Jeremy Upsal

Department of Applied Mathematics
University of Washington
Lewis Hall 211, Box 353925

E-mail: jupsal@uw.edu
Phone: +1 505 629 9868
Webpage: `amath.washington.edu/people/jeremy-upsal`

EDUCATION

Ph.D. in Applied Mathematics   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

APPOINTMENTS

Acting Instructor, The University of Washington   9/2020 – current
Department of Applied Mathematics

TEACHING EXPERIENCE

Acting Instructor, The University of Washington (2020 – Current)

AMATH 481/581 - Scientific Computing (200 students)   Autumn 2022

- This is a classical applied numerical analysis class, covering finite differences, finite elements, and spectral methods for solving ODEs and PDEs
- Taught in MATLAB and python
- Used mastery/proficiency-based grading
- Undergraduate and graduate class are separate
- Online support included for distance-learning students

AMATH 301 - Introduction to Scientific Computing (300−500 students)   Autumn 2020 & Spring 2022

- Large introductory scientific computing course with three sections of undergraduate students
- This course introduces mathematical algorithms in MATLAB and python.
- Updated the course to include python, instead of only MATLAB
- We used weekly in-class activities for students as a means of active learning as well as Poll Everywhere to gauge student understanding.

AMATH 402/502 - Introduction to Dynamical Systems and Chaos (100 students)

Winter 2021 & 2022

- This class introduces dynamical systems and chaos using Strogatz's *Dynamical Systems and Chaos*
- Completely online in 2021 and hybrid in 2022.
- Undergraduate and graduate class are separate
- Online support included for distance-learning students

Predoctoral Instructor, The University of Washington (2017 − 2020)

AMATH 301 - Introduction to Scientific Computing

Autumn 2019

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.
- Introduces solution methods for linear and nonlinear PDEs.
- Emphasis on analysis of solutions
- Implemented mastery-based testing ideas, including the ability to retake quizzes.
- Redesigned learning goals to include affective and cognitive learning goals

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 (2018 − 2019)

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 (2014 – 2019)

- **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 (2013 – 2014)

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

Private Tutoring 8/2013–9/2020
- 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

8. *Applying Bloom's taxonomy to exam questions in an undergraduate scientific computing course*, In preperation. With C. Gin, B. Liu, K. Marcinko, and J. Price.

7. *A nonlinear Gershgorin's theorem for operator matrices*, In preparation.

6. *Predicting movie preferences using the k-Nearest Neighbors algorithm*, Accepted chapter in the *Plug and Play Data Science* book for teaching data science to undergraduates. With N. Gilbertson and J. Price. (2022)

5. *Sensor Placement on a Cantilever Beam Using Observability Gramians*, Accepted for publication at 2022 IEEE 61st Conference on Decision and Control (CDC). With N. Brace, N. Andrews, and K. Morgansen. (2022)

4. *Modulational instability of periodic standing waves in the derivative NLS equation*, Journal of Nonlinear Science, Volume 31, Issue 3: 1-32. With J. Chen and D. Pelinovsky. (2021) `https://arxiv.org/pdf/2009.05425.pdf`

3. *Real Lax spectrum implies spectral stability*, Studies in Applied Mathematics, Volume 145, Issue 4: 765 - 790. With B. Deconinck (2020). With B. Deconinck. `https://arxiv.org/abs/1909.10119`

2. *The orbital stability of elliptic solutions of the Focusing Nonlinear Schrödinger Equation*, SIAM Journal on Mathematical Analysis, Volume 52, Issue 1: 1-41. With B. Deconinck. (2020) `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 Activities and Service

Invited talks

9. *Determining stability of PDE wave-like solutions.* The University of Washington Department of Applied Mathematics Research Panel for Undergraduates. January 25, 2022.

8. *Establishing and using a nonlinear Gershgorin theorem for operator matrices to solve ODEs with parameter dependence.* The University of New Mexico Applied Math Seminar. November 8, 2020.

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

4. *The University of Washington Department of Applied Mathematics Research Panel for Undergraduates*, co-organized with Becky Beard. This was the inaugural event in which faculty and postdocs share their research with undergraduates trough 15-minute undergraduate-level talks.

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 IMAC 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.

Refereeing

- Water Waves, Springer
- SIAM Journal on Mathematical Analysis, SIAM
- Nonlinear Analysis, Elsevier

MENTORING

The University of Washington Department of Applied Mathematics

Jenna Bendinelli. In Summer 2022 Jenna did an Independent Research project with me in which she read about numerical climate models. Jenna also setup and ran some test cases for the MOM (Modular Ocean Model) software.

6/2022 – 9/2022

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

UW AMATH Teaching Award   6/2021
- Awarded to a teacher in the Department of Applied Mathematics for excellence in teaching.

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

Boeing Service Award   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

UW AMATH Pre-Application Review Program Coordinator	10/2021 – present
UW WAMM (Women in Applied Mathematics Mentorship) Program Coordinator	9/2021 – present
Member of The University of Washington Applied Mathematics DEI Committee	9/2018 – present
The University of Washington Applied PDEs Seminar Co-organizer	1/2016 – 10/2019
The University of Washington Applied Mathematics Graduate Student Representative	9/2017 – 8/2018
SIAM UW treasurer	9/2015 – 9/2017

Outreach

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

Other Work Experience

Tutoring and consulting at Jeremy Upsal Consulting	9/2016 – present
University of Washington DRS (Disability Resources for Students) Exam Proctor	12/2016 – 6/2022
Student Assistant at University of Colorado Boulder 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
IT/Systems Engineer at Colorado Space Grant Consortium	1/2012 – 5/2013

Professional Societies

The Math Alliance	1/2022 – Current
American Mathematical Society (AMS)	1/2015 – 1/2020
Association for Women in Mathematics (AWM)	10/2014 – 1/2020
Society for Industrial and Applied Mathematics (SIAM)	8/2014 – 6/2020

Computer Skills/Other

- 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, Maple, and R.
- Other software: MySQL, MS Office Suite, and LaTeX.