pritish patil

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interests

Dynamical Systems in Biology, Modelling Biological Systems, Neuroscience, Ecology, Systems Biology, Theoretical Biology, Spatial Dynamics, Mathematical Biology, Astronomy, Numerical Methods, Algorithms, Scientific Computing

education

2012–2016 **Bachelor of Science** — Indian Institute of Science, Bangalore
Biology Major with Mathematics Minor CGPA 6.7/8.0 (After 5 semesters)

2012 **12th Grade** — KVN Naik College, Nashik
Science Stream 79.83%

2010 **10th Grade** — JDC Bytco High School, Nashik
Matriculation 86.16%

major achievements

2012 **International Biology Olympiad** — Singapore, Singapore
Silver Medal

2011 **International Biology Olympiad** — Taipei, Taiwan
Silver Medal

2010 **International Astronomy Olympiad** — Crimea, Ukraine
Silver Medal

research experience

2014 **Finding network topologies which show adaptation response** — NCBS, Bangalore
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. Used variable step-size 4th order Runge-Kutta routine to solve the system of differential equations.

2013 **Modelling of High Energy Cosmic Ray Spectrum** — HBCSE, Mumbai
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.

2013 **Lab techniques for isolation and purification of proteins** — IISc Bangalore
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.

2012 **Constraining Dark Energy Parameters using Supernova-1a data** — IISER, Mohali
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).

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.

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.

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.

course projects

2014 **Spatial Dynamics of Sympatric Speciation (Ongoing)** Theoretical and Mathematical Ecology
Prof. Vishwesha 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.

2014 **Sexual Selection with a Two Locus Model** Theoretical and Mathematical Ecology
Prof. Vishwesha 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 computers

Proficient in C, R, Python, Matlab, LaTeX, shell/bash and linux.

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.

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

- Probability Theory
- Measure theory
- Linear Algebra
- Real Analysis

engineering

- Information Theory

relevant courses (undergrad level)

biology

- Developmental Biology
- Introductory Structural Biology
- General Biochemistry
- Introductory Physiology
- Laboratory courses in Biology
  - Biochemistry and Physiology
  - Microbiology and Ecology
  - Molecular Biophysics
  - Neurobiology
  - 3 semesters of introductory lab courses

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

camps attended

2014 **Physics of Life, NCBS-Simons Annual Monsoon School** NCBS, Bangalore
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.

2012 2013 **NIUS Astronomy Nurture Camp** HBCSE Mumbai
Worked on various astronomical projects listed above.

2011, 2012 **Vijyoshi Camp** IISc, Bangalore
Similar to Lindau Meet with Noble Laureates for students. For top ≈600 science students across India

extracurricular activities

2014-2015 **Programming Events Manager for Pravega, the annual college festival** IISc, Bangalore
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

2013–2014 **Convener and founder of Scipher** Bangalore
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.

You can email me for the longer, more detailed version of my CV.