

TANISHK PATODI

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ABOUT

I am a Ph.D. research student with a primary interest in **computational modeling and data-driven analysis of biological systems**. My work focuses on integrating data analysis, machine-learning-based methods, and mathematical modeling to study biological systems at multiple scales. I am particularly interested in metabolic and regulatory networks, phenotypic heterogeneity, and how data-driven and mechanistic models can be combined to extract meaningful insights from complex biological datasets. My long-term goal is to develop computational frameworks that translate existing biological data into interpretable and actionable understanding.

SKILLS

Languages: MATLAB, Python, R, Perl, C, Bash

Computational Tools: RStudio, MATLAB, Visual Studio Code, Excel

Data Analysis & Statistical Methods: Transcriptomic data analysis; regression models; decision trees; statistical analysis; data visualization

Experimental Techniques: Animal tissue culture; protein biochemistry; molecular biology; microbiology; immunological assays

Professional Skills: Scientific communication; analytical thinking; problem-solving; attention to detail

RESEARCH EXPERIENCE

PhD Research Student | IISc Mathematics Initiative, IISc **IISc, Bengaluru, India**
(August’2025 – Present)

- Under the guidance of **Dr. Mohit Kumar Jolly** and **Dr. Amit Singh** – Investigating phenotypic heterogeneity and drug tolerance mechanisms in *Mycobacterium tuberculosis* using genome-scale metabolic modeling (GSMM).
- Collaborating with **Dr. Samrat Chatterjee’s group (THSTI, Faridabad)** to integrate computational predictions with experimental insights.
- Developing context-specific metabolic models by integrating bulk transcriptomic data with constraint-based frameworks to understand host-pathogen interactions.
- Implementing reaction- and gene-level perturbation analyses to explore condition-specific metabolic sensitivities.
- Building custom MATLAB pipelines using COBRA Toolbox and Gurobi for multi-seed model generation and pathway-level analysis.

Master’s Thesis | Cancer Systems Biology Lab, Bioengineering, IISc **IISc, Bengaluru, India**
(June’2023 – June’2024)

- Under the guidance of **Dr. Mohit Kumar Jolly** – Conducted meta-analysis on bulk and single-cell RNA-seq datasets. Implemented gene set enrichment analysis (ssGSEA/AUCell) scoring and utilized the Markov Affinity-based Graph Imputation of Cells (MAGIC) algorithm for imputation.
- Generated volcano plots to elucidate correlations between Hypoxia Inducible Factors and metabolism-related gene sets. (*Manuscript in preparation*)
- Engaged in simulating Boolean networks to assess the resilience of toggle switches in the presence of random networks. The next phase involves a comparative analysis with an Ordinary Differential Equations (ODE) based approach for steady-state determination, with the aim of optimizing computational efficiency.

Summer Intern | Protein Biochemistry Lab **Dr. D. Y. Patil Biotechnology and Bioinformatics Institute, Pune, India**
(July ‘2022 - September’ 2022)

- Under the guidance of Dr. Rajesh Kumar Gupta - Investigated the role of long non-coding RNAs (lncRNAs) in gene expression regulation, with emphasis on cancer biology. Additionally, delved into the intriguing interactions between plant-based lectins and lncRNAs in the context of cancer biology research.
- Proficiently executed protein purification techniques on plant-based lectins, demonstrating adeptness in experimental methodologies related to molecular biology and cellular processes.

Student Research | Stem Cell and Regeneration Lab **National Center for Cell Science, Pune, India**
(July’ 2021 - August’2021)

- Under the guidance of Dr. Amruta Naik - Gained foundational understanding of mesenchymal stem cell biology and their role in tissue repair and regenerative processes.
- Conducted extensive literature reviews on the impact of IL3 on mesenchymal stem cell.

EDUCATION

Ph.D., IISc Mathematics Initiative CGPA – 8.6	IISc, Bengaluru (August’2024 - Present)
M.tech. Integrated Biotechnology CGPA - 9.17	Dr. D. Y. Patil Biotechnology and Bioinformatics Institute, Pune, India (August’2019 - June’2024)

ACTIVITIES

Awards & Recognition <ul style="list-style-type: none">• Best Poster Award, ASM Global Research Symposium on One Health Approach to Antimicrobial Resistance, IISc, Bengaluru. (2025)• 7th Rank, 20th National Level MicrobiOlympiad, Government Institute of Science, Aurangabad (2021)
Conferences & Workshops <ul style="list-style-type: none">• Workshop on Computational Oncology, IIT Hyderabad (2024)• IBSE Computational Oncology Workshop, IIT Madras (2025)• Physics of Cells and Tissues 3.0, IISc Bengaluru (2025)• Systems Approaches to Cell Plasticity Meeting, IISc Bengaluru (2025)
Academic Service & Teaching <ul style="list-style-type: none">• Volunteer, Physics of Cells and Tissues 3.0, IISc Bengaluru (2025)• Volunteer, Systems Approaches to Cell Plasticity Meeting, IISc Bengaluru (2025)• Volunteer Instructor, Summer Training Program on Genome-Scale Metabolic Modeling for Undergraduate Students (2025)
Outreach <ul style="list-style-type: none">• Volunteer, Robin Hood Army – Community food redistribution initiatives (2023 - Present)• Volunteer, Notebook Distribution Drive, NBD, IISc (2025)