

MICHAEL FRANCIS

Last Update: November 2023

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Department of Mathematics

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Citizenship: Canadian

PROFESSIONAL APPOINTMENTS

Postdoctoral Fellow, University of Western Ontario 2021-present

EDUCATION

PhD Mathematics, Pennsylvania State University 2021

Advisor: Nigel Higson, External funding: NSERC PGS-D 2015-2018

Dissertation: *Groupoids and algebras of certain singular foliations with finitely many leaves*

MSc Mathematics, University of Victoria 2014

Advisors: Heath Emerson & Marcelo Laca

Thesis: *Traces, one-parameter flows and K-theory*

BSc Honours Mathematics, University of Victoria 2011

RESEARCH INTERESTS

Operator algebras, differential geometry, foliations, smooth groupoids

ORGANIZATIONAL ACTIVITIES

Co-Organizer: *51st Annual Canadian Operator Symposium*, 2023

M. Francis, A. Ghorbanpour, M. Khalkhali and X. Tang.

Supported by Fields Institute (25,000 CAD, primary proposal writer) and NSF (15,000 USD).

Co-Organizer: Geometry, Analysis & Physics Seminar 2021

University of Western Ontario, weekly

Co-Organizer: Climate and Diversity Workshop 2017

Penn State University

Organizer: von Neumann Algebra Learning Seminar 2017

Penn State University, weekly

Organizer: Student Geometric Functional Analysis Seminar 2017

Penn State University, weekly

ACCEPTED ARTICLES

Tatyana Barron and Michael Francis, *On automorphisms of complex b^k -manifolds*, to appear in Proceedings of the XL Workshop on Geometric Methods in Physics (2023)

Michael Francis, *A Dixmier-Malliavin theorem for Lie groupoids*, J. Lie Theory 32, no. 3, 879–898 (2022)

Michael Francis, Christina M. Mynhardt and Jane L. Wodlinger, *Subgraph-avoiding minimum decycling sets and k -conversion sets in graphs*, Australas. J. Combin. 74, 288–304, (2019)

PREPRINTS

Michael Francis, *On singular foliations tangent to a given hypersurface*, arXiv:2311.03940

Tatyana Barron and Michael Francis, *The Newlander-Nirenberg theorem for complex b -manifolds*, arXiv:2310.08013

Michael Francis, *H -unitality of smooth groupoid algebras*, arXiv:2307.00232

Michael Francis, *The smooth algebra of a one-dimensional singular foliation*, arXiv:2011.08422

Michael Francis, *Two topological uniqueness theorems for spaces of real numbers*, arXiv:1210.1008

PUBLICALLY AVAILABLE NOTES

Elementary number theory lecture notes (2023)

<https://publish.uwo.ca/~mfranc65/Elementary%20Number%20Theory%20Lecture%20Notes%20-%20Michael%20Francis.pdf>

Darboux's theorem and Euler-like vector fields (2018)

<https://publish.uwo.ca/~mfranc65/DarbouxEuler.pdf>

Introduction to C^ -algebra homology theories* (2018)

<https://publish.uwo.ca/~mfranc65/CstarHomology.pdf>

Linear Galois theory (2018)

<https://publish.uwo.ca/~mfranc65/LinearGaloisTheory.pdf>

A first look at geometric group theory (2017)

<https://publish.uwo.ca/~mfranc65/GeomGrpThry.pdf>

SCHOLARSHIPS AND AWARDS

PhD

NSERC Postgraduate Scholarship (PGS-D)	2015-2018
Pennsylvania State University Teaching Assistantship	2015-2021
Robert W. and Ann M. Emery Endowed Scholarship	2019-2021
Jack and Eleanor Pettit Scholarship in Science	2018-2019

Pennsylvania State University Graduate Fellowship	2015
<i>Masters</i>	
Univ. of Victoria Graduate Award	2011-2014
JJEM Graduate Award in Mathematics	2012

<i>Undergraduate</i>	
NSERC Undergraduate Student Research Award (USRA)	2010
Univ. of Victoria President's Scholarship	2009-2010
Paul Smith Memorial Prize	2008-2010
Univ. of Victoria Faculty of Science Undergraduate Research Award (SURA)	2009
Bob Harrison Memorial Scholarship	2009-2010
Stephen A. Jennings Scholarship	2009-2010
Mark E. Mooney Memorial Scholarship	2008
Greater Victoria CUPE Entrance Scholarship	2008

TEACHING

<i>Professional Development</i>		
Math Pedagogy Reading Group, biweekly (directed by J. Uren & A. Ghorbanpour)	University of Western Ontario	2022-2023
Graduate Teaching Seminar, 1 hour/week (directed by A. Zelenberg)	Penn State University	Fall 2015
Math Teaching Workshop, 3 hours/week (directed by Dr. A. Gracia-Saz)	University of Victoria, Learning and Teaching Centre	Summer 2012

<i>Instructor</i>		
Math 0110 (Calculus), 4 hrs/week	University of Western Ontario	Fall 2023
Math 2156 (Number Theory and Graph Theory), 3 hrs/week	University of Western Ontario	Spring 2023
Math 0110 (Calculus), 4 hrs/week	University of Western Ontario	Fall 2022
Calculus 1000, 4 hrs/week	University of Western Ontario	Spring 2022
Math 1228 (Discrete Math), 3 hours/week	University of Western Ontario	Fall 2021
Math 26 (Trigonometry), 3 hours/week	Penn State University	Spring 2021
Math 232 (Vector Calculus), 2 hours/week	Penn State University	Fall 2020
Math 230 (Vector Calculus), 4 hours/week	Penn State University	Fall 2020
Math 230 (Vector Calculus), 4 hours/week	Penn State University	Fall 2019
Math 230 (Vector Calculus), 8 hours/week	Penn State University	Spring 2019
Math 26 (Trigonometry), 6 hours/week	Penn State University	Fall 2018
Math 26 (Trigonometry), 3 hours/week	Penn State University	Fall 2017
Math 101 (Calculus 2), 3 hours/week	University of Victoria	Spring 2014

<i>Tutorial Instructor</i>		
Math 200 (Vector Calculus), 3 hours/week	University of Victoria	Fall 2013
Math 110 (Linear Algebra), 3 hours/week	University of Victoria	Fall 2013
Math 100 (Calculus 1), 5 hours/week	University of Victoria	Fall 2012
Math 100 (Calculus 1), 3 hours/week	University of Victoria	Fall 2011

<i>Other</i>		
Tutor	Camosun College, School of Access, MathLab	2014-2015
Tutor	University of Victoria, Math Assistance Centre	2008-2013
Grader (Calculus, Discrete Math, Galois Theory, Topology, Measure Theory)	University of Victoria	2009-2013
Tutor	University of Victoria, Resource Centre for Students with a Disability	2011-2012

TALKS

<i>The Newlander-Nirenberg theorem in b-geometry</i>		2023
Workshop on Operator Algebras and Applications: Non-Commutative Geometry, Fields Institute		
<i>The b-Newlander-Nirenberg theorem</i>		2023
Analysis Seminar, University of Western Ontario		
<i>The transverse orientation class of certain singular foliations</i>		2023
North Atlantic Noncommutative Geometry Seminar, Mathematical Institute of the Polish Academy of Sciences		
<i>Detecting the orientation class of a singular foliation</i>		2023
Topology and Geometry Seminar, University of Western Ontario		
<i>Some things never change: solving problems using invariants</i>		2023
Canadian Mathematical Society Math Camp, University of Western Ontario		
<i>On automorphisms of complex b^k-manifolds</i>		2023
XL Workshop on Geometric Methods in Physics, University of Bialystok		
<i>H-unitality of smooth groupoid algebras</i>		2023
Noncommutative Geometry Festival, Washington University in St Louis		
<i>Homological unitality of smooth groupoid algebras</i>		2023
Canadian Mathematical Society Summer Meeting, Noncommutative Geometry and Mathematical Physics, University of Ottawa		
<i>H-unitality for smooth groupoid algebras</i>		2023
Canadian Operator Symposium, University of Western Ontario		
<i>Some things never change</i>		2022
Canadian Mathematical Society Math Camp, University of Western Ontario		
<i>Jet holonomies along a singular hypersurface</i>		2022
Canadian Operator Symposium, University of Ottawa		

<i>Covering tubes of nef-foliations and vanishing cycles</i> (two-part series) Analysis Working Seminar, University of Western Ontario	2022
<i>Nef-foliations of complex surfaces</i> Analysis Working Seminar, University of Western Ontario	2022
<i>Groupoids and algebras of foliations</i> (two-part series) Geometry, Analysis & Physics Seminar, University of Western Ontario	2021
<i>On singular foliations tangent along a given hypersurface</i> C*-Seminar, Arizona State University (Zoom)	2021
<i>Tonight's entertainment: holonomy!</i> Rude Questions Seminar, Penn State University (Zoom)	2020
<i>Around the Robertson-Seymour graph minor theorem</i> Student Directed Colloquium, Penn State University	2019
<i>The Dixmier-Malliavin theorem and Lie groupoids</i> Noncommutative Geometry Seminar, Penn State University	2019
<i>Groupoids and algebras of some singular foliations of the circle</i> Noncommutative Geometry Seminar, University of Victoria	2018
<i>Cuntz's proof of Bott periodicity</i> K-Theory Learning Seminar, University of Victoria	2018
<i>Étale groupoids and Cartan subalgebras</i> Seminar on UCT and Groupoids, Penn State University	2018
<i>Groupoids and algebras of singular foliations with finitely many leaves</i> Workshop On Computability of K-Theory, Texas A&M University	2018
<i>The Fejér kernel and the Kaplansky density theorem in operator algebras</i> von Neumann Algebra Learning Seminar, Penn State University	2017
<i>The Betti numbers of a foliation</i> Student Geometric Functional Analysis Seminar, Penn State University	2017
<i>The Group von Neumann algebra and comparison</i> von Neumann Algebra Learning Seminar, Penn State University	2017
<i>Lifting projective representations</i> (two-part series) Operator Algebras and Physics Seminar, University of Victoria	2017
<i>Introduction to harmonic analysis</i> , (two-part series) Harmonic Analysis Seminar, University of Victoria	2017

<i>A first look at geometric group theory</i> Graduate Student Seminar, Penn State University	2017
<i>Lifting one-parameter automorphism groups</i> Student Geometric Functional Analysis Seminar, Penn State University	2016
<i>Morita equivalence and imprimitivity theorems</i> Student Geometric Functional Analysis Seminar, Penn State University	2015
<i>The irrational rotation algebra</i> Student Geometric Functional Analysis Seminar, Penn State University	2015
<i>Geometry and numbers</i> CMS Math Camp, University of Victoria	2013
<i>M.F. Atiyah's "K-theory" book</i> Summer Graduate Workshop in Algebraic Topology, MSRI	2013
<i>The Bargmann-Wigner theorem and Connes' cocycle lemma</i> Operator Theory Seminar, University of Victoria	2012
<i>A map on odd K-theory induced by a KMS-state</i> Operator Theory Seminar, University of Victoria	2012
<i>Sierpiński's theorem on countable metrizable spaces</i> Graduate Seminar, University of Victoria	2011
<i>Topological uniqueness of the Cantor set</i> Canadian Undergraduate Mathematics Conference, University of Waterloo	2010
OTHER CONFERENCES AND SUMMER SCHOOLS	
Workshop on Noncommutative Geometry, Free Probability Theory and Random Matrix Theory, University of Western Ontario	2022
Micro-Workshop on the Hypoelliptic Laplacian, Penn State University	2019
West Coast Operator Algebra Seminar, Seattle University	2018
Young Women in C*-Algebras & Young Mathematicians in C*-Algebras, KU Leuven	2018
Geometry and Physics XV Conference and Summer School, Penn State University	2017
Noncommutative Geometry: Index theory and its Ramifications in Geometry, Topology and Physics; State of the Art and Future Prospects, Fudan University	2017

KK-Theory, Gauge Theory and Topological Phases School, Lorentz Centre	2017
Cornell-Penn State Joint Symplectic Seminar, Penn State University	2017
Summer Graduate Workshop in Algebraic Topology, Mathematical Sciences Research Institute	2013
Spring Institute on Noncommutative Geometry and Operator Algebras: Index Theory and K-Theory, Vanderbilt University	2013
West Coast Operator Algebra Symposium, University of Oregon	2012
Summer School on Operator Algebras and Noncommutative Geometry, University of Victoria	2010
Front Propagation in Heterogeneous Media: Mathematical, Numerical and Statistical Issues in Modeling a Forest Fire Front, Banff International Research Station	2010
MITACS/GEOIDE Summer School on Mathematical and Statistical Descriptions of Forest Fire Spread: Spatial Statistics and Level Set Methods, Hinton Training Centre	2009
Workshop on Fire Spotting, Fields Institute and University of Toronto	2009