

# Mary Vaughan

---

CONTACT INFORMATION	Department of Mathematics Iowa State University 396 Carver Hall 411 Morrill Rd Ames, IA 50011 USA	Email: <a href="mailto:maryo@iastate.edu">maryo@iastate.edu</a> Website: <a href="http://orion.math.iastate.edu/maryo/">orion.math.iastate.edu/maryo/</a>
EDUCATION	<b>Iowa State University</b> , Ames, IA Ph.D. Candidate, Mathematics ◊ Advisor: Pablo Raúl Stinga	expected: May 2020
	<b>University of Wisconsin–La Crosse</b> , La Crosse, WI B.S. in Mathematics ◊ Minor in chemistry ◊ Academic Advisor: Susan Kelly ◊ Research Advisor: James Peirce	May 2015
RESEARCH INTERESTS	<b>Partial Differential Equations and Harmonic Analysis</b> Nonlocal equations, fractional derivatives, fractional Laplacians, regularity theory, materials modeling, frame theory, Kaczmarz algorithm	
PUBLICATIONS	[1] P. R. Stinga and M. Vaughan, Fractional derivatives, fractional Laplacians, and weighted Sobolev spaces, <i>Nonlinear Anal.</i> (2019), to appear. [2] A. Aboud, E. Curl, S. N. Harding, M. Vaughan, and E. S. Weber, The dual Kaczmarz algorithm, <i>Acta Appl Math</i> (2019), to appear.	
PAPERS IN PREPARATION	[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.	
FELLOWSHIPS AND INTERNSHIPS	<b>Brown Graduate Fellowship</b> , \$10,000 Iowa State University, Office of the Vice President for Research One of twelve students across the university to receive this award	Fall 2019-Spring 2020
	<b>NSF-MSGI Summer Internship</b> , \$12,000 Project Title: Fractional PDEs for materials modeling Mentor: Pablo Seleson Hosting Facility: Oak Ridge National Laboratory One of twenty students to be selected	Summer 2018
	<b>Dean’s Distinguished Summer Fellowship</b> , \$4,000 University of Wisconsin–La Crosse, College of Science and Health Mentor: James Peirce	Summer 2014

GRANTS	<b>Graduate Student Travel Grant</b> , \$250	October 2018
	American Mathematical Society Purpose: Invited to present at AMS Sectional Meeting in Ann Arbor, MI	
	<b>Inclusion Initiatives Grant</b> (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	
HONORS AND AWARDS	<b>Women's and Diversity Grant Award</b> (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	
	<b>Student Travel Grant</b> , \$400	Fall 2015
	University of Wisconsin–La Crosse Purpose: Present at the Joint Mathematics Meetings in San Antonio, TX	
	Honorable Mention in the Elevating Mathematics Video Competition National Academies' Board on Mathematical Science and Analytics Video found at <a href="https://youtu.be/tSy1HPE6WKk">https://youtu.be/tSy1HPE6WKk</a>	March 2019
	Robert J. Lambert Research Award, \$1,000 Iowa State University, Department of Mathematics Awarded to two graduate students for research excellence	Fall 2018
	Graduate College Teaching Excellence Award, \$250 Iowa State University, Graduate College Awarded to the top 10% of the graduate students involved in teaching	Fall 2017
RESEARCH STAYS	Outstanding Work in Mathematics Award University of Wisconsin–La Crosse, Department of Mathematics	Spring 2014, 2015
	Freshmen Chemist of the Year University of Wisconsin–La Crosse, Department of Chemistry	Spring 2012
	Oak Ridge National Laboratory, TN	January 27-29, 2019
CONFERENCE TALKS	[1] <i>Fractional derivatives in one-sided weighted Sobolev spaces</i> at SIAM Central States Section, Ames, IA. October 2019 ( <b>Invited</b> ) - upcoming	
	[2] <i>Fractional derivatives and one-sided weighted Sobolev spaces</i> at 7th Midwest Women in Mathematics Symposium, Iowa City, IA. April 2019	
	[3] <i>Fractional derivatives in one-sided weighted Sobolev spaces</i> at AMS Sectional Meeting, Special Session on Recent Trends on Local, Nonlocal and Fractional Partial Differential Equations, Ann Arbor, MI. October 2018 ( <b>Invited</b> )	
	[4] <i>Investigating the dependence of transmission rate to water temperature in a host-parasite system</i> at Wisconsin MAA Section Meeting, Ripon College, WI. April 2015	
	[5] <i>Investigating the dependence of transmission rate to water temperature in a host-parasite system</i> at Joint Mathematics Meeting, San Antonio, TX. January 2015	

SEMINARS AND  
COLLOQUIUM  
TALKS

- [1] PDE & Analysis Seminar, University of Pittsburgh, PA. February 2020 - upcoming
- [2] Colloquia, Carleton College, MN. November 2019 - upcoming
- [3] *Viscosity Solutions of Elliptic Equations* at Junior Analysis Seminar, Iowa State University, IA. October & November 2019
- [4] *Viscoelasticity and Fractional Derivatives* at Continuum Mechanics Seminar, University of Nebraska-Lincoln, NE. April 2019
- [5] *A brief history and comparison of fractional derivatives* at UWL Math Club, University of Wisconsin-La Crosse, WI. November 2018 (Invited)
- [6] *Fractional derivatives in one-sided weighted Sobolev spaces* at SIAM Seminar, Iowa State University, IA. November 2018
- [7] *What are fractional derivatives?* at Graduate Student Seminar, Iowa State University, IA. September 2018.
- [8] *Fractional PDEs for materials modeling* at Computational and Applied Mathematics Seminar, Oak Ridge National Laboratory, TN. August 2018
- [9] *How to define fractional Laplacians and fractional derivatives* at Continuum Mechanics Seminar, University of Nebraska-Lincoln, NE. April 2018
- [10] *How to define fractional Laplacians and fractional derivatives* at Analysis Seminar, Iowa State University, IA. April 2018
- [11] *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)
- [12] *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
- [13] *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
- [14] *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] *Fractional derivatives and Laplacians in one and two-sided weighted Sobolev spaces* at the 2020 Joint Mathematics Meeting, Denver, CO. January 2020 - upcoming
- [2] *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 - upcoming
- [3] *Fractional derivatives and Laplacians in one and two-sided weighted Sobolev spaces* at SIAM Conference on Computational Science and Engineering, Spokane, WA. February 2019
- [4] *Fractional PDEs for materials modeling* at ORPA Research Symposium, Oak Ridge National Laboratory, TN. August 2018
- [5] *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

	<p>[6] <i>Investigating the dependence of transmission rate to water temperature in a host-parasite system</i> at Joint Mathematics Meeting, San Antonio, TX. January 2015</p> <p>[7] <i>Investigating the dependence of transmission rate to water temperature in a host-parasite system</i> at Summer Research Expo, University of Wisconsin–La Crosse, WI. August 2014</p>																	
WORKSHOP PARTICIPANT	<p>AWM Workshop at the 2020 Joint Mathematics Meeting, Denver, CO. January 2020</p> <p>AWM Workshop at the 2019 SIAM Conference on CSE, Spokane, WA. February 2019</p>																	
CONFERENCE ATTENDANCE	<p>[1] Texas Differential Equations Conference, Austin, TX. March 2020 - upcoming</p> <p>[2] Joint Mathematics Meetings, Denver, CO. January 2020 - upcoming</p> <p>[3] SIAM Central States Section, Ames, IA. October 2019 - upcoming</p> <p>[4] Local and Nonlocal Trends in Analysis and Geometry, Pittsburgh, PA. October 2019 - upcoming</p> <p>[5] Midwest Geometry Conference 2019, Ames, IA. September 2019</p> <p>[6] 7th Midwest Women in Mathematics Symposium, Iowa City, IA. April 2019</p> <p>[7] SIAM Conference on Computational Science and Engineering, Spokane, WA. February 2019</p> <p>[8] AMS Sectional Meeting, University of Michigan, MI. October 2018</p> <p>[9] NSF CBMS Conference on Harmonic Analysis: Smooth and Non-Smooth, Iowa State University, IA. June 2018</p> <p>[10] Rivière-Fabes Symposium, University of Minnesota, MN. May 2018</p> <p>[11] Midwest Women in Mathematics Symposium, Purdue University, IN. April 2018</p> <p>[12] February Fourier Talks, University of Maryland, MD. February 2018</p> <p>[13] Nonlocal School on Fractional Equations, Iowa State University, IA. August 2017</p> <p>[14] Iowa Nebraska Functional Analysis Seminar, Creighton University, NE. April 2017</p> <p>[15] Workshop on Noncommutative Analysis, University of Iowa, IA. June 2016</p> <p>[16] Thematic Program on Boundaries and Dynamics, Undergraduate Summer School, University of Notre Dame, IN. May 2015</p> <p>[17] Midwest Mathematical Biology Conference, University of Wisconsin–La Crosse, WI. May 2015</p> <p>[18] Wisconsin MAA Section Meeting, Ripon College, TX. April 2015</p> <p>[19] Joint Mathematics Meetings, San Antonio, TX. January 2015</p>																	
TEACHING EXPERIENCE	<p><b>Iowa State University</b></p> <table><tr><td>Math 554: Stochastic Proc.</td><td>Grader</td><td>Fall 2019</td></tr><tr><td>Math 519: Applied Math I</td><td>Grader</td><td>Fall 2019</td></tr><tr><td>Math 267: Elementary Diff. Eqs. &amp; Laplace Transforms</td><td>Sole Instructor (15 students)</td><td>Summer 2019</td></tr><tr><td>Math 266: Elementary Diff. Eqs.</td><td>Sole Instructor (3 students)</td><td>Summer 2019</td></tr><tr><td>Math 166: Calculus II</td><td>Sole Instructor (35 students)</td><td>Spring 2018</td></tr></table>			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 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	Fall 2019–Spring 2020
	◊ Seminar at Iowa State for graduate students interested in analysis	

Midwest Mathematics Inclusion and Diversity Workshop for Undergraduates

◊ Organizing committee	October 2018
◊ <a href="https://sites.google.com/iastate.edu/mmduw18/">https://sites.google.com/iastate.edu/mmduw18/</a>	

Joint EDGE/AWM-MOCA Speaker Series Organization Committee

◊ Co-founder and Chair	Summer 2017 - Present
◊ <a href="https://orion.math.iastate.edu/jamss/">https://orion.math.iastate.edu/jamss/</a>	

Math Graduate Student Organization

◊ Treasurer	Fall 2016 - Spring 2017
◊ Graduate Student Liaison	Spring 2017 - Spring 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  
◇ Assisted with student activities and organization

March 2019

Great Plains Math League Competition

February 2016, 2017

GRADUATE  
COURSEWORK

- |   |   |
|---|---|
| <input type="checkbox"/> Abstract Algebra I, II               | <input type="checkbox"/> Linear Algebra                       |
| <input type="checkbox"/> Complex Variables                    | <input type="checkbox"/> Methods of Applied Math I, II        |
| <input type="checkbox"/> Continuum Mechanics (Engineering)    | <input type="checkbox"/> Partial Differential Equations I, II |
| <input type="checkbox"/> Early Graduate Research              | <input type="checkbox"/> Real Analysis I, II                  |
| <input type="checkbox"/> Functional Analysis                  | <input type="checkbox"/> Regularity Theory for Elliptic PDEs  |
| <input type="checkbox"/> Introduction to Stochastic Processes |   |

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](mailto:stinga@iastate.edu), 515-294-6420)  
Assistant Professor,  
Department of Mathematics, Iowa State University  
*Ph.D. Advisor*

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

**Paul Sacks** ([psacks@iastate.edu](mailto:psacks@iastate.edu), 515-294-8143)  
Professor of Mathematics,  
Department of Mathematics, Iowa State University

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