderate-M	Strong-H	Strong-H	Weak-L	Weak-L
6					CO4	Discuss Patent Act, Copyright, Trademark, and, Design Act in the learning and research process.	Strong-H	Strong-H	Moderate-M	Strong-H	Weak-L	Weak-L
7	SEM III	0403470307 - PP	TH4106	Introduction to Laboratory AnimalScience	CO1	Sense the ethical use of laboratory animals andalternatives to animal models.	Strong-H	Strong-H	Moderate-M	Strong-H	Moderate-M	Strong-H
7					CO2	Learn the management practices of laboratoryanimals.	Strong-H	Moderate-M	Strong-H	Strong-H	Moderate-M	Weak-L

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7					CO3	Students should be able to learn handling of commonlyused laboratory animals.	Strong-H	Moderate-M	Moderate-M	Moderate-M	Strong-H	Moderate-M
7					CO4	Learn methods of detection ofbacterial and viral infections in laboratory rodent and other animal colonies.	Strong-H	Moderate-M	Strong-H	Strong-H	Moderate-M	Strong-H
8	SEM III	0403470308 - PP	TH4283	Structural Biology	CO1	Enlist the methods of protein structure determination and their applications.	Strong-H	Strong-H	Moderate-M	Strong-H	Weak-L	Weak-L
8					CO2	Explain the principles of XRD and NMR	Strong-H	Strong-H	Moderate-M	Strong-H	Moderate-M	Weak-L
8					CO3	Interpret the results obtained from various structure analysis.	Moderate-M	Moderate-M	Strong-H	Strong-H	Weak-L	Weak-L
8					CO4	Analyse protein structure determination and docking studies in drug development in treatment of various simple and complex diseases.	Strong-H	Strong-H	Moderate-M	Strong-H	Weak-L	Weak-L
8					CO5	Evaluate the applicability of various tools and techniques used in structure determination and structure prediction based on their advantages and limitations	Strong-H	Strong-H	Moderate-M	Strong-H	Weak-L	Weak-L
9	SEM IV	403420401 - PP	T4820	Project	CO1	The student should be able to outline project proposal.	Moderate-M	Moderate-M	Strong-H	Moderate-M	Strong-H	Weak-L
9					CO2	The student should be able to analyze the researchfindings in the relevant area of the project.	Strong-H	Strong-H	Moderate-M	Strong-H	Moderate-M	Moderate-M
9					CO3	The student should be able to construct the hypothesisfor the research problem identified.	Strong-H	Moderate-M	Weak-L	Strong-H	Strong-H	Moderate-M
9					CO4	The student should be able to plan the experiments tosupport the hypothesis.	Strong-H	Weak-L	Moderate-M	Moderate-M	Strong-H	Strong-H
9					CO5	The student should be able to interpret the results.	Strong-H	Weak-L	Strong-H	Strong-H	Moderate-M	Moderate-M
10	SEM I	0403470101 - PP	TH4098	Advance Molecular Biology	CO1	Explain processes involved in the flow of genetic information.	Strong-H	Strong-H	Strong-H	Strong-H	Moderate-M	Weak-L
10					CO2	Interpret the results obtained from molecular biology experiments	Moderate-M	Moderate-M	Strong-H	Strong-H	Weak-L	Weak-L
10					CO3	Compare and contrast molecular pathways in eukaryotes and prokaryotes.	Strong-H	Strong-H	Moderate-M	Moderate-M	Weak-L	Moderate-M
10					CO4	Evaluate the results of the molecular biology experiments.	Strong-H	Strong-H	Moderate-M	Moderate-M	Moderate-M	Strong-H
11	SEM I	0403470102 - PP	TH4425	Biomolecules	CO1	Examine the properties of water, solvents, functional groups and non-covalent interactions	Strong-H	Strong-H	Moderate-M	Moderate-M	Moderate-M	Weak-L
11					CO2	Analyze and compare the structures and functions of lipids, carbohydrates	Strong-H	Strong-H	Strong-H	Weak-L	Moderate-M	Moderate-M
11					CO3	Relate the structure-functions relationship with biological roles, health and diseases	Strong-H	Strong-H	Moderate-M	Moderate-M	Moderate-M	Weak-L
11					CO4	Connect the fundamental knowledge to commercial production, innovation and applications in these biomolecules	Strong-H	Moderate-M	Weak-L	Weak-L	Moderate-M	Weak-L

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12	SEM I	0403470103 - PP	TH4107	Microbiology	CO1	Student should be able to explain the factors affecting microbial growth, microbial interactions, antimicrobial interactions and outbreak investigations.	Strong-H	Strong-H	Moderate-M	Moderate-M	Strong-H	Weak-L
12					CO2	Student should be able to communicate applied microbiology related studies and data effectively to audiences in written and oral formats.	Strong-H	Moderate-M	Strong-H	Strong-H	Moderate-M	Weak-L
12					CO3	Student should be able to critically evaluate relevant scientific literature in applied microbiology and demonstrate comprehension of the nature, scope and technical issues through written and oral tasks.	Strong-H	Strong-H	Moderate-M	Strong-H	Strong-H	Moderate-M
13	SEM I	0403470104 - PR	TH4275	Practicals In Biochemical Techniques	CO1	Learn about various good lab practices and safety measures while working in the lab. They will learn art of record keeping and presentation of data.	Strong-H	Strong-H	Strong-H	Moderate-M	Weak-L	Weak-L
13					CO2	Learn skills of performing various tests to identify, quantify and separate biomolecules.	Strong-H	Strong-H	Moderate-M	Moderate-M	Strong-H	Weak-L
13					CO3	Learn Isolation of industrially important biomolecules from crude samples.	Strong-H	Strong-H	Moderate-M	Moderate-M	Weak-L	Moderate-M
14	SEM I	0403470105 - PR	TH4274	Practicals in Microbiology and molecular Biology	CO1	Acquire proficient technical skills in core molecular biology and Microbiology laboratory techniques.	Strong-H	Moderate-M	Strong-H	Strong-H	Strong-H	Moderate-M
14					CO2	Acquire creativity through troubleshooting of the experiments.	Moderate-M	Moderate-M	Strong-H	Moderate-M	Strong-H	Weak-L
14					CO3	Generate interest in the experimental molecular biology and microbiology through the skilful experimental demonstration to resolve global issues in developing advanced methods	Strong-H	Strong-H	Moderate-M	Moderate-M	Weak-L	Moderate-M
14					CO4	Sense human values through cooperative experiments in group	Strong-H	Moderate-M	Moderate-M	Strong-H	Moderate-M	Weak-L
15	SEM I	0403470106 - PP	TH4116	Research Methodology and Biostatics	CO1	To understand and formulate a research problem.	Strong-H	Strong-H	Strong-H	Strong-H	Strong-H	Moderate-M
15					CO2	To analyze the different scientific research designs and methods	Strong-H	Strong-H	Moderate-M	Weak-L	Weak-L	Moderate-M
15					CO3	To familiarize about the set up a research study	Strong-H	Strong-H	Moderate-M	Moderate-M	Weak-L	Weak-L
15					CO4	To relate Biostatistics methods required in Scientific Research	Strong-H	Strong-H	Moderate-M	Weak-L	Weak-L	Moderate-M
16	SEM I	0403470107 - PP	TH4103	Genetic Analysis	CO1	Explain the laws of genetics, population genetics, and methods used in structural and functional genomics	Strong-H	Strong-H	Strong-H	Moderate-M	Weak-L	Moderate-M

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16					CO2	Identify the type of inheritance, estimate allele/genotype/phenotype frequency and calculate linkage distance	Strong-H	Moderate-M	Strong-H	Strong-H	Moderate-M	Moderate-M
16					CO3	Estimate the probability of inheritance. Analyze the DNA fingerprinting data. Analyze if the population is in a state of equilibrium.	Strong-H	Strong-H	Strong-H	Moderate-M	Strong-H	Moderate-M
16					CO4	Evaluate the results, conclusion, hypotheses based on the genetic analysis	Strong-H	Strong-H	Moderate-M	Strong-H	Moderate-M	Moderate-M
17	SEM II	0403470201 - PP	TH4097	Advanced Immunology	CO1	Discuss the characteristic features and functions of organs, cells and molecules of the immune system.	Strong-H	Strong-H	Moderate-M	Moderate-M	Weak-L	Strong-H
17					CO2	Interpret how the immune system acquires the ability to recognize/differentiate between self and non-self and what factors lead to malfunction as seen in immune disorders.	Strong-H	Strong-H	Strong-H	Moderate-M	Weak-L	Strong-H
17					CO3	Analyze the molecular mechanisms of the immunological responses.	Strong-H	Strong-H	Strong-H	Moderate-M	Weak-L	Strong-H
17					CO4	Evaluate the cellular and molecular factors leading to abnormal immune responses	Strong-H	Strong-H	Strong-H	Moderate-M	Weak-L	Strong-H
18	SEM II	0403470202 - PP	TH4101	Cell Biology	CO1	Students will be able to list characteristics of eukaryotic cells.	Strong-H	Strong-H	Strong-H	Strong-H	Weak-L	Strong-H
18					CO2	Students will be able to explain the organisation, mechanism(s) of cellular communication and regulation of cell division in eukaryotic cells.	Strong-H	Strong-H	Moderate-M	Weak-L	Moderate-M	Strong-H
18					CO3	Students will be able to demonstrate the functional characteristics of a eukaryotic cell.	Strong-H	Moderate-M	Strong-H	Moderate-M	Weak-L	Moderate-M
18					CO4	Students will be able to compare the cellular and molecular differences between a functionally normal and deregulated cell.	Strong-H	Moderate-M	Strong-H	Weak-L	Moderate-M	Moderate-M
19	SEM II	0403470209 - PR	TH4108	Practicals in Animal Tissue Culture	CO1	Students will be able to revive cryopreserved animal cells.	Strong-H	Moderate-M	Strong-H	Strong-H	Moderate-M	Weak-L
19					CO2	Students should be able to maintain the animal cell culture.	Strong-H	Moderate-M	Strong-H	Moderate-M	Strong-H	Moderate-M
19					CO3	Students should be able to analyze the effect of a given compound on cell viability	Strong-H	Moderate-M	Strong-H	Moderate-M	Strong-H	Moderate-M
19					CO4	Students should be able to prepare the primary cell culture.	Strong-H	Moderate-M	Strong-H	Moderate-M	Strong-H	Strong-H
20	SEM II	403420206 - PP	TH4105	Genomics, Proteomics and Bioinformatics	CO1	The student should be able to define genomics and proteomics and list various tools and techniques involved.	Strong-H	Strong-H	Strong-H	Moderate-M	Weak-L	Weak-L
20					CO2	The student should be able to explain the principles of DNA and protein sequencing techniques and techniques of quantitative estimation of gene/protein expression.	Strong-H	Strong-H	Moderate-M	Weak-L	Weak-L	Moderate-M
20					CO3	The student should be able to apply various tools in bioinformatics for analysis.	Strong-H	Moderate-M	Strong-H	Moderate-M	Moderate-M	Weak-L

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20					CO4	The student should be able to analyze sequences of biomolecules and compare the contrast the techniques for their advantages and limitations.	Strong-H	Strong-H	Moderate-M	Moderate-M	Weak-L	Moderate-M
21	SEM II	403470203 - PP	TH4277	Metabolism	CO1	Student should be able to enlist the enzymes, cofactors, and intermediates of various metabolic pathways.	Strong-H	Strong-H	Moderate-M	Moderate-M	Weak-L	Strong-H
21					CO2	Student should be able to explain how metabolism is regulated.	Strong-H	Moderate-M	Strong-H	Moderate-M	Weak-L	Strong-H
21					CO3	Students should be Interpret the outcome of absence of certain functional enzymes on the metabolism.	Strong-H	Moderate-M	Strong-H	Moderate-M	Weak-L	Strong-H
21					CO4	Students should be able to analyze the connection between different metabolic pathways	Strong-H	Strong-H	Moderate-M	Moderate-M	Weak-L	Strong-H
22	SEM II	403470204 - PP	TH4273	Proteins and Enzymes	CO1	Analyze the structure and function relationship of proteins and enzymes	Strong-H	Strong-H	Moderate-M	Weak-L	Weak-L	Strong-H
22					CO2	Distinguish the various parameters of enzyme assays, kinetics, regulation, inhibitors	Strong-H	Strong-H	Moderate-M	Moderate-M	Strong-H	Weak-L
22					CO3	Compare the various methods of protein and enzyme purification.	Strong-H	Strong-H	Strong-H	Moderate-M	Weak-L	Moderate-M
23	SEM II	403470205 - PP	TH4278	Biophysical Techniques	CO1	Understand the principles of biophysical techniques and acquire skills used in the analysis of biomolecules.	Strong-H	Strong-H	Moderate-M	Moderate-M	Strong-H	Moderate-M
23					CO2	Learn the core concepts of biophysical techniques through independent and collaborative assignments.	Strong-H	Strong-H	Strong-H	Moderate-M	Moderate-M	Strong-H
23					CO3	Understand the usage of biophysical problems to resolve global issues related to health and diseases	Strong-H	Strong-H	Moderate-M	Moderate-M	Strong-H	Moderate-M
24	SEM II	403470207 - PR	TH4276	Practicals in Enzymology	CO1	Practice to identify and quantify the enzymes, enzyme activity.	Strong-H	Strong-H	Moderate-M	Weak-L	Weak-L	Moderate-M
24					CO2	To analyze the optimum conditions and kinetic properties of enzyme assays	Strong-H	Moderate-M	Strong-H	Moderate-M	Weak-L	Moderate-M
24					CO3	To compare the various methods of enzyme purification	Strong-H	Strong-H	Moderate-M	Moderate-M	Weak-L	Moderate-M
25	SEM II	403470208 - PP	T4005	Integrated Disaster Management *	CO1	To enable student understand various types of disasters, its preparedness and management.	Weak-L	Moderate-M	Moderate-M	Strong-H	Strong-H	Moderate-M
25					CO2	To instill knowledge on reducing disasters and capacity building through community participation.	Moderate-M	Moderate-M	Weak-L	Strong-H	Strong-H	Moderate-M
25					CO3	To train students to perform First aid and CPR in an emergency	Strong-H	Moderate-M	Moderate-M	Strong-H	Strong-H	Moderate-M
26	SEM II	403470210 - PR	TH4111	Practicals in Bioinformatics	CO1	The student should be able to explain the principles of DNA and protein sequencing techniques and techniques of quantitative estimation of gene / protein expression.	Strong-H	Strong-H	Strong-H	Moderate-M	Moderate-M	Weak-L
26					CO2	The student should be able to apply various tools in bioinformatics for analysis of biological data.	Strong-H	Strong-H	Strong-H	Moderate-M	Weak-L	Strong-H

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26					CO3	The student should be able to analyze sequences of biomolecules using existing tools and compare the contrast the techniques for their advantages and limitations.	Strong-H	Strong-H	Moderate-M	Weak-L	Moderate-M	Weak-L
26					CO4	The student should be able to evaluate the results obtained and the hypothesis drawn from the analysis of biological data using bioinformatics tools.	Strong-H	Strong-H	Strong-H	Moderate-M	Moderate-M	Strong-H