Ryan P. Creedon

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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 (*Highest Distinction*) — 2012 –2016
- B.S. in Mathematics (*Highest Distinction*) — 2012 –2016

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

Research Interests

General: Methods of Applied Mathematics, Mathematical Physics, Partial Differential Equations, Dynamical Systems, Numerical Analysis, Applied Analysis, Fluid Dynamics, Math Education

Emphasis: Stability Theory, Nonlinear Waves, Asymptotic & Perturbation Methods, Bifurcation Theory, Integrable & Near-Integrable Systems, Lie Theory, Variational Methods, Geophysical Fluid Dynamics, Air-Sea Interaction, Computational Fluid Dynamics, Computational Linear Algebra

Publications

[1] **R. Creedon**, "Spectral stability of all elliptic 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", *In preparation*, 2024.

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

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

Teaching

University of Washington | Instructor

- Partial Differential Equations & Waves (Amath 353) Sp. 2024
- Beginning Scientific Computing (Amath 301) Sp. 2024
- 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 –2024

- 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.

Invited Talks

1. **Transverse instability of Stokes waves in finite depth**, *SIAM Conference on Nonlinear Waves and Coherent Structures (NWCS24)*, Baltimore, MD, Jun. 24-27, 2024.
2. **Tranverse instability of Stokes waves part ii: finite depth**, *UW Applied PDE Seminar*, Seattle, WA, May 30, 2024.
3. **Transverse instability of small-amplitude Stokes waves in infinite depth**, *Joint Math Meetings (JMM24)*, San Francisco, CA, Jan. 3-6, 2024.
4. **On the transverse instability of Stokes waves**, *SIAM Pacific Northwest Section Conference (SIAMPNW23)*, Bellingham, WA, Oct. 13-15, 2023.
5. **The instability spectrum of small-amplitude Stokes waves**, *UW Applied PDE Seminar: The Stability of Water Waves*, Seattle, WA, Apr. 27, 2023.
6. **Instabilities of small-amplitude Stokes waves**, *SIAM Conference on Nonlinear Waves and Coherent Structures (NWCS22)*, Bremen, Germany, Aug. 30-Sept. 2, 2022.
7. **Spectral instabilities of periodic water waves**, *SIAM Annual Conference (AN22)*, Pittsburgh, PA, Jul. 11, 2022 (*Student Travel Award*).
8. **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.
9. **High-frequency instabilities of Stokes waves**, *AMS Annual Conference (AMS22)*, Seattle, WA, Jan. 5-8, 2022.
10. **High-frequency instabilities of Stokes waves: a perturbative approach**, *SIAM Annual Conference (AN21)*, Spokane, WA, Jul. 19, 2021 (*Student Travel Award*).
11. **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.

Service & Outreach

University of Washington

- Co-leader of the Mathematics in Climate Science Journal Club 2023
- Speaker for the Research Panel for Undergrad Majors, Department of Applied Mathematics 2023
- Volunteer for the UW Sample-A-Class Program 2023 –
- Volunteer for the Pre-Application Review (PAR) Program, Department of Applied Mathematics 2022 –

- Leader of the Teaching College Mathematics Journal Club 2020 –2021
- Co-organizer and Co-founder of the BIG Networking Event 2017, 2019
- Graduate Student Representative for the Department of Applied Mathematics 2019 –2020
- Outreach Coordinator of SIAM UW Student Chapter 2018 –2019
- President of SIAM UW Student Chapter 2017–2018

Pennsylvania State University

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

Conferences

- Poster Session Judge, *SIAM Pacific Northwest Section Conference*, Bellinghan, WA, Oct. 14, 2023.
- Minisymposium Organizer, Nonlinear Waves, *SIAM Pacific Northwest Section Conference*, Bellinghan, WA, Oct. 13-15, 2023.
- Scientific Program Committee Member, Water Waves, *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 - Part III of III, *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
- SIAM Journal on Mathematical Analysis
- Wave Motion
- Water Waves

External Service

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

Internship Experiences

Pacific Marine Environmental Laboratory | NOAA 2015–2016

- Advisor: Meghan Cronin
- Analyzed upper-ocean mooring 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 –2014

- Advisor: Jason Smerdon
- Validated tree-ring reconstruction of European hydroclimate against twentieth century observations
- Calculated principal components of tree-ring reconstruction of European hydroclimate

Summer Schools & Workshops

1. **Mathematics Teacher-Scholar Symposium (MaTSS)**, Department of Mathematics, *Reed College*, May 2021.
2. **Teaching and Learning in Higher Education**, Center for Teaching and Learning, *University of Washington*, Mar. 2019 – Jun. 2019.
3. **Solving Problems in Multiply Connected Domains**, NSF-CBMS, *University of California, Irvine*, Jun. 2018.
4. **Workshop in Nonlinear Waves**, *Drexel University*, May 2018.
5. **Topics in Nonlinear Water Waves**, The Burgers Summer School Program, *University of Maryland*, Jun. 2016.

Selected Awards and Grants

- NSF Mathematical Sciences Postdoctoral Fellowship (*$190,000*) 2024–
- Boeing Award for Teaching | University of Washington 2023
- Boeing Award for Research, Teaching, and Service | University of Washington 2021
- Boeing Award for Teaching | University of Washington 2020
- Achievement Rewards for College Scientists (ARCS) Fellowship (*$17,500*) 2016–2019
- Werner A. Baum Scholar | American Meteorological Society 2015–2016
- Barry M. Goldwater Honorable Mention 2015
- Ernest F. Hollings Scholar | National Oceanic & Atmospheric Administration 2014–2016
- Schreyer Honors Scholar | Pennsylvania State University 2012–2016

Professional Affiliations

- 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, 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.