Jennifer CRODELLE, PhD

CURRENT POSITION: **Assistant Professor of Mathematics** at Middlebury College
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PAST POSITIONS

2017-2020 | NSF Mathematical Sciences Postdoctoral Research Fellow at the
Courant Institute of Mathematical Sciences, NYU

RESEARCH INTERESTS

COMPUTATIONAL BIOLOGY | I am interested in dynamics of neuronal networks during development and mechanisms underlying pain processing in the spinal cord.

MATHEMATICAL TOOLS | I use tools such as dynamical systems, stochastic processes, differential equations, and numerical methods.

EDUCATION

AUG 2017 | Doctor of Philosophy in MATHEMATICS, **Rensselaer Polytechnic Institute**
Thesis: "The role of electrotonic coupling between pyramidal cells in the cortex"
Advisor: Prof. Gregor KOVACIC

MAY 2012 | Bachelor of Science in APPLIED MATHEMATICS, **Marist College**
Graduated with honors in the major.

PUBLICATIONS

PEER-REVIEWED JOURNAL ARTICLES

J. M. Epstein, E. Hatna, **J. Crodelle**. *Triple contagion: a two-fears epidemic model*
J. R. Soc. Interface.18(181):20210186 (2021).

J. Crodelle and D. W. McLaughlin. *Modeling the role of gap junctions between excitatory neurons in the developing visual cortex*. PLoS Computational Biology, 17(7):e1007915 (2021).

J. Crodelle, C. Vallejo, M. Schmidtchen, C. Topaz, and M.R. D'Orsogna . *Impacts of California Proposition 47 on crime trends in Santa Monica, CA*, PLoS One, 16(5):e0251199 (2021).

J. Crodelle and P. Maia. *A Computational model for pain processing in the dorsal horn following axonal damage to receptor fibers*, Brain Sciences, 11(4):505 (2021).

J. Crodelle, D. Zhou, G. Kovacic, and D. Cai. *A computational model of electrotonic coupling between pyramidal cells in the cortex*, Journal of Computational Neuroscience, 48(4):387–407, (2020).

Zq.K. Tian, **J. Crodelle**, and D. Zhou. *A Combined Offline-Online Algorithm for Hodgkin-Huxley Neuronal Networks*. Journal of Scientific Computing, 84(1):10 (2020)

J. Crodelle, K.A. Newhall, P.B. Pyzza, and G. Kovacic. *Coarse-grained descriptions of oscillations in neuronal network models*. Communications in Mathematical Sciences, 1437:1458, (2019).

J. Crodelle, M. Hagenauer, S. Piltz, and V. Booth. *Modeling the daily rhythm of human pain processing in the dorsal horn.* PLoS Computational Biology, 15(7): e1007106, (2019).

J. Crodelle, D. Zhou, G. Kovacic, D. Cai. *A role for electrotonic coupling between cortical pyramidal cells,* Frontiers in Computational Neuroscience, 13:33, (2019).

Z.Q. Xu, **J. Crodelle**, D. Zhou, D. Cai. *Maximum entropy principle analysis in network systems with short-time recordings,* Physical Review E, 99:022409, (2019).

J. Crodelle, M. Hagenauer, S. Piltz, and V. Booth. *A neural circuit model for pain processing in the spinal cord.* Proceedings of A Research Collaboration Workshop for Women in Mathematical Biology, Springer, (2016).

M.Hagenauer, **J. Crodelle**, S. Piltz, N. Toporikova, P. Ferguson, and V. Booth. *The Modulation of Pain by Circadian and Sleep-Dependent Processes: A Review of the Experimental Evidence.* Proceedings of A Research Collaboration Workshop for Women in Mathematical Biology, Springer, (2016).

SELECTED INVITED TALKS

APR 2022	*Development of orientation preference in mice: a mathematical model,* RWTH AACHEN UNIVERSITY EDDY SEMINAR, (Virtual)
JUNE 2021	*Firing-rate models for analyzing spinal circuit motifs underlying chronic pain,* SOCIETY MATHEMATICAL BIOLOGY (SMB) ANNUAL MEETING (Virtual)
OCT 2020	*A simple mathematical model of synapse formation in the developing visual cortex of mice,* APPLIED MATHEMATICS SEMINAR, UNC Chapel Hill, NC (Virtual)
NOV 2019	*Modeling visual circuit development of mice through synaptic plasticity,* SIMONS COLLABORATION ON THE GLOBAL BRAIN POSTDOC MEETING, New York, NY
OCT 2019	*Do mice and cats see eye-to-eye?,* WILLIAMS COLLEGE COLLOQUIUM, Williamstown, MA
JUL 2019	*Modeling visual circuit development of mice through synaptic plasticity,* SOCIETY FOR MATHEMATICAL BIOLOGY (SMB) ANNUAL MEETING, Montreal, CAN
JUN 2019	*Introduction to computational neuroscience,* UNDERGRADUATE SUMMER RESEARCH SEMINAR, Courant Institute, NY
MAY 2019	*Modeling gap junctions in the cortex,* SIAM CONFERENCE ON APPLICATIONS OF DYNAMICAL SYSTEMS, Salt Lake City, UT
APR 2019	*Gap junctions in the developing mouse visual cortex,* APPLIED MATH DAYS, Rensselaer, NY
AUG 2018	*Gap junctions between pyramidal cells in cortical neuronal networks,* SIAM CONFERENCE ON THE LIFE SCIENCES, Minneapolis, MN

Mar 2018	*Circadian rhythmicity of pain sensitivity: A mathematical model,* Pɪ Mu Epsɪʟon Honor Socɪ́ety Inducтιon Cerеmony, Marist College, NY
Feb 2018	*Circadian rhythmicity of pain sensitivity: A firing-rate model of dorsal horn circuitry* Computatɪonaʟ Bɪoʟogy Semɪnar, Courant Institute, NY

Contributed Talks & Poster Presentations

Oct 2021	*Mathematical modeling of neuronal networks,* Faʟʟ Facuʟty Forum, Middlebury, VT
Nov 2018	*A mathematical model for the circadian rhythmicity of pain sensitivity in the dorsal horn (poster),* Socɪ́ety for Neuroscɪ́ence (SFN) Annuaʟ Meetɪng, San Diego, CA
Jan 2017	*The role of electrotonic junctions between excitatory neurons in the cortex,* Joɪnt Mathematɪcaʟ Meetɪngs, Atlanta, GA

Teaching Experience

Instructor

Spring 2022	Partial Differential Equations (Middlebury) Calculus II (Middlebury)
Fall 2021	Differential Equations (Middlebury) Calculus II (Middlebury)
Spring 2021	Differential Equations (Middlebury) Mathematical Modeling (Middlebury)
Fall 2020	Differential Equations (Middlebury) Multivariable Calculus (Middlebury)
Spring 2019-2020	Linear Algebra x3 (Courant)
Fall 2018	Ordinary Differential Equations (Courant)
Fall 2016	Multivariable Calculus (Russell Sage College)

Substitute lecturer

Fall 2017	Partial Differential Equations (Courant)
AY 2016-2017	Ordinary Differential Equations and Dynamical systems (Rensselaer)
AY 2015-2016	Introduction to Ordinary Differential Equations (Rensselaer)

Teaching Assistant

Spring 2016	Methods of PDEs of Mathematical Physics
Fall 2015	Ordinary Differential Equations and Dynamical Systems
Fall 2015	Linear Algebra
Spring 2013	Calculus II
Fall 2012	Multivariable Calculus and Matrix Algebra

Mentoring Experience

Research Mentor/Advisor to:

Summer 2021 | (Bryan Currie, Class of 2022, Middlebury College) A summer undergraduate research student at Midd focused on modeling the synchronization properties of neurons coupled by a gap junction.

Summer 2021 | (Ben Elstner, Class of 2022.5, Middlebury College) A summer undergraduate research student at Midd focused on understanding and characterizing inhibitory STDP.

Summer 2019 | (Paulina Czarnecki, Class of 2020, University of Michigan) A summer undergraduate research student at Courant focused on modeling the electrophysiological properties of a Merkel cell.

Summer 2018 | (Taylor Meredith, Class of 2020, Courant) An undergraduate student focused on modeling the neuromuscular disease Myasthenia Gravis and its treatment.

2017-2018 | (Mallory Gaspard, Class of 2019, Rensselaer) A master's student at Rensselaer modeling the the degradation of connections in an Alzheimer-infected brain.

Summer 2016 | (Amanda Hampton, Class of 2017, Stony Brook University) A summer undergraduate research student at Rensselaer modeling gap-junction connections in the brain.

Awards & Honors

Jun 2022 | *Vermont Biomedical Research Network Pilot Award,* $25,000.

Aug 2017 | *National Science Foundation, Mathematical Sciences Postdoctoral Fellowship,* DMS-1703761.

May 2017 | *Joaquin B. Diaz Thesis Prize* at Rensselaer for showing curiosity in new questions, an inquiring mind, a love to understand things, and the patience for systematic inquiry.

Apr 2015 | *Student Paper Award* at the Ninth IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory in Athens, GA

May 2015 | *SIAM Certificate of Recognition* for outstanding contribution to the SIAM student chapter at Rensselaer.

AY 2013-2015 | *Graduate Assistance in Areas of National Need Fellowship (GAANN)*

Fall 2014 | *Founders Award of Excellence* for having the qualities of creativity, discovery, leadership, and the values of pride and responsibility at Rensselaer.

Fall 2013 | *Ralph Ernest Huston Teaching Prize* for demonstrating unusual promise and ability as a teacher at Rensselaer.

Travel Grants

May 2019 | *SIAM Early Career Travel Award* to attend and give a talk at the SIAM Conference on Applications of Dynamical Systems, Salt Lake City, UT

Jan 2019 | *AMS-MRC Travel Award* to attend and continue research collaboration at the Joint Mathematical Meetings, Baltimore, MD

Jul 2018 | *INS Travel Award* from the Institute of Natural Sciences (INS) to attend the International Conference on Applied Mathematics and Computational Neuroscience, in memory of David Shenou Cai, Shanghai, China

Aug 2018 | *SIAM Early Career Travel Award* to attend and give a talk at the SIAM Conference on the Life Sciences, Minneapolis, MN

Jul 2016 | *SIAM Student Travel Award* to attend and give an invited talk at the SIAM Conference on the Life Sciences, Boston, MA

Workshops

Mar 2021	*Mathematical and computational approaches to social justice* ICERM at Brown University, Virtual
Sep 2019	*Statistical model fitting* NYU Center for Neural Science, New York, NY
Jul 2018	*Crime in Santa Monica* AMS-MRC: Agent-based modeling in Biological and Social Systems, Whispering Pines, RI
Aug 2015	*Understanding neuromechanical processes in locomotion with physical modeling and network analysis* SAMSI: Challenges in Computational Neuroscience (CCNS)
Jun 2015	*Sleep, circadian rhythms and pain* A Research Collaboration Workshop for Women in Mathematical Biology, NIMBioS, Knoxville TN
May 2015	SIAM Workshop on Network Sciences, Salt Lake City, UT

Organizing Activities

Jul 2019	Co-organizer of a minisymposium titled *Mathematical modeling of neuronal networks* SMB Annual Meeting, Montreal, CAN
May 2019	Co-organizer of a minisymposium titled *Neuronal Computations in Brain Networks* SIAM Conference on Applications of Dynamical Systems, Salt Lake City, UT
Aug 2018	Co-organizer of a minisymposium titled *Information Processing in Neuronal Networks* SIAM Conference on the Life Sciences, Minneapolis, MN
May 2017	Co-organizer of a minisymposium titled *Computational models of neuronal connectivity in the brain* SIAM Conference on Applications of Dynamical Systems, Salt Lake City, UT

Service & Outreach

Apr 2021	*Midd Hackathon* Served as a judge for Midd's first Hackathon.
Apr 2021	*Intro to mathematical modeling* Invited to the math club to talk about mathematical modeling and opportunities for modeling competitions.
2020-2021	*1000 Girls 1000 Futures Mentoring Program* Served as a math and science mentor to an international group of high school students.
Apr 2019	*Courant Splash!* Taught a mathematical modeling course to local high school students.
2017- present	*NYUrWIS Girls Mentorship Program* Conducted science experiments with 4th and 5th grade NYC students.
Jan 2019	*Judge at JMM undergraduate poster session*
2017- 2018	*1000 Girls 1000 Futures Mentoring Program* Served as a math and science mentor to a middle school student in Denmark.
Apr 2018	*Judge at The Scientista Symposium*

Journals refereed: PLoS Computational Biology, Physical Review E, Cognitive Neurodynamics, PLoS One, SIAM Journal on Applied Dynamical Systems .

Memberships

Organization for Computational Neuroscience (OCNS)

Society for Industrial and Applied Mathematics (SIAM)

Association for Women in Mathematics (AWM)

Society for Mathematical Biology (SMB)

New York Academy of Sciences (NYAS)

Women in Science (WIS)