| Course Type | Course Code | Name of Course | L | T | P | Credit |
|---|---|---|---|---|---|---|
| DP | NCYC505 | Chemical Biology Lab | 0 | 0 | 3 | 1.5 |

| **Course Objective** |
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| • To understand the basic experimental techniques in cell and molecular biology |
| **Learning Outcomes** |
| • Students are expected to understand the principle behind cell culture, bacteriology and molecular biology with an aim to enable troubleshooting of techniques. |

| Unit No. | Topics to be Covered | Lecture Hours | Learning Outcome |
|---|---|---|---|
| 1 | General Instructions | 3 | General instructions for the lab |
| 2 | Bacterial transformation | 3 | Understand bacterial competence and perform DNA transformation into bacteria by heat shock |
| 3 | Plasmid isolation from bacteria | 3 | Practice bacterial culture and isolation of the high copy number plasmids by alkaline lysis |
| 4 | Restrictionn Digestion and Agarose Gel Electrophoresis | 3 | Perform the basic rDNA techniques of cutting DNA and electrophoretic separation of fragments based on size |
| 5 | Demonstration of cell culture | 3 | Understand cell growth, splitting, counting, freezing and storage of cells, thawing and maintenance in $CO_2$ incubators. |
| 6 | Demonstration of MTT assay | 3 | Understand how to enumerate cell death using chemotherapeutic drugs that can cause cancer cell death. |
| 7 | Live-dead assay using plate reader | 3 | Another assay for cell number enumeration and cell death enumeration using propidium iodide and calcein AM based assay with plate reader based reading and analysis |
| 8 | SDS-Polyacrylamide Gel electrophoresis | 3 | Separation of proteins based on size followed by visualization using Coomassie staining |
| 9 | Western Blotting | 3 | Antibody based analysis of cellular proteins-Chemiluminescence imaging using a gel documentation instrument |
| 10 | ABTS radical cation scavenging assay | 3 | Understanding how to evaluate antioxidant potential using radical scavenging assay |
| 11 | FRAP anti-oxidant assay | 3 | Understanding how to evaluate antioxidant potential using radical scavenging assay |
| 12 | Disc diffusion assay for antibiotic sensitivity | 3 | Bacterial sensitivity to antibiotics evaluated using disc diffusion. |
| 13 | Kinetics of phosphatase | 3 | Understand enzyme kinetics and analysis parameters using purified phosphatase and PNPP substrate. |
| 14 | Polymerase Chain Reaction | 3 | Perform PCR and analyse amplicon on Agarose gel. |
| | **Total** | **42L** | |

**Text Books:**

Molecular Cloning: A Laboratory Manual, Vols 1,2 and 3 – J.F. Sambrook and D.W. Russell

**Reference Books:**

Culture of Animal Cells: A Manual of Basic Technique and Specialized Applications by R. Ian Freshney