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|  | 18BTB101T | **Course Name** | BIOLOGY | **Course Category** | *B* | *Basic Sciences* | L | T | P | C |
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| **Pre-requisite Courses** | *Nil* | | **Co-requisite Courses** | *Nil* | | **Progressive Courses** | *Nil* |
| **Course Offering Department** | | *Biotechnology* | | | **Data Book / Codes/Standards** | *Nil* | |

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| **Course Learning Rationale (CLR):** | | | *The purpose of learning this course is to:* | |  | **Learning** |  | **Program Outcome (PO)** | | | | | | | | | | | | ***Program Specific Outcome (PSO)*** | | |
|  |  |
| **CLR-1 :** | *Recall the cell structure and function from its organization* | | | |  |  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | 3 |
| **CLR-2 :** | *Discuss molecular and biochemical basis of an organism* | | | |  | Blooms Level (1-6) |  | Engineering Knowledge | Problem Analysis | Design & Development | Analysis, Design, Research | Modern Tool Usage | Society & Culture | Environment & Sustainability | Ethics | Individual & Team Work | Communication | Project Mgt. & Finance | Life Long Learning | Industrial application of Biotechnology | Applied fields of Biotechnology | Advancement in Research and Development |
| **CLR-3 :** | *Compare enzyme reaction and photosynthesis* | | | |  |  |
| **CLR-4 :** | *Explain different types of biosensors* | | | |  |  |
| **CLR-5 :** | *Analyze the different types of bioremediation* | | | |  |  |
| **CLR-6 :** | Relate the concept of nervous and immune system pertaining to diseases | | | |  |  |
|  | |  | | |  |  |
| **Course Outcomes (CO):** | | | | *At the end of this course, learners will be able to:* | |  |
| **CO-1 :** | *Describe the cell growth, metabolism and reproduction.* | | | | | *1* |  | *2* | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO-2 :** | *Explain the concepts and experiments in biochemistry* | | | | | *2* |  | *3* | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO-3 :** | *Consolidate the significance of photosynthesis* | | | | | *3* |  | *2* | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO-4 :** | *Determine enzyme catalytic functions in different metabolic reaction* | | | | | *5* |  | *3* | *3* | *3* | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO-5 :** | *Analyze the role of biosensors and its applications* | | | | | *3* |  | *3* | *3* | *2* | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO-6 :** | *Compile the concepts of nervous system disorder and the diseases associated with it* | | | | | *6* |  | *3* | *-* | *3* | - | - | - | - | - | - | - | - | - | - | - | - |

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| Duration (hour) | | 6 | 6 | 6 | 6 | 6 |
| **S-1** | SLO-1 | *Basics of cell biology: Relevance to Engineers* | *Biochemistry: Macromolecules, Biodiversity and its importance* | *Bioenergetics and metabolism* | *Molecular machines and motors* | *Nervous system: History of neuroscience* |
| SLO-2 | *Cell basic unit of life, Evidence for cell theory* | *Chemistry of life* | *Enzymes as biological catalysts, Significance of enzymes* | *Properties of ATP based protein molecular machines* | *Glial cells, Neurons* |
| **S-2** | SLO-1 | *Cell structure and function* | *Biochemistry and human biology, DNA replication* | *Thermodynamics of enzymes* | *F0F1 ATP synthase motors, Coupling and coordination of motors* | *Action potential, Organization of nervous system* |
| SLO-2 | *Genetic Information, Protein structure* | *Transcription, Protein synthesis* | *Factors affecting enzyme activity, Effect of inhibitors on enzyme activity* | *Bacterial flagellar motor, Cytoskeleton* | *Central Nervous system, Peripheral nervous system* |
| **S-3** | SLO-1 | *Cell metabolism* | *Eukaryotic and prokaryotic protein synthesis difference* | *Mechanism of enzyme action* | *Microtubules* | *Diseases of nervous system* |
| SLO-2 | *Carbohydrate metabolism, Fatty acid metabolism* | *Concept of genetic code, Stem cells* | *Enzyme strategies, Restriction enzymes* | *Microfilaments, Intermediate filaments* | *Computer- based neural networks* |
| **S-4** | SLO-1 | *Homeostasis* | *Source of stem cells, Classification of stem cells* | *NMP kinases, Photosynthesis* | *Kinesin linear motor, Dynein motor* | *Immune system* |
| SLO-2 | *Pathways that alter homeostasis, Cell growth* | *Human embryonic stem cell, Importance and applications of stem cells* | *Light reactions, Photosystems* | *Biosensor* | *Fluid systems of the body, Innate immune system* |
| **S-5** | SLO-1 | *Reproduction* | *Therapeutic Cloning* | *ATP synthesis in chloroplasts* | *Resonant biosensors, Glucose biosensors* | *Cells of innate immune system, Adaptive immunity* |
| SLO-2 | *Eukaryotic cell division, Mitosis* | *Regenerative medicine* | *Calvin cycle* | *Bio detectors, Biosensor detection in pollutants* | *Diseases of immune system, Immune engineering* |
| **S-6** | SLO-1 | *Meiosis, Cell differentiation* | *Bone tissue engineering* | *Significance of photosynthesis* | *Bioremediation* | *Cell signaling* |
| SLO-2 | *Neural crest* | *Gene therapy* | *Metabolism, Glycolysis* | *Bioventing and bio augmentation* | *Cell- surface receptors* |

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| **Learning**  **Resources** | 1. *S. Thyagarajan, N.Selvamurugan, R.A.Nazeer et.al., Biology for engineers McGraw Hill Education. 2012* | 1. *Norman Lewis, Gabi Nindl Waite, Lee R. Waite et.al., Applied Cell and Molecular Biology for Engineers. McGraw-Hill Education. 2007* |

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| ***Learning Assessment*** | | | | | | | | | | | |
|  | *Bloom’s*  *Level of Thinking* | *Continuous Learning Assessment (50% weightage)* | | | | | | | | *Final Examination (50% weightage)* | |
| *CLA – 1 (10%)* | | *CLA – 2 (15%)* | | *CLA – 3 (15%)* | | *CLA – 4 (10%)#* | |
| *Theory* | *Practice* | *Theory* | *Practice* | *Theory* | *Practice* | *Theory* | *Practice* | *Theory* | *Practice* |
| *Level 1* | *Remember* | *15%* | *-* | *15%* | *-* | *15%* | *-* | *10%* | *-* | *15%* | *-* |
| *Level 2* | *Understand* | *25%* | *-* | *25%* | *-* | *25%* | *-* | *15%* | *-* | *25%* | *-* |
| *Level 3* | *Apply* | *30%* | *-* | *30%* | *-* | *30%* | *-* | *30%* | *-* | *30%* | *-* |
| *Level 4* | *Analyze* | *30%* | *-* | *30%* | *-* | *30%* | *-* | *25%* | *-* | *30%* | *-* |
| *Level 5* | *Evaluate* | *-* | *-* | *-* | *-* | *-* | *-* | *15%* | *-* | *-* | *-* |
| *Level 6* | *Create* | *-* | *-* | *-* | *-* | *-* | *-* | *5%* | *-* | *-* | *-* |
|  | *Total* | *100 %* | | *100 %* | | *100 %* | | *100 %* | | *100 %* | |

# CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

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| **Course Designers** |  |  |  |  |  | |  |
| Experts from Industry | | Experts from Higher Technical Institutions | | | | Internal Experts | |
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| *2. Dr. Karthik Periyasamy, Aurobindo Pharma Limited, Hyderabad,* [*karthikmpk@gmail.com*](mailto:karthikmpk@gmail.com) | | *2. Dr. R. B. Narayanan, SVCE Chennai, rbn@svce.ac.in* | | | | *Dr.S.Barathi, SRMIST* | |