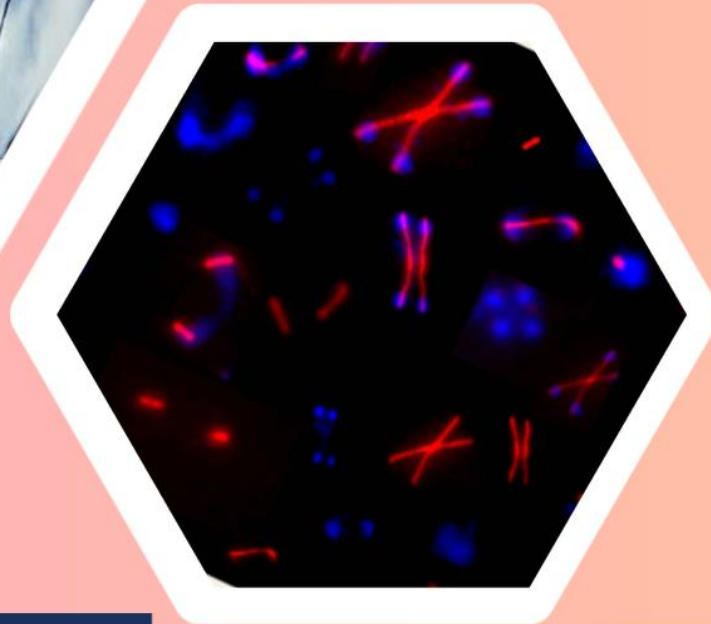


# Department of Biotechnology IIT Hyderabad



Department of Biotechnology, IIT Hyderabad,  
Kandi, Sangareddy, Telangana-502285, India

(O.) +91 40 2301 6026 (Fax) +91 40 2301 6032  
Email: [head@bt.iith.ac.in](mailto:head@bt.iith.ac.in)

<https://biotech.iith.ac.in/home>



## **Table of Contents**

<b>❑ Department of Biotechnology</b>	<b>1</b>
<b>❑ About the Course</b>	<b>2</b>
<b>❑ Course Structure</b>	<b>2</b>
<b>❑ Current Research</b>	<b>3-6</b>
<b>❑ Bio industry webinar series</b>	<b>7</b>
<b>❑ Testimonials</b>	<b>8</b>
<b>❑ Batch Statistics</b>	<b>9-10</b>
<b>❑ Our Past Recruiters</b>	<b>11</b>
<b>❑ Placement Coordinators</b>	<b>12</b>

# DEPARTMENT OF BIOTECHNOLOGY

IIT Hyderabad's Department of Biotechnology was established in 2010. The department was established with the goal of employing biotechnology in a multi-disciplinary manner to address the various medical and environmental needs of the society.

The Department seeks to meet the country's technical needs by performing high-quality translatable research and training students to be technological innovators in the field of biotechnology.

This Department not only strives to answer fundamental biological questions and develop breakthrough technological innovations but also aims to translate these discoveries into actionable solutions for benefit of the society.

The multidisciplinary research in the department integrates scientific and technological advancements into innovations that will not only improve public health but also significantly contribute to agriculture, energy and environment independence of our country.

# M.Tech in Medical Biotechnology

## About the Course

The department offers M.Tech in Medical Biotechnology and PhD in Biotechnology. IIT Hyderabad is currently the only IIT offering M.Tech Degree in Medical Biotechnology.

The M. Tech Program in Medical Biotechnology is designed with courses which prepares the students for both industries as well as research.

Students are encouraged to actively formulate and solve innovative research problems. An M. Tech Degree is awarded upon completion of 48 credits out of which 24 credits are allocated for Departmental theory courses and other 24 credits are allocated for the Thesis submitted after the completion of the course.

### Courses Offered

#### First Year

Semester-I	Semester-II
<ul style="list-style-type: none"> <li>Protein misfolding in Neurodegenerative Disease</li> <li>Structural Bioinformatics</li> <li>Cell Technology</li> <li>Advanced Cell biology</li> <li>Pharmacology and physiology of receptors</li> <li>Biochemistry</li> <li>Gene Technology</li> </ul>	<ul style="list-style-type: none"> <li>Immunology</li> <li>Programming for Biomacromolecular Data Analysis</li> <li>Macromolecular crystallography</li> <li>Stem Cell Biology and Regenerative Medicine</li> <li>Molecular Biotechnology</li> <li>Protein Technology</li> <li>Molecular Basis of Cancer</li> <li>Molecular Machines: DNA Interacting Proteins</li> <li>Biomolecular NMR</li> <li>Pharmaceutical Biotechnology</li> </ul>

#### Second Year

Semester-III	Semester-IV
Thesis Stage-I	Thesis Stage-II

## Current Research Areas

The Department of Biotechnology has active research groups in the frontier areas encompassing cancer biology, RNA biology, genomics, transcriptomics, infectious diseases, prion & amyloid diseases, molecular mechanisms of diseases/toxicity using zebrafish animal model, electrophysiology, molecular and cellular neurobiology and structural biology. The department is rapidly expanding in the other cutting-edge biotechnology research areas as well.

### **Structural Biology Laboratory**

This Lab employs multi-pronged biochemical, biophysical and computational approaches to unravel the mechanistic insights into the functioning of biological macromolecules in epigenetic events and in topological modulation of DNA structures during replication and repair. This lab also working on structure based drug design and enzyme engineering for asymmetric synthesis of chiral molecules. This Lab has 6 different publications in very reputed structural biology journal like International Journal of Biological Macromolecules, ACS Omega, and Scientific Reports. This Lab is funded by Department of Biotechnology (DBT) and Department of Science and Technology (DST)

### **Cell Signalling Laboratory**

This Lab uses molecular biology, protein chemistry, cell culture and specialized techniques such as Patch-clamp electrophysiology, optical calcium imaging and advanced microscopy to understand how calcium channels work and how they contribute to diseases where they are dysfunctional. This lab currently works on calcium channels and calcium signalling in non-excitabile cells such as cancerous cells. As an alternative to rodent models, this lab has established Zebrafish animal model in their lab for the investigation of disease and pathology mechanisms. This Lab is currently funded by the Science and Engineering Research Board (SERB).

### **Cancer Genomics and RNA Biology Laboratory**

The Lab employs an integrated approach to understand the role of RNA binding proteins in regulating a wide variety of cellular processes and diseases such as bacterial infections, cancer and neurological disorders. The lab also aims to develop computational tools for analyzing genome-wide deep sequencing data in order to investigate genomic and transcriptomic aberrations, which will allow early diagnosis of diseases such as cancer and haematological malignancies.

### **Protein Misfolding Research Laboratory**

This Lab uses yeast *Saccharomyces cerevisiae* model system in conjunction with biochemical/biophysical tools to unravel molecular mechanisms pertaining to protein misfolding, and their consequent cytotoxicity, with relevance to neurodegenerative diseases such as amyotrophic lateral sclerosis (ALS). This lab also characterizes factors affecting the in vitro amyloid-like aggregation of proteins implicated in the pathogenesis of various non-neuropathic human amyloidosis diseases such as renal amyloidosis.

### **Cancer Biology Laboratory**

This Laboratory studies nucleic acid modification and genome integrity. Nucleotide modification plays a critical role in many biological processes directly associated with cancer. Presently this Lab is focusing on the iron-dependent dioxygenases family of enzymes and studying the DNA repair reaction modulated by these enzymes in relation to cancer. This Lab is working in increasing efficacy of DNA alkylating cancer drugs. This lab is also working on low-cost assay development suitable for point-of-care diagnostic device which will be helpful in detection of cancer.



### **Molecular Biophysics Laboratory**

This Lab studies on the CPS translocation mechanism in *E. coli*. by employing computational and NMR methods. Transition state structures have a key role in protein folding and assembly pathways. This Lab will determine the transition states of smaller proteins such as the B1 domain of streptococcal protein G (GB1/protein G) and acyl-coenzyme A binding protein (ACBP). Nucleic acids...protein interaction has an important role in regulating biological functions. This Lab applies NMR and molecular dynamics simulation methods to understand nucleic acids protein interaction in *Saccharomyces cerevisiae*.

### **Circadian Rhythms and Disease Biology Laboratory**

Circadian clocks have extensive impacts on human health as they play a central role in coordinating daily physiological and behavioral processes This lab focuses on disease-clock biology, sleep, and circadian medicine using cutting-edge multi-omics approaches and their underlying mechanisms. This research group is intending to decipher how circadian clocks regulate innate and adaptive immune functions, and thereby the host responses towards infectious organisms (such as *Plasmodium*). This lab is also investigating how targeting clock components could be used to prevent or treat chronic diseases such as cancers.

### **Chromosome Dynamics and Gene Regulation Laboratory**

The lab focus on studying the functions of chromatin remodelers during meiotic chromosome segregation, understanding the single-molecule dynamics of the mitotic kinases such as aurora kinases, cyclin-dependent kinase 1, polo kinases, checkpoint regulators etc. during mitosis, exploring the mechanism of epigenetic transcription memory/mitotic bookmarking and understanding how the mitotic to meiotic transition is achieved at the level of 3D genome organization, kinetochore composition and transcriptome which helps towards developing therapeutics to treat infertility, genetic disorders and cancers.

### **Protein Interaction Analysis Laboratory**

The lab studies DNA-protein and protein-protein interactions that occur during innate immune response to cancer and viral infection. In particular, we are interested in understanding how the information regarding the presence of a foreign material in the cytoplasm is passed on to the nucleus. The nucleic acids of pathogens as well as those that are tumor-derived, are potent initiators of innate immune response. A great deal of information is known regarding the cytoplasmic proteins that recognize out-of-place nucleic acids and initiate signaling. However, as the understanding of a system increases, it seems to pose more questions than answers, because the number of dots on the canvas keep increasing. Our primary focus in the lab is to understand how these dots representing the innate immune response are connected. Needless to say, innovation is the key for such an understanding.

### **Computational Genomics and Transcriptomics Laboratory**

Our lab primarily focus on implementing the computational genomics techniques to identify the genetic drivers of cancer progression and drug resistance. As we know only ~2% of the genome code for proteins and rest of the genome is called as non-coding. Despite being non-coding, it plays critical regulatory roles in cellular homeostasis. We are interested in investigating the non-coding genome and how the genomic aberrations in non-coding genome can initiate the disease. We rely on in-house and public domain computational techniques to analyse high throughput sequencing data from various platforms i.e. whole genome sequencing (WGS), RNA-seq, ChIP-seq and ATAC-seq. Ultimate goal is to identify diagnostic and prognostic markers from the non-coding genome and take it further into the clinics for precision medicine. Currently, we are focusing on glioblastoma multiform (GBM) and acute myeloid leukemia (AML).

We also work in developing of AI/ML based prediction algorithms and biological databases.

### **Bionanotechnology Laboratory**

We use computational methods blended with statistical mechanics to understand and predict the biological form and function. Our group excels in the all-atom and coarse-grained molecular dynamics simulation method and harnesses the power of high-performance supercomputers to create advances in the area of nanobiotechnology. The goal of our research group is to decipher the interaction that governs the behavior of biomolecules and led up to what we may call "Life". In this process of understanding the biomolecular form and function, we ask the question "can we create the synthetic analog of the cellular components and use them to solve real-world problems like water desalination, drug design, etc."





## BIONDUSTRY WEBINAR SERIES



**Dr. Puneeta Arora**  
(AvidInvent)



**Dr. Sebastian Raja**  
(Olympus)



**Dr. Amit Das**  
(Smart Farming  
India)



**Dr. Durairaj Remu**  
(Strand Life  
sciences)

In This webinar series , we have invited eminent scientists , founders and representatives from reputed companies with the likes of Olympus , AvidInvent , Strand life sciences , Genei labs, Amelariate Biotech, AstraZeneca, Syngene and Smart Farming India. The main aim of Bioindustry webinar series is to make students aware of how industry functions and in what different areas the research is carried out at commercial scale. The students also will get to know about the different skills required for career in research as well as industry. They will also learn different skills too which will help them in future prospects and even motivate them to think of their own start-up . This will make them understand about having responsibility and leadership and how this will benefit the mankind and nature.



**Dr. Gururaj  
Shivange**  
(Syngene)



**Dr. Rajeev Soni**  
(Genei Labs)



**Dr. Binita Tunga**  
(Amelariate  
Biotech)



**Dr. Anil Kukreja**  
(AstraZeneca)

## Testimonials



**Chittaranjan  
Sahu**

*The courses offered by the Department of Biotechnology at IIT Hyderabad were very well designed. The most recent researches in the field of Biotechnology were also included in the course curriculum which helped us to become industry-ready. Some courses particularly the computational biology courses helps me a lot in working as a software developer in Tata Consultancy Services(TCS) Digital. The faculties at IIT Hyderabad are world-class who guided and mentored me a lot during my study at IIT Hyderabad.*

**Chittaranjan Sahu**  
Software developer  
Tata Consultancy Services(TCS).



**Prathyusha  
Potharaju**

*The mode of teaching in the course work and my thesis work at the lab has moulded me to work efficiently and manage my current project easily. Working in teams for assignments and managing in house symposiums have reflected in improving my management skills. My overall experience at IITH helps me not only in my technical growth but also in building my interpersonal relationships with my team and managing my professional life.*

**Prathyusha Potharaju**  
BIRAC- SPARSH Fellowship  
(Maternal and child healthcare)  
IKP Knowledge Park,  
Hyderabad, India



**Gururaj  
Shivange**

*Biotechnology department at IIT Hyderabad is a great place to do research. Besides strong research training, we got immense exposure in setting up laboratories and smartly prioritizing the experiments to meet the deadlines of papers and funding. With young, diverse, and research-focused faculties, the department is earning unique recognition in the scientific research field and is setting up a successful example for the new institutions.*

**Dr Gururaj Shivange**  
Senior Research Scientist  
Syngene International Ltd.  
Biocon Bangalore

## **BATCH 2021-23**



### **Arpita Kannihalli**

- Graduate trainee for 6 months at the CSIR-CIMAP, Bangalore
- Research Trainee under YSL for 5 months at the Indian Institute of Technology, Roorkee
- Internships in Animal handling techniques and analytical testing



### **Manusmriti Agarwal**

- DST-SERB Junior Research Fellow at Netaji Subhas University of Technology, India Bioengineering Summer training fellowship at IISc for 2 months.
- Summer student at Neuromatch academy for 1 months.



### **Ambuj Kumar**

- Summer Research Fellowship Program at IISc Bengaluru
- SRTP 2020 Training from CSIR-NIEST, Jorhat.



### **Jas Chaudhary**

- Project trainee at UM-DAE-CEBS.



### **Aditya Subramanian**

- Student intern, Apex biotechnology training institute, Chennai.
- Student intern, Avanz Bio Private limited, Chennai



### **Deepa R**

- Research assistant at P.E.S



### **Raj Gupta**

- Project Student at DAE-ACTREC.
- Intern at Tata Memorial Hospital.





### **Keerthana V Kumar**

- Scientific Analyst at Molecular Connections Pvt.Ltd, Bangalore.
- Intern at Sangene Biotech and Research Center, Bangalore.
- Intern at Hafi Biotech and Research Center, Cochin.



### **Neeharika Singh**

- Summer Research Training Program at CSIR NEIST Jorhat Assam.
- Research trainee at Forest Research Institute, Dehradun.
- Research trainee at Artificial Insemination centre, Raghogarh.



### **Sarah Nawaz**

- Intern at National Bureau of Plant and Genetic Research.
- Intern at ICAR-Indian Agricultural Statistic Research Institute.
- Project student at Guru Gobind Singh Indraprastha University.



### **Tharunika Subramanian**

- Project trainee at IIT Kharagpur



### **Ayushi Goel**

- Project student at Rapture biotech Noida.



### **Carmel Keerthana**

- CTDt project at Anna University.
- Project at ICMR-NIRT.



### **Anoop Nair**

- Research Intern at RGCb, Trivandrum.
- Intern at Aster MIMS Hospital.

## Faculty In-Charge Placement



**Dr. Ashish Misra,**  
**Assistant Professor**  
**Email: [ashishmisra@bt.iith.ac.in](mailto:ashishmisra@bt.iith.ac.in)**

## Student Placement Coordinators



**Raj Gupta**  
**Email: [bo21mtech14007@iith.ac.in](mailto:bo21mtech14007@iith.ac.in)**  
**Contact No.: 7666455577**



**Sarah Nawaz**  
**Email: [bo21mtech11001@iith.ac.in](mailto:bo21mtech11001@iith.ac.in)**  
**Contact No.: 7291834935**