

Nadejda V. Drenska's Curriculum Vitae

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Research Interests

Viscosity solutions of PDEs and optimal control theory applied to online machine learning problems from the area of ‘prediction with expert advice;’ semi-supervised learning analysis through the game-theoretic p -Laplacian.
Broader: nonlinear analysis, PDEs, semi-supervised learning, repeated two-person games, graph theory, applications in computer science, financial mathematics

Positions Held:

Rufus Isaacs Postdoctoral Fellow at Johns Hopkins University	2021-present
MCFAM Postdoc at University of Minnesota, Twin Cities	2018-2021

Education

New York University – Courant Institute of Mathematical Sciences	2017
Mathematics Ph.D., adviser Professor Robert V. Kohn, A PDE Approach to a Prediction Problem Involving Randomized Strategies	
Brown University	2012
B. Sc. in Mathematics with Honors and B. Sc. in Applied Mathematics with Honors, <i>magna cum laude</i>	
Sofia High School of Mathematics (Sofia, Bulgaria)	2007

Publications and Manuscripts

N. Drenska and M. Bichuch **Optimal Investment under Small Changes of Risk Aversion** (*in preparation*)
J. Calder and N. Drenska. **Semi-Supervised Learning and the p -Laplacian.** (*in preparation*)
D. Mosaphir, J. Calder, and N. Drenska. **Numerical Solution of a PDE Arising from Prediction with Expert Advice.** (*in preparation*)
J. Calder and N. Drenska. **Asymptotically Optimal Strategies for Online Prediction with History-Dependent Experts.** *accepted, Journal of Fourier Analysis and Applications*, **27**, article 20, 2020, <https://doi.org/10.1007/s00041-021-09815-4>
N. Drenska and J. Calder. **Online Prediction with History-Dependent Experts: The General Case.** *accepted, Communications on Pure and Applied Mathematics (CPAM)*, 2020, *arXiv:2008.00052*
N. Drenska and R. V. Kohn. **A PDE Approach to the Prediction of a Binary Sequence with Advice from Two History-Dependent Experts.** *accepted, Communications on Pure and Applied Mathematics (CPAM)*, 2020 *arXiv:2007.12732*
N. Drenska and R.V. Kohn. **Prediction with Expert Advice: a PDE Perspective.** *Journal of Nonlinear Science*, **30(1): 137-173**, 2020, <https://doi.org/10.1007/s00332-019-09570-3>
N. Drenska. **A PDE Approach to a Prediction Problem Involving Randomized Strategies.** PhD thesis, New York University, 2017

Selected Talks

A PDE Interpretation of Prediction with Expert Advice	
Johns Hopkins Applied Mathematics and Statistics Colloquium	2021

JMU Artificial Intelligence and Machine Learning Seminar Series	2021
WPI Colloquium	2021
Joint Mathematics Meetings	2021
OneWorld Machine Learning	2020
LMS-Bath Symposium	2020
Two PDE Approaches to A Problem from Prediction with Expert Advice	
IPAM, UCLA	2020
Analysis and Applied Mathematics Seminar, UIC	2020
PDE Approaches to Two Problems from Prediction with Expert Advice	
Applied Interdisciplinary Mathematics Seminar, UMichigan	2019
A PDE Approach to Some Randomised-Strategy Two-Player Games	
IMA Data Science Seminar, UMN	2018
Materials Working Groups, NYU	2016
A PDE Approach to Prediction with Expert Advice	
WPI STEM Faculty Launch, WPI	2016
RPI Applied Math Days, RPI	2016
SIAM Conference on Analysis of PDEs, Scottsdale AZ (awarded SIAM Student Travel Award)	2015
Materials Working Group, NYU	2015

Teaching Experience

Applied Mathematics and Statistics Department, Johns Hopkins University

Instructor for Probability and Statistics for the Life Sciences present

Instructor for Freshman Experience Course ‘Mathematics in Baseball’ present

University of Minnesota 2018-2021

Instructor for Multivariable Calculus, PDEs I and II

Instructor and course supervisor for 13 Multivariable Calculus sections 2018

Courant Institute of Mathematical Sciences, NYU 2014, 2015

Teaching Assistant for Calculus I, PDEs, and ODEs

Mathematics Department, Brown University 2009, 2010, 2012

Teaching Assistant and/or grader for Analysis, ODEs, PDEs, Multivariable Calculus

Division of Applied Mathematics, Brown University 2011

Teaching Assistant for Methods of Applied Mathematics I, Methods of Applied Mathematics II

Math Resource Center, Brown University 2009

Tutor for calculus, linear algebra, and methods of applied mathematics (differential equations)

Teaching High School Students

Instructor for Machine Learning Virtual Summer Camp for high school students	2020
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Undergraduate Research Projects

“Snaking Under Radial Perturbations”	Summer 2012
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supervisor Professor Bjorn Sandstede, presented at Summer at ICERM

Applied Mathematics Thesis: “Numerical Approximation of Spectra for Localized Oscillatory Structures”	2012
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Thesis Adviser Professor Bjorn Sandstede, Division of Applied Mathematics, Brown University

presented at Summer Research Symposium and Theories in Action, Brown U

Mathematics Thesis: “Representation of Periodic Data with Fourier Methods and Wavelets”	2012
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Thesis Adviser Professor Jill Pipher, Mathematics Department, Brown University

- presented at Mathematics Undergraduate Group under “Wavelet Approximations of Curves in the Plane”

Awards and Recognition

Moses A. Greenfield Research Award for Outstanding Interdisciplinary studies, Courant Institute, NYU	2016
Rohn Truell Prize to an outstanding undergraduate student in the Division of Applied Mathematics, Brown U	2012
Sarah Dyer Barnes Scholarship – Brown University	2011 - 2012
Henry Parker Manning Prize Examination – 1 st prize (Brown University mathematics competition)	2011
- graduated with Recognition for Outstanding Achievements in the Areas of Mathematics and Physics	
- National Diploma for Outstanding Achievements from the Minister of Education of Bulgaria	
Member of the Bulgarian Extended National Team for the International Mathematics Olympiad	2007
Member of the Bulgarian Extended National Team for the Balkan Mathematics Olympiad	2005
1 st and 2 nd prizes at National Physics Competitions	2005 - 2006

Service

Elected Postdoc Representative at faculty meetings at the Applied Mathematics and Statistics Department, Johns Hopkins University	2021
Co-organizing an IMA workshop ‘Optimal Control, Optimal Transport, and Data Science’ with Jeff Calder, Dejan Slepcev, and Chai Wu	2020
Co-organized a minisymposium ‘Partial Differential Equations in Machine Learning and Data Science’ with Jeff Calder at the SIAM Conference on Analysis of PDEs	2017
President of The Courant Student Organization	2014 - 2015
President of The Department Undergraduate Group of Applied Mathematics	2011 - 2012