

Jennifer Crodelle

Courant Institute of Mathematical Sciences, NYU

September 2017 - present

NSF Mathematical Sciences Postdoctoral Research Fellow

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Research Interests

- **Mathematical neuroscience** (*dynamics of neuronal networks during development, mechanism of pain processing in the spinal cord, mechanics of the neuromuscular junction.*)
- Dynamical systems, ordinary differential equations, numerical methods.

Education

Rensselaer Polytechnic Institute Troy, NY

August 2017

Ph.D. in Mathematics

Thesis title: “The role of electrotonic coupling between pyramidal cells in the cortex.”

Rensselaer Polytechnic Institute Troy, NY

August 2014

M.S. in Applied Mathematics

Marist College Poughkeepsie, NY

May 2012

B. S. in Applied Mathematics, Minor in Chemistry

Publications

J. Crodelle, K.A. Newhall, P.B. Pyzza, and G. Kovačič. Coarse-grained descriptions of oscillations in neuronal network models. (*Submitted*)

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. Kovačič, 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)

Select Invited Talks

Introduction to Computational Neuroscience

Undergraduate Summer Research Seminar, Courant Institute, NY

June 2019

Modeling gap junctions in the cortex

SIAM Conference on Applications of Dynamical Systems, Salt Lake City, UT

May 2019

Gap junctions in the developing mouse visual cortex

Applied Math Days, Rensselaer, NY

April 2019

Gap junctions between pyramidal cells in cortical neuronal networks

SIAM Conference on the Life Sciences, Minneapolis, MN

August 2018

Circadian rhythmicity of pain sensitivity: A mathematical model

Pi Mu Epsilon Honor Society Induction Ceremony, Marist College, NY

March 2018

Circadian rhythmicity of pain sensitivity: A firing-rate model of dorsal

horn circuitry *Computational Biology Seminar, Courant Institute, NY*

February 2018

Synchrony among synaptically and electrically connected neurons in the cortex

Third International Conference on Mathematical Neuroscience, Boulder, CO

June 2017

Mathematical model of a network containing electrotonic junctions between excitatory neurons in the adult cortex

SIAM Conference on Applications of Dynamical Systems, Salt Lake City, UT

May 2017

The role of gap junctions in synchronizing neuronal activity

Oxford College of Emory University Colloquium Oxford, GA

March 2017

An Investigation into the role of gap junctions in synchronizing neuronal activity

Marist College Seminar Series, Poughkeepsie, NY

January 2017

Synchronizing cortical dynamics via gap junctions between excitatory neurons

*AIMS Conference Series on Dynamical Systems
and Differential Equations, Orlando, FL*

July 2016

Gap Junctions in the Cortex and their properties

Dynamical Systems Seminar, RPI

October 2015

The role of gap junctions between excitatory neurons in Synchronizing Cortical Dynamics

*The Ninth IMACS International Conference on Nonlinear Evolution
Equations and Wave Phenomena: Computation and Theory, Athens, GA*

April 2015

Contributed Talks & Poster Presentations

A mathematical model for the circadian rhythmicity of pain sensitivity in the dorsal horn (poster)

Society for Neuroscience (SFN) Annual Meeting, San Diego, CA

November 2018

The role of electrotonic junctions between excitatory neurons in the cortex

Joint Mathematical Meetings, Atlanta, GA

January 2017

Synchronizing Cortical Dynamics via Gap Junctions Between Excitatory Neurons (poster)

Society for Neuroscience (SFN) Annual Meeting, Chicago, IL

September 2015

The Role of Gap Junctions Between Excitatory Neurons in Synchronizing Cortical Dynamics (poster)

Challenges in Computational Neuroscience (CCNS) workshop, Durham, NC

August 2015

Teaching & Mentoring Experience

Instructor:

Linear Algebra (Courant)

Spring 2019

Ordinary Differential Equations (Courant)

Fall 2018

Multivariable Calculus (Russell Sage College)

Fall 2016

Calculus II (Rensselaer)

Summer 2015

TA Seminar (Rensselaer)

Fall 2015

Research Mentor/Advisor:

(Courant) Advisor to an undergraduate student project focused on modeling the neuromuscular disease Myasthenia Gravis, and its treatment. *Summer 2018 - present*

(Rensselaer) Mentor to a graduate student project on modeling the degradation of connections in an Alzheimer-infected brain.

2017 - present

(Rensselaer) Mentor to an undergraduate student on a project involving modeling network connections in the developing brain.

Summer 2016

Substitute lecturer:

Partial Differential Equations (Courant)

Fall 2017

Ordinary Differential Equations and Dynamical systems (Rensselaer)

AY 2016-2017

Introduction to Ordinary Differential Equations (Rensselaer)

AY 2015-2016

Teaching Assistant (Rensselaer):

Methods of PDEs of Mathematical Physics

Spring 2016

Ordinary Differential Equations and Dynamical Systems

Fall 2015

Linear Algebra

Fall 2015

Calculus II

Spring 2013

Multivariable Calculus and Matrix Algebra at Rensselaer

Fall 2012

Awards & Honors

National Science Foundation

August 2017 - present

Mathematical Sciences Postdoctoral Fellowship, DMS-1703761

Joaquin B. Diaz Thesis Prize

May 2017

at Rensselaer for showing curiosity in new questions, an inquiring mind, a love to understand things, and the patience for systematic inquiry.

Student Paper Award <i>at the Ninth IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory in Athens, GA.</i>	<i>April 2015</i>
SIAM Certificate of Recognition <i>for outstanding contribution to the SIAM student chapter at Rensselaer.</i>	<i>Spring 2015</i>
Graduate Assistance in Areas of National Need Fellowship (GAANN)	<i>2013-2015</i>
Founders Award of Excellence <i>for having the qualities of creativity, discovery, leadership, and the values of pride and responsibility at Rensselaer.</i>	<i>Fall 2014</i>
Ralph Ernest Huston Teaching Prize (1973) <i>for demonstrating unusual promise and ability as a teacher at Rensselaer.</i>	<i>Fall 2013</i>

Service & Outreach

Courant Splash! <i>Taught a mathematical modeling course to local high school students.</i>	<i>April 2019</i>
NYUrWIS Girls Mentorship Program <i>Conducted science experiments with 4th and 5th grade NYC students.</i>	<i>2017- present</i>
Judge at JMM undergraduate poster session	<i>January 2019</i>
1000 Girls 1000 Futures Mentoring Program <i>Served as a math and science mentor to a middle school student in Denmark.</i>	<i>2017- 2018</i>
Judge at The Scientista Symposium	<i>April 2018</i>
Chapter president (AWM) at Rensselaer	<i>2016-2017</i>
Coach for the Mathematical Contest in Modeling (MCM/ICM)	<i>January 2016</i>
Volunteer at Science Enrichment Day <i>Engaged 4th and 5th grade students in science activities.</i>	<i>April 2016</i>
Department of Mathematical Sciences student representative <i>in the School of Science Graduate Student Council</i>	<i>AY 2014-2015</i>
Chapter Treasurer of the (SIAM) student chapter at Rensselaer	<i>2012-2014</i>
Journals refereed: PLOS One, Physical Review E.	

Organizing Activities

Co-organizer of a minisymposium titled “Mathematical modeling of neuronal networks” <i>SMB Annual Meeting, Montreal, Canada</i>	<i>July 2019</i>
Co-organizer of a minisymposium titled “Neuronal Computations in Brain Networks” <i>SIAM Conference on Applications of Dynamical Systems, Salt Lake City, UT</i>	<i>May 2019</i>
Co-organizer of a minisymposium titled “Information Processing in Neuronal Networks” <i>SIAM Conference on the Life Sciences, Minneapolis, MN</i>	<i>August 2018</i>

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 *May 2017*

Co-organizer of a **minisymposium** titled “The emergence of oscillations in neuronal networks” *SIAM Conference on the Life Sciences*, Boston, MA *July 2016*

Workshops

AMS-MRC: Agent-based modeling in Biological and Social Systems
Crime in Santa Monica, Whispering Pines, RI *July 2018*

SAMSI: Challenges in Computational Neuroscience (CCNS)
Understanding Neuro-mechanical Processes in Locomotion with Physical Modeling and Network Analysis, Durham, NC *August 2015*

A Research Collaboration Workshop for Women in Mathematical Biology
Sleep, Circadian Rhythms and Pain, NIMBioS, Knoxville TN *June 2015*

SIAM Workshop on Network Sciences, Salt Lake City, UT *May 2015*

Travel Grants

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

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

MRC Award – to attend the *Mathematics Research Communities (MRC)* workshop on Agent-based modeling *July 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 *July 2018*

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

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

SAMSI Travel Award – to attend and participate in the *Challenges in Computational Neuroscience Workshop at SAMSI*, Durham, NC *August 2015*

NIMBioS Travel Award – to attend the *Research Collaboration Workshop for Women in Mathematical Biology*, Knoxville, TN *June 2015*

SIAM Student Travel Award – to attend and give an invited talk at the *SIAM Conference on Applications of Dynamical Systems*, Snowbird, UT *May 2015*

Memberships

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)

Society for Neuroscience (SFN)

Graduate Society for Women Engineers (SWE)