AMJAD KHAN, Ph.D.

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Contact:	Medical bioinformatics @Western, Depart- ment of Pathology and Laboratory Medicine Schulich School of Medicine & Dentistry Western University, London, ON, Canada N6A 5C1	(226) 998-4114 han659@uwo.ca oogle Scholar
Research Interests:	<ul> <li>Mathematical Biology</li> <li>Viral evolution</li> <li>Bioinformatics</li> <li>Antibiotic resistance</li> <li>Genomic Data Science</li> <li>Dynamical Systems &amp; Bifurcation Analysis</li> </ul>	
Education:	• <b>PhD</b> (Applied Mathematics) Western University, London, ON, Canada Thesis: Phage-Bacteria Interaction and Prophage Genomes Supervisor: Lindi M. Wahl	<b>2020</b> Sequences in Bacterial
	• <b>MSc</b> (Mathematics) McMaster University, Hamilton, ON, Canada Thesis: Approximations of lattice dynamics Supervisor: Dmitry Pelinovsky	2015
	• <b>MPhil</b> (Mathematics) NUST, Islamabad, Pakistan	2009
	• <b>BSc</b> (Mathematics & Computer Sciences) Pakistan	2004
Employment:	• Adjunct Assistant Professor Schulich School of Medicine & Dentistry, Wester Ontario	<b>2023 - present</b> n University, London,
	• <b>Postdoctoral Associate</b> Schulich School of Medicine & Dentistry, Wester Ontario	<b>2022 - present</b> n University, London,
	• <b>Postdoctoral Fellow</b> Faculty of Computer Science, Dalhousie University	<b>2020 - 2022</b> y, 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

**Teaching** I have taught the following courses at an undergraduate level:

As a Guest Lecturer

**Experience:** 

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

## As an Instructor

- Introduction to Medical Bioinformatics (MBI 3100) Fall 2023 Schulich School of Medicine & Dentistry, Western University London, ON
- 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

Research	
Experience:	• 1
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 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 methods for the surveillance of HIV outbreaks

Postdoctoral Fellow 2020 - 2022
 Faculty of Computer Science, Dalhousie University, Halifax, NS, Canada
 Supervisor: Rob Beiko
 Project: Antimicrobial Besistance: Emergence, Transmission, and Ecol

**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." Virus Evolution, Volume 9, Issue 2, 2023, vead046, https://doi.org/10.1093/ve/vead046.
- 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 (Q4)*, 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:

<sup>•</sup> Amjad Khan, Art Poon, Battle Within: Evolutionary Dynamics of HIVThe

Without Treatment. 30th International Dynamics & Evolution of Human Viruses, German Cancer Research Center (DKFZ), Heidelberg, Germany, Apr 19 – 22, 2023 (Due to a scheduling conflict, I was unable to attend in person).

- Amjad Khan, Evolutionary dynamics of viral genomes that lurk in the prey genome: bioinformatics, modelling and simulation. Augustana Campus, University of Alberta, 4901 46 Avenue, Camrose, Alberta, Canada T4V 2R3, Apr 14, 2023.
- Amjad Khan, *The mathematics of the lurker genes in the bacterial genome*. Rose-Hulman Institute of Technology-Terre Haute, IN, (Online) 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 dynam-

AMJAD KHAN, Ph.D.

ics. April 21, 2015, Department of Mathematics and Statistics, McMaster University, Hamilton, ON.

Thesis:	<ul> <li>PhD Dissertation Phage-bacteria interaction and prophage sequences in bacterial genomes. Amjad Khan. Western University, London, Ontario, Canada, 2020.</li> <li>Master Dissertation Approximations of the lattice dynamics. Amjad Khan. McMaster University, Hamilton, Ontario, Canada, 2015.</li> </ul>	
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 Pro- teins Schulich School of Medicine & Dentistry, Western University London, Ontario	
Awards and Scholarships:	<ul> <li>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.</li> <li>Student paper prize, AMMCS International Conference, Waterloo, Ontario, Canada -August 20-25, 2017.</li> <li>Graduate Research Scholarship (2015-2019), Western University, London, Ontario, Canada</li> <li>Graduate Research Scholarship (2013- 2015), McMaster University, Hamilton, Ontario, Canada</li> <li>Scholarship for M.Phil. studies (2007- 2009), Higher Education Commission (HEC), Islamabad, Pakistan</li> </ul>	
Services:	<ul> <li>I was in charge of overseeing ARETE project finances, scientific reporting, and administration during my tenure as a postdoc at Dalhousie University.</li> <li>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.</li> </ul>	
Technical Skills:	<ul><li>Experience with computers and programming languages on Linux and windows operating systems:</li><li>Python</li><li>MATLAB</li></ul>	

- $T_EX$  (LAT<sub>E</sub>X) Maple
- Linux
- Shell Scripting