

D. Chloe Griffin

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EDUCATION**Brown University**, Providence, RI*Ph.D. in Applied Mathematics* | NSF Graduate Research Fellow & GEM Fellow

Expected May 2027

Master of Science in Applied Mathematics

May 2023

Cumulative Graduate GPA: 3.93/4.0

Converse University, Spartanburg, SC*Bachelor of Science in Mathematics and Bachelor of Arts in Biology*

May 2022

Cumulative and Major GPA: 4.0/4.0

GRADUATE RESEARCH EXPERIENCE*Brown University, Providence, RI*

Aug 2024 - Present

High-Order Positivity Preserving Methods for Conservation Laws—Research Advisor: Professor Chi-Wang Shu

- Designed positivity-preserving post-processing for nonlinear pressure function in the Euler equations
- Prevented numerical blow-ups, ill-posedness, and non-physical distortions of numerical solutions
- Implemented challenging test cases in MATLAB and Fortran using MPI on Brown's HPC cluster
- Demonstrated algorithm's numerical accuracy, robustness, simplicity, and versatility for CFD applications
- Manuscript published in *Research in the Mathematical Sciences* (see Publications)

Oak Ridge National Lab, Oak Ridge TN

June 2026 – Aug 2026

Positivity Preserving Implicit Continuous Galerkin Framework—Research Advisor: Dr. Eirik Endeve

- Extended positivity-preserving post-processing for implicit continuous finite element method
- Designed novel correction procedure for large magnitude negative density and pressure violations
- Developed multigrid acceleration protocol to speed up convergence for high quantity errors
- Implemented challenging test cases in FEniCs with PETSc for nonlinear Newton solver
- Manuscript submitted to *Communications on Applied Mathematics and Computation* (see Publications)

Alfred Wegener Institute (AWI), Bremerhaven, Germany,

May 2025 - Aug 2025

Multi-Resolution WENO Implementation for Global Ocean Model—Research Advisor: Dr. Sergey Danilov

- Overcame challenges of implementing finite volume WENO on dual mesh with parallel computing
- Provided cost-effective alternative for numerical solution for scalar transport in global ocean model
- Prototyped numerical simulation in MATLAB in 1D and 2D cases for regular and irregular mesh
- Demonstrated target order of accuracy with robust shock-capturing using a compact, hierarchical stencil

Karlsruhe Institute of Technology, Karlsruhe, Germany,

Jun 2023 - Aug 2023

Robustness Metrics for Tumor Volume Delineation CNN—Research Advisor: Professor Martin Frank

- Measured robustness of deep learning model for automated head and neck tumor volume delineation
- Augmented computed tomography data with MONAI and ran inference on nnU-Net model with PyTorch
- Produced Jupyter Notebooks with robustness tests easily extendable to different augmentation methods
- Found model was not robust to significant augmentations, delivered report, and presented findings

Karlsruhe Institute of Technology, Karlsruhe, Germany,

Jun 2022 - Aug 2022

Optimal Coefficients of Runge-Kutta Schemes with Machine Learning—Research Advisor: Professor Martin Frank

- Created numerical schemes for ordinary differential equations using artificial neural networks
- Produced new methods, rediscovered classical schemes, and achieved target order of accuracy
- Constructed neural networks using TensorFlow and the Keras deep learning API in Python

PUBLICATIONS

Griffin, D. Chloe and Chi-Wang Shu (2026). "A Sweeping Positivity-Preserving Implicit Continuous Galerkin Scheme for Euler Equations," (Submitted to *Communications on Applied Mathematics and Computation*: Special Issue in Honor of Christian Klingenberg)

Griffin, D. Chloe and Chi-Wang Shu (2025). "A sweeping positivity-preserving high order finite difference WENO scheme for Euler equations," *Research in the Mathematical Sciences*: Vol. 13, Article 38. (Special Issue in Honor of Björn Engquist).

Griffin, D. Chloe and Mangum, Amanda (2024) "Fitting a COVID-19 Model Incorporating Senses of Safety and Caution to Local Data from Spartanburg County, South Carolina," *CODEE Journal*: Vol. 17, Article 3.

Griffin, Chloe and Sorrells, Jessica (2023) "Tile-Based Modeling of DNA Self-Assembly for Two Graph Families with Appended Paths," *Involve, a Journal of Mathematics*: Vol. 16, Article 1.

NOTABLE AWARDS AND HONORS

National GEM Consortium Fellowship	May 2026 - Present
Stella Dafermos Award (Brown University Excellence in Applied Math Research)	May 2026
NSF Graduate Research Fellowships Program (GRFP),	August 2022-Present
Outstanding Senior Mathematics Major,	May 2022
Elford C. Morgan Award (Highest Academic Standing in Arts and Sciences),	May 2022
Best Initial Abstract (Oak Ridge National Lab SULI Program),	July 2021
Strom Thurmond Award (Leadership and Academic Excellence),	April 2021
Stemler Scholarship (Alpha Lambda Delta National Travel Scholarship),	April 2020
Bioengineering Best Poster Award (SC INBRE Conference),	January 2020
Excellence in Community Service Award,	May 2019
Simpson Scholar (Full Tuition, Room, and Board),	August 2018 - May 2022
Dean's List,	Fall 2018 - Spring 2022

INVITED TALKS

- **"A Conservative, Positivity-Preserving Sweeping Framework for Hyperbolic Systems."**
 - SIAM Conference on Computational Science and Engineering (Feb 2027)
- **"A Conservative, High-Order, Structure-Preserving Sweeping Procedure for Compressible Flows"**
 - Chi-Wang Shu 70th Birthday Conference (Jan 2027)
- **"Positivity Preservation via Conservative Sweeping for High-Order Discretizations of Hyperbolic Conservation Laws"**
 - SIAM New England Section Meeting (Aug 2027)
- **"A Conservative, Structure-Preserving Sweeping Framework for High-Order Discretizations of Hyperbolic Systems"**
 - SIAM Annual Meeting Mini-symposium (June 2026)
- **"A Robust, High-Order Positivity-Preserving Sweeping Procedure for Compressible Flows"**
 - Los Alamos National Lab (May 2026)
 - Oak Ridge National Lab (Jan 2026)
- **"High Order Operator Splitting Schemes for Stiff Differential Equations"**
 - UMASS Dartmouth Center for Scientific Computing (Apr 2022)

SELECTED PRESENTATIONS

- **"A Positivity-Preserving Implicit Continuous Galerkin Framework Toward Multicomponent Flow Applications"**
 - ASINA CFD Presentation, Oak Ridge National Laboratory (Aug 2026)
 - CCSD Intern Presentation, Oak Ridge National Laboratory (Aug 2026)
- **"A Robust, Conservative, High-Order Positivity-Preserving Sweeping Procedure for Compressible Flows"**
 - Contributed Talk, Hyperbolic Problems Conference, Wurzburg (Mar 2026)
- **"Fitting a COVID-19 Model Incorporating Senses of Safety and Caution to Local Data from Spartanburg County, SC"**
 - Presentation, Joint Mathematics Meeting (Jan 2024)
- **"Mechanistic Modeling of COVID-19 Data with Regional Applications"**
 - Award-Winning Poster, Converse University RISE Symposium (Apr 2022)
- **"High Order Operator Splitting Schemes for Stiff Differential Equations"**
 - Poster, Oak Ridge National Lab Summer Intern Symposium (Jul 2021)
- **"Modeling Self Assembling DNA Structures for Lollipop Graphs"**
 - Posters, Southern Regional Honors e-Conference (Apr 2020)
 - SC INBRE Conference & Speech (Jan 2020)
 - SCMB Workshop (Aug 2019, 2020)

UNDERGRADUATE RESEARCH EXPERIENCE

Converse University, Spartanburg, SC,

Mar 2021 - May 2022

Fitting Deterministic SVIRD COVID-19 Model to Test Data—Research Advisor: Dr. Amanda Mangum

- Compared and applied mechanistic models for COVID-19 data including SIR, SEIR, and SVIRD models
- Applied parameter fitting and implemented ODE45 MATLAB solver with time-dependent parameters
- Discovered higher probable cases at start of pandemic and impacts of limited testing and data anomalies

Science Undergraduate Laboratory Intern (SULI), Oak Ridge National Lab, Oak Ridge, TN,

Jun 2021 - Aug 2021

Implicit High-Order Operator Splitting Schemes—Research Advisors: Dr. Cory Hauck and Dr. Zachary Grant

- Developed implicit high-order operator splitting schemes for stiff differential equations
- Implemented novel correction method to reduce computation cost by 80% for stiff problems
- Prototyped numerical solvers in MATLAB within Computer Science & Mathematics Division
- Delivered an abstract, poster, and report paper to the Department of Energy; work presented at ORNL Summer Symposium (see Scientific Presentations).

Converse University, Spartanburg, SC,

Jun 2019 - Sep 2021

Minimizing Design Components for Self-Assembling DNA Nanostructures—Research Advisor: Dr. Jessica Sorrells

- Drafted successful grant proposal from SC IDeA Networks of Biomedical Research Excellence (SC INBRE)
- Modeled design components of self-assembling DNA nanostructures using graph theory concepts
- Found and proved theoretical minimum component number for two graph families in three lab scenarios

TEACHING EXPERIENCE

(MIT)- Community Impact Tutoring — *Cambridge Coaching, Providence, RI,*

Aug 2025 - Present

- Designed and delivered weekly lessons for AP Calculus student receiving free tutoring through MITES

MATLAB Workshop Designer & Co-Organizer — *Brown University, Providence, RI*

February 2026

- Developed and taught an interactive, zombie-themed MATLAB tutorial for 40+ undergraduates

Teaching Assistant — *Brown University, Providence, RI,*

Aug 2023 - May 2024

- Led weekly ODE recitations, produced LaTeX homework solutions, and graded exams for 200 students
- Developed automatic grading software in MATLAB for numerical methods course
- Held individual and group office hours with excellent student feedback

Math Tutoring — *Converse University, Spartanburg, SC,*

Aug 2019 - May 2021

- Enhanced student performance in Converse courses ranging from Finite Math to Calculus II
- Coached circuit analysis, signals and systems, and control systems independently for Grantham University

TECHNICAL SKILLS**Programming Languages:** Python (NumPy, SciPy, Pandas, Matplotlib), MATLAB, Fortran, Julia**Deep Learning & Machine Learning:** TensorFlow/Keras, PyTorch, Hugging Face (Transformers, CLIP), Transfer Learning, nnU-Net, MONAI, CNNs, ANNs**High-Performance Computing & Tools:** MPI, Linux Systems (Bash/Shell), Git/GitHub, LaTeX, Jupyter**Numerical Methods & Libraries:** Finite Volume/Difference/Element Methods, Discontinuous Galerkin Methods, and Spectral Methods for Computational Fluid Dynamics (CFD), MFEM, FEniCS