Mary Vaughan

CONTACT INFORMATION	Department of Mathematics Iowa State University Email: `maryo@iastate.edu` 396 Carver Hall Website: `maryvaughan.github.io` 411 Morrill Rd Ames, IA 50011 USA

<small>EDUCATION</small>

Iowa State University, Ames, IA   expected: 2015-2020

Ph.D. Candidate, Mathematics

⋄ Advisor: Pablo Raúl Stinga

University of Wisconsin–La Crosse, La Crosse, WI   2011-2015

B.S. in Mathematics

⋄ Minor in chemistry
⋄ Academic Advisor: Susan Kelly
⋄ Research Advisor: James Peirce

<small>RESEARCH INTERESTS</small>

Partial Differential Equations and Harmonic Analysis
Nonlocal equations, fractional derivatives, fractional Laplacians, regularity theory, materials modeling, viscoelasticity, peridynamics, frame theory, Kaczmarz algorithm

<small>PUBLICATIONS</small>

[1] P. R. Stinga and M. Vaughan, Fractional derivatives, fractional Laplacians, and weighted Sobolev spaces, *Nonlinear Anal.* **193** (2020), 111505.

[2] A. Aboud, E. Curl, S. N. Harding, M. Vaughan, and E. S. Weber, The dual Kaczmarz algorithm, *Acta Appl Math* **165** (2020), 133–148.

<small>PAPERS IN PREPARATION</small>

[3] P. R. Stinga and M. Vaughan, Regularity of viscosity solutions for nonlocal equations.

[4] P. Seleson, P. R. Stinga, and M. Vaughan, Peridynamic models for viscoelastic materials.

<small>FELLOWSHIPS AND INTERNSHIPS</small>

Robert J. Lambert Graduate Assistantship   Spring 2020

Iowa State University, Department of Mathematics
Teaching release awarded to one graduate student to improve the quantity and quality of research

Brown Graduate Fellowship, $10,000   Fall 2019-Spring 2020

Iowa State University, Office of the Vice President for Research
One of twelve students across the university to receive this award

NSF-MSGI Summer Internship, $12,000   Summer 2018

Project Title: Fractional PDEs for materials modeling
Mentor: Pablo Seleson
Hosting Facility: Oak Ridge National Laboratory
One of twenty students to be selected

	Dean's Distinguished Summer Fellowship, $4,000	Summer 2014

University of Wisconsin–La Crosse, College of Science and Health
Mentor: James Peirce

GRANTS	**Graduate Student Travel Grant**, $250	October 2018

American Mathematical Society
Purpose: Invited to present at AMS Sectional Meeting in Ann Arbor, MI

Inclusion Initiatives Grant (Co-PI), $1,580   May 2018

Iowa State University, Office of the Vice President for Diversity and Inclusion
Purpose: Host the Midwest Mathematics Inclusion and Diversity Workshop for Undergraduates, October 2018

Women's and Diversity Grant Award (Co-PI), $5,000   May 2017

Iowa State University, Office of the Vice President for Diversity and Inclusion
Purpose: Host the first Joint EDGE-MOCA Speaker Series, 2018-19

Student Travel Grant, $400   Fall 2015

University of Wisconsin–La Crosse
Purpose: Present at the Joint Mathematics Meetings in San Antonio, TX

HONORS AND AWARDS   Honorable Mention in the Elevating Mathematics Video Competition   March 2019
National Academies' Board on Mathematical Science and Analytics
Video found at `https://youtu.be/tSylHPE6WKk`

Robert J. Lambert Research Award, $1,000   Fall 2018
Iowa State University, Department of Mathematics
Awarded to one graduate student for research excellence

Graduate College Teaching Excellence Award, $250   Fall 2017
Iowa State University, Graduate College
Awarded to the top 10% of the graduate students involved in teaching

Outstanding Work in Mathematics Award   Spring 2014, 2015
University of Wisconsin–La Crosse, Department of Mathematics

Freshmen Chemist of the Year   Spring 2012
University of Wisconsin–La Crosse, Department of Chemistry

RESEARCH STAYS   Oak Ridge National Laboratory, TN   January 2019

CONFERENCE TALKS

[1] *A priori estimates for fractional powers of nondivergence form elliptic operators* at AIMS Conference on Dynamical Systems, Differential Equations and Applications, Atlanta, GA. June 2020 (**Invited**) - upcoming

[2] *Fractional derivatives and characterizations of one-sided weighted Sobolev spaces* at AIMS Conference on Dynamical Systems, Differential Equations and Applications, Atlanta, GA. June 2020 (**Invited**) - upcoming

[3] *A priori estimates for fractional powers of nondivergence form elliptic operators* at Texas Differential Equations Conference, Austin, TX. March 2020

[4] *Fractional derivatives and characterizations of one-sided weighted Sobolev spaces* at Young Researchers Minisymposium, Onna, Okinawa, Japan. February 2020 (**Invited**)

[5] *Fractional derivatives and Laplacians in one and two-sided weighted Sobolev spaces* at Joint Mathematics Meeting, Denver, CO. January 2020

[6] *Fractional derivatives in one-sided weighted Sobolev spaces* at SIAM Central States Section, Ames, IA. October 2019 (**Invited**)

[7] *Fractional derivatives and one-sided weighted Sobolev spaces* at 7th Midwest Women in Mathematics Symposium, Iowa City, IA. April 2019

[8] *Fractional derivatives in one-sided weighted Sobolev spaces* at AMS Sectional Meeting, Special Session on Recent Trends on Local, Nonlocal and Fractional Partial Differential Equations, Ann Arbor, MI. October 2018 (**Invited**)

[9] *Investigating the dependence of transmission rate to water temperature in a host-parasite system* at Wisconsin MAA Section Meeting, Ripon College, WI. April 2015

[10] *Investigating the dependence of transmission rate to water temperature in a host-parasite system* at Joint Mathematics Meeting, San Antonio, TX. January 2015

SEMINARS AND COLLOQUIUM TALKS

[1] Continuum Mechanics Seminar, University of Nebraska-Lincoln, NE. April 2020 (Invited) - upcoming

[2] *A priori* estimates for fractional powers of nondivergence form elliptic operators at PDE & Analysis Seminar, University of Pittsburgh, PA. February 2020 (Invited)

[3] Fractional powers of nondivergence form elliptic operators Junior Analysis Seminar, Iowa State University, IA. January 2020

[4] What is a fractional derivative? at Colloquia, Carleton College, MN. November 2019 (Invited)

[5] *Viscosity Solutions of Elliptic Equations (2 Days)* at Junior Analysis Seminar, Iowa State University, IA. October & November 2019

[6] *Viscoelasticity and Fractional Derivatives* at Continuum Mechanics Seminar, University of Nebraska-Lincoln, NE. April 2019 (Invited)

[7] *A brief history and comparison of fractional derivatives* at UWL Math Club, University of Wisconsin–La Crosse, WI. November 2018 (Invited)

[8] *Fractional derivatives in one-sided weighted Sobolev spaces* at SIAM Seminar, Iowa State University, IA. November 2018

[9] *What are fractional derivatives?* at Graduate Student Seminar, Iowa State University, IA. September 2018.

[10] *Fractional PDEs for materials modeling* at Computational and Applied Mathematics Seminar, Oak Ridge National Laboratory, TN. August 2018

[11] *How to define fractional Laplacians and fractional derivatives* at Continuum Mechanics Seminar, University of Nebraska-Lincoln, NE. April 2018 (Invited)

[12] *How to define fractional Laplacians and fractional derivatives* at Analysis Seminar, Iowa State University, IA. April 2018

[13] *Two talks: the truth about graduate school and what is a fractional derivative?* at UWL Math Club, University of Wisconsin–La Crosse, WI. November 2017 (Invited)

[14] *Investigating the dependence of transmission rate to water temperature in a host-parasite system* at Mathematics Department Colloquium, University of Wisconsin–La Crosse, WI. October 2014

[15] *Investigating the dependence of transmission rate to water temperature in a host-parasite system* at Mathematics-Biology Working Group, University of Wisconsin–La Crosse, WI. October 2014

[16] *Investigating the dependence of transmission rate to water temperature in a host-parasite system* at Dean's Distinguished Fellowship Meeting, University of Wisconsin–La Crosse, WI. July 2014

POSTER PRESENTATIONS

[1] *Viscoelasticity and fractional derivatives* at Workshop on Experimental and Computational Fracture Mechanics, Baton Rouge, LA. February 2020

[2] *Fractional derivatives and Laplacians in one and two-sided weighted Sobolev spaces* at the 2020 Joint Mathematics Meeting, Denver, CO. January 2020

[3] *Fractional derivatives and Laplacians in one and two-sided weighted Sobolev spaces* at Local and Nonlocal Trends in Analysis and Geometry, Pittsburgh, PA. October 2019

[4] *Fractional derivatives and Laplacians in one and two-sided weighted Sobolev spaces* at SIAM Conference on Computational Science and Engineering, Spokane, WA. February 2019

[5] *Fractional PDEs for materials modeling* at ORPA Research Symposium, Oak Ridge National Laboratory, TN. August 2018

[6] *Investigating the dependence of transmission rate to water temperature in a host-parasite system* at Midwest Mathematical Biology Conference, University of Wisconsin–La Crosse, WI. May 2015

[7] *Investigating the dependence of transmission rate to water temperature in a host-parasite system* at Joint Mathematics Meeting, San Antonio, TX. January 2015

[8] *Investigating the dependence of transmission rate to water temperature in a host-parasite system* at Summer Research Expo, University of Wisconsin–La Crosse, WI. August 2014

WORKSHOP PARTICIPANT

AWM Workshop at the 2020 Joint Mathematics Meeting, Denver, CO. January 2020

AWM Workshop at the 2019 SIAM Conference on CSE, Spokane, WA. February 2019

CONFERENCE ATTENDANCE

[1] AIMS Conference on Dynamical Systems, Differential Equations and Applications, Atlanta, GA. June 2020 - upcoming

[2] The 50th John H. Barrett Memorial Lectures, Knoxville, TN. May 2020 - upcoming

[3] Texas Differential Equations Conference, Austin, TX. March 2020

[4] Workshop on Experimental and Computational Fracture Mechanics, Baton Rouge, LA. February 2020

[5] Young Researchers Minisymposium, Onna, Okinawa, Japan. February 2020

[6] Joint Mathematics Meetings, Denver, CO. January 2020

[7] SIAM Central States Section, Ames, IA. October 2019

[8] Local and Nonlocal Trends in Analysis and Geometry, Pittsburgh, PA. October 2019

[9] Midwest Geometry Conference 2019, Ames, IA. September 2019

[10] 7th Midwest Women in Mathematics Symposium, Iowa City, IA. April 2019

[11] SIAM Conference on Computational Science and Engineering, Spokane, WA. February 2019

[12] AMS Sectional Meeting, University of Michigan, MI. October 2018

[13] NSF CBMS Conference on Harmonic Analysis: Smooth and Non-Smooth, Iowa State University, IA. June 2018

[14] Rivière-Fabes Symposium, University of Minnesota, MN. May 2018

[15] Midwest Women in Mathematics Symposium, Purdue University, IN. April 2018

[16] February Fourier Talks, University of Maryland, MD. February 2018

[17] Nonlocal School on Fractional Equations, Iowa State University, IA. August 2017

[18] Iowa Nebraska Functional Analysis Seminar, Creighton University, NE. April 2017

[19] Workshop on Noncommutative Analysis, University of Iowa, IA. June 2016

[20] Thematic Program on Boundaries and Dynamics, Undergraduate Summer School, University of Notre Dame, IN. May 2015

[21] Midwest Mathematical Biology Conference, University of Wisconsin–La Crosse, WI. May 2015

[22] Wisconsin MAA Section Meeting, Ripon College, TX. April 2015

[23] Joint Mathematics Meetings, San Antonio, TX. January 2015

TEACHING EXPERIENCE

Iowa State University

Math 554: Stochastic Proc.	Grader	Fall 2019
Math 519: Applied Math I	Grader	Fall 2019
Math 267: Elementary Diff. Eqs. & Laplace Transforms	Sole Instructor (15 students)	Summer 2019
Math 266: Elementary Diff. Eqs.	Sole Instructor (3 students)	Summer 2019
Math 166: Calculus II	Sole Instructor (35 students)	Spring 2018
Math 165: Calculus I	Team–Based Learning TA	Fall 2017
Math 166: Calculus II	Sole Instructor (35 students)	Summer 2017
Math 365: Complex Variables	Grader	Spring 2017
Math 105: Intro to Math Ideas	Grader	Spring 2017
Math 160: Survey of Calculus	Teaching Assistant	Fall 2016
Math 265: Calculus III	Grader	Summer 2016
Math 143: Pre-Calculus	Grader	Summer 2016
Math 265: Calculus III	Teaching Assistant	Spring 2016
Math 166: Calculus II	Teaching Assistant	Fall 2015

University of Wisconsin–La Crosse

Tutor	Fall 2013 - Spring 2015

| | Young Scholars Teaching Assistant | July 14-18, 2014 |

TEACHING DEVELOPMENT	Team Based Learning Curriculum Assistant	Fall 2018–Spring 2019

      Funded through the Howard Hughes Medical Institute grant
Goal: Develop Team Based Learning material for non-TBL instructors to implement active learning in non-TBL classes

Teaching Seminar on the Book *Make It Stick - The Science of Successful Learning* by Peter C. Brown

Co-leader of seminar	Spring 2019
Participant of seminar	Spring 2017

SERVICE

Junior Analysis Seminar

⋄ Co-founder and co-organizer   2019-2020
⋄ Seminar at Iowa State for graduate students interested in analysis

Midwest Mathematics Inclusion and Diversity Workshop for Undergraduates

⋄ Organizing committee   October 2018
⋄ https://sites.google.com/iastate.edu/mmidwu18/

Joint EDGE/AWM-MOCA Speaker Series Organization Committee

⋄ Co-founder and Chair   2017 - 2019
⋄ https://orion.math.iastate.edu/jamss/

Math Graduate Student Organization

⋄ Treasurer   2016 - 2017
⋄ Graduate Student Liaison   2017 - 2018

Association for Women in Mathematics (AWM) - Iowa State Chapter

⋄ Co-founder and member   November 2017 - present
⋄ Interim Secretary   November 2017 - February 2018
⋄ Member of Program and Events Committee   November 2017 - August 2018

First-year graduate peer mentor, Iowa State University   Summer 2016 - present

VOLUNTEERING

Midwest Geometry Conference 2019 at Iowa State   September 2019

⋄ Assisted with registration and organization

Sonia Kovalevsky Mathematics Day at Iowa State   March 2019

⋄ Assisted with student activities and organization

Great Plains Math League Competition   February 2016, 2017

GRADUATE COURSEWORK

❏ Abstract Algebra I, II
❏ Complex Variables
❏ Continuum Mechanics (Engineering)
❏ Early Graduate Research
❏ Functional Analysis
❏ Introduction to Stochastic Processes

❏ Linear Algebra
❏ Methods of Applied Math I, II
❏ Partial Differential Equations I, II
❏ Real Analysis I, II
❏ Regularity Theory for Elliptic PDEs

RELEVANT SKILLS   Elementary MatLab and Mathematica

MEMBERSHIPS   American Mathematical Society
                    Association for Women in Mathematics
                    Enhancing Diversity in Graduate Education - Iowa State Cluster
                    Mathematical Association of America
                    National Postdoctoral Association
                    Society for Industrial and Applied Mathematics
                    SIAM Activity Group on Analysis of Partial Differential Equations

OTHER   Certified Completion of Green Dot Bystander Training   February 2018
                    ◇ Training to enhance influence to address power-dominated violence

                    Summer Lifeguard   2009 - 2015
                    ◇ More than 10 active saves
                    ◇ Swim lesson instructor for 5 years

                    Martial Arts
                    ◇ Black Belt in Karate
                    ◇ Blue Belt in Taekwondo

REFERENCES   **Pablo Raúl Stinga** (`stinga@iastate.edu`, 515-294-6420)
                    Assistant Professor,
                    Department of Mathematics, Iowa State University
                    Ph.D. Advisor

                    Pablo Seleson (`selesonpd@ornl.gov`, 865-576-2856)
                    Research Scientist,
                    Computer Science and Mathematics Division, Oak Ridge National Laboratory

                    Paul Sacks (`psacks@iastate.edu`, 515-294-8143)
                    Professor of Mathematics,
                    Department of Mathematics, Iowa State University

                    Heather Bolles (`hbolles@iastate.edu`, 515-294-8465)
                    Senior Lecturer,
                    Department of Mathematics, Iowa State University
                    Teaching Reference