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Academic Positions

- September 2016 – Present: Associate Professor of Mathematics, with tenure
  Institution: The Cooper Union for the Advancement of Science and Art, New York, NY.
- September 2010 – August 2016: Assistant Professor of Mathematics, tenure-track
  Institution: The Cooper Union for the Advancement of Science and Art, New York, NY.
- September 2008 – August 2010: Visiting Assistant Professor of Mathematics
  Institution: The Cooper Union for the Advancement of Science and Art, New York, NY.

Education

- September 2002 – August 2008: Ph.D. (2008), M.S. (2006), Mathematics.
  Institution: Courant Institute of Mathematical Sciences, New York University (NYU).
  Doctoral Thesis: Self-Organization Phenomena in Networks of Pulse-Coupled Phase Oscillators.
  Advisor: Prof. Lai-Sang Young, Dynamical Systems.
- September 1998 – May 2002: BS Physics, BS Mathematics. Majors with special honors.
  Institution: The George Washington University (GWU), Washington, DC.
  Undergraduate Honors Thesis: Continued Fraction Expansions and Self-similarity of Irrational Rotations, directed by Prof. E.A. Robinson, Jr.

Principal Research Interests

- Dynamical Systems and Chaos Theory, Applied Dynamical Systems, Computational Mathematics, Applications to Mathematical Physics, Biology, Neuroscience, Machine Learning, and Pattern Recognition.

Papers

- Published

  1. M. Maama, B. Ambrosio, M.A. Aziz-Alaoui, and S. M. Mintchev. Emergent properties in a V1-inspired network of Hodgkin-Huxley neurons. *Mathematical Modeling of Natural Phenomena* **19** 3 (2024). https://doi.org/10.1051/mmnp/2024001

  2. B. Frost and S. M. Mintchev. A high-efficiency model indicating the role of inhibition in the resilience of neuronal networks to damage resulting from traumatic injury. *Journal of Computational Neuroscience* **51** 463-474 (2023). https://doi.org/10.1007/s10827-023-00860-0

  3. B. Ambrosio and S. M. Mintchev. Periodically kicked feedforward chains of simple excitable FitzHugh-Nagumo neurons. *Nonlinear Dynamics* **110** 2805-2829 (2022).

  4. B. Fernandez and S. M. Mintchev. Wave generation in unidirectional chains of idealized neural oscillators. *The Journal of Mathematical Neuroscience* **6:5** (2016).

  5. O. E. Lanford III and S. M. Mintchev. Stability of a family of traveling wave solutions in a feedforward chain of phase oscillators. *Nonlinearity* **28** 237-261 (2015).

  6. S. M. Mintchev and L.-S. Young. Self-organization in predominantly feedforward oscillator chains. *Chaos* **19** 043131 (2009).

- Preprints

  S. M. Mintchev and R. W. Smyth. —title withheld, manuscript is presently subject to double-blind peer review— *Submitted 2023.*

- Current Projects / In Preparation
  – The effects of traumatic injuries on complex neuronal networks
  – Existence of stable traveling waves in smooth systems of coupled phase oscillators.
  – Traveling waves and propagation of rhythmic dynamics in excitable extended systems.
  – Stable perfectly-transmitted signals in phase oscillator chains with instantaneous Dirac impulse coupling.
  – The applicability of return-map studies to the global stability analysis of traveling wave solutions in chains of neural oscillators.

Conference Proceedings & Extended Abstracts

- Spring 2023

  May 2023: (*with B. Ambrosio, M.A. Aziz-Alaoui, and M. Maama*) Analysis of a network of Hodgkin-Huxley excitatory and inhibitory neurons (French Regional Conference on Complex Systems (FRCCS 2023), Le Havre, FR).

Meetings & Sessions Organized

- Summer 2023

  February-June 2023: Bio Dynamics Days (BDD 2023), LMAH-Le Havre Normandie, FR (*Scientific Committee, with Y. Latushkin and A. Rangan*).

- Spring 2023

  May 2023: (*with B. Ambrosio*) Oscillation propagation in continuous and discrete-space reaction-diffusion type networks (MS160 minisymposium at SIAM Conference on Applications of Dynamical Systems (DS23), Portland, OR).

Talks & Oral Presentations

- Spring 2024

  April 3, 2024: Small-network case studies of resilience to damage from focal axonal swelling (Dynamical Systems Seminar, NYU Courant).

- Fall 2023

  September 11, 2023 (Invited): Excitation propagation in neural media: simple models, as well as some pathologies associated with axonal swelling (Dynamical Systems Seminar – Department of Mathematics and Statistics, Boston University, Boston MA).

- Spring 2023

  May 18, 2023: Complex cascades of depolarization arising from periodic stimulation of FitzHugh-Nagumo chains (MS160 at SIAM DS23, Portland, OR).

  January 12, 2023: Examples of oscillation transmission and transmutation in chains of certain idealized neurons (Seminar of the French Society for Theoretical Biology).

- Summer 2022

  June 7, 2022: An introduction to some basic principles from geometric singular perturbation theory, with applications to the FitzHugh-Nagumo model for neuronal dynamics (DS, NT & Applications, Normandie Université UNIHAVRE, Le Havre, FR).

- Fall 2018

  September 29, 2018: Periodically kicked feedforward chains of simple excitable FitzHugh-Nagumo neurons (Special Session on Stochastic Processes in Mathematical Biology – Fall Eastern Sectional Meeting of the American Mathematical Society, University of Delaware, Newark, DE).

- Spring 2018

  April 6, 2018 (Invited): A friendly introduction to slow-fast systems and their importance in mathematical neuroscience (Pi Mu Epsilon Mathematics Honor Society Lecture Series – Department of Mathematics, The George Washington University, Washington, DC).

  April 6, 2018: Signal transmission properties of unidirectional chains of phase oscillators (Applied Math Seminar – Department of Mathematics, The George Washington University, Washington, DC).

- Spring 2017

  May 22, 2017: Generation of stable traveling waves in unidirectional chains of idealized neural oscillators (MS73 at SIAM DS17, Snowbird, UT).

- Summer 2016

  June 16, 2016: Wave generation in unidirectional chains of idealized neural oscillators (Workshop Modélization – LPMA, Université Paris 7 Denis Diderot, Paris, FR).

- Spring 2016

  May 20, 2016: Robust traveling waves in chains of simple neural oscillators (BAMM! 2016 – VCU, Richmond, VA).

- Summer 2015

  June 9, 2015: Rigorous results on robust traveling waves in periodically-forced chains of simple type-I oscillators (1^{st} ICMNS – Antibes, FR).

- Spring 2015

  April 23, 2015: Existence and stability of traveling wave solutions in a non-monotone feedforward chain of phase oscillators (NYU – Courant Institute).

- Summer 2013

  June 26 – August 1, 2013: Geometric singular perturbation theory – parts I,II, and III (NYU – Courant Institute).

- Fall 2012

  November 7, 2012: Stability of a family of traveling wave solutions in a feedforward chain of phase oscillators (NYU – Courant Institute).

Poster Presentations

- Spring 2019

  May 15, 2019: Spiking activity in networks of neurons impacted by axonal swelling (Virginia Commonwealth University, *presented by Brian Frost-Laplante*).

- Spring 2014

  March 10, 2014: Generation and stability of traveling wave solutions in unidirectional chains of phase oscillators (University of Pittsburgh).

Extended Research Visits

- Laboratoire de Probabilités, Statistique et Modélisation (LPSM)
  CNRS – Université Paris 7 Denis Diderot, Paris, FR

  June, 2018: Project on Oscillator Dynamics (visiting Bastien Fernandez).

  March, 2018: Project on Oscillator Dynamics (visiting Bastien Fernandez; sabbatical leave).

  June, 2016: Project on Oscillator Dynamics (visiting Bastien Fernandez).

  June, 2015: Project on Oscillator Dynamics (visiting Bastien Fernandez).

- Centre de Physique Théorique,
  CNRS – Aix-Marseille Université, Campus de Luminy Case, Marseille, FR

  June/July, 2012: Project on Oscillator Dynamics (visiting Bastien Fernandez).

Meetings Attended

- June 8 –July 6, 2023: *Bio Dynamics Days 2023 (member of conference scientific committee)*, LMAH, Université du Havre, FR -and- Courant Institute, NYU, New York NY.
- May 14–18, 2023: *SIAM Conference on Applications of Dynamical Systems*, Portland, OR.
- May 27 –July 1, 2021: *Bio Dynamics Days 2021*, LMAH, Université du Havre, FR -and- Courant Institute, NYU, New York NY.
- June 4 –July 2, 2020: *Bio Dynamics Days 2020*, LMAH, Université du Havre, FR -and- Courant Institute, NYU, New York NY.
- September 29–30, 2018: *AMS Fall Eastern Sectional Meeting (Meeting # 1141)*, University of Delaware, Newark, DE.
- May 21–25, 2017: *SIAM Conference on Applications of Dynamical Systems*, Snowbird, UT.
- May 18–20, 2017: *Biology and Medicine Through Mathematics (BAMM! 2017)*, Virginia Commonwealth University, Richmond, VA.
- May 20–22, 2016: *Biology and Medicine Through Mathematics (BAMM! 2016)*, Virginia Commonwealth University, Richmond, VA.
- June 8–10, 2015: 1^{st} *International Conference on Mathematical Neuroscience*, INRIA – Nice, Antibes, FR.
- March 10–12, 2014: *Nonlinear Dynamics and Stochastic Methods: From Neuroscience to Other Biological Applications*, University of Pittsburgh, Pittsburgh, PA.
- May 22–26, 2011: *SIAM Conference on Applications of Dynamical Systems*, Snowbird, UT.
- January 14–15, 2010: *Mini-Conference on Dynamical Systems*, Princeton University, Princeton, NJ.
- May 17–21, 2009: *SIAM Conference on Applications of Dynamical Systems*, Snowbird, UT.
- April 24–25, 2009: *Nonlinear Dynamics and Chaos Workshop 2009*, Courant Institute (NYU), New York, NY.
- January 22–26, 2007: *Introductory Workshop on Dynamical Systems with Emphasis on Extended Systems*, Mathematical Sciences Research Institute (MSRI), Berkeley, CA.
- October 6–8, 2006: *Dynamics Days at the Courant Institute—7th Workshop on Nonlinear Dynamics and Chaos*, New York, NY.
- June 27–July 10, 2005: *Resonances and Periodic Orbits—Spectrum and Zeta Functions in Quantum and Classical Chaos*, Centre Emile Borel, Institut Henri Poincaré, Paris, FR.
- October 1–3, 2004: *Dynamics Days at CIMS—6th Workshop on Nonlinear Dynamics and Chaos*, New York, NY.
- May 17, 2002: *Knots in Washington XIV*, Washington, DC.
- March 20–26, 1999: *American Physical Society Centennial Meeting*, Atlanta, GA.

Research Service

- 2015 – Present: Referee for *Mathematical Reviews*, American Mathematical Society.
- 2011 – Present: Journal Referee for *Chaos, An Interdisciplinary Journal of Nonlinear Science*. American Institute of Physics.

Prepared to Teach

- Ordinary and Partial Differential Equations, Numerical Analysis and Scientific Computing, Linear Algebra, Introductory and Vector Calculus, Probability, Discrete Mathematics, Topology, Advanced Calculus, Real and Complex Analysis, Abstract Algebra.

Teaching Experience

Boldface = regular course; *italicised = independent study / tutorial.*

- The Cooper Union (as Associate Professor)

  Fall 2023: **Linear Algebra, Calculus I, Introduction to Linear Algebra,** *Point-set Topology.*

  Spring 2023: **Calculus II, Differential Equations,** *Selected Topics in Mathematical Neuroscience.*

  Fall 2022: **Linear Algebra, Calculus I, Introduction to Linear Algebra,** *1. Mathematical Statistics, 2. Differential Equations Models for Mathematical Neuroscience.*

  Spring 2022: **Calculus II, Discrete Mathematics.**

  Fall 2021: **Linear Algebra, Calculus I, Introduction to Linear Algebra,**

  Spring 2021: **Calculus II, Discrete Mathematics.**

  Fall 2020: **Linear Algebra, Calculus I, Introduction to Linear Algebra,** *Point-set Topology.*

  Spring 2020: **Calculus II, Vector Calculus, Differential Equations.**

  Fall 2019: **Linear Algebra, Calculus I, Introduction to Linear Algebra.**

  Spring 2019: **Calculus II, Differential Equations,** *1. Research Problem: Mathematical Neuroscience, 2. Dynamical Systems for Mathematical Neuroscience.*

  Fall 2018: **Linear Algebra, Calculus I, Introduction to Linear Algebra,** *Point-set Topology.*

  Spring 2018: – on sabbatical leave –

  Fall 2017: **Linear Algebra, Calculus I, Introduction to Linear Algebra,** *Numerical Analysis.*

  Spring 2017: **Calculus II, Differential Equations,** *Mathematical Statistics.*

  Fall 2016: **Linear Algebra, Calculus I, Introduction to Linear Algebra,** *Mathematical Statistics.*

- The Cooper Union (as Assistant Professor)

  Spring 2016: **Calculus II, Differential Equations,** *Research Problem: Delay Differential Equations in Mathematical Neuroscience.*

  Fall 2015: **Linear Algebra, Calculus I, Introduction to Linear Algebra,** *Point-set Topology.*

  Spring 2015: **Calculus II, Differential Equations,** *Algebraic Topology.*

  Fall 2014: **Linear Algebra, Calculus I, Introduction to Linear Algebra,** *Point-set Topology.*

  Spring 2014: **Calculus II, Probability,** *Algebraic Topology.*

  Fall 2013: **Linear Algebra, Calculus I, Introduction to Linear Algebra,** *Point-set Topology.*

  Spring 2013: **Numerical Analysis (graduate), Differential Equations,** *Dynamical Systems and Chaos.*

Fall 2012: **Linear Algebra, Calculus I, Introduction to Linear Algebra.**

Spring 2012: **Linear Algebra, Differential Equations.**

Fall 2011: **Calculus I, Introduction to Linear Algebra, Probability.**

Spring 2011: **Calculus II,** *Algebraic Topology.*

Fall 2010: **Calculus I, Introduction to Linear Algebra, Differential Equations,** *Point-set Topology.*

- The Cooper Union (as Visiting Assistant Professor)

  Spring 2010: **Calculus II, Vector Calculus.**

  Fall 2009: **Calculus I, Introduction to Linear Algebra.**

  Spring 2009: **Vector Calculus, Differential Equations.**

  Fall 2008: **Calculus I, Introduction to Linear Algebra.**

- The Cooper Union (as Adjunct Assistant Professor, while ABD at NYU Courant)

  Spring 2008: **Calculus I.**

- New York University (Course Instructor and Teaching Assistant)

  Fall 2007 and Spring 2008: Course Instructor, **Algebra and Calculus (Precalculus)**. Lecture with enrollment of 120 students; management of 3 teaching assistants.

  Summer 2007: Course Instructor, **Calculus I.**

  Spring 2007: Calculus Placement Test Design. Design of a multiple-choice based placement test, to be given to entering undergraduates wishing to enroll into the introductory calculus sequence.

  Fall 2006: Course Instructor, **Linear Algebra.**

  Spring 2006 and Fall 2005: Course Instructor, **Calculus III.**

  Spring 2005: Course Instructor, **Calculus II.**

  Fall 2004: Teaching Assistant, **Ordinary Differential Equations.**

  Fall 2003, Spring 2003, and Fall 2002: Teaching Assistant, **Calculus for Social and Management Sciences.**

- George Washington University (Teaching Assistant)

  Spring 2002: **Calculus for Social and Management Sciences.**

Student Club Advising

- The Cooper Union

  Fall 2023 – Present: *Faculty Co-advisor (with M. Shah)*, SIAM student chapter at The Cooper Union.

  Fall 2013: *Cooper Team Coach*, 74^{th} William Lowell Putnam Mathematical Competition (substituting for R. Smyth); team placed 42^{nd} out of 430 competing teams.

Curriculum and Program Development

- The Cooper Union

  Spring 2021 – Spring 2023: Revisions to the *Introduction to Linear Algebra* and *Differential Equations* courses in the mathematics foundation for Engineering (collaboration within the Department of Mathematics).

  Spring 2014 – Present: Curriculum research, undergraduate programs in Mathematics.

  Spring 2013: Numerical Analysis (graduate).

  Summer 2011 – Summer 2014: Design and oversight of calculus placement examination.

  Fall 2010 – Spring 2011: Review and selection of textbook for calculus sequence.

Assessment Work

- The Cooper Union

  Spring 2018: Updates to the Departmental Syllabi for the Department of Mathematics, in preparation for the Fall 2018 ABET accreditation visit.

  Spring 2013: Draft of Departmental Interim Report for Middle States Commission on Higher Education (collaboration with O. Agrawal).

  Spring 2012: Standardization/Composition of Drafts of the Departmental Syllabi for the Department of Mathematics, in preparation for the Fall 2012 ABET accreditation visit.

  Spring 2012: Design of Alumni Questionnaire regarding the Department of Mathematics (collaboration with G. del Cerro Santamaría).

  Fall 2010 – Spring 2011: Development and Draft of Student Learning Outcomes document for the Mathematics Program.

Institutional Service Activities at Cooper Union

- Faculty of Engineering

  September 2020 – May 2021: Co-chair, Mathematics Faculty Search Committee.

  September 2019 – Present: Member, Engineering Curriculum Committee.

  September 2017 – May 2018: Member, Mathematics Faculty Search Committee.

- Faculty-Student Senate

  September 2016 – September 2017: Senate Chair.

  October 2012 – September 2014; October 2015 – September 2016: Senate Secretary.

  September 2012 – September 2017: Representative of the Faculty of the School of Engineering.

  May 2011 – August 2012: Alternate Representative, School of Engineering.

- Faculty of the Humanities and Social Sciences

  February 2012 – December 2016: Representative of the Faculty of the School of Engineering.

Synergistic Activities Focused on DEI and the Profession

- Fall 2021 – Present: *Faculty Co-liaison (collaboration with M. Shah)*, Developing student interest and engagement in SIAM; advising upperclass undergraduates on initiating a SIAM student chapter at The Cooper Union. Chapter application filed by student leadership in April 2023; chapter recognized formally by SIAM in July 2023.

Outreach Service

- 2011 – 2012: *Judge*, NY Area Math Fair (held at Brooklyn Technical High School in March of each year).
- 2008 – 2009: *Organizer*, cSplash - committees on advertising and academic planning (see `http://www.csplash.org`).

Professional Affiliations

- Current Member: American Mathematical Society (AMS), Mathematical Association of America (MAA), Society for Industrial and Applied Mathematics (SIAM).

Fellowships and Awards

- September 2002 – August 2008: McCracken Doctoral Fellowship (NYU).
- September 2002 – August 2005: VIGRE Fellowship (NSF).
- May 2002: Marvin Green Prize (GWU).
- May 2001: Ruggles Prize (GWU).
- September 1998 – May 2002: Presidential Science Scholarship (GWU).