

# Jennifer CRODELLE, PhD

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

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

## RESEARCH INTERESTS

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COMPUTATIONAL BIOLOGY | In particular, 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

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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

AUG 2014 | Master of Science in APPLIED MATHEMATICS, **Rensselaer Polytechnic Institute**

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

## PUBLICATIONS

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### JOURNAL ARTICLES

J. Crodelle, D. Zhou, G. Kovacic, and D. Cai. *A computational model of electrotonic coupling between pyramidal cells in the cortex*, (Accepted).

Z.K. Zhang, J. Crodelle, and D. Zhou. *A Combined Offline-Online Algorithm for Hodgkin-Huxley Neural Networks*. *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).

#### IN PREPARATION

J. Crodelle and David W. McLaughlin. *Mathematical model of the developing visual cortex*.

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*.

#### SELECTED INVITED TALKS

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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*,  
PI MU EPSILON HONOR SOCIETY INDUCTION CEREMONY, Marist College, NY

FEB 2018 | *Circadian rhythmicity of pain sensitivity: A firing-rate model of dorsal horn circuitry*  
COMPUTATIONAL BIOLOGY SEMINAR, Courant Institute, NY

- JUN 2017 | *Synchrony among synaptically and electrically connected neurons in the cortex*  
THIRD INTERNATIONAL CONFERENCE ON MATHEMATICAL NEUROSCIENCE, Boulder, CO
- MAR 2017 | *The role of gap junctions in synchronizing neuronal activity*  
OXFORD COLLEGE OF EMORY UNIVERSITY COLLOQUIUM, Oxford, GA
- JAN 2017 | *An Investigation into the role of gap junctions in synchronizing neuronal activity*  
MARIST COLLEGE SEMINAR SERIES, Poughkeepsie, NY
- JUL 2016 | *Synchronizing cortical dynamics via gap junctions between excitatory neurons*  
AIMS CONFERENCE SERIES ON DYNAMICAL SYSTEMS AND DIFFERENTIAL EQUATIONS, Orlando, FL
- OCT 2015 | *Gap Junctions in the Cortex and their properties*  
DYNAMICAL SYSTEMS SEMINAR AT RENSSELAER, Troy, NY
- APR 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

## CONTRIBUTED TALKS & POSTER PRESENTATIONS

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- NOV 2018 | *A mathematical model for the circadian rhythmicity of pain sensitivity in the dorsal horn (poster)*,  
SOCIETY FOR NEUROSCIENCE (SFN) ANNUAL MEETING, San Diego, CA
- JAN 2017 | *The role of electrotonic junctions between excitatory neurons in the cortex*,  
JOINT MATHEMATICAL MEETINGS, Atlanta, GA
- SEP 2015 | *Synchronizing Cortical Dynamics via Gap Junctions Between Excitatory Neurons (poster)*,  
SOCIETY FOR NEUROSCIENCE (SFN) ANNUAL MEETING, Chicago, IL

## TEACHING EXPERIENCE

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### INSTRUCTOR

- Fall 2019 | Linear Algebra (Courant)
- Spring 2019 | Linear Algebra (Courant)
- Fall 2018 | Ordinary Differential Equations (Courant)
- Fall 2016 | Multivariable Calculus (Russell Sage College)
- Summer 2015 | Calculus II (Rensselaer)
- Fall 2015 | TA Seminar (Rensselaer)

### 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

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### RESEARCH MENTOR/ADVISOR TO:

- 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 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

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- 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

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- 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

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- 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

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- 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
- Jul 2016 | Co-organizer of a minisymposium titled *The emergence of oscillations in neuronal networks*  
SIAM CONFERENCE ON THE LIFE SCIENCES, Boston, MA

## SERVICE & OUTREACH

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- 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*
- AY 2016-2017 | *Chapter president (AWM) at Rensselaer*
- Jan 2016 | *Coach for the Mathematical Contest in Modeling (MCM/ICM)*
- Apr 2016 | *Volunteer at Science Enrichment Day* Engaged 4th and 5th grade students in science activities.
- AY 2014-2015 | *Department of Mathematical Sciences student representative*
- 2012-2014 | *Chapter Treasurer of the (SIAM) student chapter at Rensselaer*

JOURNALS REFEREED: PLOS One, Physical Review E.

## MEMBERSHIPS

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- 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)