



# Mary Elizabeth Breen-Lyles

ENGINEER - RESEARCHER - PROGRAMMER

## SUMMARY

Fast-learning, critically-thinking, methodical worker with substantial design and programming experience from a wide breadth of engineering and research applications. Maintains strong mathematical aptitude and passion for problem-solving. Always a tenacious team member willing to put in the necessary work to rigorously learn on the job and enthusiastically pursue project goals.

## EDUCATION

**M.S. Mechanical Engineering**, Northern Illinois University (August 2019) - GPA: 3.9

- ▶ Certificate of Graduate Study: Thermal, Fluid, and Energy Systems
- ▶ Thesis Title: Direct Polymer Grafting as a Method of Preserving the Mechanical Properties of Cellulose Nanocrystals in the Presence of Moisture
- ▶ Took courses in CFD simulation, and thermodynamic systems

**B.S. Physics**, Beloit College (May 2017) - GPA: 3.9

## WORK EXPERIENCE

2018

**Graduate Research Assistant**, Northern Illinois University  
DeKalb, IL (January 2018 - present)

- ▶ Designed and executed molecular simulations across distributed systems to demonstrate the effectiveness of polymer grafting at enhancing mechanical properties of a cellulose nanofiller
- ▶ Conducted a literature review of CNC use in materials, accompanied by comprehensive computational materials design and programming.
- ▶ Use of VMD, LAMMPS, OVITO, NAMD, and Tcl/Python3 and Excel for data analysis and acquisition.

2017

**Research Assistant**, Beloit College  
Beloit, WI (August 2016 - May 2017)

- ▶ Repaired handmade proton accelerator via machining and configurational planning for new/existing instrumentation
- ▶ Designed and wired a new power supply switching system for the accelerator and machined a box to house it
- ▶ Worked extensively on the electromagnet including the cooling system, Faraday cup implementation, electrical load and bending angle calculations
- ▶ Tuned magnet based on initial predictions and later testing. Used MATLAB, thermal imaging, and thermocouple, voltmeter, ammeter data for analysis

2016

**Undergraduate Research Fellow**, Georgia Southern University  
Statesboro, GA (June 2016 - August 2016)

- ▶ Developed LabVIEW programs for pressure transducers, accelerometers, and flow meters on a jet turbine and diesel engine to transfer, process, and analyze the engine data
- ▶ Machined and/or welded new pieces for a diesel engine to help with safety or to aid in data acquisition
- ▶ Designed, machined, and soldered new signal amplifier for a pressure transducer
- ▶ Gained substantial experience in sensor calibration, instrumentation, advanced data acquisition, programming, and machining

2015

**Sustainability Fellow**, Beloit College  
Beloit, WI (September 2015 - May 2016)

- ▶ Wrote program to compute thermodynamic properties of new campus building
- ▶ Developed in-depth model using thermal FEA to predict HVAC needs
- ▶ Presented at 2016 Student Symposium and to Beloit College Board of Trustees

## CONTACT



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## ACCOMPLISHMENTS

**Co-author of ASME Publication** (2017)

Performance of Supercharged Engine Fueled with  
CTI Binary Mixture at Different Injection Pressures

**Walter S. Haven Physics Prize** (2017)

Awarded to students in physics who complete  
outstanding research projects. Granted specifically  
in honor of excellent work with the Physics  
Department's accelerator.

**Departmental Honors** (awarded May 2017)

**Phi Beta Kappa Member** (inducted May 2017)

**Presidential Scholarship** (2014-2017)

Beloit College's prestigious honor awarded for  
exceptional academic achievement.

## SKILLS

MACHINING	<div></div>
WELDING	<div></div>
SOLDERING	<div></div>
JAVA	<div></div>
PYTHON	<div></div>
UNIX / LINUX	<div></div>
MATLAB	<div></div>
HPC CLUSTERS	<div></div>
CFD	<div></div>
LabVIEW	<div></div>
TCL	<div></div>
LAMMPS	<div></div>
SQL	<div></div>