

# 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

- 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

- 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

- 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

- Volunteer, Robin Hood Army – Community food redistribution initiatives (2023 - Present)
- Volunteer, Notebook Distribution Drive, NBD, IISc (2025)