

**Department of Biotechnology, IIT Madras**  
**PhD admissions July 2022**

**List of Stream-wise Faculty names, PhD Project titles and vacancies**

**1) CB- Computational Biology Stream**

Si.No	Faculty Name	Project title(s), Number of vacancies
1	Karthik Raman	<p>1. Modelling the evolution of microbial communities (1 student) The goal of this project will be to perform in silico evolution of microbial communities to understand key trajectories of community evolution, e.g. how microbes are gained and lost, and use this understanding to engineer possible therapeutic interventions (e.g. post antibiotic treatment, etc.). A combination of network science and optimisation approaches is expected to be used in this project.</p> <p>2. Understanding environmental microbiomes (1 student) Recent consortia such as MetaSUB, MetaSEW and MetaAIR have been shedding light on the microbiome present in various public places, sewage or atmosphere, respectively. As part of this project, we will develop new algorithms to identify keystone species in these datasets, and also develop approaches to understand the structure and organisation of these microbiomes. A mixture of both machine learning approaches and network science approaches will be used.</p>
2	V S Chakravarthy	1. Large scale models of brain dynamics using networks of nonlinear oscillators (1 student)
3	Sanjib senapati	Structure-based designing of a novel class of HIV Protease drugs effective against both apo and mutant variants: A comprehensive study using Molecular Dynamics (MD) Simulations and In-vitro studies (1 Student)
4	S. Mahalingam	Breast Cancer Genomics: Comprehensive analyses of whole exome and transcriptome sequencing data to identify mutational landscape, biomarkers and drug targets for novel anti-cancer therapeutics- (1 student)
5	Athi Narayanan N	Molecular Simulations of Proteins: Function through the Lens of Folding Mechanisms, (1 student)
6	M. Hamsa Priya	1. Computational Investigation of cyclodextrin-RNA interactions for therapeutics (1 student)
7	Michael Gromiha	<p>1. Large scale analysis and development of AI based tools for identifying cancer causing mutations.(1 student)</p> <p>2. An integrative approach for understanding the structure, function and dynamics of HIV protease: applications to design novel inhibitors (1 student)</p>
8	Nirav Bhatt	<p>Topic 1: Integrated Modeling and Control of Biological Disease Networks using Omics, Literature Data, and clinical Data: The objective of this project is to develop integrated (regulator-signalling-metabolic) biological networks using omics and literature data. The integrated models will be used for developing optimal therapeutic strategies using networked control approaches (Theory/Computational). (1 student)</p> <p>Topic 2: AI-driven Approaches for De Novo Molecule Generation. In our group, we have developed a chemistry-inspired feature representation technique for property prediction. The objective of this work is to develop an AI-driven approach for generating candidate molecules for the desired application. (Theory/Computational), (1 student)</p>
9	N Manoj	Molecular evolution of membrane associated proteins (1 student)
10	Vani J	Host-pathogen interactions, (1 student)

## 2) **BS- Biological Sciences Stream**

Si.No	Faculty Name	Project title(s), Number of vacancies
1	Ninitha AJ	Role of PARP in cardiovascular disease development and treatment. (1 student)
2	Greeshma Thrivikraman	Deciphering neurovascular guidance in 3D hydrogel systems, (1 student)
3	Nathiya	Role of MEN1 in pancreatic cancer progression, (1 student)
4	Guhan Jayaraman	Recombinant Antibody Engineering (1 student)
5	Santhosh Sethuramanujam	1) Investigating the mechanisms by which neuropeptides modulate retinal circuits. (1 student) 2) Investigating the mechanisms by which diabetic retinopathy compromise retinal function. (1 student)
6	Madhulika Dixit	1) A molecular and cellular biology approach to elucidate the role of PTPN members in cardiovascular diseases (1 student) 2) 2. Biochemical and biophysical characterisation of human Protein tyrosine phosphatase-PEST (PTP-PEST). (1 student)
7	sanjib senapati	Stabilizing DNA and RNA at Room Temperature using a new class of green solvents (1 student)
8	Baskar	1) Estimating meiotic recombination rates in naturalized Arabidopsis accessions (1 student) 2) Molecular genetic characterisation of a ubiquitin ligase in Dictyostelium (1 student). 3) A study to find the role of neurotransmitters in plant movement (1 student) 4) A study on serotonin biosynthesis in the social amoebae Dictyostelium (1 student), 5) A study to find the mechanisms of bacterial volatile mediated chemotaxis in Dictyostelium (1 student)
9	S. Mahalingam	RAS effector dependent epigenetic regulation in cancer (1 student)
10	Nitish Mahapatra	Genetic and molecular bases of early myocardial infarction in Indian population (1 student)
11	N.Manoj	Biochemical and biophysical characterization of industrial enzymes (1 student)
12	Suresh Rayala	Cancer Biology (3 students)

## 3) **BE- Biological Engineering Stream**

Si.No	Faculty Name	Project title(s), Number of vacancies
1	Greeshma Thrivikraman	Topic 1. Development of tissue engineered vasculature to study age-related vascular pathologies (1 student) Topic 2. Neuroimmunomodulation-on-a-chip for infectious and inflammatory diseases (1 student)
2	Guhan Jayaraman	Metabolic and Bioprocess Engineering for conversion of lignocellulosic biomass to value-added chemicals. (1 student)
3	Smita Srivastava	To decipher the biosynthesis pathway of camptothecin in the endophyte <i>Alternaria burnsii</i> (1 student)
4	M. Hamsa Priya	Modeling of protein aggregation and phase separation (1 student)
5	G. K. Suraishkumar	Shear stress related strategies for disease management, (1 student)
6	Nirav Bhatt	Automated 3D Printed On-Demand Bio-manufacturing Processes. The objective of the project is to develop an approach for online monitoring and control of 3D printed bioreactors using low-cost NIR spectroscopy. (Nature of work: Computational/Experimental), 1 Student
7	M. S. Narayanan	Biosensor development for precise early detection of epithelial ovarian cancer. (1 student)