

## EDUCATION

- 2009–2014 **Ph.D. Mechanical Engineering** Clemson University, Clemson SC  
Thesis: *A verification of steady state discontinuous solutions using the method of manufactured solutions for finite volume computational fluid dynamic codes*
- 2005–2009 **B.S. Mechanical Engineering** Clemson University, Clemson, SC  
GPA: 3.87, Magna Cum Laude, General and Departmental Honors  
Honors Thesis: *Development and design of a magnetostrictive alternator*

## TEACHING EXPERIENCE

2023–Curr. **Professor** Colorado State University, Fort Collins CO

### Teaching

- Courses taught: MECH 103 - Intro to Mechanical Engineering & MECH 231 - Engineering Experimentation totaling 8 sections over 3 semesters. <https://catalog.colostate.edu/general-catalog/courses-az/mech/>
- Course coordinator for MECH 103. Managed a team consisting of 6 sections, 3 faculty, 2 GTAs, and 12 UTAs to assist with content and grading consistency.
- Developed well documented, daily, active learning activities for MECH 103 which can be easily distributed to other faculty. Examples of activities include:
  1. "Daily problems," derived from assigned book readings, are provided at the beginning of each class to help students practice skills and identify knowledge gaps.
  2. Lectures built with MATLAB .mlx files which encourages interaction *during* presentations and provides opportunities for active learning throughout.
- Created a virtual escape room final project in which challenges students to integrate MATLAB with Arduinos to design a series of puzzles or mini-games. In Fall 2024, this project was implemented across six sections with approximately 100 teams, culminating in a public showcase at Moby Arena where students proudly presented their work.

### Service

- Common first-year taskforce committee member. Created class learning objectives, syllabi, active learning activities, and collaborate across all engineering departments to ensure incoming students have a rewarding experience at CSU.
- AIAA student advisor. Assisted with running and organizing the 2023 AIAA Rocky Mountain Annual Technical Symposium.
- Worked closely with the engineering technology services to ensure that lab computers were compatible with Arduinos and accessible to students without personal computers.
- Mentored a graduate student in teaching MECH 103 for first time. Weekly collaboration led to positive outcomes for instructors and students alike.
- Leading a small team to redesign the MECH 231 - Engineering Experimentation laboratory experience.

- Master Teacher Initiative (MTI) Coordinator for the College of Engineering (Aug 2024-curr). Weekly responsibilities include researching, coordinating, and communicating weekly best teaching practices with the college of engineering.
- Mentor for senior design team. Provided feedback, brainstormed solutions, and monitored project milestone progress.

2020–2023. **Lecturer** The Ohio State University, Columbus OH

- Taught a wide variety of fundamentals of engineering classes. Main topics include software based problem solving in MATLAB, C, and C++, CAD modeling, and the engineering design process.
- Courses taught: ENGR 1181, ENGR 1182, ENGR 1186, ENGR 1281, & ENGR 1282.01 totaling 16 sections over 6 semesters. [eed.osu.edu/academics/first-year-engineering-program/fundamentals-engineering](http://eed.osu.edu/academics/first-year-engineering-program/fundamentals-engineering)
- Course coordinator for first and second semester honors courses: Managed Canvas pages for up to 8 sections, oversaw 40+ undergraduate and 8+ graduate teaching assistants, lead weekly faculty meetings to facilitate course consistency, and designed and implemented curriculum changes to be in line with updated learning objectives and student feedback.
- Taught synchronous classes up to 72 students both online and in-person.
- Repeatedly evaluated with a 4.9+/5.0 overall teaching effectiveness on semester evaluations.
- Structured classes using a flipped classroom approach with a student-centered, active learning pedagogy and a strong emphasis on diversity, equity and inclusion.

2009–2013 **Mechanical Engineering Graduate Teacher** Clemson University, Clemson SC

- Taught a sophomore engineering lab which included concepts of strength of materials, fluid dynamics, metrology, PLC programming, and metal machining.
- Responsibilities included preparing and delivering lectures, overseeing student experiments, and grading.
- Led a group of 8 graduate teachers which included training as well as first year mentoring.
- Augmented course-wide reverse engineering and metrology modules to address traditionally difficult learning objectives.

## INDUSTRY AND RESEARCH EXPERIENCE

2019–2020 **Mechanical/Aerospace Engineering Research Associate** The Ohio State University, Columbus OH

- Developed a CFD/FEM coupling framework for studying shock loading on localized geometric features.
- Advanced sampling techniques for sparse, high dimensional spaces when connected by linked parameters.
- Assisted in the advising and mentorship of graduate students.

- 2015–2019 **Mechanical/Aerospace Engineering Postdoctoral Researcher** The Ohio State University, Columbus OH
- Built Kriging surrogates for rapid loads prediction on high speed vehicles.
  - Designed roughness configurations for delaying turbulent transition in hypersonic boundary layers.
  - Created mesh deformation schemes to accommodate CFD grids for variable structural displacements from nominal geometry.
- 2010–2013 **Summer Research, Air Force Research Laboratory** Wright–Patterson AFB, Dayton OH
- Verified the computational fluid dynamic code AVUS (Air Vehicles Unstructured Solver) using the method of manufactured solutions for its use with Euler and Navier–Stokes governing equations.
  - Developed generic verification procedures for CFD solutions with discontinuities.
  - Produced instructional examples for engineers using a suite of ANSI C libraries written for symbolic manipulation, Gaussian process regression, and quasi–random sequences.
- 2007–2009 **General Electric Fall and Summer Internship** Greenville SC
- Completed rotations in gas turbine accessories, wind turbine fleet support, and wind turbine gearboxes.
  - Projects included ice detection using FFTs to prevent blade failure, metal fragment identification in oil to signal gearbox maintenance, and tool development for consistent bolt elongation on wind turbine towers.
- 2006 **Hartness International Summer Internship** Greenville SC
- Converted AutoCAD drawings to SolidWorks assemblies for bottle packaging machines leading to better estimates in cost and production time.
  - Collaborated daily with assembly workers to increase database of undocumented product information.

## PUBLICATIONS AND PRESENTATIONS

- June 2023 Kecskemety K., Morin B., Grier B. "The Impact of a Workload–Reduction–Focused Curricular Redesign in a First–Year Engineering Programming Course," *2013 ASEE Annual Conference & Exposition*, Baltimore, MD
- June 2023 Kecskemety K., Morin B., Grier B., Kramer A., Kennedy K. "GIFTS: Learning Theory Workshop Led to Classroom Innovations," *2013 ASEE Annual Conference & Exposition*, Baltimore, MD
- Mar 2021 Dreyer E., Grier B., McNamara J., Orr B. "Rapid Steady–State Hypersonic Aerothermodynamic Loads Prediction Using Reduced Fidelity Models," *Journal of Aircraft*
- Apr 2019 Grier B., Brouwer K., Dreyer E., McNamara J. "Controlling the p–Norm Function Space Distribution of Linked Surrogate Parameters," *AIAA Journal*, 2019
- Jan 2018 Dreyer E., Grier B., McNamara J. "Towards Characterization of Relevant Fidelity Modeling of Loads for Maneuvering Hypersonic Vehicles," *2018 AIAA Structural Dynamics Conference*, Orlando, FL

- Jan 2017 Dreyer E., Klock R., Grier B., McNamara J., Cesnik E. "Multi-Discipline Modeling of Complete Hypersonic Vehicles Using CFD Surrogates," *AIAA 58th Structural Dynamics Conference*, Grapevine, TX
- Jun 2016 Grier B., Riley Z., McNamara J. "Numerically Assessing Boundary Layer Stabilization due to Axisymmetric Roughness Strips in Hypersonic Flow," *46th AIAA Fluid Dynamics Conference*, Washington DC
- Feb 2015 Grier B., Alyanak E., Camberos J., Figliola R. "Discontinuous solutions using the method of manufactured solutions on finite volume solvers," *AIAA Journal*, 2014
- Sept 2014 Grier B., Alyanak E., White M., Camberos J., Figliola R. "Numerical integration techniques for discontinuous manufactured solutions," *Journal of Computational Physics*, 2014
- May 2013 Grier B., Figliola R., Alyanak E., Camberos J. "Techniques for using the method of manufactured solutions for verification and uncertainty quantification of CFD simulations having discontinuities," *ASME Validation & Verification Conference*, Las Vegas, NV

## WORKSHOPS AND TRAININGS

- April 2024 KEEN - Entrepreneurial Mindset in the First Year (EMIFY) Summit (invited)
- August 2022 OSU Office of Diversity and Inclusion - Microaggressions 101
- May 2022 Jeff Froyd - Workshop on Principles for Effective Learning
- May 2022 KEEN - First-year focused Professional Learning Community
- January 2022 OSU The Center for Belonging and Social Change - Safe Zone Training
- June 2021 NETI-3 - Teaching in an Online Environment

## AWARDS

- Jan 2023 Charles E. MacQuigg Award for Outstanding Teaching, The Ohio State University, Columbus, OH
- May 2023 Outstanding Teaching in Engineering Education, The Ohio State University, Columbus OH

## SKILLS

Programming: MATLAB, C, C++, FORTRAN, Ladder Logic, VBA · CAD: SolidWorks, Onshape · CFD: Fluent, FUN3D, CFL3D, AVUS · Linux ·  $\LaTeX$  · Metal Machining · Woodworking · Maple · Pointwise