

Matthew Burke

Mathematics and Statistics, 612 Campus Place NW
University of Calgary, 2500 University Drive NW
Calgary, AB, Canada, T2N 1N4

Email: matthew.burke1@ucalgary.ca
Telephone: +14036049368
Website: <https://mwpb.uk>

Academic Employment

- **University of Calgary, Canada**
Postdoctoral Scholar in the Department of Mathematics and Statistics, 2017.09-Present.
Supervisor: Kristine Bauer.
- **Masaryk University, Brno, Czech Republic**
Visiting Postdoctoral Researcher in the Department of Mathematics and Statistics, 2015.10-11.

Education

- **Macquarie University, Sydney**
PhD Mathematics, 2011-2015.
Thesis: Synthetic Lie Theory.
Supervisor: Richard Garner. Co-supervisor: Dominic Verity.
- **Christ's College, University of Cambridge**
Part III Mathematics (MMath), 2010-2011.
Pass with Merit.
Part III Essay scored 95/100.
- **Christ's College, University of Cambridge**
Bachelor's Degree in Mathematics (BA), 2007-2010.
Upper Second Class Honours.
Completed seven optional computational projects all of which gained alpha quality marks.

Publications and Preprints

- The Algebroid of a Groupoid in a Tangent Category, *preprint*, 2017.11.28. Available at <https://arxiv.org/abs/1711.09328>.
- A Synthetic Version of Lie's Second Theorem, *accepted in Applied Categorical Structures pending corrections*, 2017.09.18. Available at <https://arxiv.org/abs/1605.06378>.
- Connected Lie Groupoids are Internally Connected and Integral Complete in Synthetic Differential Geometry, *Symmetry, Integrability and Geometry: Methods and Applications*, 2016.06.29. Available at <http://www.emis.de/journals/SIGMA/2017/007/>.

Teaching and Work Experience

2017.09-Present	Sessional Instructor at the University of Calgary Lectured Mathematics 249 in the Department of Mathematics and Statistics.
2016.11-2017.08	Chief Technology Officer at MathSpire Ltd. Extended existing course structure and developed new courses, interactive mathematics lessons and tests for A-level mathematics students. Used F#, C#, SQL, JavaScript, ASP.NET and the Xamarin Framework to create cross platform mobile applications, desktop applications and an integrated web API.
2016.07-08	Tutor at Debate Chamber Mathematics Summer School Guided A-level students through undergraduate level mathematics topics including Linear Algebra, Analysis, Differential Equations, Turing Machines, Infinity and Cryptography.
2016.06-2016.11	Software Developer and Content Creator at MathSpire Ltd. Created database of mathematics videos, tests and graphics using F# and SQL.
2013-2014	Tutor for Macquarie University Demonstrated solutions on the whiteboard for three undergraduate mathematics courses and provided additional individual assistance.
2012	Tutor at Macquarie University Numeracy Centre Guided and motivated first year students individually and in small groups at the drop-in centre.
2010.06	GCSE Tutor for Blue Tutors

Talks and Conferences

- Calgary Peripatetic Seminar in Logic and Category Theory, *Sites of Smooth Affine Schemes: Part III*, University of Calgary, 2017.10.13.
- Calgary Peripatetic Seminar in Logic and Category Theory, *Sites of Smooth Affine Schemes: Part II*, University of Calgary, 2017.10.06.
- Calgary Peripatetic Seminar in Logic and Category Theory, *Sites of Smooth Affine Schemes*, University of Calgary, 2017.09.22.
- Calgary Peripatetic Seminar in Logic and Category Theory, *Lie's Third Theorem using an Intuitionistic Double Negation*, University of Calgary, 2017.09.06.
- Category Theory Seminar, *Lie's Third Theorem in Synthetic Differential Geometry*, University of Cambridge, 2017.04.02.
- Calgary Mathematics Department Colloquium, *Infinitesimals in Lie Theory*, University of Calgary, 2016.10.07.
- Calgary Peripatetic Seminar in Logic and Category Theory, *Lie Theory for Categories using Infinitesimals*, University of Calgary, 2016.09.30.
- Category Theory Seminar, *A Synthetic Version of Lie's Second Theorem*, University of Cambridge, 2015.11.17.
- Seminaire de geometrie et physique mathematique, *Multi-object Lie theory using synthetic differential geometry*, Universite Paris Diderot, Paris 7, 2015.12.04.
- Algebra Seminar, *Lie's Second Theorem*, Masaryk University, Brno, 2015.11.05.
- Algebra Seminar, *Jet Part of a Category*, Masaryk University, Brno, 2015.10.28.

- Differential Geometry Seminar, *An Introduction to Synthetic Differential Geometry*, Masaryk University, Brno, 2015.10.26.
- Plenary Speaker at Eduard Čech Institute Workshop, *Synthetic Lie Theory*, Trest, Czech Republic, 2015.10.10.
- Centre of Australian Category Theory, *Jet Categories in the Cahiers Topos (2 talks)*, Macquarie University, 2015.05.13ff.
- Category Theory 2014, *Synthetic Lie Theory*, University of Cambridge, 2014.07.04.
- MCDC 2014, *A Synthetic Perspective on the Integrability of Lie Algebroids*, Macquarie University, 2014.06.19.
- Centre of Australian Category Theory, *A Synthetic Perspective on the Integrability of Lie Algebroids (3 talks)*, Macquarie University, 2014.05.21ff.
- MCDC 2013, *Cohomology from the Perspective of Restriction Categories and Atlases*, Macquarie University, 2013.07.04.
- MCDC 2012, *Applications of Logic in Differential Geometry*, Macquarie University, 2012.06.15.
- Part III talk, *Synthetic Differential Geometry*, University of Cambridge, 2011.