

Matthew Burke

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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.
Christ's College Whelan Prize in 2008 for First Class Examination Performance.
Completed seven optional computational projects all of which gained alpha quality marks.

Publications

- A Synthetic Version of Lie's Second Theorem, *Applied Categorical Structures*, 2018.02.06. Available at <https://doi.org/10.1007/s10485-018-9518-2>.
- 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

- 2017.09-2017.12 **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**

Academic Service

- 2018.01-Present **Seminar Organiser**
Peripatetic Seminar in Category Theory and Logic at the University of Calgary.
- 2018.05 **Session Chair**
Category Theory and Logic, Alberta Mathematics Dialogue 2018.
- 2017.12 **Article Referee**
Advances in Mathematics.

Professional Development

- 2018 **Mitacs Online Workshops**
Managing Project Timelines
- 2016 **University of Michigan on Coursera**
Using Python to Access Web Data
- 2016 **University of Michigan on Coursera**
Using Databases with Python

Talks and Conferences

- Calgary Peripatetic Seminar in Logic and Category Theory, *More Elements of the Theory of Quasi-categories*, University of Calgary, 2018.07.03.
- Calgary Peripatetic Seminar in Logic and Category Theory, *Elements of the Theory of Quasi-categories*, University of Calgary, 2018.06.27.
- Calgary Peripatetic Seminar in Logic and Category Theory, *A Two Dimensional Setting for the Calculus of Infinity Functors: Part II*, University of Calgary, 2018.05.14.

- Calgary Peripatetic Seminar in Logic and Category Theory, *A Two Dimensional Setting for the Calculus of Infinity Functors*, University of Calgary, 2018.04.30.
- Calgary Peripatetic Seminar in Logic and Category Theory, *Free co-completion, presheaves and sheaves*, University of Calgary, 2018.03.26.
- Calgary Peripatetic Seminar in Logic and Category Theory, *Localisation of Simplicial Presheaf Categories*, University of Calgary, 2018.02.26.
- Calgary Peripatetic Seminar in Logic and Category Theory, *The Calculus of Functors using Sheafification*, University of Calgary, 2018.01.22.
- 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.
- Seminaire de geometrie et physique mathematique, *Multi-object Lie theory using synthetic differential geometry*, Universite Paris Diderot, Paris 7, 2015.12.04.
- Category Theory Seminar, *A Synthetic Version of Lie's Second Theorem*, University of Cambridge, 2015.11.17.
- 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 Cech 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.