Amjad Khan

Contact:

Schulich School of Medicine & Dentistry
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Google Scholar

Education:

- **PhD** (Mathematics) **2020**
  University of Western Ontario, London, ON, Canada
  Thesis: Phage-Bacteria Interaction and Prophage Sequences in Bacterial Genomes
  Supervisor: Lindi M. Wahl

- **MSc** (Mathematics) **2015**
  McMaster University, Hamilton, ON, Canada
  Thesis: Approximations of lattice dynamics
  Supervisor: Dmitry Pelinovsky

- **MPhil** (Mathematics) **2009**
  NUST, Islamabad, Pakistan

- **BSc** (Mathematics & Computer Sciences) **2004**
  Pakistan

Employment:

- **Postdoctoral Associate** **2022 - present**
  Schulich School of Medicine & Dentistry, Western University London, Ontario

- **Postdoctoral Fellow** **2020 - 2022**
  Faculty of Computer Science, Dalhousie University, Halifax, Canada

- **Limited-Term Assistant Professor** **2021**
  Department of Mathematics and Statistics, Dalhousie University, Halifax, Canada

- **Teaching & Research Assistant** **2015 - 2020**
  Department of Applied Mathematics, University of Western Ontario (UWO), London, Canada

- **Teaching & Research Assistant** **2013 - 2015**
  Department of Mathematics & Statistics, McMaster University, Hamilton, Canada

- **Lecturer in Mathematics** **2009 - 2013**
  National University of Sciences and Technology (NUST), Islamabad, Pakistan

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Research Interests:

- Mathematical Biology, Mathematical modeling & Simulations
- Infectious diseases, Antibiotic resistance & viral evolution
- Bioinformatics
- Data Science
- Dynamical Systems & Bifurcation Analysis

Teaching Experience:

I have taught the following courses at an undergraduate level:

As a Guest Lecturer

- **Bioinformatics of Infectious Diseases** **Winter-2023**
  Schulich School of Medicine & Dentistry, Western University London, ON

As an Instructor

- **Financial Mathematics, MATH 3900 / ECON 3900** **Winter - 2021**
  Department of Mathematics and Statistics, Dalhousie University, Halifax, NS

- **Calculus II** **Winter - 2018**
  School of Applied Science and Technology, Fanshawe College, London, ON

- **Business Mathematics** **Fall - 2017**
  Lawrence Kinlin School of Business, Fanshawe College, London, ON

- **Differential Equations & Transforms** **Winter - 2013**
  NUST Institute of Civil Engineering, NUST, Islamabad, Pakistan

- **Numerical Methods** **Fall - 2012**
  NUST Institute of Civil Engineering, NUST, Islamabad, Pakistan

- **Calculus and Analytical Geometry** **Winter - 2012**
  NUST Institute of Civil Engineering, NUST, Islamabad, Pakistan

- **Probability & Statistics** **Fall - 2011**
  NUST Institute of Civil Engineering, NUST, Islamabad, Pakistan

- **Calculus & Analytical Geometry** **Winter - 2011**
  NUST Institute of Civil Engineering, NUST, Islamabad, Pakistan

- **Calculus & Analytical Geometry** **Fall - 2010**
  NUST Institute of Civil Engineering, NUST, Islamabad, Pakistan

- **Differential Equations & Transforms** **Winter - 2010**
  NUST Institute of Civil Engineering, NUST, Islamabad, Pakistan

- **Numerical Methods** **Fall - 2009**
  NUST Institute of Civil Engineering, NUST, Islamabad, Pakistan

As a Teaching Assistant

- **Differential Equations, Probability for Life Sciences** **Winter - 2019**
  Department of Applied Mathematics, Western University, London, ON

- **Calculus with Analysis for Statistics** **Winter - 2018**
  Department of Applied Mathematics, Western University, London, ON

- **Applied Mathematics for Engineers** **Fall - 2015, W - F - 2016 & W - F - 2017**
  Department of Applied Mathematics, Western University, London, ON

- **Introduction to Differential Equations** **Winter - 2015**
  Department of Mathematics & Statistics, McMaster University, Hamilton, ON

- **Engineering Mathematics** **Fall - 2014**
  Department of Mathematics & Statistics, McMaster University, Hamilton, ON

- **Linear Algebra** **Winter - 2014**
  Department of Mathematics & Statistics, McMaster University, Hamilton, ON

- **Linear Algebra** **Fall - 2013**
  Department of Mathematics & Statistics, McMaster University, Hamilton, ON

Supervision of Undergraduate Student:

- **Danish Zahid** Co-supervision with Dr. Art Poon **2023**
  Forging Episignatures
  Schulich School of Medicine & Dentistry, Western University London, Ontario

- **Bernie Xiong Jin** Co-supervision with Dr. Art Poon **2023**
  Comparing Intrinsic Disorder of Core and Accessory Viral Proteins
  Schulich School of Medicine & Dentistry, Western University London, Ontario

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Research Experience:

Postdoctoral Associate **2022 - present**
Schulich School of Medicine & Dentistry, Western University, London, ON, Canada
Supervisor: Dr. Art Poon
Projects:
- In-host modelling of HIV evolution
- Development, evaluation and implementation of genetic clustering meth-

ods for the surveillance of HIV outbreaks

Postdoctoral Fellow **2020 - 2022**
Faculty of Computer Science, Dalhousie University, Halifax, NS, Canada
Supervisor: Rob Beiko
Project: Antimicrobial Resistance: Emergence, Transmission, and Ecology (ARETE)

PhD Student **2015 - 2020**
Department of Mathematics, University of Western Ontario, London, ON, Canada
Supervisor: Dr. Lindi M. Wahl
Project: Phage Bacteria interaction and prophage sequences in bacterial genomes

M.Sc. Student **2013 - 2015**
Department of Mathematics & Staistics, McMaster University, Hamilton, ON, Canada
Supervisor: Dr. Dmitry Pelinovsky
Project: Approximation of lattice dynamics

Publications:

- Edward Kankaka, Andrew Redd, **Amjad Khan**, Steven Reynolds, ... Jessica Prodger, Art Poon, "Dating reservoir formation in virologically suppressed people living with HIV-1 in Rakai, Uganda." *Submitted*, 2023.

- Haley Sanderson, Kristen L. Gray, Alexander Manuele, Finlay Maguire, **Amjad Khan** ... Robert G. Beiko, "Exploring the mobilome and resistome of Enterococcus faecium in a One Health context across two continents." *Microbial Genomics*, 2022.

- **Amjad Khan**, Alita R. Burmeister and Lindi M. Wahl. Evolution along the parasitism-mutualism continuum determines the genetic repertoire of prophages. *PLoS Comput Biol*, 16(12): e1008482. (2020).

- **Amjad Khan** and Lindi M.Wahl. Quantifying the forces that maintain prophages in bacterial genomes. *Theoretical Population Biology*, 133:168-179, 2020. Fifty years of Theoretical Population Biology.

- **Amjad Khan**, Lindi M. Wahl, and Pei Yu. Phage Therapy and Antibiotics for Biofilm Eradication: A Predictive Model. In: D. Marc Kilgour, Herb Kunze, Roman Makarov, Roderick Melnik, and Xu Wang, editors, *Recent Advances in Mathematical and Statistical Methods*, volume 259, pages 375-383, 2018.

- **Amjad Khan** and Dmitry E. Pelinovsky. Long-time stability of small FPU solitary waves. *Discrete & Continuous Dynamical Systems - A*, 37(4):2065-2075, 2017.

Conferences, Poster and Presentations:

- Amjad Khan, *The mathematics of the lurker genes in the bacterial genome.*

Rose-Hulman Institute of Technology-Terre Haute, IN, July 14, 2022.

- Amjad Khan, Robert G Beiko, *A data-driven mathematical model to explore the evolutionary dynamics of conjugative transposons*. "Workshop in Mathematical and Computational Biology", Online, from 9th June 2022 to 10th June 2022.
- Amjad Khan, Robert G Beiko, *Evolutionary dynamics of Tn916 family of Integrative Conjugative Elements (ICEs)*. "Antimicrobial Resistance: Emergence, Transmission, and Ecology (ARETE) all hands meeting" May 17 - May 19 2022, Dalhousie University, Halifax, NS, Canada.

- Amjad Khan, Lindi M. Wahl and Robert G Beiko, *The role of temperate bacteriophages in the maintenance and distribution of Antibiotic Resistance Genes (ARGs)*. "Canadian Society of Applied and Industrial Mathematics (CAIMS 2021)" June 21- 24, 2021 Virtual (hosted by the University of Waterloo, Waterloo, ON, Canada).
- Amjad Khan, Robert G Beiko, *Modeling the transmission and loss of an important class of mobile genetic elements.* Virtual Society for Mathematical Biology (SMB 2021), June 13-17, SMB 2021.
- Systems Modeling in the Pharmaceutical Industry - Problem Solving Workshop. August 12 - 16, 2019, The Fields Institute, Toronto, ON, Canada
- Amjad Khan, Lindi M. Wahl, *The Evolutionary Forces Acting on Prophages: A Mathematical Study.* Annual Meeting and Conference of the Society for Mathematical Biology (SMB 2019), July 21-26, SMB 2019 Annual Meeting at Montral, Qubec, Canada
- Lindi M. Wahl, Khan A., *Blurring the Lines between Predator and Prey: The Evolution of Temperate Viruses.* Pokhara, Nepal June 28, 2019
- Amjad Khan, Lindi M. Wahl, *Mathematical Model of the Prophage Size Distribution in Bacterial Genomes*. "Canadian Society of Applied and Industrial Mathematics (CAIMS 2018)" June 4 to 7, 2018 at Ryerson University in Toronto, ON
- Amjad Khan, Lindi M. Wahl, *Population dynamics of phages and biofilm bacteria*. "The IV AMMCS International Conference" Waterloo, Ontario, Canada, August 20-25, 2017
- Amjad Khan, Dimitry Pelinovsky, *Approximations of the lattice dynamics*. April 21, 2015, Department of Mathematics and Statistics, McMaster University, Hamilton, ON.

Awards and Scholarships:

- My article with Prof. Lindi M. Wahl, "Quantifying the forces that maintain prophages in bacterial genomes," has been acknowledged as deserving of honorable mention in Theoretical Population Biology.
- Student paper prize, AMMCS International Conference, Waterloo, Ontario, Canada -August 20-25, 2017.
- Graduate Research Scholarship (2015-2019), Western University, London, Ontario, Canada

- Graduate Research Scholarship (2013- 2015), McMaster University, Hamilton, Ontario, Canada
- Scholarship for M.Phil. studies (2007- 2009), Higher Education Commission (HEC), Islamabad, Pakistan

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Services:

- I was in charge of overseeing ARETE project finances, scientific reporting, and administration during my tenure as a postdoc at Dalhousie University.
- Together with Rob Beiko and other colleagues, I organized a workshop/ARETE all-hands meeting at Dalhousie University in Halifax, Canada, from May 17–19, 2022.

Technical Skills:

Experience with computers and programming languages on Linux and windows operating systems:

- Python
- MATLAB
- TEX (LATEX)
- Maple
- Linux
- Shell Scripting

References: