

# Jeremy Upsal

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University of Washington  
Lewis Hall #214, Box 353925  
Seattle, WA 98195

## EDUCATION

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**Ph.D. in Applied Mathematics** Expected 6/2020

The University of Washington. Seattle, WA, USA.  
Advisor: Bernard Deconinck.

**M.S. in Applied Mathematics** 1/2016

The University of Washington. Seattle, WA, USA.  
Advisor: Bernard Deconinck.

**B.S. in Applied Mathematics, Minor in Physics** 5/2014

The University of Colorado. Boulder, CO, USA.  
Magna Cum Laude

## TEACHING EXPERIENCE

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### Predocctoral Instructor, The University of Washington

**AMATH 301 - Introduction to Scientific Computing (~ 400 students)** Autumn 2019

- This is an introductory scientific computing course with three sections of undergraduate students totalling approximately 400 students. I am in charge of all classroom activities and assessment.
- This course introduces MATLAB and mathematical algorithms in MATLAB.
- This class is taught in a flipped-classroom environment.
- We will use weekly in-class activities for students as a means of active learning as well as Poll Everywhere to gauge student understanding.

**AMATH 353 - Partial Differential Equations and Waves (~ 60 students)** Spring 2019,  
Spring 2018,  
Summer 2017

- This is an introductory Partial Differential Equations course with 60 undergraduate students. I was in charge of all classroom activities and assessment.
- This course introduces solution methods for linear and nonlinear PDEs. When I taught the course, I emphasized analysis of solutions.
- The first time I taught this course I followed departmental course notes exclusively. The second time I taught the course, I implemented some mastery-based testing ideas, including the ability to retake quizzes. The third time I taught the course, I implemented a flipped classroom, used the same mastery-based testing ideas, and created more clear and concise learning goals to improve clarity for students.

**AMATH 383 - Introduction to Continuous Mathematical Modeling (~ 50 students)** Autumn 2018

- This class is an introductory Mathematical Modeling course with 60 students. I was in charge of all classroom activities and assessment.
- I implemented a flipped classroom for this course.

## Math Science Upward Bound Summer Academy Instructor, The University of Washington

### Statistics (~ 10 students)

Summer 2019,  
Summer 2018

- This class is an accelerated AP Statistics course for approximately 10 rising high school seniors from traditionally underrepresented backgrounds.
- I co-taught this class both years.

### Machine Learning (~ 20 students)

Summer 2019,  
Summer 2018

- This class is an introduction to machine learning elective course for approximately 15 high school students from traditionally underrepresented backgrounds.
- In Summer 2018, I co-designed this course and continued to refine it in Summer 2019. I co-taught this class both years.

## Teaching Assistant, The University of Washington

- AMATH 402 - Introduction to Dynamical Systems and Chaos Winter 2019
- AMATH 383 - Introduction to Continuous Mathematical Modeling Autumn 2016
- AMATH 353 - Partial Differential Equations and Waves Summer 2016
- AMATH 352 - Applied Linear Algebra and Numerical Analysis Summer 2016
- AMATH 351 - Introduction to Differential Equations and Applications Spring 2016
- MATH 124 - Calculus with Analytic Geometry I Winter 2016
- MATH 126 - Calculus with Analytic Geometry III Spring 2015
- MATH 125 - Calculus with Analytic Geometry II Winter 2015 & Autumn 2014

## Learning Assistant, The University of Colorado

- APPM 3310 - Matrix Methods Spring 2014
- APPM 4440 - Undergraduate Applied Analysis I Fall 2013

## Private Tutoring

8/2013–present

- I typically tutor 1-2 students per quarter.
- Topics include: high-school algebra, high-school precalculus, high-school calculus, college calculus, linear algebra, differential equations, modern algebra, and topology.

## Math Tutor, The University of Colorado Student Academic Success Center

9/2011–5/2014

## PUBLICATIONS

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5. *Applying Bloom's taxonomy to exam questions in an undergraduate scientific computing course*, In preparation. With C. Gin, B. Liu, K. Marcinko, and J. Price.
4. *A nonlinear Gershgorin's theorem for operator matrices*, In preparation.
3. *Real Lax spectrum implies spectral stability*, Submitted. With B. Deconinck. <https://arxiv.org/abs/1909.10119>
2. *The orbital stability of elliptic solutions of the Focusing Nonlinear Schrödinger Equation*, Accepted for publication in the SIAM Journal on Mathematical Analysis. With B. Deconinck. (2019) <https://arxiv.org/abs/1901.08702>.

1. *On the nonintegrability of equations for long- and short-wave interactions*, Physics Letters A, Volume 38, Issue 29: 1916-1921. With B. Deconinck. (2018) <https://arxiv.org/abs/1710.09427>

## ACADEMIC CONFERENCES

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### Invited talks

7. *Stability in Partial Differential Equations*. Math/CS Seminar at the University of Puget Sound. December 9, 2019. Tacoma, Washington.
6. *Stability and integrability*. 2nd Biennial Meeting of SIAM Pacific Northwest Section, October 18-20, 2019. Seattle, Washington.
5. *Determining stability for solutions of integrable PDEs*. Applied Mathematics: The Next 50 Years, June 20, 2019. Seattle, Washington.
4. *Real Lax spectrum implies stability*. Eleventh IMACS International Conference on Nonlinear Equations and Wave Phenomena, April 18, 2019. Athens, Georgia.
3. *Aligning exams to learning goals and Bloom's taxonomy in a scientific computing course*. Annual Meeting of the Pacific Northwest Section of the Mathematical Association of America, April 13, 2019. Portland, Oregon.
2. *On the orbital stability of elliptic solutions to focusing NLS*. SIAM Conference on Nonlinear Waves and Coherent Structures, June 12, 2018. Orange, California.
1. *On the orbital stability of elliptic solutions to focusing NLS*. 1st Biennial Meeting of SIAM Pacific Northwest Section, October 27, 2017. Corvallis, Oregon.

### Poster presentations

4. *On the orbital stability of elliptic solutions to focusing NLS*. NSF-CBMS Conference on Solving Problems in Multiply-Connected Domains, June 19, 2018. Orange, California.
3. *On the orbital stability of elliptic solutions to focusing NLS*. Recent Advances in Nonlinear Waves, July 31, 2017. Seattle, Washington.
2. *On the integrability of long and short wave interaction models*. The Tenth IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory, March 30, 2017. Athens, Georgia.
1. *On the integrability of long and short wave interaction models*. Water Waves session at ICERM, April 24, 2017. Providence, Rhode Island.

### Session organization

3. *Aligning practice and assessment with course learning goals*, co-organized with Craig Gin and Kelsey Marcinko. The 2019 Annual Meeting of the Pacific Northwest Section of the Mathematical Association of America, April 12-13, 2019. Portland, Oregon.
2. *Stability and traveling waves*, co-organized with Bernard Deconinck, Anna Ghazaryan, Mat Johnson, Stephane Lafortune, Yuri Latushkin, and Samuel Walsh. The Eleventh IMACS International Conference on Nonlinear Equations and Wave Phenomena, April 17-19, 2019. Athens, Georgia.
1. *Recent Advances in Nonlinear Waves*, co-organized with Xin Yang. 2017 SIAM Pacific Northwest Regional Conference, October 27 - 29, 2017. Corvallis, Oregon.

## RESEARCH EXPERIENCE

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### University of Washington Department of Applied Mathematics

9/2014 – present

- My thesis work focuses on studying the stability of solutions to integrable PDEs.
- I am currently working on a mathematics pedagogy research project that will help to determine the effectiveness of active learning in a large beginning scientific computing course.
- I have worked on a project involving computation of Riemann Surfaces for finite-genus solutions to PDEs.
- I have worked on examining the connection between the Schottky-Prime function on Riemann Surfaces built through Schottky Uniformization and the Riemann Theta Function on Riemann Surfaces built from an algebraic curve.
- I have worked on studying integrability of various Hamiltonian PDEs using Hamiltonian normal form theory, classical perturbation theory, and the method of Zakharov and Schulmann.

### University of Colorado at Boulder Applied Math Department

4/2014 – 8/2014

- Worked towards analytically describing all regions of stability in the four-wave mixing equations with explosive instability.
- Advisor: Professor Harvey Segur.
- Funded under NSF Award Number 1107354.

### University of Michigan undergraduate research assistant

5/2012 – 8/2014

- NSF REU with advisors Professor Brian Arbic and Dr. David Trossman on a physical oceanography project.

## MENTORING

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### The University of Washington Department of Applied Mathematics

**Ryan Bushling.** I worked with Ryan as he continued his WXML project (below) by computing the stability spectrum for the constant solutions of the Benjamin-Ono equation.

7/2018 – 2/2019

### The University of Washington Experimental MathLab

**Ryan Bushling and Kush Gupta.** I worked as a graduate mentor for two undergraduate students at the Washington Experimental MathLab (WXML). Together we computed the stability spectrum of the mKdV equation using Hill's method.

1/2018 – 6/2018

## AWARDS

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### Boeing Research Award, 6/2019

6/2019

- Awarded to two students at the University of Washington annually for outstanding research by a student in the Department of Applied Mathematics.

**Best Student Paper Award, 4/2019** 4/2019

- Awarded to four students at the Eleventh IMACS Conference on Nonlinear Equations and Wave Phenomena.

**Boeing Service Award, 6/2018** 6/2018

- Awarded to one student in the Department of Applied Mathematics at the University of Washington for outstanding service to the department.

## SERVICE/LEADERSHIP

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**Member of The University of Washington Applied Mathematics Diversity Committee** 9/2018 – present

**The University of Washington Applied Mathematics Graduate Student Representative** 9/2017 – 8/2018

**The University of Washington Applied PDEs Seminar Co-organizer** 1/2016 – present

**SIAM UW treasurer** 9/2015 – 9/2017

## OUTREACH

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**Volunteer, SIAM Pi Day Math Fair event at Northshore Middle School, Bothell WA** 3/14/2019

**Volunteer, Girl Scouts Math Fair at the University of Washington, Seattle, WA** 4/28/2018

**Volunteer, The University of Washington Math Day, Seattle, WA** 3/19/2018,  
3/25/2019

**Volunteer, Math For Love Julia Robinson Mathematics Festival, Seattle, WA** 3/2/2019,  
11/17/2018,  
3/10/2018,  
2/25/2017

**Volunteer, SIAM Math Fair at the Pacific Science Center, Seattle, WA** 3/5/2016

**Volunteer, SIAM Math Fair at Lockwood Elementary, Bothell WA** 12/11/2017,  
12/16/2016,  
12/8/2014

**Volunteer, AVID tutor at Boulder High School, Boulder, CO** 1/2014 – 5/2014

## WORK EXPERIENCE

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<b>University of Washington DRS (Disability Resources for Students) Exam Proctor</b>	12/2016 – present
<b>Tutoring and consulting at Jeremy Upsal Consulting</b>	9/2016 – present
<b>Student Assistant at University of Colorado Boulder</b> Working with Professor Harvey Segur and lab technicians, I redesigned old and designed new projects for the undergraduate PDE/Fourier Series class at the University of Colorado.	6/2013 – 12/2013
<b>IT/Systems Engineer at Colorado Space Grant Consortium</b>	1/2012 – 5/2013

## PROFESSIONAL SOCIETIES

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<b>American Mathematical Society (AMS)</b>	1/2015 – present
<b>Association for Women in Mathematics (AWM)</b>	10/2014 – present
<b>Society for Industrial and Applied Mathematics (SIAM)</b>	8/2014 – present

## COMPUTER SKILLS/OTHER

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- Operating systems: Proficient in Windows OS, Linux/Unix systems, and OSX.
- Programming/Scripting: Working knowledge of FORTRAN, C++, Python, Java, Bash, Mathematica, MATLAB, Sage, as well as a limited knowledge of PowerShell and Maple.
- Other software: MySQL, MS Office Suite, and L<sup>A</sup>T<sub>E</sub>X.