VALUE PROPOSITION

Industry–Academia Collaboration

Department of Biotechnology | Delhi Technological University (DTU), Delhi

1. Executive Summary

The Department of Biotechnology at Delhi Technological University (DTU) is a research-driven academic unit committed to translating biological science into scalable, engineering-enabled solutions. Established in 2004, the department integrates engineering principles with modern life sciences to address real-world challenges in healthcare, agriculture, environment, and industrial biotechnology.

With a foundation of specialized faculty, industry-aligned programs, and advanced laboratories, Department of Biotechnology at DTU offers a reliable platform for Industry-Ph.D. programs and sponsored research.

2. Vision & Mission

Vision:

To promote innovation, invention and employability in biotechnology through education and research for the service of humanity.

Mission:

- To establish Centers of Excellence in various fields of biotechnology
- To create awareness about potentials of biotechnology with socio-ethical implications
- To impart quality education for life-long professional growth and career development
- To initiate multi-disciplinary programs through academic-industry interface

3. Academic Programs

The Department of Biotechnology, DTU offers rigorous undergraduate, postgraduate, and doctoral programs. The curricula are regularly reviews and aligned with industry needs.

Degree	Specialization
B.Tech.	Biotechnology
M.Tech.	Industrial Biotechnology
M.Tech.	Bioinformatics
M.Tech.	By Research
M.Sc.	Biotechnology
Integrated B.Sc.–M.Sc.	Biotechnology
Ph.D.	Biotechnology

4. Research Leadership & Core Expertise

The department hosts faculty members with global training and specialized in:

- **Biomedical:** Cancer Biology, Tumor Metabolism, & Infectious Diseases (AMR)
- **Diagnostics:** Immunology & Molecular Diagnostics
- **Agri-Tech:** Plant Biotechnology & Plant–Microbe Interactions
- **Industrial:** Environmental Biotechnology & Bioprocess Optimization
- **Computational:** Bioinformatics, Systems Biology, & AI-driven Genomics

5. Infrastructure & Facilities

The Department of Biotechnology at DTU is equipped with state-of-the-art infrastructure that supports cutting-edge teaching, training, and research activities. The facilities are continuously upgraded to meet the emerging needs of modern biotechnology education and interdisciplinary research.

Departmental Laboratories

The department houses well-established laboratories that cater to both fundamental and advanced research in various domains of biotechnology:

- **Complex systems and genome informatics Laboratory:** This laboratory focuses on computational modelling and genome data analysis to unravel complex biological networks and systems biology**.** Dell Precision 5820 Tower Workstations; All-in-one Desktop; Canon Printer/Photocopier; HP Laser Jet Color Printer
- **Environmental and Industrial Biotechnology Laboratory:** This lab emphasizes the development of sustainable bioprocesses and technologies for environmental monitoring and industrial applications. The lab is equipped with many advanced scientific instruments including Ultra-High-Performance Liquid Chromatography; Kjeltec 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.
- **Molecular Neurosciences and Functional Genomics Laboratory:** Dedicated to understanding the molecular mechanisms underlying neural function and genetic regulation, this lab integrates genomics and cellular tools. Sophisticated instruments present in the lab are Thermocycler; Inverted Microscope; Inverted Microscope; -20°C Refrigerator; Gel Documentation System; Western Blot Apparatus; Electrophoresis Unit; Microtome; CO_2 Incubator; Workstation.
- **Plant and Algal Biotechnology:** This laboratory advances research in plant tissue culture, genetic transformation, and algal bioresource utilization for sustainable agriculture and bioenergy. The lab is well-equipped with advanced equipments including Temperature regulated 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

- **Immunotherapeutics:** The Immunotherapeutics Lab focuses on immune-based therapeutic development, including monoclonal antibodies, vaccines, and cell-based therapies. Highly specialized instruments such as Flow Cytometer; CO2 Incubator; -20°C Refrigerator; Laminar Air Flow; Liquid Nitrogen Storage Container; UV-Visible Spectrophotometer; Ice Flaking Machine; Centrifuge; Thermostat Water-bath are available in the lab.

Support Infrastructure

The department ensures robust support infrastructure for safety, maintenance, and data management. This includes biosafety cabinets, waste management systems, uninterrupted power supply, and digital record systems. A dedicated technical team oversees laboratory operations and ensures compliance with biosafety and quality standards.

6. Awards, Achievements & Recognitions

The Department of Biotechnology, DTU has earned consistent national recognition in recent years for excellence in research, innovation, teaching, and student outcomes. These achievements underline the department's credibility as a reliable academic partner for industry-driven R&D and doctoral collaborations**.**

- **Prof. Pravir Kumar honored with the Prof. Ch. Radhakrishna Murthy Memorial Award 2025**
- **DST INSPIRE Faculty Fellowship (2024)-** Awarded to Dr. Ankita
- **Research & Innovation Excellence Awards ((RIEA-2025), DTU-** Faculty members of the Department of Biotechnology were recognized at the Research & Innovation Excellence Awards (RIEA-2025), DTU**,** reflecting measurable research impact.
    - **Cumulative Citation Award (Gold) –** *Prof. Pravir Kumar*
    - **Cumulative Citation Award (Silver) –** *Dr. Asmita Das*
    - **Yearly Citation Award –** *Prof. Pravir Kumar, Dr. Navneeta Bharadvaja, Dr. Asmita Das*
    - **Early Research Impact & Influence Award –** *Prof. Pravir Kumar, Dr. Navneeta Bharadvaja, Dr. Asmita Das*
    - **Commendable Research Award –**
      Prof. Yasha Hasija, Prof. Jai Gopal Sharma, Prof. Pravir Kumar, Dr. Navneeta Bharadvaja, Dr. Asmita Das, Dr. Smita Rastogi Verma, Dr. Prakash Chandra, Dr. Kriti Bhandari

7. Patents, Intellectual Property and Publications

The department's intellectual property portfolio and innovation capabilities received a substantial boost with the successful filing and grant of patents to the faculty member. This demonstrated the faculty member's cutting-edge research and contributed to the department's growing reputation as a leader in innovation and intellectual rigor.

- **Granted Patent (2025):** ***Vending System for Precision Plant Disease Management Through Image Recognition and Automated Pesticide Dispensing***
  Inventors: **Prof. Yasha Hasija** and **Rajkumar Chakraborty**
  This patent demonstrates the department's capability in developing deployable, **technology-driven solutions** for smart agriculture, image-based disease diagnostics, and automated intervention systems, with strong potential for industrial scaling and commercialization.

- **Granted Design Patent (2025):** ***Device for Diagnosis of Inborn Errors of Metabolism (IEM)***
  Inventors: **Prof. Yasha Hasija** and **Akansha Bisht**
  This innovation reflects the department's strength in medical diagnostics and device design, supporting industry partnerships in healthcare technology, diagnostics manufacturing, and translational research.
- **Granted Patent (2024):** ***A Reusable Digestion Tube for Amino Acid Assay***

  Inventor: **Prof. Jai Gopal Sharma**

  The invention introduces an advanced reusable digestion tube specifically designed for the digestion of samples offering a safer, more efficient, and environment-friendly solution for amino acid assays
- **Earlier Indian Patent Filing (2020): Faculty Co-Inventorship**
  Co-Inventor: **Dr. Ankita**

Complementing its IP portfolio, faculty members maintain a robust publication record in high-impact, peer-reviewed international journals and edited volumes, with **interdisciplinary** research output, a cumulative h-index of 170, and over 17,800 citations. For industry partners, this combination of protected intellectual property and strong publication impact ensures scientifically validated outcomes, enhanced global visibility for joint research and greater credibility for co-developed products and processes.

8. Ph.D. Strength and Research Manpower

Currently, more than 40 Ph.D. scholars are actively pursuing doctoral research in the Department of Biotechnology, DTU, across biomedical, agricultural, industrial, environmental, and computational biotechnology domains. In addition, more than 50 scholars have already been awarded Ph.D. degrees from the department. This strong doctoral ecosystem offers industry partners access to highly trained research manpower and a reliable talent pipeline for future recruitment.

9. Government-Funded & Interdisciplinary Projects

The department have secured significant competitive funding

Funding Agency	Project Title	Investigator(s)
Department of Biotechnology (DBT), Govt. of India	Investigations on micro-nano plastics (MNPs) fingerprinting in cruciferous truck crops with special reference to *Brassica oleracea* spp.	**Prof. Jai Gopal Sharma** (PI)
Department of Biotechnology (DBT), Govt. of India	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	**Prof. Jai Gopal Sharma** (PI)
Department of Science & Technology (DST),	Integrated farming of Lates calcarifer and Macrobrachium rosenbergii in	**Prof. Jai Gopal Sharma** (PI)

Funding Agency	Project Title	Investigator(s)
Govt. of India	aquaponic system: a sustainable water utilization approach	
Department of Biotechnology (DBT), Govt. of India	DNA-Free RNP Mediated Genome Editing for Nitrogen-Smart Rice: A Sustainable Approach to Agriculture	**Dr. Jyotsna Bharti** (PI); **Prof. Jai Gopal Sharma** (Mentor)
Delhi Technological University (Interdisciplinary Grant)	AI-Based Modeling of Diabetes and Cardiovascular Disease Crosstalk	**Prof. Yasha Hasija** (PI); **Prof. Anil Singh Parihar** (Co-PI)
Delhi Technological University (Interdisciplinary Grant)	Life Cycle Analysis (LCA) of Algal Biomass for Sustainable Industrial Applications	**Prof. Amit Pal** (PI); **Dr. Navneeta Bharadvaja** (Co-PI)
Delhi Technological University (Interdisciplinary Grant)	Bacteria-Based Self-Healing Concrete for Sustainable Infrastructure	**Dr. Asmita Das** (PI); **Dr. Shilpa Pal** (Co-PI)

10. Curriculum Innovation & Industry Alignment

- **Industry Micro-Credential Course in Next Generation Sequencing (NGS)**

  In collaboration with Premas Life Sciences Pvt. Ltd., with joint certification – to equip students with highly sought-after skills, significantly boosting their career prospects in the burgeoning field of genomics.

- **Indian Knowledge Systems (IKS) Electives**

  Integrating traditional knowledge with modern biotechnology to provide a holistic education that not only delves into cutting-edge scientific principles but also explores the rich legacy of traditional Indian knowledge and its applications in modern biotechnology.

- **M.Tech. by Research Program**

  With a focus on research areas such as Functional Genomics, Environmental Biotechnology, Machine Learning, Immunology, Plant Biotechnology, Bioprocess Technology, Nanobiotechnology, Molecular Therapeutics, Big Data in Biology

11. Collaborations & MoUs

The department has active research and academic collaborations with leading national and international institutions including DBT, DST, DRDO laboratories, AIIMS, ICAR institutes, Universities across India, and international partners such as **University of Tennessee Health Science Center (USA)**. These collaborations enable joint Ph.D. supervision, shared infrastructure, international exposure, and accelerated translation of research outcomes.

- MoUs with ICAR–IARI and ICAR–NBPGR
- Active engagement with research institutes and healthcare organizations
- Regular national lecture series, symposia, awareness programs
- Strong alumni and industry engagement

12. Extension and Outreach Activities

The department regularly conducts extension and outreach activities including industrial visits, entrepreneurship and innovation workshops, proposal-writing sessions (BIRAC and other funding schemes), national and international seminars, and community engagement programs. These activities strengthen industry–academia interaction, promote early industry engagement with students and researchers, and facilitate identification of industry-relevant problems.

13. Industry Collaboration Models Offered

- Industry-Linked Ph.D. Programs
- Sponsored Research
- Consultancy & Expert Advisory

14. Future Roadmap

Short-Term (1–3 Years)

- Expand industry MoUs and sponsored research
- Increase joint funding proposals
- Host national industry–academia meets

Long-Term (3–5 Years)

- Strengthen startup incubation
- Industry-Academia collaboration
- Setting up Industry-Sponsored Laboratories and Industry-defined Research Projects
- Scale translational research and technology transfer

The Department of Biotechnology, DTU invites biotechnology, pharmaceutical, healthcare, agri-biotech, environmental, and data-driven life science industries to partner in structured, transparent, and outcome-oriented collaborations.