

Peter C. Jentsch

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Education

- 09/2016–09/2021 **PhD, Applied Mathematics**, *University of Waterloo*, Waterloo, Canada
Dissertation: Coupled models of structured contagion processes in human-environment systems
Supervisors: Chris T. Bauch, Madhur Anand
Coursework in stochastic processes, dynamical systems, deep learning
- 09/2011–09/2016 **Honours Bachelors of Mathematics**, *University of Waterloo*, Waterloo, Canada
Coursework in dynamical systems, optimization, molecular biology

Journal Articles

- [1] Peter C Jentsch, Madhur Anand, and Chris T Bauch. Spatial correlation as an early warning signal of regime shifts in a multiplex disease-behaviour network. *Journal of Theoretical Biology*, 448:17–25, 2018.
- [2] Peter C Jentsch, Madhur Anand, and Chris T Bauch. Prioritising covid-19 vaccination in changing social and epidemiological landscapes: a mathematical modelling study. *The Lancet Infectious Diseases*, 2021.
- [3] Peter C Jentsch, Chris T Bauch, and Madhur Anand. Fire mitigates bark beetle outbreaks in serotinous forests. *Theoretical Ecology*, 2021.
- [4] Peter C Jentsch, Chris T Bauch, Denys Yemshanov, and Madhur Anand. Go big or go home: A model-based assessment of general strategies to slow the spread of forest pests via infested firewood. *PloS one*, 15(9):e0238979, 2020.
- [5] Sansao A Pedro, Frank T Ndjomatchoua, Peter Jentsch, Jean M Tchuenche, Madhur Anand, and Chris T Bauch. Conditions for a second wave of covid-19 due to interactions between disease dynamics and social processes. *Frontiers in Physics*, 8:428, 2020.

Conference Publications

- Peter C. Jentsch and Chrystopher L. Nehaniv. Exploring Tetris as a Transformation Semigroup. In: *Recent Developments in Mathematical, Statistical and Computational Methods* (D. Marc Kilgour, Herb Kunze, Roman Makarov, Roderick Melnik and Sunny Wang, eds.). Springer Proceedings in Mathematics & Statistics 343:71-80, 2021. (Accepted in 2020)

- Peter C Jentsch, Abdeslem Boukhtouta. A Simulation Study Of Military Land Equipment Availability Under Corrective And Preventive Maintenance Regimes. In ECMS 2015 (pp. 373-379).
- Abdeslem Boukhtouta, Peter C Jentsch. Support Vector Machine for Demand Forecasting of Canadian Armed Forces Spare Parts. In 2018 6th International Symposium on Computational and Business Intelligence (ISCBI) 2018 Aug 27 (pp. 59-64). IEEE.

In Prep

- Peter C. Jentsch, Calvin Sjaarda, Jennifer Guthrie, Robert A. Kozak, Chris Kandel, Prameet Seth, Allison McGeer, Samira Mubareka, Finlay Maguire. Best of a Bad Method: Optimal use of SNP distance thresholds for SARS-CoV-2 transmission clustering.
- Peter C. Jentsch, Finlay Maguire, Samira Mubareka. Large-scale mapping of antigenic relationships in Sars-CoV-2.

Experience

11/2021–present **Postdoctoral Researcher**, *Department of Mathematics, Simon Fraser University*

- Worked under the supervision of Dr. Samira Mubareka (Sunnybrook Health Sciences Centre, University of Toronto) and Dr. Finlay Maguire (Dalhousie University)
- Research project on epidemiological models incorporating large genomic datasets to study the evolution of SARS-CoV-2
- Second research project on genomic distance thresholds for identifying outbreaks from viral samples
- Contributed to bioinformatics pipelines in Bash and Python, as well as writing modelling code in Julia and Python

10/2021–present **Software Engineer (part time)**, *LiquidAnalytics*

- Prototyped algorithms and data models to rapidly process datasets, in both Julia and Rust
- Led and assisted in refactors of the webserver backend written in Rust using Actix Web
- Implemented distributed unique identifier generation in Rust

09/2016 - 09/2021 **Doctoral Researcher**, *Department of Applied Mathematics, University of Waterloo*

- Developed and presented quantitative models for understanding complex systems, from disease spread over networks to Tetris
- Implemented models and findings in Julia and Python
- Presented findings to audiences of many backgrounds, including an invited talk at JMM2020

07/2021 **Extended Problem Solving Workshop on Data Science and Analytics**, *CQAM at Fields Institute, University of Toronto*

- Funded collaboration with other researchers to extend an industry infectious disease model
- Implemented model and extensions in Julia
- Presented findings to academic audience

- 06/2018–10/2019 **Forestry Geospatial Data Analyst**, *Canadian Forest Service*
- Implemented and analysed model for human transport of invasive forest pests in Eastern Canada over network
 - Wrote and published paper on this model
- 09/2015–12/2015 **Undergraduate Research Term**, *Department Of Applied Mathematics, University Of Waterloo*
- Developed an agent based model of influenza and social dynamics on multiplex networks, implemented in Java
 - Authored an academic paper on detection of critical transitions within this model via spatial statistical indicators
- 05/2015–09/2015 **Software Developer**, *Defence Research and Development Canada*
- Developed a Java and SQL backend for a simulation of submarine interfaces in a small team
 - Implemented unsupervised learning algorithms
- 09/2014–12/2014 **Research Internship**, *Institute Of Systems Science, National University of Singapore*
- Data analysis and presentation for metro transit system
 - Collected research on technical topics for a lay audience
- 01/2014–4/2014 **Time Series Analysis/Operations Research**, *Defence Research and Development Canada*
- Applied support vector regression to sparse military part demand
 - Developed discrete event simulation in Arena for military repair processes
 - Wrote technical reports assessing efficacy of above methods compared to current approaches
- 09/2012–12/2012 **Research Assistant**, *Natural Resources Canada*
- Research comparing landcover classification capability of Sentinel 2 and Landsat with support vector machines
 - Scripting for automated download of satellite imagery

Conferences

Invited talks

- 01/2021 **Joint Mathematics Meeting 2021**, *Washington D.C.*
 Prioritizing COVID-19 Vaccination in Changing Social and Epidemiological Landscapes

Oral presentations

- 08/2022 **Pathogenomics Day**, *Sunnybrook Health Sciences Centre*
 Assessing clustering methods for rapid assessment of direct SARS-CoV-2 transmissions
- 07/2022 **CANMOD General Meeting**, *Remote*
 Characterizing evolutionary dynamics on a broader scale: a strain-space model for SARS-CoV-2
- 07/2021 **CANMOD General Meeting**, *Remote*
 Assessing clustering methods for rapid assessment of direct SARS-CoV-2 transmissions

- 02/2021 **SMB Mathematical Epidemiology, Remote**
Prioritizing COVID-19 Vaccination in Changing Social and Epidemiological Landscapes
- 08/2019 **The Vth AMMCS International Conference, Wilfred Laurier University**
Tetris As An Introduction to Krohn-Rhodes and Semigroup Theory
- 08/2019 **The Vth AMMCS International Conference, Wilfred Laurier University**
Fire Mediates Bark Beetle Outbreaks in Serotinous Forests
- Poster presentations
- 07/2019 **SMB 2019, Université de Montréal**
Fire Mediates Bark Beetle Outbreaks in Serotinous Forests
- 07/2018 **CSEE 2018, University of Guelph**
Fire Mediates Bark Beetle Outbreaks in Serotinous Forests
- 05/2017 **Interdisciplinary Conference on Resilience in Complex Natural and Human Systems, University of Waterloo**
Spatial correlation as an early warning signal of regime shifts in a multiplex disease-behaviour network (award for best student poster)

Teaching

- 09/2020 - 12/2020 **Lecturer, University of Waterloo**
Introductory Calculus for Engineering (Math 116)
- 09/2016 - 05/2021 **Teaching Assistant, University of Waterloo**
Calculus, algebra, differential equations, mathematical biology, etc

Other

Contributions to open-source projects such as the Julia language and Apache Arrow