

CV for Alla Borisyuk

Professional Preparation

Moscow State University	Mathematics, Applied Mathematics	Diploma (M.S.), 1997
New York University	Mathematics	M.S., 1999
New York University	Mathematics	Ph. D., 2002

Postdoctoral Institution

Ohio State University	Mathematical Biology	2002 – 2005
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Appointments

2020-current	Professor, Department of Mathematics, University of Utah
2019-current	Associate Chair, Department of Mathematics, University of Utah
2013-2020	Associate Professor, Department of Mathematics, University of Utah
2005-2013	Assistant Professor, Department of Mathematics, University of Utah
2002 – 2005	Postdoctoral Researcher, Mathematical Biosciences Institute, Ohio State University
1997 – 2002	Teaching and Research Assistant, Dept. of Mathematics, New York University
June - July 2000	Visiting researcher, National Institutes of Health (NIDDK)
June - July 1999	Visiting researcher, National Institutes of Health (NINDS)
June - July 1998	Research Assistant, Institute for Systems Research, University of Maryland
June - July, 1996	Summer student research, Center for Applied Mathematics, Cornell University

Publications: Peer-reviewed

Zavitz D., Amematsro E., Borisyuk A., Caron S. Connectivity patterns shape sensory representation in a cerebellum-like network. doi: <https://doi.org/10.1101/2021.02.10.430647>. *Under revision*.

A. Liu, A. Borisyuk. (2023) Investigating Navigation Strategies in the Morris Water Maze through Deep Reinforcement Learning. *Neural Networks*, online 14 December 2023
<https://doi.org/10.1016/j.neunet.2023.12.004>

G. Handy, A. Borisyuk. (2023) Investigating the ability of astrocytes to drive neural network synchrony. *PLoS Comput Biol.*19(8):e1011290. doi: 10.1371/journal.pcbi.1011290.
<https://doi.org/10.1101/2022.09.26.508928>.

Zavitz D., Youngstrom I.A., Borisyuk A., Wachowiak M. (2020) Effect of interglomerular inhibitory networks on olfactory bulb odor representations. *J. Neuroscience*, 40 (31) 5954-5969;
<https://doi.org/10.1523/JNEUROSCI.0233-20.2020>

R. Viertel, A. Borisyuk (2019) A Computational Model of the Mammalian External Tufted Cells. *J Theor Biol.*; 462: 109-121. doi: 10.1016/j.jtbi.2018.10.003

G. Handy, S.D. Lawley, A. Borisyuk (2019) Role of trap recharge time on the statistics of captured particles. *Physical Review E*, 99(2)

G. Handy, S.D. Lawley, A. Borisyuk (2018) Receptor recharge time drastically reduces the number of captured particles. *PLoS Computational Biology*, <https://doi.org/10.1371/journal.pcbi.1006015>

- M. Taheri, G. Handy, A. Borisyuk, J.A. White (2017) Diversity of Evoked Astrocyte Ca²⁺ Dynamics Quantified through Experimental Measurements and Mathematical Modeling. *Front. Syst. Neurosci.* <https://doi.org/10.3389/fnsys.2017.00079>
- G. Handy, M. Taheri, J.A. White, A. Borisyuk (2017) Mathematical investigation of IP₃-dependent calcium dynamics in astrocytes. *J Comput Neurosci.* 42(3): 257-273
- R. Carey, W.E. Sherwood, M. Shipley, A. Borisyuk, M. Wachowiak (2015) Role of intraglomerular circuits in shaping temporally structured responses to naturalistic inhalation-driven sensory input to the olfactory bulb. *Journal of Neurophysiology.* 113(9), 3112- 3129. doi: 10.1152/jn.00394.2014
- A. Borisyuk, F. Rassoul-Agha (2014) Quasiperiodicity and Phase Locking in Stochastic Circle Maps: a Spectral Approach, *Physica D: Nonlinear Phenomena.* DOI: 10.1016/j.physd.2014.07.006
- A. Borisyuk (2014) Modulation of neuronal entrainability by epilepsy-associated currents and noise: a spectral approach. *BMC Neuroscience*, 15(Suppl 1):P202
- A. Borisyuk, J. Best, D. Terman (2013) Frequency separation by an excitatory-inhibitory network. *J. Comp. Neurosci.* 34(2): 231-243
- T. Broicher, P. Malerba, A. Dorval, A. Borisyuk, F. Fernandez, and J. White (2012) Spike Phase Locking in CA1 Pyramidal Neurons depends on Background Conductance and Firing Rate. *J Neurosci*, 32(41): 14374-14388
- S.E.Odom, A.Borisyuk (2012) Estimating three synaptic conductances in a stochastic neural model. *J. Comp. Neurosci.* 33: 191-205
- S.Ahn, B.H. Smith, A. Borisyuk, D. Terman (2010) Analyzing Neuronal Networks Using Discrete-Time Dynamics, *Physica D: Nonlinear phenomena* 239(9): 515-528 (In Physica D Top 25 Hottest Articles list)
- W.H. Nesse, A. Borisyuk, P.C. Bressloff (2008) Fluctuation-Driven rhythmogenesis in an excitatory network with slowadaptation, *J. Comp. Neurosci.* 25(2): 317-33
- J. Best, A. Borisyuk, J. Rubin, D. Terman, M. Wechselberger (2005) The dynamic range of bursting in a network of synaptically coupled square-wave bursting respiratory pacemaker cells, *SIAM J. of Appl. Dyn. Syst.* 4: 1107-1139
- A. Borisyuk, B. H. Smith (2004) Odor interactions and learning in a model of the insect antennal lobe. *Neurocomputing* 58-60: 1041-1047
- A. Borisyuk, M. N. Semple, J. Rinzel (2002) Adaptation and inhibition underlie responses to time-varying interaural phase cues in a model of inferior colliculus neurons. *J. Neurophysiol.* 88: 2134-2146
- A. Borisyuk, M. N. Semple, J. Rinzel (2001) Computational model for the dynamic aspects of sound processing in the auditory midbrain. *Neurocomputing* 38: 1127-1134

Publications: Book Chapters, etc.

- A. Borisyuk. Dynamical Systems: Overview. *Encyclopedia of Comp. Neuroscience.* Springer-Verlag NewYork, 2015
- A. Borisyuk. Morris-Lecar Model. *Encyclopedia of Computational Neuroscience.* Springer-Verlag New York, 2015
- A. Borisyuk. Physiology and mathematical modeling of the auditory system. *In: Tutorials in Mathematical Biosciences I. Mathematical Neurosciences, Lecture Notes in Mathematics, Vol. 1860,* Springer, Berlin Heidelberg NewYork, 2005

A. Borisyuk, J. Rinzel. Understanding neuronal dynamics by geometrical dissection of minimal models. *In: Methods and Models in Neurophysics, Les Houches Summer School, Session LXXX, C. Chow, B. Gutkin, D. Hansel and C. Meunier (eds). Elsevier, 2005*

Grants:

- Granted (2019-2024) NSF-DMS-1853673. PI: Borisyuk. Incorporating the Effects of Synaptic Ensheathment in Neuronal Networks: A Multi-scale Investigation.
- Granted (2018-2024) NIH. 1R01NS109979-01 (PI: Wachowiak, Role: Co-Investigator). Using functionally-defined glomeruli to probe circuit function in the mammalian olfactory bulb
- Granted (2012-2018) RTG, Mathematical biology (PI: Keener. Role: co-PI), \$2,496,299.00
- Granted (Oct. 2010-Sept. 2015) NSF-DMS-1022945. PI: Borisyuk. Coding of Timing Information in the Auditory System, \$150,000
- Granted (July 2005 - June 2009) NIH/NIDCD R01-DC-7997 Importance of temporal information for olfactory codes (co-PI with D. Terman (OSU), B.H. Smith (ASU)), \$618,180 (d+i)

AWARDS

2003 Kurt O. Friedrichs Prize for an outstanding dissertation in mathematics. Courant Institute, New York University

2001 Bella Manel Prize for outstanding achievement in mathematics on the graduate level by a woman. Courant Institute, New York University

2000 Sandra Bleistein Prize for notable achievement by a woman in applied mathematics or computer science. Courant Institute, New York University

1997 - 2001 Teaching and Research Assistantship. Courant Institute, New York University

1996, 1997 Soros Foundation Scholarship for high academic and scientific performance

SELECTED INVITED TALKS (since 2013)

- January 2024 Mathematical Neuroscience Summer School, Bay of Islands, New Zealand
- October 2023 Intro to Computational Neuroscience at INCF Neuroinformatics short course
- June 2023 ICERM (Brown University) Mathematical and Computational Biology workshop
- March 2023 Applied Mathematics Colloquium, University of Arizona
- Feb 2023 Math Bio Seminar, Arizona State University
- July 2022 Minisymposium talk at the SIAM LS conference
- October 2021 Math Bio Seminar, University of Iowa
- Sept. 2021 The Cold Place Mathematical Biology Seminar
- April 2021 Dynamics seminar, University of Exeter, UK
- June 2020 Minisymposium talk at the SIAM LS conference
- May 2020 Mathematical Biosciences Institute, OSU
- November 2019 Northwestern Applied Mathematics Colloquium
- May 2019 Minisymposium talk at the SIAM DS conference
- May 2018 Workshop for Women in Mathematical Biology, IMA

February 2017 U of Arizona, Applied Math colloquium
 February 2017 COSYNE workshop
 October 2016 Mathematical Biosciences Institute, OSU
 October 2016 BYU Dynamical Systems seminar
 October 2016 Mathematical Biosciences Institute, OSU
 May 2016 Minisymposium talk at the SIAM LS conference
 August 2015 Kavli Institute, UCSB
 April 2015 Centre de Recerca Matematica, Barcelona, Spain
 April 2015 Warwick University, UK
 January 2015 Biomath and Dyn.Systems seminars, Courant Institute, NYU
 July 2014 CNS-2014 Workshop, Quebec
 February 2013 Math Colloquium, IUPUI

COURSE DEVELOPMENT

Spring 2018 Data Analysis in Neuroscience. Math 4800. Modern data analysis techniques learned through working with real experimental data

Spring 2009 Mathematics in Medicine and Physiology. Oriented to pre-med physics and math majors. Required course in physics department pre-med program. Course number as of Spring 2010: Math 4600

OUTREACH AND OTHER EDUCATIONAL ACTIVITIES

2023 ACCESS program faculty liaison for math
 2018-20, 2023 High School Math Circle Faculty coordinator
 2014-2019 Elementary Math Circle
 Summer 2016 ACCESS program guest instructor
 Fall 2012 Science Day presentation
 2011-2012 AWM student section helper
 2007-2011 Presentations at West High School, East High Math, Granite summer program
 Summer 2010 ACCESS summer program lecturer. University of Utah
 Summer 2009 ACCESS summer program lecturer. University of Utah
 August 2004 Project leader in the MBI Summer Program on Cell Processes

TEACHING EXPERIENCE: REGULAR COURSES

Spring 2024 Math 6780: Computational Neuroscience
 Fall 2023 Math 1170: Calculus for Life Sciences
 Spring 2023 Graduate Reading course in Computational Neuroscience
 Spring 2023 Math 5470: Chaos
 Fall 2022 Math 5110: Introduction to Mathematical Biology I
 Spring 2021 Reading course in Computational Neuroscience (1st & 2nd year PhD students)
 Spring 2021 Math 4600: Math in Medicine and Physiology
 Fall 2020 Introduction to Mathematical Biology I (5110)
 Spring 2020 Math 3010: Topics in the History of Mathematics

Fall 2019 Computational Neuroscience (graduate)
 Spring 2019 Math 3010: Topics in the History of Mathematics
 Fall 2018 Math 1170: Calculus for Life Sciences
 Spring 2018 Math 4800: Data Analysis in Neuroscience
 Fall 2017 Math 6770: Computational Neuroscience
 Spring 2017 Math 4600: Math in Medicine and Physiology; Math 5470: Chaos
 Fall 2016 Math 5740: Module 1 – Applications of Discrete Dynamics
 Spring 2016 Mathematics in Medicine and Physiology (4600)
 Fall 2015 Computational Neuroscience (graduate)
 Spring 2014 Mathematics in Medicine and Physiology (4600). University of Utah
 Spring 2014 Math for Life Sciences II (1180). University of Utah
 Fall 2013 Math for Life Sciences I (1170). University of Utah
 Spring 2013 Math for Life Sciences II (1180). University of Utah
 Fall 2012 Topics in Mathematical Biology: Computational Neuroscience (6770).
 Fall 2012 Math for Life Sciences I (1170). University of Utah
 Spring 2012 Mathematics in Medicine and Physiology (4600). University of Utah
 Fall 2011 Introduction to Mathematical Biology I (5110). University of Utah
 Spring 2011 Mathematics in Medicine and Physiology (4600). University of Utah
 Spring 2011 Math for Life Sciences II (1180). University of Utah
 Fall 2010 Math for Life Sciences I (1170). University of Utah
 Spring 2010 Mathematics in Medicine and Physiology (4600). University of Utah
 Spring 2010 Introduction to Mathematical Biology II (5120). University of Utah
 Fall 2009 Introduction to Mathematical Biology (5110). University of Utah
 Spring 2009 Medical mathematics (3900). University of Utah
 Spring 2008 Computational Neuroscience (6780). University of Utah
 Fall 2007 Math for Life Sciences I (1180). University of Utah
 Fall 2007 Dynamical systems and chaos (5470/6440). University of Utah
 Spring 2007 Math for Life Sciences I (1170). University of Utah
 Spring 2007 Introductory Statistics (1040). University of Utah
 Fall 2006 Introduction to Mathematical Biology (5110). University of Utah
 Fall 2005, Spring 2006 Elementary Statistics (1070). University of Utah
 Fall 2000 PreCalculus. New York University
 Spring 2000 Elementary Statistics. New York University

BOARDS, EDITORIAL, EXECUTIVE COMMITTEES, ETC

2016 - Journal of Theoretical Biology, Editorial Board Member
 2017-2020 Program Director (Officer board member. Co-chair of society conference on Life Sciences), Society for Industrial and Applied Mathematics (SIAM) SIAG Activity Group on Life Sciences (Elected by Society Members)
 2015 Encyclopedia of Computational Neuroscience, Section Editor, Springer-Verlag New York
 2012-2015 Board Member, Society/Organization for Computational Neuroscience (OCNS). (Elected by Society Members)

2009-2011 Secretary (Officer board member), Society for Industrial and Applied Mathematics (SIAM) SIAG Activity Group on Life Sciences (Elected by Society Members)

CONFERENCES, WORKSHOPS AND MINISYMPOSIA ORGANIZED

Co-chair and organizer of SIAM Life Sciences Biannual Conference 2018, 2020
Minisymposium organizer at SIAM Dynamical Systems 2003, 2007, 2009, 2017
May 2007 Co-organizer of JPK60: a conference in honor of Kim Keener's 60th birthday
July 2006 Minisymposium at SMB - SIAM Life Sciences meeting
March 2005 Co-organizer of First Young Researchers Workshop in Mathematical Biology, MBI, OSU
May 2003 Minisymposium at SIAM Dynamical systems 2003 meeting

REVIEWER

Brain Sciences, Frontiers of Neuroscience, NSF Review panels, Journal of Neural Engineering, Journal of Theoretical Biology, Chaos, Biological Cybernetics, Scholarpedia, Encyclopedia of Computational Neuroscience, Bulletin of Mathematical Biology, PLoS Computational Biology, Mathematical Medicine and Biology, NRC-CNRC, Canada, SIAM Journal of Applied Dynamical Systems, Society for Computational Neuroscience, Physica D, Journal of Computational Neuroscience, Neural Networks

DEPARTMENT AND UNIVERSITY COMMITTEE WORK

2023-2024 Utah Asia Campus Math Faculty hiring committee, Chair
2023-2024 Career Line Faculty hiring committee, Chair
2023 Bioinformatics degree development committee
2019-2023 Associate Chair, Department of Mathematics
2022-2023 Faculty, Grads and Postdocs awards committees, Teaching Instructorship committee chair
2022 College of Science Scholarship committee member
2021-2022 Teaching Instructorship committee chair
2020-2021 Dept of Math.: Scholarship committee; Faculty, Grads and Postdocs awards committees Awards Program committee
2020-2021 Chair of College of Science Scholarship committee
2020-2021 University Undergraduate Council member
2015-2019 Director of Undergraduate Studies, chair of the Undergraduate Curriculum committee
2017-2018 University Undergraduate Council member
2017-2018 Integrated Science Core planning committee
2013-2014 Chair of Graduate recruitment
2013-2014 Dean search committee
2013-2014 University Undergraduate Council member
2012-2013 Graduate committee (recruitment)
2010-2011 Graduate committee (recruitment)
2009-2010 Undergraduate curriculum committee
2007-2008 Dean's task force on diversity
2007-2008 VIGRE committee
2007-2008 Undergraduate curriculum committee

2006-2007 Instructorship committee

TRAINEES

Graduate students: Nicole Lacey (current), Andy Liu (current), Colin Denis (current), Anil Cengiz (2020-2023), Samantha Linn (2020-2021), Patrick Talley (2020-2021), Daniel Zavitz (PhD 2021), Gregory Handy (PhD 2019), Marsa Taheri (John White's lab; PhD bioeng 2019), Ryan Viertel (PhD 2018), Vera Babenko (MS 2015), Steve Odom (MS 2012), Alex Heitman (MS 2011), Chad Hokama (MS CS)

Postdoctoral: Erik Sherwood (2012-13), Carter Johnson (2020-2021)

Undergraduates: Previous: Hanna Okamura, Sage Auburn, Darshan Shimpi, Jacob Jones, Elom Amematsro (Caron lab), Yousef Alamri, Audrey Brown, Adam Lee, Emma Fine, Daniel Griffin (USU), Alexandria Cervantes (CSUMB), Heather Brooks, Marsa Taheri, Nathan Rickett