

Emma Hart
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EDUCATION

Emory University, Atlanta, GA Present
Ph.D. in Mathematics

Colgate University, Hamilton, NY May 2022
Bachelor of Arts; Major: Applied Mathematics; Minor: Educational Studies
GPA: 4.02/4.00

HONORS AND AWARDS

<i>Computational Sciences Graduate Fellowship</i>	Department of Energy
<i>Dean's Award for Academic Excellence with Distinction</i>	Colgate University, all semesters
<i>Osborne Mathematics Prize</i> for achievement in mathematics	Colgate University, Spring 2021
<i>Sisson Mathematics Prize</i> for achievement in mathematics	Colgate University, Spring 2020
<i>Charles A. Dana Scholar</i> for academic achievement and leadership	Colgate University, Spring 2020
<i>Liberal Arts Core Curriculum Prize</i> for best research paper	Colgate University, Spring 2020
<i>Liberal Arts Core Curriculum Prize</i> for best analytical paper	Colgate University, Spring 2019

PAPERS

Elle Buser, Emma Hart, and Ben Huenemann. "Comparison of atlas-based and neural-network-based semantic segmentation for DENSE MRI images." *SIURO Volume 15*, Published electronically May 26, 2022.
DOI: 10.1137/21S1448392

PRESENTATIONS

Georgia Scientific Computing Symposium, Georgia Institute of Technology, Atlanta, GA, "Image-Based Diagnosis of Type I Chiari Malformation," February, 2022

Hudson River Undergraduate Mathematics Conference, Keene State College, Keene, NH, "On Ash Trees in the Green Mountain Region," April, 2021

RESEARCH

Current Interests

Numerical Methods for Inverse Problems and Uncertainty Quantification

Senior Thesis

Fall 2021

Advisor: Professor Dan Schult

"*The transition of opposed flow smoldering to flaming combustion*": developed a three step reaction model and simulated with a system of partial differential equations to explore the transition from smoldering to flaming to better understand how we may control smoldering fires

- Reviewed literature to develop a model with a well-justified set of governing equations
- Nondimensionalized equations and introduced moving coordinate system
- Simulated in MATLAB with finite difference approximations to find interesting solutions

NSF Summer Research at Emory University

Summer 2021

Advisor: Professor Lars Ruthotto

Collaborators: Elle Buser, Ben Heunemann, Justin Smith

“Comparison of atlas-based and neural-network-based semantic segmentation for DENSE MRI images”:

Compared how well these semantic segmentation approaches could identify regions of interest in a given MR image and produce a biomarker to be used in the diagnosis of Chiari Malformation

- Preprocessed and normalized images to be used in training algorithms
- Developed an algorithm, building on existing MATLAB toolboxes for image registration, working to make diagnosis faster, cheaper, and more feasible for wide scale use
- Worked in a team, coordinating efforts between coworkers across many platforms (GitHub for collaborative coding, Overleaf/Beamer for poster/slideshow presentations)

TEACHING EXPERIENCES

Emory University

MATH 212: Differential Equations Grader

Primary Instructor Manuela Manetta, Spring 2023

MATH 112: Calculus II Grader

Primary Instructor Jim Nagy, Fall 2022

Colgate University

Computational Mathematics Grader and Teaching Assistant

Spring 2021, Spring 2022

Colgate University Department of Mathematics, Hamilton, NY

- Hold weekly office hours answering student questions about MATLAB, LaTeX, and course content (including round off error, root-finding, numerical linear algebra, dynamics, chaos, ...)
- Grade student work and coordinate with professor to discuss student understanding

Mathematics Peer Tutor

Fall 2021 - Spring 2022

Colgate University Center for Learning, Teaching, and Research, Hamilton, NY

- Meet regularly with students to discuss key concepts and questions
- Find ways to ask student guiding questions, rather than give answers, to help them learn

Writing Center Peer Consultant

Fall 2019 - Spring 2022

Colgate University Writing and Speaking Center, Hamilton, NY

- Work one-on-one with students during in-person or virtual appointments to help strengthen the writing they have brought in and to help optimize their writing process
- Evaluate the argument and clarity of a paper and discuss concerns with students
- Balance time during appointments to prioritize higher-level/global concerns and give students tools to address other lower-level/local concerns

Other

Volunteer Math Tutor

Summers 2016-2018, Spring 2019

Schroeder High School, Webster, NY and **Hamilton High School**, Hamilton, NY

- Prepared and delivered a series of lessons to a small class of six high school seniors, covering the material in the mathematics section of the SAT
- Guided high school students through past NYS Regents exams to help students raise their scores on retake exams held in August

COMPUTER PROFICIENCIES

MATLAB, Python, LaTeX, R, GitHub, Microsoft Excel (introductory), Inventor (introductory)