Benjamin P. Russo

Contact Information

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Oak Ridge National Laboratory
Computer Science and Mathematics Division

Education/ Employment

Postdoctoral Research Associate   Current
Oak Ridge National Laboratory - Data Analysis and Machine Learning
Assistant Professor   September 2018 - August 2021
Farmingdale State College SUNY
Visiting Assistant Professor   August 2016 - August 2018
University of Connecticut
Ph.D in Mathematics   May 2016
University of Florida, Advisor: Scott McCullough
M.S. in Mathematics   May 2012
University of Florida
B.S. in Mathematics and Physics   May 2010
University of Florida

Publications

The 3-isometric Lifting Theorem
Integral Equations and Operator Theory, Volume 84, no. 1, 69–87, with Scott McCullough
Lifting Commuting 3-Isometric Tuples
Operators and Matrices, Volume 11, no. 2, 397–433.
The Mittag Leffler Reproducing Kernel Hilbert Spaces of Entire and Analytic Functions
Journal of Mathematical Analysis and Applications, Volume 463, Issue 2, 576–592, with Joel Rosenfeld and Warren Dixon
Occupation Kernels and Densely Defined Liouville Operators for System Identification
2019 IEEE Conference on Decision and Control Proceedings, with Joel Rosenfeld, Rushikesh Kamalapurkar, and Taylor T Johnson
Motion Tomography via Occupation Kernels
Journal of Computational Dynamics , Volume 9, Issue 1, 27–45, with Rushikesh Kamalapurkar, Dongsik Chang, and Joel Rosenfeld.
Non-commutative disintegrations: existence and uniqueness in finite dimensions
Accepted in Journal of Noncommutative Geometry, with Arthur Parzygnat.
A non-commutative Bayes' Theorem
Linear Algebra and its Applications, Volume 644, 28–94, with Arthur Parzygnat.
Liouville operators over the Hardy space
Journal of Mathematical Analysis and Applications, Volume 508, Issue 2, with Joel Rosenfeld.
Spectra for Toeplitz Operators Associated with a Constrained Subalgebra
Integral Equations and Operator Theory, Volume 94, Issue 2, with Christopher Felder and Douglas Pfeffer.

In Submisssion (*indicates an arXiv link*)

Convergence of weak-SINDy Surrogate Models*
    with M. Paul Laiu
Bayesian inversion and the Tomita–Takesaki modular group*
    with Luca Giorgetti, Arthur J. Parzygnat, Alessio Ranallo
Theoretical Foundations for Higher Order Dynamic Mode Decomposition*
    with Joel Rosenfeld and Rushikesh Kamalapurkar
The Occupation Kernel Method for Nonlinear System Identification*
    with Joel Rosenfeld, Rushikesh Kamalapurkar, and Taylor T Johnson

Skills

Python – Fluent,   **MATLAB** – Intermediate,   **LaTeX** – Fluent.

Research Interests

Machine Learning for Dynamical Systems and Engineering, Functional Analysis, Operator Theory, Matrix Analysis, Applied Functional Analysis, Reproducing Kernel Hilbert Spaces, Quantum Information Theory.

Invited Talks

AMS Special Session on Operators, Function Spaces, and Models (January 2016)
    Sub-Jordan Operator Tuples
IWOTA Special Session on Multivariable Operator Theory (July 2016)
    Sub-Jordan Operator Tuples
Graduate Mathematics Association, University of Florida (February 2016)
    Dilations and Completely Positive Maps
SIGMA Seminar, University of Connecticut (October 2016)
    Dilations and Completely Positive Maps
AMS Sectional Meeting Special Session, Indiana University (April 2017)
    A Generalization of the Fock Space
AMS Special Session on Operators on Function Spaces, JMM (January 2018)
    A Generalization of the Fock Space
AMS Special Session, University of Delaware (September 2018)
    C-algebras and the Category of Stochastic Maps*
WINRS Special Session, University of Virginia (September 2018)
    Fractional Derivatives and the Segal Bargmann Space
AMS Special Session on Multivariable Operator Theory, JMM (January 2019)
    C-algebras and the Category of Stochastic Maps*
IWOTA Special Session on Free-Analysis and Free Probability (July 2019)
    C-algebras and the Category of Stochastic Maps*
AMS Special Session on Recent Progress in Operator Theory (November 2019)
    Occupation Kernels and Liouville Operators
American Control Conference Workshop (June 2020)
    Motion Tomography via Occupation Kernels
Mathematics in Compuation Seminar - ORNL (June 2021)
    Embedding Non-Linear Systems Data into a Reproducing Kernel Hilbert space
Marquette University Mathematics Colloquium (April 2022)
    System Identification Techniques

JMM Special Session on the Interplay of Matrix Analysis and Operator Theory (April 2022)
  Applications of Reproducing Kernels to Dynamical Systems in the Sciences
University of Tennessee - Analysis Seminar (May 2022)
  Spectra for Toeplitz Operators Associated with a Constrained Subalgebra
University of South Florida Mathematics Colloquium (May 2022)
  System Identification Techniques
International Symposium on Mathematical Theory of Networks and Systems (September 2022)
  Kernelized Active Subspaces
SIAM Conference on the Mathematics of Data Science (September 2022)
  Data Driven System Identification and Surrogate Modeling

Talks

Graduate Mathematics Association, University of Florida (September 2014)
  My Love/Hate Relationship with the Cantor Set
Southeastern Analysis Meeting, University of Georgia (March 2015)
  The Equivalence of Lifting and Factorization for 3-Isometric Tuples
Great Plains Operator Theory Symposium, Purdue University (May 2016)
  The Equivalence of Lifting and Factorization for 3-Isometric Tuples
Southeastern Analysis Meeting, University of South Florida (March 2016)
  Multivariate Lifting Theorems with an Application
Southeastern Analysis Meeting, University of Tennessee (March 2017)
  A Generalization of the Fock Space
Hilbert Function Spaces, Gargnano, Italy (May 2017)
  A Generalization of the Fock Space
UConn Math Club, University of Connecticut (October 2017)
  The Game of Hex
Northeastern Analysis Meeting, University of Albany (October 2017)
  A Generalization of the Fock Space
Southeastern Analysis Meeting, University of Alabama (March 2019)
  C*-algebras and the Category of Stochastic Maps
Mathematics in Compuation Seminar - ORNL (July 2021)
  Analysis of the use of System Identification Techniques to Generate Surrogate Models

Referee Activity

Operators and Matrices
Annales de l'institut Fourier
Banach Journal of Mathematical Analysis
Czechoslovak Mathematical Journal
Journal of Mathematical Analysis and Applications

Undergraduate Research Mentoring

Periodic Cycles on the Riemann Sphere under Möbius Transformations
with Anthony Ercolano

Teaching Experience

Courses taught at Farmingdale State College SUNY

MTH 107 - Introduction to Mathematical Ideas

MTH 116 - College Algebra
MTH 129 - Pre-Calculus
MTH 130 - Calculus I with Applications
MTH 150 - Calculus I
MTH 151 - Calculus II
MTH 322 - Advanced Mathematical Analysis
MTH 354 - Principles of Real Analysis
MTH 390 - Methods in Operations Research

Courses taught at University of Connecticut

MATH 1070 - Mathematics for Business and Economics
MATH 1131Q - Calculus I
MATH 2210Q - Applied Linear Algebra
MATH 2710 - Transition to Advanced Mathematics
MATH 3210 - Abstract Linear Algebra
MATH 3150 - Analysis I

Courses taught at University of Florida

Instructor
MGF 1106 - Mathematics for Liberal Arts Majors
MAC 2312 - Analytic Geometry and Calculus II
MAP 2302 - Elementary Differential Equations

AIM Instructor
MAC 1105 - Basic College Algebra

Online Instructor
MAC 1147 - Pre-Calculus and Trigonometry

Lecturer
MAC2313 - Analytic Geometry and Calculus III

Discussion Leader
MAC 1140 - Pre-calculus Algebra
MAC 1105 - Basic College Algebra
MGF 1106 - Mathematics for Liberal Arts Majors
MAC 2311 - Analytic Geometry and Calculus I
MAC 2312 - Analytic Geometry and Calculus II
MAC 2313 - Analytic Geometry and Calculus III

Course Development

Online Course Development for MAC 2313 at UF	Spring 2015 - Summer 2015
Course Development for MTH 129 at Farmingdale	Spring 2018 - 2021

Department Service

Graduate Student Mentor	Spring 2016
Graduate Mathematics Association Webmaster	Spring 2013 - Fall 2014
Graduate Analysis Seminar Organizer	Fall 2015
Teaching Help Desk	Fall 2015
Hiring Committee	Fall 2018
Hiring Committee	Fall 2019
Head of the Masters Program Development Committee	Spring 2018 - 2021

Seminar Organizer	2021
Undergraduate Seminar Organizer	2021

Grants, Awards and Recognition

Neil White Teaching Award	Spring 2016
Letter of Recognition for Excellence in Teaching	Spring 2017
Provost Professional Development Grant	Summer 2018