



# EXPERIMENTAL BIOTECHNOLOGY

## PROF. VISHAL TRIVEDI

Department of Biosciences and Bioengineering  
IIT Guwahati

**PRE-REQUISITES :** General Biology 10+2

**INTENDED AUDIENCE :** PG/PhD

**INDUSTRY SUPPORT :** Biocon <https://www.biocon.com/> Jubilant Life Sciences [www.jubl.com/](http://www.jubl.com/)  
Shantha Biotechnics Ltd Panacea Biotec Other companies related to biotechnology

## COURSE OUTLINE :

In the current MOOCs course I have put effort to briefly discuss different analytical techniques and their potential in solving the scientific problems. We are taking several scientific problems or questions which can be solved by using these techniques. By the end of this course, student will be able to understand:

1. Basics of Good Lab practices.
2. Understanding different analytical techniques and their applications.
3. Specific Scientific questions and their solutions.
4. Designing new experiments.

## ABOUT INSTRUCTOR :

Prof. Trivedi did his Ph.D. from Central Drug Research Institute, Lucknow in the field of Structural Biology. From his postdoctoral research at the Department of Molecular and Cellular Biology, Harvard University and Molecular Oncology Research Institute, Tufts University, Boston, USA, he gained extensive research experience in the field of cell biology, intracellular signal transduction, and immunology. Currently, his laboratory at Department of Biosciences and Bioengineering has an active group working and exploring questions related to malaria parasite biochemistry, the role of novel proteins, development of anti-malarial agents, and lastly understanding factors playing a crucial role in immunomodulation and host pathology in different organs.

## COURSE PLAN :

- Week 1:** Buffering solution in Biological System: Good Lab Practices, Concept of buffering and Preparation of Solutions and Reagents
- Week 2:** Electrophoresis (Part 1): Basic Concept of Electrophoresis, performance of electrophoresis and its applications.
- Week 3:** Electrophoresis: Horizontal Gel electrophoresis, discussion about scientific questions and related experiments to solve them utilizing electrophoresis.
- Week 4:** Chromatography (Part I): Analytical techniques in purification of biomolecules; Column chromatography, HPLC.
- Week 5:** Chromatography (Part II) : Analytical techniques in purification of biomolecules; Column chromatography, HPLC.
- Week 6:** Chromatography (Part III) : Discussion about scientific questions and related experiments to solve them utilizing chromatography.
- Week 7:** Immunology Techniques: Immunological tools, Antibody Generation and Purification, ELISA, Radial Immuno-diffusion, Western blotting and Immuno-precipitation.
- Week 8:** Cell Biology Techniques (Part 1): Basics of cell-culture, isolation of cells from tissue and fractionation.
- Week 9:** Cell Biology Techniques (Part 2): Immuno-localization, cell sorting, and discussion about scientific questions and related experiments to solve them utilizing cell biology techniques.
- Week 10:** Molecular Biology (Part 1):Primer designing, Polymerase chain reaction, Different variants of PCR and their applications.
- Week 11:** Molecular Biology (Part 2) Blotting Techniques, DNA and protein sequencing techniques and their applications.
- Week 12:** Summary and Conclusions