

Shaurya Goyal

Phone: +91 8454869021 | **Email:** shauryagoyal789@gmail.com

Education

IST Austria

2023 - 2024

Exchange Student Coursework in Neuroscience and Computer Science

Indian Institute of Technology (IIT), Kharagpur

2020 - 2025

Int. MSc in Economics Minor : Mathematics and Computing Micro: Artificial Intelligence CGPA: 8.3

Grade 12 (HSC): 92% Grade 10 (ICSE): 95%

Awards and Scholarships

ISTern, IST Austria Summer Program and Oead Scholarship 2023

MITACS Globalink Summer Internship [Declined] 2023

Summer Research Award, Next Gen Scientists Foundation 2022

International Research Fellowship, IIT Kharagpur Foundation 2022

Selected for PhD-level inStem workshop on Stem Cells and funded by Govt. of India 2022

Selected for PhD-level ICTP-ICTS Winter School in Sensorimotor Control 2021

IIT Kharagpur Student Excellence Award [declined for MCM] 2021

Top 5% grade across batch of 1800 students in the institute at the end of 1st year 2021

Merit-Cum-Means (MCM) Scholarship, IIT Kharagpur [full tuition + stipend] 2020-2023

Top 1% in JEE Advanced from 150,000 selected students across India 2020

Top 0.8% in JEE Mains from over 1 million students across India 2020

Selected as Times Scholar from 300,000+ students and felicitated by Vice-President of India 2019

Publication

Subbalakshmi, A.R., Sahoo, S., Manjunatha, P., **Goyal, S.**, et al. The ELF3 transcription factor is associated with an epithelial phenotype and represses epithelial-mesenchymal transition. J Biol Eng 17, 17 (2023). <https://doi.org/10.1186/s13036-023-00333-z>

Research Experience

Role of mPFC spatial coding in context association

October 2023 – Ongoing

IST Austria — Prof Jozsef Csicsvari

In-Person

- Analyzing mPFC and CA1 neural data using single cell and population methods

Place Field Remapping and Memory Stabilization

October 2022 – Ongoing

University College London — Prof Dan Bendor

In-Person/Remote

- Developed a novel bayesian decoding model to study place field remapping in sleep
- Analyzing rat CA1 data during wake and sleep to study memory stabilization in novel environments
- Spike sorting and clustering using Kilosort, KlustaKwik and Phy

Reactivation of goal locations

May – August 2023

IST Austria — Prof Jozsef Csicsvari

In-Person

- Analyzed how CA1 reactivation events code for possible goals across contexts

Neuro Inspired Reinforcement Learning

February – September 2022

Brown University — Prof Michael J Frank

Remote

- Developed an actor-critic deep reinforcement learning model motivated by striatum dopamine circuits
- Created a base deep learning architecture using CNNs and RNNs and implemented the model and A2C
- Compared performance with A2C on Atari games sparse rewards and varying reward statistics

White-Grey-Opaque Plasticity in Candida Albicans

June 2022 – October 2022

Indian Institute of Science (IISc), Bangalore — Prof Mohit Kumar Jolly

Remote

- Constructed gene network controlling white-grey-opaque plasticity in *Candida Albicans* using literature
- Using non-linear differential equations and machine learning to identify critical links controlling grey state
- Analyzed switching dynamics and multistability using bifurcations and stochastic simulations

Epithelial-Mesenchymal (EMT) Plasticity in Cancer

November 2021 – June 2022

Indian Institute of Science (IISc), Bangalore — Prof Mohit Kumar Jolly

Remote

- Examined the effect of ELF3 gene on EMT and compared the MET capacity with KLF4 and GRHL2
- Investigated the clinical outcome of ELF3 expression in ER+ breast cancer and tamoxifen resistance
- Found increased PD-L1 induced immune evasion that was driven by increasing ELF3 levels
- Used Gaussian Mixture Modelling, K-Means Clustering, UMAP, PCA, Regression and bulk & single cell RNA analysis methods like MAGIC algorithm, AUCell, Gene Set Enrichment etc

Phylogenetic Analysis of Eukaryote Evolution

April 2021 – May 2022

IIT Kharagpur — Prof Riddhiman Dhar

Remote

- Developed the analysis pipeline and used information criterion and bootstrapping for selecting best fit

Graph Fourier Transform

July – October 2021

IIT Kharagpur — Prof Sanand Athalye

Remote

- Implementations, running time comparisons and theoretical analysis of graph laplacian

Skills

Programming: Python, MATLAB, Linux (Bash), HPC (SLURM), PyTorch, C/C++

Biology (Beginner): Cell Culturing, RT-PCR, Immunocytochemistry, Gel Electrophoresis

Relevant Coursework

Brain: Neural Computation², Computational Cognitive Neuroscience², Psychology and Economics², Human Brain², Introductory Psychology, Introductory Neuroscience¹

CS: Machine Learning¹, Algorithms 1², Artificial Intelligence¹, Deep Learning²

Math: Non-Linear Dynamics², Probability, Statistics, Linear Algebra, Numerical Analysis

Bio: Systems Biology¹, Molecular and Cell Biology, Cancer¹

Other: Econometrics 1 & 2, Experimental Economics Lab, Linear Programming, Schizophrenia³

1 PhD level course, 2 Online from Stanford, MITOCW etc, 3 Coursera

Selected Projects

Simulation & Classification of Theta-Gamma Oscillations

2022

- Simulated LFP signals with multiple slow and fast components corresponding to theta-gamma frequencies
- Identified distinct phase - frequency coupled states using clustering and neural signal processing

Computational Neuroscience Mini-Projects

2022

- Analyzed epilepsy - normal EEG data, Analyzed tuning curve of visual neurons, Estimated auditory receptive field, Perceptron classification, Dimensionality reduction and decoding activity, Simulated a LIF neuron

Impact of Environment on Food Production in India

2022

- Used time series econometrics to investigate the combined effect of environmental factors on Indian agriculture

Do bike lanes increase bike commuter rates ?

2022

- Used two-stage multivariate regression and error testing to investigate the causal impact of bike lanes

Reinforcement Learning to Play Pong

2021

- Built a reinforcement learning agent that uses deep Q-learning and learns from pixel data to play Pong

Workshops / Conferences Attended

Neuromatch Conference 5.0	2022
Alzheimer's Disease (Biology, Pathology & Clinical Treatments) - IIT Kharagpur	2022
Computational Neuroscience - Neuromatch Academy	2022
Essential Stem Cell Lab Techniques - inStem and NCBS, Bangalore, India	2022
Sensorimotor Control - ICTP & ICTS	2021
Neuromatch Conference 4.0	2021
High Performance Computing and AI for Biology - IIT Kharagpur	2021

Volunteer Work

Academic Mentor, IIT Kharagpur **2022 – 2023**

- Mentored 6 students (2022) and 3 students (2023) in their 1st year to ensure they have a smooth integration to university life and assisting with academic and non-academic matters

English Mentor, IIT Kharagpur **2022**

- Guided 4 students who struggled with English to learn and get better by providing feedback and solving doubts based on weekly exercises for 1 semester

Teacher(Independent) **2020**

- Taught 2 under privileged kids in my locality of grade 5 (to grade 6) math, science and english
- Led to improved understanding and skill and their grade also improved by nearly 20 percent

Leadership / Extracurricular

- Core member of Biotechnology Reading Group and iGEM Team, IIT Kharagpur
- National level debate tournaments as a member of the Debating Society, IIT Kharagpur
- Represented institute in the Inter-IIT Scrabble Tournament
- Silver Medal in National Taekwondo Championship (2017) and 1st Dan Black Belt

Other Interests: Guitar, Hiking, Cooking, Running, Frisbee, Volleyball, Biking, Board Games, Boulderling