

pritish patil

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interests

Theoretical Neuroscience, Computational Neuroscience, Stochastic Modeling, Numerical Methods, Systems Biology, Stochastic Differential Equations, Spatial Dynamics, Applied Mathematics in Biology.

education

2012–2016	Bachelor of Science Biology Major with Mathematics Minor CGPA 6.6/8.0 (After 6 semesters)	Indian Institute of Science, Bangalore
2012	12th Grade Science Stream 79.83%	KVN Naik College, Nashik
2010	10th Grade Matriculation 86.16%	JDC Bytco High School, Nashik

major achievements

2012	Silver Medal@ International Biology Olympiad	Singapore, Singapore
2011	Silver Medal@ International Biology Olympiad	Taipei, Taiwan
2010	Silver Medal@ International Astronomy Olympiad	Crimea, Ukraine

research experience

2015	Making a realistic model CA1 Pyramidal Neuron in MOOSE (Ongoing) Guide : Dr. Upi Bhalla, NCBS, Bangalore Coming up with a distribution ion channels for the CA1 Pyramidal neurons which has realistic behavior for different morphologies. All coding in MOOSE	NCBS, Bangalore
2014	Finding network topologies which show adaptation response Guide : Dr. Sandeep Krishna, NCBS, Bangalore Modelled a general three node gene/protein network using a system of differential equations and simulated it. The aim was to find the topologies which show the adaptation response. Programming was done in C. Used variable step-size 4th order Runge-Kutta routine to solve the system of differential equations.	NCBS, Bangalore
2013	Modelling of High Energy Cosmic Ray Spectrum Guide : Prof. Mayank Vahia, TIFR, Mumbai Explored the effect of magnetic field on cosmic rays produced inside galaxies and proposed an explanation for the features seen in the cosmic ray spectrum. Tried to explain galactic X-Ray halos using these cosmic rays. Matlab and C were used.	HBCSE, Mumbai
2013	Lab techniques for isolation and purification of proteins Guide : Prof. V. Nagaraja, IISc, Bangalore Learned various lab techniques like Polyacrylamide Gel Electrophoresis, Ion-exchange Chromatography, Affinity and Immunoaffinity Chromatography, Metal Chelate Affinity Chromatography, Size-exclusion Chromatography. General techniques in microbiology were also learned.	IISc Bangalore
2012	Constraining Dark Energy Parameters using Supernova-1a data Guide : Prof H.K. Jassal, IISER Mohali Understood standard cosmology, obtained constraints on dark energy parameters of the standard model and evaluated different cosmological models by comparing with SN1a data(Union Supernova Project). Programming and analysis were done in C and MATLAB.	IISER, Mohali

- 2012 **Karyotyping for screening of chromosomal abnormalities** Genetic Health & Research Centre, Nasik
 Guide : Dr. Dnyandeo Chopade, Genetic Health & Research Centre, Nasik
 Mastered the basics of Karyotyping. Learned to make karyotypes from blood and from chorionic villi. Apprenticed for detection of defects in chromosomes in the karyotypes.
- 2011 **A stacking analysis of radio properties of photometrically selected quasars** NCRA, Pune
 Guide : Dr. Yogesh Wadadekar, NCRA, Pune
 Analysed the radio properties of 1 million quasars (all the known quasars at that time) found by SDSS photometrically. Correlated the optical data to radio data by doing statistics on radio image stacks of quasars. Programmed in Python using SciPy, NumPy, PyFITS as well as some other astronomy specific Python modules.
- 2010 **Effect of metallicity on the evolution of stellar populations** NCRA, Pune
 Guide : Dr. Yogesh Wadadekar, NCRA, Pune
 Studied the effects of changes in metallicity of a nebula upon the evolution of clusters of stars within it. Programming and analysis were done using C and shell script.
- 2009 **Study of Irregularities in the Spiral Structure of M101** HBCSE, Mumbai
 Guide : Prof. Mayank Vahia, TIFR, Mumbai
 Analysed the spiral structure of M101 Pinwheel galaxy, examined the irregularities and proposed explanations for them. Analysis was done in MATLAB.

course projects

- 2015 **Analysis of dendritic transmission using synaptic input and somatic output spike trains** Theoretical and Computational Neuroscience
 Prof. Rishikesh Narayanan and Prof. SP Arun, IISc Bangalore
 Using a realistic detailed neuronal model, studied dendritic transmission and computation. Using only poisson input and corresponding output spike trains, calculated time for dendritic transmission, and after correcting for this delay, analyzed how synaptic processing.
- 2014 **Spatial Dynamics of Sympatric Speciation** Theoretical and Mathematical Ecology
 Prof. Vishvesha Guttal, IISc Bangalore
 Studied spatial dynamics of sympatric speciation due to disruptive selection.
- 2014 **Leeches: Animal movements and random walks** Experiment in Ecology
 Dr. Farah Ishtiaq, IISc Bangalore
 Explored how the leeches could be locating their prey in absence of stimulus. Found that the leeches perform a correlated random walk, which emulate a Levy random walk.
- 2014 **Comparing Weiner chaos decomposition and Monte Carlo methods for solving stochastic differential equations.** Introduction to Scientific Computing
 Prof. S. Raha, IISc Bangalore
 Used Weiner Chaos Decomposition and Monte Carlo method to find the solutions of a system of stochastic differential equations numerically. Compared the accuracy of and the time taken by these methods. Programming and analysis were done in MATLAB.
- 2014 **Sexual Selection with a Two Locus Model** Theoretical and Mathematical Ecology
 Prof. Vishvesha Guttal, IISc Bangalore
 Modelled the effects of sexual selection on two loci in haploid and diploid systems analytically, and in more complex cases numerically. Studied various equilibria of the system and determined their stability. Analysed the dynamics of invasion of one genotype by another. Programming and analysis were done in MATLAB.

programming and computers

Common programming

C, R, Python, MATLAB, \LaTeX , shell/bash, linux.

Neuroscience related

MOOSE, NEURON, BRIAN

relevant courses [grad level]

biology

- Topics in Systems Neuroscience
- Theoretical and Computational Neuroscience
- Theoretical and Mathematical Ecology
- Spatial Dynamics in Biology
- Cellular Neurophysiology
- Fundamentals of Systems and Cognitive Neuroscience
- Fundamentals of Molecular and Cellular Neuroscience

mathematics

- Stochastic Processes [martingales and brownian motion]
- Probability Theory [measure theoretic]
- Measure theory
- Algebra
- Topology
- Linear Algebra
- Real Analysis

engineering

- Information Theory

relevant introductory courses

- Physics (3 courses)
- Chemistry (3 courses)
- Mathematics (3 courses)
- Biology (3 courses)

relevant courses [undergrad level]

biology

- Introductory Structural Biology
- General Biochemistry
- Introductory Physiology
- Developmental Biology

mathematics

- Multivariable Calculus and Complex Variables
- Elementary Algebra and Number Theory
- Probability and Statistics

engineering

- Introduction to Scientific Computing
- Algorithms and Programming
- Introduction to Electrical and Electronics Engineering
- Introduction to Material Sciences
- Introduction to Environmental Sciences

laboratory courses

- Experiments in Biochemistry and Physiology
- Experiments in Microbiology and Ecology
- Experiments in Molecular Biophysics
- Experiments in Neurobiology

other notable achievements

2011	Selected as a member of Indian team for International Earth Science Olympiad	Modena, Italy
	One of top 4 from India to get selected.	
2011 – 2014	Recipient of KVPY (Kishore Vaigyanik Protsahan Yojana) Scholarship	
	Awarded to the top 200 science students from India each year.	
2009 – 2011	Recipient of NTSE (National Talent Search Exam) Scholarship	
	Awarded to the top 1000 students from India each year.	
2013	Regionals of ACM International Collegiate Programming Contest	Amrita University Coimbatore
	One of the top 389 teams selected from across the country	
2013	Won MIMAMSA, a national inter-college science quiz	IISER, Pune
	Qualified for the final quiz from amongst more than 100 teams and WON the 14 hours long quiz.	
2010	The C.L. Bhat Memorial Award for the Best Student	Indian Astronomy Olympiad Camp
	Awarded to the best overall performer in the Indian Astronomy Olympiad Camp	
2010-2012	INFOSYS Award for Olympiad Medalists	
	Awarded to all the Olympiad medallists every year.	
2010	Rural Electrification Corp. Award for Olympiad Medalists	
	Awarded to all the International Olympiad from India.	
2011–2012	Orientation Cum Selection Camp of Indian National Biology Olympiad	HBCSE, Mumbai
	In top 35 selected from ≈6000 from across the country	
2010	Orientation Cum Selection Camp of Indian Junior Science Olympiad	HBCSE, Mumbai
	In top 35 selected from ≈10000 from across the country	
2009–2011	Orientation Cum Selection Camp of Indian Astronomy Olympiad	HBCSE, Mumbai
	In top 35 selected from ≈6000 from across the country	

2011	Selected for Indian National Mathematics Olympiad In top 250 selected from more than 10000 from across the country
2009–2012	Selected for Indian National Olympiad in Informatics In top 250 selected from across the country
2007–2010	Australian National Chemistry Quiz Certificate Of Excellence with Plaque / High Distinction (One from top 7-8 from India every year)

camps attended

2015	Computational Approaches to Memory and Plasticity 16-day summer school on the theory and simulation of learning, memory and plasticity in the brain.	NCBS, Bangalore
2014	Physics of Life, NCBS-Simons Annual Monsoon School Topics included: biophysics and soft-matter physics, ranging from aspects molecules to those of cells and tissues; information processing and decision making, at the level of cells or of the brain; stochastic processes in molecules or populations; dynamical systems models of genetic networks or biomechanical systems.	NCBS, Bangalore
2012 2013	NIUS Astronomy Nurture Camp Worked on various astronomical projects listed above.	HBCSE Mumbai
2011, 2012	Vijyoshi Camp Similar to Lindau Meet with Noble Laureates for students. For top ≈600 science students across India	IISc, Bangalore
2011, 2012	Biology Olympiad Pre-Departure Training Camp Had training session in theoretical and practical aspects of biology as preparation for the IBO.	HBCSE Mumbai
2011, 2012	Biology Olympiad Orientation Cum Selection Camp Lectures and practical training by various faculty. Selection exam in both theory and practicals.	HBCSE Mumbai
2011	Earth Science Olympiad Orientation Cum Selection Camp Lectures and practical training by various faculty. Selection exam in both theory and practicals.	University of Hyderabad
2010	Astronomy Olympiad Pre-Departure Training Camp Had training session in theoretical and practical aspects of astronomy as preparation for the IAO.	HBCSE Mumbai
2009, 2010	NIUS Astronomy Nurture Camp Worked on various astronomical projects listed above.	HBCSE Mumbai
2009, 2010	Astronomy Olympiad Orientation Cum Selection Camp Lectures and practical training by various faculty. Selection exam in both theory and practicals.	HBCSE Mumbai

extracurricular activities

2014	Programming Events Manager for Pravega, the annual college festival Reverse coding: given the executable, write the source code Online programming contest: a standard programming contest Connect the dots: a programming treasure hunt, which requires you to solve programming questions to get to the next question	IISc, Bangalore
2013–2014	Convener and founder of Scipher Scipher is a mock test for the KVPY scholarship exam. We set a model question paper and conducted the model exam across various states in India. 3,500 students took the mock exam Coordinated with 30 people for setting and designing question paper. Co-ordinated with 70 people for conduction and supervision of the examination.	Bangalore
2013	Acted in the play "Photograph 51" Character played : Francis Crick	IISc, Bangalore
2012	Acted in and gave sound effects to the play "Safar" Character played : Software engineer	Alliance Française, Bangalore
2013–2014	Active member of Samasya, IISc Math club	IISc, Bangalore
2012–2013	On the committee of Marathi Mandal Group of people in IISc following Maharashtrian traditions and ethnicity	IISc, Bangalore