Ryan P. Creedon

(*he/him/his*)

Contact Information

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Research Interests

Nonlinear Waves, Partial Differential Equations, Dynamical Systems, Asymptotic & Perturbation Methods, Pattern Formation, Geophysical Fluid Dynamics, Numerical Methods, Applied Analysis

Professional Appointments

Prager Assistant Professor / NSF MSPRF Fellow 2024 –
Division of Applied Mathematics | Brown University | Providence, RI

Acting Instructor 2022 – 2024
Department of Applied Mathematics | University of Washington | Seattle, WA

Education

University of Washington Seattle, WA

- Ph.D. in Applied Mathematics | Advisor: Bernard Deconinck 2016 – 2022
- M.S. in Applied Mathematics 2016 – 2017

Pennsylvania State University State College, PA
Schreyer Honors College

- M.S. in Meteorology and Atmospheric Science | Advisor: Raymond Najjar 2015 – 2016
- B.S. in Meteorology and Atmospheric Science, *Summa Cum Laude* 2012 – 2016
- B.S. in Mathematics, *Summa Cum Laude* 2012 – 2016

Selected Awards and Grants

- NSF Mathematical Sciences Postdoctoral Fellowship (*$190,000*) 2024 –
- Boeing Award for Teaching | University of Washington 2023
- SIAM Early Career Travel Awards 2021 – 2022
- Boeing Award for Research, Teaching, and Service | University of Washington 2021
- Boeing Award for Teaching | University of Washington 2020
- Achievement Rewards for College Scientists Fellowship (*$17,500*) 2016 – 2019
- The Ruth Jung Chinn Endowed Fellowship | University of Washington 2016 – 2018
- EMSAGE Laureate | Pennsylvania State University 2016
- The Jerome N. Behrmann Scholarship in Meteorology | Pennsylvania State University 2016

- Werner A. Baum Scholar | American Meteorological Society (*$5,000*) 2015 – 2016
- The John A. Dutton Award in Atmospheric Dynamics | Pennsylvania State University 2015
- The Physical Meteorology Award | Pennsylvania State University 2015
- Barry M. Goldwater Honorable Mention 2015
- Ernest F. Hollings Scholar | National Oceanic & Atmospheric Administration (*$26,000*) 2014 – 2016
- Schreyer Honors Scholar | Pennsylvania State University 2012 – 2016

Publications

[1] **R. Creedon**, "Existence of all Wilton ripple solutions of the Kawahara equation", *In preparation*, 2024.

[2] **R. Creedon**, H. Nguyen, and W. Strauss, "Proof of the transverse instability of Stokes waves at finite depth", *Submitted to SIAM Journal on Mathematical Analysis*, 2024.

[3] **R. Creedon**, H. Nguyen, and W. Strauss, "Proof of the transverse instability of Stokes waves", *Accepted to Annals of PDE*, 2024.

[4] **R. Creedon**, H. Nguyen, and W. Strauss, "Stokes waves are unstable, even very small ones", *Submitted to EMS Surveys in Mathematical Sciences*, 2023.

[5] **R. Creedon** and B. Deconinck, "A high-order asymptotic analysis of the Benjamin-Feir instability spectrum in arbitrary depth", *Journal of Fluid Mechanics*, 2023.

[6] **R. Creedon**, B. Deconinck, and O. Trichtchenko, "High-frequency instabilities of Stokes waves", *Journal of Fluid Mechanics*, 2022.

[7] **R. Creedon**, B. Deconinck, and O. Trichtchenko, "High-frequency instabilities of a Boussinesq-Whitham system", *Fluids*, 2021.

[8] **R. Creedon**, B. Deconinck, and O. Trichtchenko, "High-frequency instabilities of the Kawahara equation", *SIAM Journal on Applied Dynamical Systems*, 2021.

Invited Talks

1. **The stability of interfacial waves**, *SIAM Dynamical Systems*, Denver, Colorado, May 11 - 15, 2025.
2. **Progress in the stability of irrotational, interfacial waves**, *AMS Sectional Meeting*, Lawrence, Kansas, Mar. 29 - 30, 2025.
3. **Transverse instabilities of periodic water waves**, *NSF-FRG Conference: Singularities in incompressible flows: computer assisted proofs and physics-informed neural networks*, Princeton, NJ, Mar. 15 - 16, 2025.
4. **Transverse instability of Stokes waves**, *Joint Math Meetings (JMM25)*, Seattle, WA, Jan. 8 - 11, 2025.
5. **Instabilities of Stokes waves**, *Boston University Dynamical Systems Seminar*, Boston, MA, Nov. 11, 2024.
6. **Transverse instability of Stokes waves in infinite depth**, *Banff International Research Station (BIRS)*, Banff, Canada, Oct. 27 - Nov. 1, 2024.
7. **Transverse instability of Stokes waves in finite depth**, *SIAM Conference on Nonlinear Waves and Coherent Structures (NWCS24)*, Baltimore, MD, Jun. 24 - 27, 2024.
8. **Tranverse instability of Stokes waves part ii: finite depth**, *UW Applied PDE Seminar*, Seattle, WA, May 30, 2024.

9. **Transverse instability of small-amplitude Stokes waves in infinite depth**, *Joint Math Meetings (JMM24)*, San Francisco, CA, Jan. 3 - 6, 2024.

10. **On the transverse instability of Stokes waves**, *SIAM Pacific Northwest Section Conference (SIAMPNW23)*, Bellingham, WA, Oct. 13 - 15, 2023.

11. **The instability spectrum of small-amplitude Stokes waves**, *UW Applied PDE Seminar: The Stability of Water Waves*, Seattle, WA, Apr. 27, 2023.

12. **Instabilities of small-amplitude Stokes waves**, *SIAM Conference on Nonlinear Waves and Coherent Structures (NWCS22)*, Bremen, Germany, Aug. 30 - Sept. 2, 2022.

13. **Spectral instabilities of periodic water waves**, *SIAM Annual Conference (AN22)*, Pittsburgh, PA, Jul. 11, 2022 (*Student Travel Award*).

14. **High-frequency instabilities of small-amplitude Stokes waves**, *The Twelfth IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory (IMACS22)*, Athens, Georgia, Mar. 30 - Apr. 1, 2022.

15. **High-frequency instabilities of Stokes waves**, *AMS Annual Conference (AMS22)*, Seattle, WA, Jan. 5 - 8, 2022.

16. **High-frequency instabilities of Stokes waves: a perturbative approach**, *SIAM Annual Conference (AN21)*, Spokane, WA, Jul. 19, 2021 (*Student Travel Award*).

17. **High-frequency instabilities in a shallow-water model with full dispersion**, *SIAM Conference on Nonlinear Waves and Coherent Structures (NWCS20)*, Bremen, Germany, Jul. 29, 2020 (*canceled due to Covid-19*).

Posters

1. **The instability spectrum of small-amplitude Stokes waves**, *Drexel Waves Workshop*, Philadelphia, Pennsylvania, March 30-31, 2023 (*Early Career Travel Award*).

2. **Deviations from climatological turbulence below the mixed layer in the North Pacific**, *American Geophysical Union Ocean Sciences Meeting*, New Orleans, LA, February 21, 2016.

3. **Daily variability of ocean mixed layer base diffusivities in the northeast Pacific**, *American Meteorological Society Annual Meeting*, New Orleans, LA, January 10, 2016.

Workshop Participation

1. **Nonlinear Water Waves: Rigorous Analysis and Scientific Computing**, Banff International Research Station, Oct. 2024 – Nov. 2024.

2. **Mathematics Teacher-Scholar Symposium (MaTSS)**, Department of Mathematics, *Reed College*, May 2021.

3. **Teaching and Learning in Higher Education**, Center for Teaching and Learning, *University of Washington*, Mar. 2019 – Jun. 2019.

4. **Solving Problems in Multiply Connected Domains**, NSF-CBMS, *University of California, Irvine*, Jun. 2018.

5. **Workshop in Nonlinear Waves**, *Drexel University*, May 2018.

6. **Topics in Nonlinear Water Waves**, The Burgers Summer School Program, *University of Maryland*, Jun. 2016.

Teaching

University of Washington | Instructor

- Partial Differential Equations & Waves (Amath 353) Sp. 2024
  Class Size: 100 students Course Evaluations: 4.9/5.0 Response Rate: 94%
- Beginning Scientific Computing (Amath 301) Sp. 2024

Section A	Class Size: 140 students	Course Evaluations: 4.8/5.0	Response Rate: 85%
Section B	Class Size: 90 students	Course Evaluations: 4.8/5.0	Response Rate: 83%
Section C	Class Size: 190 students	Course Evaluations: 4.8/5.0	Response Rate: 77%

- Applied Linear Algebra & Numerical Analysis (Amath 352) Wi. 2024
  Class Size: 105 students Course Evaluations: 4.9/5.0 Response Rate: 88%
- Mathematical Methods for Quantitative Finance (Cfrm 405) Au. 2023
  Class Size: 80 students Course Evaluations: 4.9/5.0 Response Rate: 81%
- Special Topics Course in Asymptotics and Perturbation Methods (Amath 490) Sp. 2023
- Beginning Scientific Computing (Amath 301) Sp. 2023

Section A	Class Size: 70 students	Course Evaluations: 4.8/5.0	Response Rate: 82%
Section B	Class Size: 160 students	Course Evaluations: 4.9/5.0	Response Rate: 80%
Section C	Class Size: 130 students	Course Evaluations: 4.8/5.0	Response Rate: 90%

- Applied Linear Algebra & Numerical Analysis (Amath 352) Wi. 2023
  Class Size: 100 students Course Evaluations: 4.8/5.0 Response Rate: 95%
- Introduction to Continuous Mathematical Modeling (Amath 383) Au. 2022
  Class Size: 90 students Course Evaluations: 4.8/5.0 Response Rate: 92%
- Applied Linear Algebra & Numerical Analysis (Amath 352) Wi. 2022
  Class Size: 100 students Course Evaluations: 4.8/5.0 Response Rate: 95%
- Partial Differential Equations & Waves (Amath 353) Su. 2021
  Class Size: 60 students Course Evaluations: 4.8/5.0 Response Rate: 91%
- Partial Differential Equations & Waves (Amath 353) Sp. 2021
  Class Size: 90 students Course Evaluations: 4.9/5.0 Response Rate: 83%
- Partial Differential Equations & Waves (Amath 353) Su. 2020
  Class Size: 40 students Course Evaluations: 4.6/5.0 Response Rate: 85%
- Applied Linear Algebra & Numerical Analysis (Amath 352) Wi. 2020
  Class Size: 110 students Course Evaluations: 4.6/5.0 Response Rate: 93%
- Partial Differential Equations & Waves (Amath 353) Su. 2019
  Class Size: 25 students Course Evaluations: 5.0/5.0 Response Rate: 91%

University of Washington | Teaching Assistant

- Applied Linear Algebra (Amath 584) — Au. 2021
- Partial Differential Equations & Waves (Amath 353) — Sp. 2020
- Applied Linear Algebra & Numerical Analysis (Amath 352) — Au. 2019
- Introduction to Differential Equations and Applications (Amath 351) — Wi. 2019
- Applied Complex Analysis (Amath 567) — Au. 2018
- Partial Differential Equations & Waves (Amath 353) — Su. 2018
- Introduction to Differential Equations & Applications (Amath 351) — Su. 2018
- Advanced Methods for Partial Differential Equations (Amath 569) — Sp. 2018
- Calculus with Analytic Geometry II (Math 125) — Au. 2016

Section CC	Class Size: 30 students	Course Evaluations: 4.9/5.0	Response Rate: 63%
Section CD	Class Size: 30 students	Course Evaluations: 5.0/5.0	Response Rate: 70%

Pennsylvania State University | Teaching Assistant

- Atmospheric Dynamics (Meteo 420) — Sp. 2016

Professional Tutoring

Bellevue Learning Center | Instructor — 2023 – 2024

- Algebra 2, Precalculus, and SAT Math Prep Summer Instructor
- Tutored calculus and linear algebra in-person for local Seattle high school students

University of Washington Women's Center | Tutor & Mentor — 2017 – 2021

- Algebra, Precalculus, Calculus, Linear Algebra, Physics, Chemistry
- Tutored underrepresented minority groups from local Seattle high schools

Penn State Learning | Tutor & Guided Study Group Leader — 2013 – 2015

- Algebra, Precalculus, Calculus, Linear Algebra, Differential Equations
- Tutored in-person and online through Penn State's World Campus
- Guided Study Group leader for Calculus I with Analytic Geometry (Math 140)
- Received inaugural Guided Study Group Leader Award in 2016

Student Mentorship

1. **Noah McMahon**, Undergraduate Mathematics Major, University of Washington, Mar. 2023 – Dec. 2023.
2. **Rohan Sabhaya**, Making Connections Mentorship Program, University of Washington Women's Center, Feb. 2019 –Jun. 2019.

Outreach & Service

University of Washington

- Mathematics in Climate Science Journal Club Co-leader 2023
- Research Panel for Undergrad Majors Panelist, Department of Applied Mathematics 2023

- Mathematics in Climate Science Journal Club Co-leader 2023
- Research Panel for Undergrad Majors Panelist, Department of Applied Mathematics 2023
- UW Sample-A-Class Program Participant 2023
- Pre-Application Review (PAR) Program Volunteer, Department of Applied Mathematics 2022
- Teaching College Mathematics Journal Club Leader 2020 – 2021
- BIG (Business, Industry, and Government) Networking Event Co-founder 2017, 2019
- Graduate Student Representative for the Department of Applied Mathematics 2019 – 2020
- SIAM UW Student Chapter Outreach Coordinator 2018 – 2019
- SIAM UW Student Chapter President 2017 – 2018

Pennsylvania State University

- President of Chi Epsilon Pi Meteorological Honor Society 2015 – 2016

External Service

- Project Mentor and Consultant, Polygence 2023 –
- Outreach Committee of Spectra: the Association for LGBT Mathematicians 2022

Conferences Served

- Scientific Program Committee Member, *The 13th IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory*, Athens, Georgia, Apr. 14 - 16, 2025.
- Minisymposium Organizer, Nonlinear Water Waves, *SIAM Nonlinear Waves and Coherent Structures*, Baltimore, MD, Jun. 24 - 27, 2024.
- Poster Session Judge, *SIAM Pacific Northwest Section Conference*, Bellinghan, WA, Oct. 14, 2023.
- Minisymposium Organizer, Nonlinear Waves, *SIAM Pacific Northwest Section Conference*, Bellingham, WA, Oct. 13 - 15, 2023.
- Scientific Program Committee Member, *The 12th IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory*, Athens, Georgia, Mar. 30 - Apr. 1, 2022.
- Minisymposium Organizer, The Euler Water Wave Problem, *SIAM Conference on Nonlinear Waves and Coherent Structures*, Bremen, Germany, July 29, 2020 (canceled due to Covid-19).
- Conference Staff, Applied Mathematics: The Next Fifty Years, *University of Washington*, Seattle, WA, Jan. 2019 - Jun. 2019.
- Conference Volunteer, Recent Advances in Nonlinear Waves, *University of Washington*, Seattle, WA, Jul. 31, 2017.

Journals Refereed

- AIMS Mathematics
- Journal of Fluid Mechanics
- Nonlinearity
- SIAM Journal on Mathematical Analysis
- Wave Motion
- Water Waves

Internship Experiences

Pacific Marine Environmental Laboratory | NOAA 2015 – 2016

- Advisor: Meghan Cronin
- Analyzed upper-ocean turbulence data from Ocean Climate Stations KEO and Papa
- Configured simulations of upper-ocean turbulence according to the KPP model

Lamont-Doherty Earth Observatory | Columbia University 2014

- Advisor: Jason Smerdon
- Validated tree-ring reconstruction of European hydroclimate against twentieth century observations
- Conducted principal component analysis of tree-ring reconstruction of European hydroclimate

Professional Affiliations

- Spectra: the Association for LGBT Mathematicians 2021 –
- Association for Women in Mathematics 2017 –
- Mathematical Association of America 2017 –
- American Mathematical Society 2016 –
- Society for Industrial and Applied Mathematics 2016 –
- American Geophysical Union 2015 – 2020
- American Meteorological Society 2014 – 2020

Skills

- **Operating Systems:**
  Windows PC, OSX, Linux/Unix
- **Graphical Software:**
  Inkscape, Tikz, IPE, GeoGebra
- **Word Processors:**
  Microsoft Office, LaTeX
- **GitHub Repositories:**
  https://github.com/rpac5130?tab=repositories

Languages

- **MATLAB:** Highly Proficient
- **Mathematica:** Highly Proficient
- **Python:** Proficient
- **Maple:** Proficient
- **FORTRAN:** Basic
- **R**: Basic

In the Media

1. When Math Equals Fun, *UW College of Arts & Sciences Newsletter*, University of Washington, 2019.

2. Schreyer Scholar Investigates Climate Science-Oceanography through NOAA Program, *PSU News*, Pennsylvania State University, 2015.