

Matthew Cody Nitschke

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EDUCATION

Ph.D.	Mathematical Sciences	University of Adelaide, Australia	2022
M.Sc.	Mathematics	North Dakota State University, USA	2010
M.Sc.	Physics	University of North Dakota, USA	2005
B.Sc.	Physics and Mathematics	University of North Dakota, USA	2003

EXPERIENCE

Oct. 2023 -	Research Fellow in Eco-epidemiology, Global Ecology Lab, Flinders University, Adelaide Australia
2021 - 2023	Postdoctoral Fellow in Mathematical Biology, University of Sydney, Sydney Australia
2018 - 2021	Research Scholar in Mathematical Biology, University of Adelaide, Adelaide Australia
2016 - 2017	Teacher of Mathematics, Fyling Hall School, Robin Hoods Bay UK
2013 - 2016	Mathematics Instructor, Black Hawk College, Moline, Illinois USA
2012 - 2013	Mathematics Teaching Assistant, University of Alberta Canada
2011 - 2012	Instructor and Coordinator of Business Calculus, University of Arkansas USA
2010 - 2011	Private Mathematics Tutor, North Dakota USA
2008 - 2009	Graduate Fellow, North Dakota State University GK-12 Project, North Dakota USA
2007 - 2008	Research Assistant, North Dakota State University Center for Visual Neuroscience USA

RESEARCH INTERESTS

Mathematical Biology: modelling of evolutionary transitions in individuality, the emergence of multicellularity and human evolution using agent-based models and ordinary differential equations.

Eco-Epidemiology: modelling the spatial spread of infectious disease and its impact on populations.

PUBLICATIONS

W. Schwalm, M.C. Nitschke, and P. Reis. Generating Two Dimensional Oscillator Matrix Elements Sorted by Angular Momentum. *Journal of Physics A: Math. Gen.* **38** (28 October 2005), 9565-9573

M.C. Nitschke, A.J. Black, P. Bourrat, and P.B. Rainey. The Effect of Bottleneck Size on Evolution in Nested Darwinian Populations. *Journal of Theoretical Biology.* **561** (21 March 2023), 0022-5193

P. Bourrat, P. Takacs, G. Doucier, M.C. Nitschke, A.J. Black, K. Hammerschmidt, and P.B. Rainey. (2024) Individuality through ecology: Rethinking the evolution of complex life from an externalist perspective. *BioEssays*. Under Review.

M.C. Nitschke, V. Kumar, K.E. Milliner, K. Hawkes, and P.S. Kim. (2024) Evolution of Human Pair Bonds as a Consequence of Male-biased Mating Sex Ratios? *Theoretical Population Biology* Under Review

M.C. Nitschke, K. Hawkes, and P.S. Kim. (2024) Half as High for Twice as Long. Manuscript in preparation

M.C. Nitschke, K. Hawkes, and P.S. Kim. (2024) An Agent-Based Model of Male-biased Mating Sex Ratios. Manuscript in preparation.

M.C. Nitschke, A. Bashford, K. Beller, M.I. Bird, S.H. Fatima, B. Briffiths, J.R. Hore, S.D. Ingrey, I.J. McNiven, L. Russell, F. Saltre, S. Ulm, A.N. Williams, C. Wilson, C.J.A. Bradshaw (2024) Modelling the historic smallpox epidemic among Indigenous Australians. Manuscript in preparation.

ACADEMIC TEACHING EXPERIENCE

Instructor (tertiary)

Business Calculus	2007, 2008, 2011, 2012, 2014	Calculus III	2014, 2015
Finite Mathematics	2007, 2013, 2014, 2015, 2016	Differential Equations	2012, 2015
College Algebra	2006, 2011, 2013	Math for General Education	2015
Intermediate Algebra	2013, 2014	Basic College Mathematics	2016
Mathematics Literacy	2015, 2016	Precalculus	2014
Calculus II	2015, 2016	Linear Algebra	2010

Online Instruction

Finite Mathematics	2014, 2016
Business Calculus	2015

Tutorial Instruction

Intro to Financial Mathematics	2018, 2019, 2020, 2021
Mathematics 1A	2018, 2019
Mathematics 1B	2018
Mathematics 1M	2018
Professional Practice	2020

SELECTED PRESENTATIONS

- (Scheduled) *Investigating the Impact of Disease on Aboriginal Australia with Stochastic Multi-Patch Epidemic Models*, a talk presented at the 13th European Conference on Mathematical and Theoretical Biology (ECMTB), Toledo, Spain 22-26 July 2024.
- *Investigating the Impact of Disease on Aboriginal Australia with Stochastic Multi-Patch Epidemic Models*, a talk presented at the South Australian ANZIAM Mini-Meeting, Flinders University City Campus, Adelaide SA, Australia 14 June 2024.
- *Modelling the impact of infectious disease introduced to Australia through European contact*, a talk presented at the 60th Australia and New Zealand Industrial and Applied Mathematics (ANZIAM) Annual meeting, Hahndorf SA, Australia 11-15 February 2024.
- *Evolution of Human Pair Bonds as a Consequence of Male-Biased Mating Sex Ratios*, a talk presented at the 59th Australia and New Zealand Industrial and Applied Mathematics (ANZIAM) Annual Meeting, Cairns QLD, Australia 5-9 February 2023.
- *Evolution of Human Pair Bonds as a Consequence of Male-Biased Mating Sex Ratios*, talk presented at the 66th Annual Meeting of the Australian Mathematical Society, Australia 6-9 December 2022.
- *Evolution of Human Pair Bonds as a Consequence of Male-Biased Mating Sex Ratios?*, talk presented at the NSW End of Year Branch Meeting, Australia 30 November 2022.
- *My Maths Career*, public lecture presented at the Mega Maths Day at the University of Sydney, Australia 18 November 2022.
- *Investigating the Origins of Ancestral Grandmothering Using Agent-Based Models*, poster presented at the 12th European Conference on Mathematical and Theoretical Biology (ECMTB), Heidelberg, Germany 19-23 September 2022.
- *The Effect of Bottleneck Size on Evolution in Nested Darwinian Populations*, talk presented at the Society for Mathematical Biology Annual Meeting, e-conference 18 August 2020.
- *Evolution by Ecological Scaffolding in a Non-Synchronous Environment*, talk presented at the ANZIAM Annual Meeting, Hunter Valley, Australia 4 February 2020.
- *Stochastic Models of Multilevel Darwinian Populations*, talk presented at the 20th INFORMS Applied Probability Society Conference, Brisbane, Australia 5 July 2019.
- *Modelling the Role of the Environment in the Initial Stages of Multicellular Evolution*, talk presented at the ANZIAM Annual Meeting, Nelson, New Zealand 5 February 2019.
- *The Effect of Bottleneck Size on Evolutionary Transitions*, talk presented at the South Australia ANZIAM Mini-Meeting, Kent Town, Australia 16 November 2018.
- *Understanding the Power of Symmetry through Electric Circuit Problems*, talk presented at the 41st Illinois Mathematics Association of Community Colleges Annual Conference, Monticello Illinois, USA April 2016.
- *A Completely Solvable 3-Body Problem for the Classroom*, talk presented at the 40th Illinois Mathematics Association of Community Colleges Annual Conference, Monticello Illinois, USA April 2015.
- *Activities for the Mathematics Classroom*, demonstration presented at the 10th National Science Foundation GK-12 Annual Meeting, Washington D.C., USA March 2009.
- *A Pedestrian Study of the Roots in y of the Polynomial $p(x) = (5x^2 - 1)y^5 + 17xy^3 + 4x^2y - x^2 + 1$ as functions of x* , talk presented at the North Central Section meeting of the Mathematical Association of America, Northfield Minnesota, USA April 2005.
- *Example of a Solvable 3-body Problem* Cody Nitschke, William Schwalm, University of North Dakota, a talk presented at the University of North Dakota Graduate Scholarly Forum, Grand Forks North Dakota, USA February 2005.
- *Example of a Solvable 3-body Problem* Cody Nitschke, University of North Dakota, a talk presented at the North Central Section meeting of the Mathematical Association of America, Fargo North Dakota, USA October 2004.
- *Electric Circuits and Symmetry Reduction* Cody Nitschke, University of North Dakota, a talk presented at the North Central Section meeting of the Mathematical Association of America, Winona Minnesota, USA April 2004.
- *Metallurgic Impurities Affect Micron Slicing of Lead for Assessment of Alpha Particle Emissions in Computer Chip Manufacturing*, Cody Nitschke, Dept. of Physics, University of North Dakota, Institute for Medical Research and Occupational Health, Zagreb Croatia; a poster presented at the 48th Annual Midwest Solid State Physics Conference and Solid State Theory Symposium, Grand Forks, North Dakota, USA October 2000.

CONFERENCES ATTENDED

- (Scheduled) *13th European Conference on Mathematical and Theoretical Biology (ECMTB)*, Toledo, Spain 22-26 July 2024.
- *ANZIAM SA Mini-Meeting*, Adelaide SA, Australia 14 June 2024.
- *Disease Modelling Workshop*, Tapanappa Winery, Piccadilly SA, Australia 29-30 April, 1 May 2024.

- *Australia and New Zealand Industrial and Applied Mathematics (ANZIAM) Annual Meeting*, Hahndorf SA, Australia 11-15 February 2024.
- *Centre of Excellence for Australian Biodiversity and Heritage (CABAH) Annual Symposium*, Hobart TAS, Australia 6-10 November 2023.
- *Australia and New Zealand Industrial and Applied Mathematics (ANZIAM) Annual Meeting*, Cairns QLD, Australia 5-9 February 2023.
- *66th Annual Meeting of the Australian Mathematical Society*, Sydney, Australia, 6-9 December 2022.
- *NSW End of Year Branch Meeting*, Sydney, Australia, 30 November 2022.
- *Mega Maths Day at the University of Sydney*, Sydney, Australia, 18 November 2022.
- *12th European Conference on Mathematical and Theoretical Biology (ECMTB)*, Heidelberg, Germany 12-23 September 2022.
- *Disease and Deep Scoping Workshop*, Charles Perkins Centre, University of Sydney, 23 February 2022.
- *Australia and New Zealand Industrial and Applied Mathematics (ANZIAM) Annual Meeting*, e-conference, 6-11 February 2022.
- *Society for Mathematical Biology (SMB) Annual Meeting*, e-conference, 17-20 August 2020.
- *Australia and New Zealand Industrial and Applied Mathematics (ANZIAM) Annual Meeting*, Hunter Valley NSW, Australia 2-6 February 2020.
- *Australian Research Council Center of Excellence for Mathematical and Statistical Frontiers (ACEMS) Annual Retreat*, Adelaide SA, Australia 28 October-1 November 2019.
- *20th INFORMS Applied Probability Society Conference*, Brisbane QLD, Australia 3-5 July 2019.
- *Australia and New Zealand Industrial and Applied Mathematics (ANZIAM) Annual Meeting*, Nelson, New Zealand 3-7 February 2019.
- *Australia and New Zealand Industrial and Applied Mathematics (ANZIAM) South Australia Branch Mini-Meeting*, Kent Town SA, Australia 16 November 2018.
- *Australian Research Council Center of Excellence for Mathematical and Statistical Frontiers (ACEMS) Annual Retreat*, Torquay VIC, Australia 31 October-2 November 2018.
- *41st Illinois Mathematics Assoc. of Community Colleges Annual Conference*, Illinois, USA April 2016.
- *40th Illinois Mathematics Assoc. of Community Colleges Annual Conference*, Illinois, USA April 2015.
- *39th Illinois Mathematics Assoc. of Community Colleges Annual Conference*, Illinois, USA April 2014.

AWARDS & ACTIVITIES

Teaching Assistantship, University of North Dakota (2004)

Teaching Assistantship, North Dakota State University (2005)

Australian Research Council Grant Funded Research Scholarship, University of Adelaide (2017)

SKILLS

Experience with mathematical modelling using MatLab and Mathematica

Working knowledge of Fortran and Python

Experience using Git for code management

PROFESSIONAL SERVICE

2013 - 2016 Black Hawk College Learning Center Advisory Faculty Senate Committee

2014 - 2016 Black Hawk College Safe Zone Establishing Committee

2015 Hiring Committee, Vice President for Instruction and Student Services

ADDITIONAL TRAINING

2018 - "Approximate Bayesian Computation in Bite-sized Chunks" ACEMS Workshop

2016 - "Learner-Centered Teaching" Prof. Dev. Course

COMMUNITY OUTREACH

18 November 2022 - "Mega Maths Day" University of Sydney

10 November 2020 - "Mathscraft" Woodcroft College

23 October 2018 - "Mathscraft" LeFevre High School

10 August 2018 - "Mathscraft" Walford Anglican School for Girls

PROFESSIONAL MEMBERSHIPS

Australian Mathematical Society (AustMS)

European Society for Mathematical and Theoretical Biology (ESMTB)

REFERENCES

Andrew Black
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Pierrick Bourrat
Senior Lecturer of Philosophy
Macquarie University
Sydney, NSW 2009
+61 426 400500
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Peter Kim
Professor of Applied Mathematics
University of Sydney
Camperdown, NSW 2006
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