D. Chloe Griffin
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EDUCATION

Brown University, Providence, RI
Ph.D. in Applied Mathematics Expected May 2027
Master of Science in Applied Mathematics May 2023
NSF Graduate Research Fellow

Converse University, Spartanburg, SC May 2022
Bachelor of Science in Mathematics and Bachelor of Arts in Biology
Cumulative and Major GPA: 4.0

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

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 accepted to *Research in the Mathematical Sciences* (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 Shu, Chi-Wang (2025) "A Sweeping Positivity-Preserving High Order Finite Difference WENO Scheme for Euler Equations," arXiv preprint arXiv:2510.27025 (Accepted to *Research in the Mathematical Science*s, Frontiers in Computational Mathematics, 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.

SCIENTIFIC MACHINE LEARNING & AI PROJECTS

Brown University, Providence, RI Nov 2022 - Dec 2022

Multimodal Dialogue Generation for *The Office* TV Show

- Applied transfer learning with CLIP for zero-shot object detection to encode scene context
- Built face detection and character recognition modules using VGG16 (vggFace2) with image preprocessing
- Fine-tuned GPT-2 on show transcripts to generate contextually coherent, character-specific dialogue
- Integrated modules for unified CNN + CLIP + GPT-pipeline for multimodal dialogue generation

PIC Math & Large Financial Institution, Spartanburg, SC Feb 2020 - May 2020

Detecting Credit Card Fraud with Machine Learning

- Delivered random forests and K-Nearest Neighbors Python implementations to cybersecurity team
- Led development of data mining methods, team report, and presentation with PIC Math
- Earned a rating of excellent from the PIC Math review committee for group project

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

NOTABLE AWARDS AND HONORS

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

SCIENTIFIC PRESENTATIONS AND INVITED TALKS

"A Robust, High-Order Positivity-Preserving Sweeping Procedure for Compressible Flows"

- Oak Ridge National Lab, Mathematics in Computation (MiC) Invited Seminar Talk, January 2025
- Brown Graduate Student Seminar**,** Seminar Talk, November 2025

"Fitting a COVID-19 Model Incorporating Senses of Safety and Caution to Local Data from Spartanburg County, South Carolina"

- Joint Mathematics Meeting, Conference Presentation, January 2024
- Brown Graduate Student Seminar, Conference Presentation, January 2024

"Mechanistic Modeling of COVID-19 Data with Regional Applications"

- Converse University RISE Symposium, Poster Presentation (with award), April 2022

"High Order Operator Splitting Schemes for Stiff Differential Equations"

- UMASS Dartmouth: Center for Scientific Computing and Data Science, Invited Seminar Talk, April 2022
- Converse University Summer Internship Fair, Poster Presentation, July 2021
- Oak Ridge National Lab Summer Intern Symposium, Poster Presentation, July 2021

"Modeling Self Assembling DNA Structures for Lollipop Graphs"

- Southern Regional Honors e-Conference, Poster Presentation, April 2020
- South Carolina IDeA Networks of Biomedical Research Excellence (SC INBRE) conference, Poster Presentation and "3 Minute Madness" speech as representative for Bioengineering, January 2020
- Southeastern Undergraduate Mathematics Workshop, Collaborative Poster Session with Southeast Center for Mathematics and Biology (SCMB) Workshop, August 2019, 2020

TEACHING EXPERIENCE

MITES (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

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