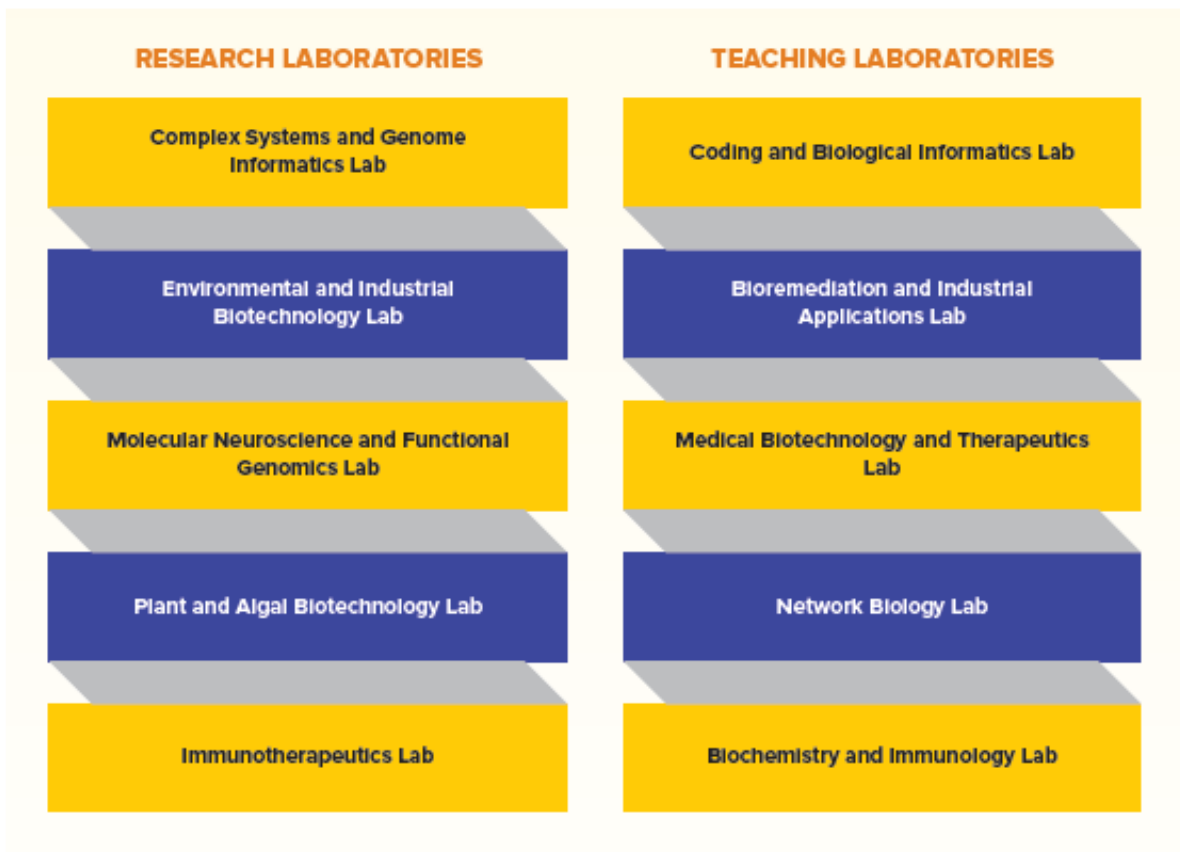


**DEPARTMENT OF BIOTECHNOLOGY
DELHI TECHNOLOGICAL UNIVERSITY**

State-of-the-Art Laboratories

The department has built a strong research foundation in various fields such as bioinformatics, machine learning, artificial intelligence, big data, environment protection, pollution mitigation, water quality management, aquaculture, neuroscience, molecular medicine, functional genomics & proteomics, human diseases, medicinal plant biotechnology, cancer therapeutics, molecular biology, microbiology, bioprocess technology, nanomaterials, and biosensors, etc.

At the heart of department's research endeavors are ten exceptionally-equipped teaching and research laboratories, which provide the perfect setting for groundbreaking research and experimentation. Undergraduate and postgraduate students perform their experiments and research scholars are engaged in high-tech research in these labs.



Complex Systems and Genome Informatics Lab

Principal Investigator: Prof. Yasha Hasija



Research Focus

- *In silico* prediction of microRNA using CNN and LSTM
- AI/ML based biomarker discovery and precision medicine
- Utilizing deep learning for drug lead optimization
- Drug design through molecular docking and simulation, coupled with *in silico* analysis of polymorphisms

Research Projects (Completed)

- Genetic analysis of dermatological disorders (2017-2020; DBT, Govt. of India)
- Tuberculosis: Genetic susceptibility and pharmacogenomics databases (2012-2015; CSIR-OSDD)
- Role of human genetic variations in age-related disorders (2012-2015; SERB under OYS Scheme)

Sophisticated Instruments

- Dell Precision 5820 Tower Workstations; All-in-one Desktop; Canon Printer/Photocopier; HP Laser Jet Color Printer

Environmental and Industrial Biotechnology Lab

Principal Investigator: Prof. Jai Gopal Sharma



Research Focus

- Effects of microplastics on plant growth and soil properties
- Sampling, extraction, and analysis procedures for microplastics in soil
- Industrial and environmental biotechnology
- Bioremediation
- Medicinal chemistry of plants
- Amino acids profile of medicinal plants
- Water quality management, water chemistry
- Aquatic ecology, aquaculture, fish nutrition
- Radiation biology
- Biosensor
- Bioenergy & Biofuel
- Microbiology
- Nanobiotechnology
- Environmental impact assessment

Research Projects (Ongoing)

- Investigations on micro-nano plastics (MNPs) fingerprinting in cruciferous truck crops with special reference to *Brassica oleracea* spp. (2023-2025; DBT, Govt. of India; DTU & Department of Botany MLSU Udaipur Rajasthan)
- Evaluation of effect of macrophytes based on the growth, gut physiology, expression of specific genes involved in the biosynthesis of DHA & EPA and production of quality freshwater fishes (2021-2024; DBT, Govt. of India)
- Integrated farming of *Lates calcarifer* and *Macrobrachium rosenbergii* in aquaponic system: a sustainable water utilization approach (2020-2024; DST, Govt. of India)

Research Projects (Completed)

- Dissemination and demonstration of fish culture technology among women self help groups in NCR region of Delhi as a self-employment activity (2018-2021; DBT)
- Development of pelleted diet for *Catla catla* and *Clarias batrachus* using *Achyranthes aspera* and evaluation of its immunostimulatory properties in pond culture system (2015-2019; DBT)
- Toxicity assessment and treatment of pharmaceutical waste water by novel nano catalyst based advanced oxidation method (2017-2019; SERB, DST)
- Development of alternative sustainable fish feeds to promote human health using novel non-conventional indigenous ingredients (2016-2019; Multicounty Project-BBSRC, UK, and DBT)
- Simultaneous degradation of organochlorine pesticides by microbes (2013-2018; UGC)
- Engineering of actin filament for the development of next generation diagnostic nanodevices (2013-2016; SERB DST)
- Nanoenabled biosensor for detection of *Neisseria gonorrhoeae* (in collaboration with AIIMS; 2017-2019; DBT)

Sophisticated Instruments

- Ultra-High Performance Liquid Chromatography; Kjeltac 8400; UV-Vis Spectrophotometer; Refrigerated Centrifuge; Laminar Air Flow; Lyophilizer; Hybridization Chamber; Electrophoresis Unit; Hach's Water Quality Multi-parameter with Various Electrodes; Screen Printer; Vacuum Evaporator; -80°C Deep Freezer; Surface Plasmon Resonance; UV-VIS-NIR Spectrophotometer; Microfluidic Pump; Colorimeter; Conductivity Meter; Digital Multimeter; Digital Micro-voltmeter; Electrochemical Analyzer; Projector

Molecular Neuroscience and Functional Genomics Lab

Principal Investigator: Prof. Pravir Kumar



Research Focus

- Post translational modification in neurodegenerative disorders
- Ubiquitin E3 ligase mediated clearance of toxic metabolites and UPS assisted therapeutics
- Molecular chaperone assisted therapeutics
- Cross talk through repurposed drugs in neurodegenerative disorders and cancer
- AI/ML based drug discovery in neurodegenerative disorders and brain tumor
- Post mitotic cell division and aberrant cell cycle entry in aged neurons and muscles
- Drug repurposing approach and lead molecule identification

Research Projects (Completed)

- Functional role of heat shock proteins and ubiquitin E3 ligase under hypoxic stress condition (2009-2012; LSRB-DRDO)
- Identification and characterization of anti-cancerous and anti-angiogenic biomolecules for colon cancer (2013-2016; DST-SERB)
- Screening and Investigation of biomolecules for therapy of diabetes via cell culture method (2016-2019; CSIR-Scientific Pool Scheme)

Sophisticated Instruments

- Thermocycler; Inverted Microscope; Inverted Microscope; -20°C Refrigerator; Gel Documentation System; Western Blot Apparatus; Electrophoresis Unit; Microtome; CO₂ Incubator; Workstation; Projector

Plant and Algal Biotechnology Lab

Principal Investigator: Dr. Navneeta Bharadvaja



Research Focus

- Selection of elite accessions for industrially important secondary metabolites
- Optimization for *in vitro* production of high-value low volume phytochemicals through tissue culture
- Plant tissue and algal culture-based approaches for the production of industrial and medicinal metabolites
- Production of nanoparticles and study of their medicinal and industrial applications
- *In silico* analysis of phytochemicals for potential drug discovery against various diseases
- Phyto and phycoremediation of dyes and heavy metals
- Optimization of biomass production of microalgae for biofuels

Sophisticated Instruments

- Temperature and Light Controlled Tissue Culture Room; Thermocycler; Gel Documentation System; UV Transilluminator; UV-Vis Spectrophotometer; Incubated Shaker; Laminar Air Flow; Autoclave; Electrophoresis Unit; Sonicator; Centrifuge; Mini-centrifuge; Double Distillation Unit; Hot Air Oven; Projector

Immunotherapeutics Lab

Principal Investigator: Dr. Asmita Das



Research Focus

- Cellular immunology and therapeutics
- Modulation of tumor cells for immune evasion
- Development of combinatorial immune therapeutics for cancer
- Prediction of immunodiagnostic markers and plant derived natural compounds for cancer therapy
- Drug design and development of natural compounds as combinatorial treatment for cancer and autoimmune diseases

Research Projects (Completed)

- Tumor cell induced NK cell receptor modulation (DST; 2013-2016; Fast Track Scheme for Young Scientist)
- Preparation of tumor targeting monoclonal antibody and crocin nanoparticle conjugate for drug delivery system (2019-2021; DTU)
- Studies on elucidating silver nanoparticle as potent inhibitor of hyphal morphogenesis and drug resistance in opportunistic fungal pathogen, Candida and potential host cell toxicity (2014-2019; JNU-UPE)

Sophisticated Instruments

- Flow Cytometer; CO₂ Incubator; -20°C Refrigerator; Laminar Air Flow; Liquid Nitrogen Storage Container; UV-Visible Spectrophotometer; Ice Flaking Machine; Centrifuge; Thermostated Water-bath; Projector

Other Research Areas of Department

- Nanomedicine for cancer therapeutics
- Nanomaterials
- Scaffold for tissue engineering
- Biosensors
- Nanotoxicology
- Isolation of microbes for industrially important enzymes
- Enzymology
- Biochemical engineering