

AMJAD KHAN

Curriculum Vitae

Publications

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PERSONAL

- Surname: Khan
- First Name: Amjad
- Nationality: Canada
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RESEARCH INTERESTS

- Mathematical & Computational Biology
- Bioinformatics and Genomic Data Science
- Viral Evolution and Infectious Disease Modeling
- Dynamical Systems & Differential Equations

EDUCATION

Ph.D. in Applied Mathematics

2020 Western University, London, ON, Canada
Phage-Bacteria Interaction and Prophage Sequences in Bacterial Genomes
Supervisor: Dr. Lindi M. Wahl

M.Sc. in Mathematics

2015 McMaster University, Hamilton, ON, Canada
Thesis: Approximations of lattice dynamics
Supervisor: Dr. Dmitry Pelinovsky

M.Phil. in Mathematics

2009 NUST, Islamabad, Pakistan

B.Sc. in Mathematics and Computer Sciences

2004 Pakistan

EMPLOYMENT

Assistant Professor

2025–present Department of Mathematics and Natural Sciences (DMNS), Prince Mohammad Bin Fahd University
Al Khobar, Kingdom of Saudi Arabia

Adjunct Assistant Professor

2023–present Schulich School of Medicine & Dentistry, Western University, London, Ontario

Postdoctoral Associate

2022–2024 Schulich School of Medicine & Dentistry, Western University, London, Ontario

Postdoctoral Fellow

2020–2022 Faculty of Computer Science, Dalhousie University, Halifax, Canada

- 2021 **Limited-Term Assistant Professor**
Department of Mathematics and Statistics, Dalhousie University, Halifax, Canada
- 2015–2020 **Teaching & Research Assistant**
Department of Applied Mathematics, University of Western Ontario, London, Canada
- 2013–2015 **Teaching & Research Assistant**
Department of Mathematics & Statistics, McMaster University, Hamilton, Canada
- 2009–2013 **Lecturer in Mathematics**
National University of Sciences and Technology (NUST), Islamabad, Pakistan

TEACHING EXPERIENCE

As a Guest Lecturer

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

As an Instructor

- Fall-2025 *MATH 1423 : Calculus II and PRPM 0022: Pre-Calculus*
Department of Mathematics and Natural Sciences (DMNS), Prince Mohammad Bin Fahd University
Al Khobar, Kingdom of Saudi Arabia.
- Fall-2024 *Computer Science 2211A: Software Tools and Systems Programming*
Department of Computer Science, Western University, London, ON, Canada
- Fall-2023 *Introduction to Medical Bioinformatics (MBI 3100)*
Schulich School of Medicine & Dentistry, Western University, London, ON, Canada
- Winter-2021 *Financial Mathematics, MATH 3900 / ECON 3900*
Department of Mathematics and Statistics, Dalhousie University, Halifax, NS, Canada
- Winter-2018 *Calculus II*
School of Applied Science and Technology, Fanshawe College, London, ON, Canada
- Fall-2017 *Business Mathematics*
Lawrence Kinlin School of Business, Fanshawe College, London, ON, Canada
- Winter-2013 *Differential Equations & Transforms*
NUST Institute of Civil Engineering, NUST, Islamabad, Pakistan
- Fall-2012 *Numerical Methods*
NUST Institute of Civil Engineering, NUST, Islamabad, Pakistan
- Winter-2012 *Calculus and Analytical Geometry*
NUST Institute of Civil Engineering, NUST, Islamabad, Pakistan
- Fall-2011 *Probability & Statistics*
NUST Institute of Civil Engineering, NUST, Islamabad, Pakistan
- Winter-2011 *Calculus & Analytical Geometry*
NUST Institute of Civil Engineering, NUST, Islamabad, Pakistan

- Fall-2010 *Calculus & Analytical Geometry*
NUST Institute of Civil Engineering, NUST, Islamabad, Pakistan
- Winter-2010 *Differential Equations & Transforms*
NUST Institute of Civil Engineering, NUST, Islamabad, Pakistan
- Fall-2009 *Numerical Methods*
NUST Institute of Civil Engineering, NUST, Islamabad, Pakistan

As a Teaching Assistant

- Winter-2019 *Differential Equations, Probability for Life Sciences*
Department of Applied Mathematics, Western University, London, ON
- Winter-2018 *Calculus with Analysis for Statistics*
Department of Applied Mathematics, Western University, London, ON
- Fall-2015,
W/F 2016-
2017 *Applied Mathematics for Engineers*
Department of Applied Mathematics, Western University, London, ON
- Winter-2015 *Introduction to Differential Equations*
Department of Mathematics & Statistics, McMaster University, Hamilton, ON
- Fall-2014 *Engineering Mathematics*
Department of Mathematics & Statistics, McMaster University, Hamilton, ON
- Winter-2014 *Linear Algebra*
Department of Mathematics & Statistics, McMaster University, Hamilton, ON
- Fall-2013 *Linear Algebra*
Department of Mathematics & Statistics, McMaster University, Hamilton, ON

RESEARCH EXPERIENCE

Postdoctoral Associate

- 2022–present
Schulich School of Medicine & Dentistry, Western University, London, ON, Canada
Supervisor: Dr. Art Poon
Projects: In-host modeling of HIV evolution; Genetic clustering methods for HIV surveillance

Postdoctoral Fellow

- 2020–2022
Faculty of Computer Science, Dalhousie University, Halifax, NS, Canada
Supervisor: Dr. 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

MSc Student

- 2013–2015
Department of Mathematics & Statistics, McMaster University, Hamilton, ON, Canada
Supervisor: Dr. Dmitry Pelinovsky
Project: Approximation of lattice dynamics

DATA ANALYSIS & COMPUTATIONAL EXPERIENCE

- Analysis of large-scale viral and bacterial genomic datasets
- Bayesian inference and uncertainty quantification using STAN
- Statistical modeling and simulation for biological systems
- Python-based data processing, visualization, and reproducible workflows

PUBLICATIONS

- 2025 Edward Kankaka, ..., **Amjad Khan**, Art F. Y. Poon, Andrew Redd. “**Estimating HIV-1 Viremic Time from Reservoir Sequence Diversity with Uncertainty Quantification**,” *The Journal of Infectious Diseases*, [jiag020](#).
- 2025 Laura Muñoz-Baena ... **Amjad Khan** and Art FY Poon. “**Evolutionary fingerprinting of protein-coding genes in RNA viruses**” <https://www.biorxiv.org/content/10.64898/2025.12.05.692645v1>, Submitted to *PLoS Comput Biol*.
- 2023 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, vead046. <https://doi.org/10.1093/ve/vead046>.
- 2022 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*. <https://doi.org/10.1093/mgen/vead001>
- 2020 **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. <https://doi.org/10.1371/journal.pcbi.1008482>
- 2020 **Amjad Khan** and Lindi M. Wahl. “**Quantifying the forces that maintain prophages in bacterial genomes.**” *Theoretical Population Biology*, 133:168-179. Fifty years of Theoretical Population Biology. <https://doi.org/10.1016/j.tpb.2019.12.003>
- 2018 **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. DOI: [10.1007/978-3-319-78033-1_30](https://doi.org/10.1007/978-3-319-78033-1_30)
- 2017 **Amjad Khan** and Dmitry E. Pelinovsky. “**Long-time stability of small FPU solitary waves.**” *Discrete & Continuous Dynamical Systems - A*, 37(4):2065-2075. <https://doi.org/10.3934/dcds.2017088>

Articles under Preparation

Amjad Khan and Rob Beiko. “**Unraveling Evolutionary Dynamics of Tn916 Family of Integrative and Conjunctive Elements (ICEs): Insights from Mathematical Modeling and Bioinformatics.**” Under preparation.

Amjad Khan, Abayomi Olabode, Hugo Castelán Sánchez, Art FY Poon, and Miguel Quiñones-Mateu. “**Comparative study of the association of genetic diversity and feasibility of vaccines for viruses.**” Under preparation.

Amjad Khan and Art FY Poon. “**Mathematical Modeling of the Impact of Reverse Transcription Errors and Clonal Expansion on the HIV Latent Reservoir.**” Under preparation.

Amjad Khan and Art FY Poon. “**Evaluating Clonal Expansion of HIV-Infected Cells.**” Under preparation.

CONFERENCES, TALKS, AND PRESENTATIONS

2025 **Amjad Khan** and Art FY Poon “Are We Over Estimating The Contribution Of Clonal Expansion In Measuring HIV Latent Viral Reservoir?” Fields Workshop on Mathematical Ecology, Queen’s University, Kingston, ON, Canada (July 24-25, 2025).

2025 **Amjad Khan**, Edward N Kankaka, Jessica L Prodger, Andrew D Redd and Art FY Poon “Clonal Expansion In The Latent Reservoir: What Is The Probability That Genetically Identical Proviruses Are Clonal?” 32nd International Dynamics & Evolution of Human Viruses, May 6 -9, Abbaye de Royaumont, France.

2024 **Amjad Khan**, Art Poon, “Mathematical Modeling of the Impact of Reverse Transcription Errors and Clonal Expansion on the HIV Latent Reservoir.” 31st International Dynamics & Evolution of Human Viruses, Jun 19 – 22, Squamish, BC, Canada.

2024 **Amjad Khan**, “Exploring the world of proviruses using Bioinformatics, mathematical modelling, and simulations.” Western Bioinformatics Research Seminar Series, May 29.

2023 **Amjad Khan**, Art Poon, “Battle Within: Evolutionary Dynamics of HIV Without Treatment.” 30th International Dynamics & Evolution of Human Viruses, German Cancer Research Center (DKFZ), Heidelberg, Germany, Apr 19 – 22. (Due to a scheduling conflict, I was unable to attend in person).

2023 **Amjad Khan**, “Evolutionary dynamics of viral genomes that lurk in the prey genome: bioinformatics, modelling, and simulation.” Augustana Campus, University of Alberta, Camrose, Alberta, Canada, Apr 14.

2022 **Amjad Khan**, “The mathematics of the lurker genes in the bacterial genome.” Rose-Hulman Institute of Technology, Terre Haute, IN, (Online), Jul 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, Jun 9 – 10.

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, Dalhousie University, Halifax, NS, Canada, May 17 – 19.

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,” Dalhousie University, Halifax, NS, Canada, May 17 - May 19.

2021 **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),” Virtual (hosted by the University of Waterloo, Waterloo, ON, Canada), June 21 - June 24.

2021 **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 - June 17.

2019 **Amjad Khan**. Systems Modeling in the Pharmaceutical Industry - Problem Solving Workshop. The Fields Institute, Toronto, ON, Canada, August 12 - August 16.

2019 **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), Montreal, Quebec, Canada, July 21 - July 26.

2019 Lindi M. Wahl, **Amjad Khan**. Blurring the Lines between Predator and Prey: The Evolution of Temperate Viruses. Pokhara, Nepal, June 28.

2018 **Amjad Khan**, Lindi M. Wahl. Mathematical Model of the Prophage Size Distribution in Bacterial Genomes. “Canadian Society of Applied and Industrial Mathematics (CAIMS 2018),” Ryerson University, Toronto, ON, Canada, June 4 - June 7.

2017 **Amjad Khan**, Lindi M. Wahl. Population dynamics of phages and biofilm bacteria. “The IV AMMCS International Conference,” Waterloo, ON, Canada, August 20 - August 25.

2015 **Amjad Khan**, Dmitry Pelinovsky. Approximations of the lattice dynamics. Department of Mathematics and Statistics, McMaster University, Hamilton, ON, Canada, April 21.

THESIS

2020 PhD Dissertation: *Phage-bacteria interaction and prophage sequences in bacterial genomes*. Western University, London, Ontario, Canada.

2015 Master Dissertation: *Approximations of the lattice dynamics*. McMaster University, Hamilton, Ontario, Canada.

SUPERVISION OF UNDERGRADUATE STUDENTS

Danish Zahid

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

Bernie Xiong Jin

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

AWARDS AND SCHOLARSHIPS

2020	Honorable mention in <i>Theoretical Population Biology</i> for article with Prof. Lindi M. Wahl on prophages in bacterial genomes.
2017	Student paper prize, AMMCS International Conference, Waterloo, Ontario, Canada.
2015	Graduate Research Scholarship (2015-2019), Western University, London, Ontario, Canada
2013	Graduate Research Scholarship (2013- 2015), McMaster University, Hamilton, Ontario, Canada
2006	Scholarship for M.Phil. studies (2007- 2009), Higher Education Commission (HEC), Islamabad, Pakistan

SERVICES

- Oversaw finances, scientific reporting, and administration for ARETE project as a postdoc at Dalhousie University.
- Organized a workshop, ARETE all-hands meeting, at Dalhousie University, Halifax, Canada, May 17–19, 2022.

TECHNICAL SKILLS

- Data Analysis & Statistical Modeling:
Python (NumPy, SciPy, pandas), Bayesian inference, probabilistic modeling, uncertainty quantification
- Computational & Modeling Tools:
MATLAB, STAN, simulation-based inference, ODE-based and stochastic models
- Bioinformatics & Genomic Data Analysis:
Sequence analysis, genetic clustering, evolutionary modeling, large biological datasets
- Programming & Systems:
Linux, shell scripting, reproducible research workflows
- Scientific Computing & Documentation:
L^AT_EX, Maple

REFERENCES

Dr. Art Poon *Postdoc Supervisor*
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Schulich School of Medicine & Dentistry
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Dr. Lindi M. Wahl *Ph.D. Supervisor*
Department of Applied Mathematics
Western University, London, Ontario, Canada, N6A 5C1
Phone: (519) 661-2111
Email: lwahl@uwo.ca

Dr. Umair Rehman *Colleague*

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