

# Joseph Nakao

## Curriculum Vitae

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🏠 [jhknakao.wixsite.com/math/](http://jhknakao.wixsite.com/math/)

## EDUCATION

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### University of Delaware

Ph.D. Applied Mathematics (in progress)

Advisor: Jingmei Qiu

Newark, DE

*Expected 2023*

### University of Delaware

M.S. Applied Mathematics

Advisor: Jingmei Qiu

Newark, DE

*2018–2020*

### Seattle University

B.S. Applied Mathematics

Advisors: Yen-Lin Han (Mechanical engineering) and Katie Oliveras (Mathematics)

Seattle, WA

*2014–2018*

## AWARDS

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- Winter Research Symposium Best Poster Award, University of Delaware February 2022  
*Voted best poster at the annual Winter Research Symposium hosted by the University of Delaware Department of Mathematical Sciences. (\$500 award)*
- Baxter-Sloyer Graduate Teaching Award, University of Delaware May 2021  
*“Given to a graduate student teaching assistant, in mathematical sciences, who has demonstrated superior effectiveness in teaching, and in the performance of their responsibilities.” (\$300 award)*
- Seth Trotter Book Collecting Contest, University of Delaware June 2019  
*Placed first in the book collecting contest put on by the Friends of the University of Delaware Library, and entered into the National Student Book Collecting Contest. (\$1000 award)*
- Wynne Alexander Guy Award, Seattle University June 2018  
*“Given in grateful acknowledgment of a graduating mathematics major whose extraordinary contribution to the department always went above and beyond what was expected. Named to honor beloved teacher Mrs. Guy, who performed extraordinary service to the Mathematics department and Seattle University for 30 years.”*

## PUBLICATIONS

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### Journals and Conference Proceedings

J. Nakao, J. Chen, and J.-M. Qiu, “An Eulerian-Lagrangian Runge-Kutta finite volume (EL-RK-FV) method for solving convection and convection-diffusion equations”, *Submitted*. ([link here](#))

J. Nakao and Y.L. Han, “Preliminary simulated results modeling a dynamic heating cancer ablation probe”, *ASME International Mechanical Engineering Congress and Exposition (IMECE) – Applications of Computational Heat Transfer*, Pittsburgh, PA, November 2018.

### Articles

J. Nakao, “The Pot of Gold at the End of the Rainbow – How Mathematics Departments Can Increase LGBTQ+ Inclusivity”, *MAA Math Values Blog*, April 2021. ([link here](#))

J. Nakao, “Adventures in Book Collecting”, *The Atrium – University of Delaware’s Quarterly Newsletter*, September 2019. ([link here](#))

## Open Access Handbooks and Reference Guides

J. Nakao, “The Handbook of MATH221”. ([link here](#))

J. Nakao, “A Mathematica Reference Guide (for calculus students)”. ([link here](#))

J. Nakao, “A Gentle Introduction to L<sup>A</sup>T<sub>E</sub>X”. ([link here](#))

J. Nakao and D. Hayes, “A MATLAB Reference Guide for Undergraduate STEM Majors”. ([link here](#))

## PRESENTATIONS

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- “A new Eulerian-Lagrangian Finite Volume (ELFV) Method for Solving Convection-Diffusion Equations and Hyperbolic Conservation Laws” March 2022  
*AMS Spring Central Sectional Meeting (virtual), originally hosted by Purdue University, West Lafayette, IN*
- “A new Eulerian-Lagrangian Finite Volume (ELFV) Method for Solving Convection-Diffusion Equations and Hyperbolic Conservation Laws” December 2021  
*Hallenbeck Graduate Student Seminar, Department of Mathematical Sciences, University of Delaware, Newark, DE*
- “An Eulerian-Lagrangian Finite Volume Method for Solving Nonlinear Transport Equations” July 2021  
*SIAM Annual Meeting (virtual), originally at Spokane, WA*
- “An Eulerian-Lagrangian Finite Volume (ELFV) Method for Nonlinear Conservation Laws” April 2021  
*Hallenbeck Graduate Student Seminar, Department of Mathematical Sciences, University of Delaware, Newark, DE*
- “Solving for Exact Stationary Solutions to Shallow-Water Waves” November 2017  
*Analysis Seminar, Department of Mathematics, Washington State University, Pullman, WA*
- “Modifying an Optimal Payload Sensor Model to Detect Mobile Targets” August 2017  
*Summer Scholar Presentations, Air Force Research Laboratory, Albuquerque, NM*

## POSTERS

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- “An Eulerian-Lagrangian Runge-Kutta finite volume (ELRK-FV) method for solving convection-diffusion equations” February 2022  
*Winter Research Symposium, University of Delaware, Newark, DE*
- “Modifying an Optimal Payload Sensor Model to Detect Mobile Targets” August 2017  
*Summer Scholar Poster Session, Air Force Research Laboratory, Albuquerque, NM*
- “Reconstructing the water-wave profile from pressure measurements in a moving body of water” April 2017  
*AMS Sectional Meeting, Washington State University, Pullman, WA*

## RESEARCH PROJECTS

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### University of Delaware

Newark, DE

Department of Mathematical Sciences

*June 2019–Current*

**Advisor:** Jingmei Qiu

**Project 2:** Developing an equilibrium-preserving, entropy-dissipative, and mass-, momentum-, energy-preserving low rank tensor method for the Fokker-Planck equation (in collaboration with William Taitano of the Air Force Research Laboratory).

**Project 1:** Developing an Eulerian-Lagrangian finite volume method for convection and convection-diffusion equations.

**Research Topics:** Numerical tensors and tensor decompositions, Eulerian-Lagrangian and semi-Lagrangian methods, weighted essentially non-oscillatory (WENO) methods, computational fluid dynamics, computational plasma physics, Fokker-Planck equation

### Air Force Research Laboratory

Aerospace Systems Directorate

Edwards, CA

(upcoming) May 2022–August 2022

**Mentors:** William Taitano and Alexander Alekseenko

**Project:** Building low rank tensor algorithms for solving the Fokker-Planck equation

### Air Force Research Laboratory

Aerospace Systems Directorate

Edwards, CA

May 2021–August 2021

**Mentors:** Robert Martin and Alexander Alekseenko

**Project:** Modelling the Fokker-Planck and Vlasov-Fokker-Planck equations

### Seattle University

Department of Mechanical Engineering

Seattle, WA

March 2017–July 2018

**Advisor:** Yen-Lin Han

**Project:** Building mathematical models for the heat transfer in thermal cancer ablation probes

**Research Topics:** heat conduction in solids, cancer ablation probes, Fourier transforms

### Seattle University

Mathematics Department

Seattle, WA

September 2015–December 2017

**Advisor:** Katie Oliveras

**Project:** Euler's equations of motion, solving for nonlocal relationships between bathymetry and shallow-water wave height

**Research Topics:** water waves, the method of Fokas

### Air Force Research Laboratory

Space Vehicles Directorate

Albuquerque, NM

June 2017–August 2017

**Mentor:** Reed Weber

Interim security clearance (secret)

**Project:** Modifying and implementing an optimal payload sensor model

## TEACHING

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### University of Delaware

- **Courses Taught**

*MATH 243 (calculus 3 for physical sciences and engineering with lab component)* Winter 2022

*MATH 221 (calculus 1 for life sciences and business)* Winter 2021

*MATH 221 (calculus 1 for life sciences and business)* Winter 2020

- **Teaching Assistantships**

*MATH 243 (calculus 3 for physical sciences and engineering with lab component)* Fall 2021

*MATH 243 (calculus 3 for physical sciences and engineering with lab component)* Fall 2020

*MATH 221 (calculus 1 for life sciences and business)* Spring 2020

*MATH 221 (calculus 1 for life sciences and business)* Fall 2019

*MATH 241 (calculus 1 for physical sciences and engineering)* Spring 2019

*MATH 221 (calculus 1 for life sciences and business)* Fall 2018

- **Other Instruction**

<i>Graduate qualifying exam review for techniques of applied mathematics</i>	Summer 2021
<i>Graduate qualifying exam review for techniques of applied mathematics</i>	Winter 2021

## Seattle University

- **Teaching Assistantships**

<i>MATH 2330 (multivariable calculus for physical sciences and engineering)</i>	Spring 2018
<i>MATH 2340 (ordinary differential equations)</i>	Winter 2018
<i>MATH 2340 (ordinary differential equations)</i>	Fall 2017
<i>MATH 2330 (multivariable calculus for physical sciences and engineering)</i>	Spring 2017
<i>MATH 2340 (ordinary differential equations)</i>	Winter 2017
<i>MATH 2330 (multivariable calculus for physical sciences and engineering)</i>	Fall 2016

## SERVICE AND EXTRACURRICULAR

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### Diversity In The Broader Mathematics Community

- Spectra Board of Directors July 2021–Current  
*Spectra ([website link here](#)) is the association for LGBTQ+ mathematicians.*  
**Membership Committee Chair**  
*Responsibilities: organizing social events, overseeing visibility campaigns, and taking actions to promote membership.*  
*Contributions: managing the Out and Ally Lists on Spectra's website, co-organizing the 2022 Joint Mathematics Meetings reception, and co-organizing the American Mathematical Society (AMS)-sponsored diversity posters highlighting LGBTQ+ mathematicians.*

### University of Delaware

- Mathematics Department Graduate Committee Member September 2021–Current  
*Responsibilities: communicating between the graduate students and faculty, ensuring every decision is inclusive of all graduate students, promoting the department to prospective students, and ensuring the voices and interests of the graduate student body were heard and accounted for at graduate committee meetings.*  
*Contributions: organizing prospective student meet and greets with current graduate students, organizing the annual department picnic, helping draft a new qualifying exam system.*
- Queer and Trans Graduate Student Union (QTGSU) June 2021–Current  
**Executive Board Member, Accessibility Committee**  
*Responsibilities: ensuring accessibility of all activities, assisting the treasurer, organizing community events, and upholding the values of the organization.*  
*Contributions: co-drafted the bylaws and organizational structure, was one of ten graduate students that helped form QTGSU, created access guides and documents.*
- Society for Industrial and Applied Mathematics (SIAM) Student Chapter July 2019–June 2021  
**Treasurer**  
*Responsibilities: managing the student chapter finances, funding requests, and the end-of-year final report. Also helped coordinate general meetings and social events.*
- Association for Women in Mathematics (AWM) Student Chapter September 2020–June 2021  
**Professional Development Chair**  
*Responsibilities: organizing and coordinating professional development workshops, and helping form open discussion on articles about women in STEM.*
- Graduate Student Mentor-Mentee Program September 2020–Current  
*Mentored two first-year graduate students.*  
*Responsibilities: monthly check-ins, and offering advice on coursework, balancing life and graduate school, and qualifying exams.*

- UD SIAM Seminar Series September 2020–June 2021  
*Instigated and organized the UD SIAM Seminar Series inviting PhD students and post-docs from other universities to present their research.*

## Other

- Memberships Current  
*Society for Industrial and Applied Mathematicians (SIAM), Association for Women in Mathematics (AWM), American Mathematical Society (AMS)*
- Incoming Student Handbook May 2018  
*Instigated and created a student handbook for the Seattle University Mathematics Department's future incoming students. The intention was to give a student point-of-view of life at Seattle University as a mathematics major.*

## PANELS, WORKSHOPS, AND MINISYMPOSIA

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### Panels

- Panelist at the Virtual Joint Mathematics Meetings April 2022  
*Spectra Workshop: Identifying Best Practices Fostering Inclusion and Retention of LGBTQ Mathematicians. Topics of discussion: supporting transgender mathematicians in the work place (Keri Sather-Wagstaff), LGBTQ+ mathematicians balancing work choices with family (Ron Buckmire), best practices for recruitment of LGBTQ+ faculty (Amanda Folsom), and supporting LGBTQ+ graduate students (Joseph Nakao).*
- Panelist at Society for Industrial and Applied Mathematics (SIAM) Annual Meeting July 2021  
*Minisymposium: Presentations by LGBTQ Mathematicians. Responsible for leading discussion about LGBTQ inclusivity in the applied mathematics community, as well as Spectra's current projects.*
- People of Color Caucus October 2017  
*Invited by Dr. Rose Ernst of the Political Science Department at Seattle University to facilitate a people of color caucus. Topics of discussion included: racism in academia, and living as a person of color in college.*

### Workshops and Minisymposia Organized

- SIAM AN22: LGBT Minisymposia July 2022 (upcoming)  
*Co-organized two Spectra-sponsored minisymposia highlighting the research of LGBT applied mathematicians.*
- Mathematica Workshop March 2021  
*Led a Mathematica workshop tailored for undergraduate students in the calculus sequence. Organized by the UD AWM Student Chapter.*
- L<sup>A</sup>T<sub>E</sub>X Workshop October 2020  
*Led an introductory L<sup>A</sup>T<sub>E</sub>X workshop geared towards graduate students in both the mathematics and other departments. Organized by the UD AWM Student Chapter.*

## COMPUTER SKILLS

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**Proficient:** MATLAB, Mathematica, L<sup>A</sup>T<sub>E</sub>X, Word, Excel, Powerpoint

**Some experience:** Fortran 90, Python, Julia