

Education	<b>University of Michigan</b> <i>Ph.D. in Ecology and Evolutionary Biology</i> <i>U-M Graduate Teacher Certificate</i> <i>Complex Systems Graduate Certificate (in progress)</i> <ul style="list-style-type: none"><li>• Advisor: Dr. Luis Zaman</li></ul>	Ann Arbor, MI, USA 2021 -
	<b>Indian Institute of Science</b> <i>BS &amp; MS in Biology</i> <ul style="list-style-type: none"><li>• BS Thesis: Evolution across scales</li><li>• MS Thesis: Architecture of the genotype-phenotype map and the coevolution of complexity in host-parasite systems</li></ul>	Bangalore, KA, India 2016 - 2021
Awards	• <b>Graduate Student Instructor Award</b> , Department of Ecology and Evolutionary Biology, University of Michigan	2025
	• <b>Rackham Outstanding Graduate Student Instructor Award</b> , Rackham Graduate School, University of Michigan	2025
	• <b>Best Poster Award</b> , iSEB 2019 annual conference, JNCASR, Bangalore	2019
	• <b>Gold Medal</b> and Best Software Tool Nomination (as Team Leader), International Genetically Engineered Machine Competition (iGEM)	2018
	• <b>Gold Medal</b> and Best Hardware Nomination, International Genetically Engineered Machine Competition (iGEM)	2017
Grants & Fellowships	• <b>Block Grant</b> , Dept. of Ecology and Evolutionary Biology, University of Michigan	2022-2025
	• <b>Rackham Research Grant</b> , University of Michigan	2023
	• <b>Indian Biological Engineering Competition Grant</b> , Dept. of Biotechnology, Govt. of India	2018
	• <b>KVPY Fellowship</b> , Dept. of Science and Technology, Govt. of India	2014
	• <b>NTSE Scholarship</b> , Natl. Council. of Edu. Research & Training, Govt. of India	2012
Publications	1. <b>Kumawat, B.</b> , Lalejini, A., Acosta, M.M. and Zaman, L., 2025. Evolution takes multiple paths to evolvability when facing environmental change. <i>Proceedings of the National Academy of Sciences</i> , 122 (1), p.e2413930121. <a href="https://doi.org/10.1073/pnas.2413930121">https://doi.org/10.1073/pnas.2413930121</a>	
	2. <b>Kumawat, B.</b> and Zaman, L., 2021, July. Architecture of the Genotype-Phenotype Map and the Coevolution of Complexity. <i>Artificial Life Conference Proceedings</i> 33 (Vol. 2021, No. 1, p. 66). MIT Press. <a href="https://doi.org/10.1162/isaL_a_00386">https://doi.org/10.1162/isaL_a_00386</a>	
	3. <b>Kumawat, B.</b> and Bhat, R., 2021. An interplay of resource availability, population size and mutation rate potentiates the evolution of metabolic signaling. <i>BMC Ecology and Evolution</i> , 21, pp.1-15. <a href="https://doi.org/10.1186/s12862-021-01782-0">https://doi.org/10.1186/s12862-021-01782-0</a>	
	4. D'Costa, J., Pujar, A., <b>Kumawat, B.</b> , Venkatesh, P., Ranjith, G., Sinha, V., Dubey, A.K., Narayan, H. <i>Resistance: Tales from a Post-Antibiotic World</i> . IISc Press, 2019. ISBN-10: 8192570789. (book chapter)	

## Teaching & Mentoring

<b>CMPLXSYS 445: Entropy and Information (Graduate Level)</b> <i>Instructor of Record, University of Michigan</i>	Fall 2025
<b>EEB Abe Scholars Undergraduate Mentor</b> <i>Mentored Undergraduate student Jenny Sun during a synthetic biology project on “Op-togenetic control of phage susceptibility”</i>	Summer 2025
<b>EEB 429: Introduction to Statistical Model Building in R</b> <i>Graduate Student Instructor, University of Michigan</i>	Winter 2024
<b>EEB 485: Population and Community Ecology (Graduate Level)</b> <i>Graduate Student Instructor, University of Michigan</i>	Fall 2022, 2023
<b>CMPLXSYS 391: Modeling Political Processes</b> <i>Graduate Student Instructor, University of Michigan</i>	Winter 2022
<b>BIO 173: Introduction to Biology Lab</b> <i>Graduate Student Instructor, University of Michigan</i>	Fall 2021

## Meetings

### *Invited*

- Talk on “Directed evolution of evolvability for enhanced phage therapy” for MAC-EPID Symposium on climate change and health: Microbial threats and microbial solutions, University of Michigan, Ann Arbor, USA, November 2024.
- Talk on “Evolution of evolvability in a computational system” for Complex Systems Advanced Academic Workshop, Center for the Study of Complex Systems, University of Michigan, Ann Arbor, USA, November 2022.
- Talk on “PhageShift: Better phage therapeutics using synthetic biology” at Centre For BioSystems Science And Engineering Symposium, Indian Institute of Science, Bangalore, India, 2019.

### *Contributed*

- Poster on “Leveraging environmental change for directed evolution of an evolvable bacteriophage” at GRC Microbial population biology, Andover, USA, July 2025.
- Poster on “Localization on phenotypic boundaries enhances population evolvability” at EMBO Workshop on predicting evolution, Heidelberg, Germany, July 2023.
- Poster on “Localization on phenotypic boundaries enhances population evolvability” at GRC/S Molecular mechanisms in evolution, Easton, USA, June 2023.
- Talk on “Selective capture at phenotypic boundaries enhances population evolvability” at EMBL Symposium on the organism and its environment, Heidelberg, Germany, May 2023.
- Talk on the paper “Architecture of the Genotype-Phenotype Map and the Coevolution of Complexity” at ALife Conference, Prague, Czech Republic, July 2021.
- Poster on “Relatively disparate evolutionary dynamics of genomic and developmental features in unicellular and multicellular contexts” at the Indo-Swiss Meeting on evolutionary biology, CHG, Bangalore, India, December 2019.
- Poster on “Utility functions with compounding returns lead to evolution of cooperativity in Multi-Armed Bandit networks” at the Indo-Swiss Meeting on evolutionary biology, CHG, Bangalore, India, December 2019.

- Poster on “Investigating the evolution of developmental mechanisms in digital multicellular organisms” at the Indian Society of Evolutionary Biologists Conference, JNCASR, Bangalore, India, October 2019. (*best poster award*)
- International Genetically Engineered Machine Competition (iGEM) Giant Jamboree Presentation on “PhageShift” project, Boston, USA, October 2018.

#### *Summer Schools & Workshops*

- Preparing Future Faculty Seminar (4 weeks), Center for Research in Learning & Teaching, University of Michigan, Ann Arbor, USA, May 2025.
- Build-a-cell Workshop, Stanford University, Stanford, USA, May 2025.
- Complex Systems Summer School (4 weeks) at the Santa Fe Institute, Santa Fe, USA, June 2024.
- ALife Conference. Attended without contribution. Montreal, Canada, 2020.

#### **Skills**

- **Languages:** Hindi, English
- **Programming:** C, C++, Python, Rust, Mathematica, Bash, Embedded C
- **Hardware:** 3D Design, Digital Electronics, 3D Printing, CNC Milling, Laser Cutting
- **Wetlab:** Microbiology, Molecular & Synthetic Biology, Bacteriophage, Biochemistry

#### **Service**

- Early Career Scientists Symposium Committee, EEB, Univ. of Michigan 2024
- Reviewer for *Proceedings of the Royal Society B* 2024
- Feria de Ciencias Volunteer, Ann Arbor High School and SACNAS 2022
- Undergraduate synthetic biology workshop leader, Indian Institute of Science 2018

#### **Research Interests**

Evolutionary theory, computational evolution, directed evolution, synthetic biology, physics of living systems

*Last updated: June 10, 2025*