

# Stanislav M. Mintchev

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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. 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>
  2. B. Ambrosio and S. M. Mintchev. Periodically kicked feedforward chains of simple excitable FitzHugh-Nagumo neurons. *Nonlinear Dynamics* **110** 2805-2829 (2022).
  3. B. Fernandez and S. M. Mintchev. Wave generation in unidirectional chains of idealized neural oscillators. *The Journal of Mathematical Neuroscience* **6:5** (2016).
  4. 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).
  5. 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*.

B. Ambrosio, M.A. Aziz-Alaoui, M. Maama, and S. M. Mintchev. Emergent properties in a V1-inspired network of Hodgkin-Huxley neurons. *Submitted 2022, revised in 2023 for 2<sup>nd</sup> round of peer review; pre-submission version available at <https://arxiv.org/abs/2004.10656>*

- CURRENT PROJECTS / IN PREPARATION

- Existence of stable traveling waves in smooth systems of coupled phase oscillators.
- Traveling waves and propagation of rhythmic dynamics in excitable extended systems.
- 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**

- 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 Modélisation – 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<sup>st</sup> 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<sup>st</sup> 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 • THE COOPER UNION  
Advising**

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

FALL 2013: *Cooper Team Coach*, 74<sup>th</sup> William Lowell Putnam Mathematical Competition (substituting for R. Smyth); team placed 42<sup>nd</sup> 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>).

**Grant  
Proposals**

- FUNDED  
DECEMBER 2021 – MAY 2023: *Grant co-recipient, 2021 Dean's Educational Innovation Program*; proposal focused on establishing Cooper Union student interest in the Society for Industrial and Applied Mathematics.
- SUBMITTED  
APRIL 2023: *AMS-Simons Research Enhancement Grants Program for Primarily Undergraduate Institution (PUI) Faculty*.

**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).