

Ashish Poonia, M.Sc.

Senior Research Fellow

Department of Mathematics

Indian Institute of Technology Guwahati

Guwahati, Assam 781039, India



apoonia@iitg.ac.in



pooniaa75@gmail.com



Google Scholar



linkedin.com/in/iamashishpoonias



iamashishpoonias.github.io

Research Interests

Broadly, my research focuses on modeling ecological and epidemiological systems using deterministic and stochastic dynamical systems, optimal control, and network theory. Currently, I am investigating how treatment coverage, adherence, switching, and resource allocation strategies influence HIV transmission dynamics, with particular emphasis on the emergence of drug resistance. As a young researcher, I aim to further strengthen my analytical skills and develop innovative modeling frameworks to inform data-driven strategies for managing medical, ecological, and environmental challenges.

Education

2020 – current



Ph.D., Indian Institute of Technology, Guwahati, Assam, India.

Thesis title: *Mathematical modelling for the community transmission of HIV: Impact of the treatment and its adherence*

2014 – 2019



Integrated M.Sc., Central University of Rajasthan, Rajasthan, India.

Major Subject: *Mathematics.*

Research Publications


Peer Reviewed Articles

- 1 A. Poonia and S. P. Chakrabarty, "Dynamics of a multi-strain HIV/AIDS epidemic model with treatment and its adherence," *The European Physical Journal Plus*, vol. 139, no. 8, p. 769, 2024. DOI: <https://doi.org/10.1140/epjp/s13360-024-05566-5>.
- 2 S. Satija, A. Saha, A. Poonia, and S. P. Chakrabarty, "Deterministic and stochastic models for Chronic Myelogenous Leukemia cellular populations in presence of immune response," *The Journal of Innovation Sciences and Sustainable Technologies*, vol. 3, no. 2, pp. 79–98, 2023. URL: https://jisst.com/article?item_id=2021001051.
- 3 A. Poonia and S. P. Chakrabarty, "Two strains and drug adherence: An HIV model in the paradigm of community transmission," *Nonlinear Dynamics*, vol. 108, no. 3, pp. 2767–2792, 2022. DOI: <https://doi.org/10.1007/s11071-022-07323-8>.
- 4 J. P. Tripathi, P. S. Mandal, A. Poonia, and V. P. Bajiya, "A widespread interaction between generalist and specialist enemies: The role of intraguild predation and Allee effect," *Applied Mathematical Modelling*, vol. 89, pp. 105–135, 2021. DOI: <https://doi.org/10.1016/j.apm.2020.06.074>.





Preprints

- 1 A. Poonia and S. P. Chakrabarty, *Strategic control of drug-resistant hiv: Multi-strain modeling with diagnosis, adherence, and treatment switching*, 2025. URL: <https://arxiv.org/pdf/2507.10625>.
- 2 A. Kumar and A. Poonia, *Dynamical analysis and optimal harvesting policy of a prey-predator model with holling type-iii functional response*, 2023. DOI: <https://doi.org/10.21203/rs.3.rs-2710709/v1>.

Projects

- 2019  **Intraguild predation with generalist predator and Allee effect in shared prey population (Master's Thesis)**
Advisor: Dr. Jai Prakash Tripathi, Assistant Professor, Central University of Rajasthan





Skills

- Coding  MATLAB, Python, Mathematica.
Utilities  L^AT_EX, MS Office.
Languages  Reading, writing and speaking competencies for English and Hindi.
Misc.  Academic research, teaching, L^AT_EX typesetting and publishing, photography.








Professional Presentations

- 2024  **HIV Community Transmission under Treatment: A Two-strain Modelling Approach.**
The International Conference on Scientific Computation and Differential Equations (SciCADE) 2024, National University of Singapore (NUS), Singapore.
- 2023  **HIV Community Transmission: A Multi-strain Modelling Approach.**
10th International Congress on Industrial and Applied Mathematics (ICIAM-2023), Waseda University, Tokyo, Japan.
-  **Community Transmission of Multiple Strains under Treatment: A Mathematical Modelling Approach.**
89th Annual Conference of Indian Mathematical Society: an International Meet (IMS-2023), Department of Mathematics, BITS-Pilani, Hyderabad Campus, Telangana, India.
- 2022  **Two Strain Dynamics of HIV Community Transmission: Competition vs Cooperation.**
International Conference on Advances in Biomathematics (ICABM-2022), Indian Society of Mathematical Modelling & Computer Simulation (ISMMACS), Amity University Uttar Pradesh, Lucknow Campus, India.
- 2021  **Dynamics of a Widespread Food Web System Consisting Intraguild Predation with Allee Effect.**
Online National Conference on Recent Trends in Mathematical Modeling and Its Applications (NCRTM-MA-2021), Department of Mathematics, ICFAI Science School, ICFAI University, Tripura, India.

Professional Developments

- 2024  **Comprehensive Data Science for Beginners.**
Online Course Organised by iHUB Divyasampark (Joint initiative of Government of India, Department of Science & Technology and IIT Roorkee) in association with Ritvij Bharat Pvt. Ltd.
- 2023  **Modelling of Complex Systems using Mathematics.**
Faculty Development Programme, Division of Mathematics, School of Advanced Sciences (SAS), Vellore Institute of Technology, Chennai, India.
-  **High-End Workshop (KARYASHALA) on Bifurcations and Chaos: Computations and Applications.**
Department of Mathematics, Indian Institute of Technology Indore, Indore, India.
-  **Scientific Computing with Python and its Applications.**
Online Course Organised by Electronics & ICT Academy at Indian Institute of Technology Guwahati in association with Ritvij Bharat Pvt. Ltd.





Professional Developments (continued)

- 2022  **Mathematical Modelling of Biosystems with Special Focus on Epidemiology.**
International Faculty Development Programme, Mizoram University, Mizoram, India.
-  **Advanced L^AT_EX.**
Faculty Development Programme, Division of Mathematics, School of Advanced Sciences (SAS),
Vellore Institute of Technology, Chennai, India.
- 2021  **Pandemic and Socio-Economic Determinants: The Uses, Mathematics and Computations behind the Modeling to Inform Decision Makers.**
Virtual International Workshop (VIW), National Institute of Technology, Uttarakhand, India.
- 2020  **Workshop on Bio-Mathematics (WoBM-2020).**
Indian Institute of Technology Patna, Patna, India.
-  **Faculty Development Programme on Biomathematics.**
Department of Mathematics, P.G.D.A.V. College, University of Delhi & Mahatma Hansraj Faculty
Development Center, Hansraj College, University of Delhi, Delhi, India.
- 2019  **Celestial Mechanics & Dynamical Astronomy (CMDA-2019).**
Department of Mathematics, Central University of Rajasthan, Rajasthan, India.
- 2016  **Short Term Training Course in Wildlife Biology: Tools and Techniques.**
Ecology and Rural Development Society & Wildlife Wing of Jodhpur Division, Rajasthan State
Forest Department, Rajasthan, India.






Relevant Courses

Calculus, Differential Equation, Real Analysis, Complex Analysis, Linear Algebra, Abstract Algebra, Numerical Analysis, Functional Analysis, Mathematical Tools & Software, Modelling & Simulation, Dynamical Systems, Statistical Methods, Probability Theory, Advanced Probability, Statistical Foundation for Data Science, Programming in C, Scientific Computing with Python and its Applications, Comprehensive Data Science for Beginners.


Achievements/Awards

- 2022 – 2024  Council of Scientific & Industrial Research (CSIR) Senior Research Fellowship (SRF).
- 2020–2021  Council of Scientific & Industrial Research (CSIR) Junior Research Fellowship (JRF).
- June, 2019  Qualified the Joint CSIR-UGC National Eligibility Test (NET) for award of Junior Research Fellowship in Mathematical Sciences (AIR-155).
- Dec, 2018  Qualified the Joint CSIR-UGC National Eligibility Test (NET) for award of Lectureship in Mathematical Sciences (AIR-82).



Teaching Assistance

- 2024, 2025  **Linear Algebra**, Coursera, Indian Institute of Technology Guwahati (as a part of Bachelor of Science (Honours) in Data Science & Artificial Intelligence).
- 2023  **Algorithmic and High Frequency Trading**, Department of Mathematics, Indian Institute of Technology Guwahati.
- 2020, 2022, 2023  **Mathematics-I (MA101)**, Department of Mathematics, Indian Institute of Technology Guwahati.
- 2022  **Mathematics-II (MA102)**, Department of Mathematics, Indian Institute of Technology Guwahati.
- 2021  **Mathematics-III (MA201)**, Department of Mathematics, Indian Institute of Technology Guwahati.



Teaching Assistance (continued)

- 2020  **Mathematical Portfolio Theory**, National Programme on Technology Enhanced Learning (NPTEL), Indian Institute of Technology Guwahati.


Leadership Positions

- 2021 – 2022  **HMC Member**, Sports Coordinator.
Disang Hostel, Indian Institute of Technology Guwahati.
- 2023 – 2024  **PhD Placement Coordinator**.
Department of Mathematics, Indian Institute of Technology Guwahati.

Reviewer

- 2023 – current  International Journal of Modelling and Simulation
- 2025 – current  Frontiers in Applied Mathematics and Statistics

Memberships

- Feb, 2024 – current  Indian Mathematical Society

References

Available on Request