David Wu

Curriculum Vitae

Personal Details

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Work Experience

Research Fellow March 2023 - Present

Dept. Econometrics and Business Statistics, Monash University, Full-time

Modelling the surveillance and control of hospital-acquired infections in the Victorian healthcare system using stochastic simulation and static and temporal network analysis methods. Additionally, organised seminars for the NUMBAT group, and tutored for courses in the department on reproducible data practices.

Research Assistant July 2020 - Feb 2023

Te Pūnaha Matatini / Covid Modelling Aotearoa, Casual

Development of stochastic epidemic simulations on networks in Python to assist with New Zealand Government response to COVID-19. Implementation of a novel non-Markovian event-driven simulation method for a system with over 5 million agents. Statistical analysis and reporting of stochastic realisations utilising high-performance computing.

Teaching Assistant Feb 2019 - June 2022

Dept. Engineering Science, University of Auckland, Part-time

Content development, tutoring, and administration of undergraduate laboratory sessions on numerical methods, software development practice, and computer systems in Python, MatLab, and C.

Software Engineer Jan 2018 - Nov 2018

Orion Health, Full-time

Site reliability engineering. Automated deployment and maintenance of Elasticsearch and Rhapsody (electronic health record interoperability platform) in AWS. Designed and executed migration plans for Ansible Tower and Elasticsearch instances.

Summer Student Researcher Nov 2016 - Mar 2017

Department of Computer Science, University of Auckland, Full-time

Development of computational and numerical models of a pre-biotic replication system in Python and MatLab. Analysis and exploration of system behaviours and parameters.

Education

PhD Engineering Nov 2018 - Sept 2022

Dept. Engineering Science, University of Auckland

Thesis Topic: *Computational Methods in Epidemic Simulation, Inference and Uncertainty Quantification*

Mathematical modelling of epidemics. Stochastic simulation of large, complex systems on networks. Frequentist, Bayesian, and likelihood-based (Fisherian) inference. Practical prediction methods for misspecified models in mathematical epidemiology. Model approximation approaches for inference with surrogate models.

BE(Hons) Engineering Science Class of 2017

University of Auckland

GPA: 8.55/9.00 (A/A+ average)

Thesis Topic: *Mechanistic Modelling of the Immune System's Impact on Health*

Computational and mathematical modelling methods. Development and parameterisation of mathematical and physical models. Continuum solid and fluid mechanics. Numerical computation methods. Optimisation methods and data analysis. Engineering decision making and project management.

Skills

Languages	English, Cantonese Chinese, Mandarin Chinese
Programming	Python, bash, LaTeX, MatLab, C++
Software	AWS, MS Excel, Ansible, GIMP

Papers

1. D. Wu, H. Petousis-Harris, J. Paynter, V. Suresh, O. J. Maclaren, "Likelihood-based estimation and prediction for a measles outbreak in Samoa" in Infectious Disease Modelling (doi: 10.1016/j.idm.2023.01.007)
2. Assortment of non-peer-reviewed reports for the New Zealand Government on COVID-19 in New Zealand, archived at `https://www.covid19modelling.ac.nz/reports/`

Conferences

ANZIAM	2024	Contributed talk: "Temporal trends of hospital transfer networks in Victoria for controlling the spread of antibiotic resistance"
Epidemics 9	2023	Contributed poster: "Estimation of Network Epidemic Models using Surrogate Correction"
ECMTB	2022	Contributed poster: "Sneaking non-Markovian dynamics into Gillespie's direct method for epidemic simulation"
NZWUQIP	2021	Contributed talk: "Likelihood-based estimation and prediction for misspecified epidemic models: an application to measles in Samoa"
ANZIAM	2020	Contributed talk: "Infectious disease outbreaks: inference and prediction under model misspecification and partially observed data"
MINZ	2019	Student Moderator, Challenge 4: "How can Mercury improve the generation efficiency of the Waikato hydro scheme?"
SMB	2018	Contributed talk: "A dynamical system model of host-pathogen interaction illustrates the role of the immune system in resilience to infection"

Awards and Honours

2023 — 2nd Place, UN Datathon (Down Under Data Wizards team)
A data science competition focused on progressing the UN Sustainable Development Goals, approximately 150 entries.

2020 — Prime Minister's Science Prize (Te Pūnaha Matatini COVID-19 group)
Awarded annually for a transformative scientific discovery or achievement, which has had a significant economic, health, social, and/or environmental impact on New Zealand, or internationally.

2018 — University of Auckland Doctoral Scholarship
Awarded to high-achieving doctoral candidates (GPA 8.0 or above) applying for admission to an approved doctoral program at the University of Auckland.

2015-2017 — University of Auckland Faculty of Engineering Dean's Honours List
Awarded annually to students who have demonstrated excellence in academic performance by being in the top 5% of their year of study.