# Nolan J. Coble

Website: nolanjcoble.com
Email: ncoble@terpmail.umd.edu
LinkedIn: nolan-coble


## Education

**University of Maryland, College Park** — College Park, MD
Applied Mathematics PhD Student, Application Area: Quantum Information — 2020–Current

**SUNY Brockport** — Brockport, NY
B.S. in Mathematics and Physics, GPA: 4.00 — 2016–2020

- Thesis: "Spectral properties of quaternionic unit gain cycles"

## Experience

**University of Maryland** — College Park, MD
Summer Graduate Researcher — Summer 2020
Advisor: Dr. Matthew Coudron

- Project title: Computing output weights for constant-depth, 3D-geometrically-local quantum circuits to within polynomial additive error. See [2] below for preprint.

**University of Maryland** — College Park, MD
Training and Research Experiences in Nonlinear Dynamics (TREND) REU — Summer 2019
Advisors: Dr. Michelle Girvan, Dr. Ed Ott, Dr. Thomas Antonsen

- Project title: Predicting Network Dynamics with a Parallel Machine Learning Approach
- Developed a parallel reservoir computing method to predict the dynamics of Kuramoto oscillator systems, which are novel network-coupled systems that exhibit complex dynamics even at relatively low dimensions.
- Wrote the object-oriented code in MATLAB which ran the prediction method
- Analyzed the performance of the predictions and made improvements to our proposed method to further increase prediction accuracy.

**University of Rochester** — Rochester, NY
Photonics REU — Summer 2018
Advisor: Dr. Benjamin Miller

- Project title: Finite-Element Modeling of Waveguide Structures Using COMSOL® Multiphysics

## Publications


[1] F. Belardo, M. Brunetti, N. J. Coble, N. Reff, and H. Skogman, "Spectra of quaternion unit gain graphs", In Preparation, 2020.

[2] N. J. Coble and M. Coudron, "Quasi-polynomial time approximation of output probabilities of constant-depth, geometrically-local quantum circuits", 2020. arXiv: 2012.05460.

[3] N. J. Coble* and N. Yu, "A reservoir computing scheme for multi-class classification", in *Proceedings of the 2020 ACM Southeast Conference*, ser. ACM SE '20, Tampa, FL, USA: Association for Computing Machinery, 2020, pp. 87–93, ISBN: 9781450371056.


*-main contributor

## Relevant Coursework

- **Computer Science:** Intro to Quantum Information Processing*, Quantum Algorithms*, Artificial Intelligence, Theory of Computation, Algorithms and Data Structures
- **Mathematics:** Algebra I* and II*, Analysis I*, Modern Algebra I and II, Coding Theory, Advanced Calculus I and II, Complex Analysis*, Topology, Advanced Differential Equations
- **Physics:** Quantum Mechanics, Advanced Theoretical Physics, Electricity & Magnetism, Classical Mechanics

*-to be completed through Spring 2021 at UMD, other courses completed at SUNY Brockport

## Languages

- **MATLAB, Python, Java:** Intermediate
- **Bash, LabView, COMSOL RF Module:** Beginner

## Teaching

- **Graduate Teaching Assistant** for *Precalculus* at University of Maryland
- **Math Tutor** at SUNY Brockport

## Independent Projects

- Title: Developing a novel classifier using reservoir computing methods — Fall 2019

  *Using the method for recurrent neural networks known as reservoir computing (RC), I developed a simple multi-class classification technique which was comparable in performance to other novel approaches such as decision tree, naïve Bayesian, and a 3 layer neural network. Before this work, literature only existed for binary classification using RC. This project developed an altered method which increased performance while also expanding to multi-class problems. I developed the object-oriented method in Python. See [3] on first page for conference publication.*

## Scholarships and Awards

- University of Maryland Dean's Fellowship — 2020
- SUNY Chancellor's Award for Student Excellence — 2020
- School of Arts and Sciences Outstanding Undergraduate Award — 2020
- Brockport Honors College Scholar Award — 2020
- Robert E. Hall Memorial Scholarship for Mathematics — 2020
- Department of Computer Science Undergraduate Research Award — 2020
- Belva A. Waite Memorial Scholarship — 2019, 2016
- Interdisciplinary Award in Mathematics — 2018
- Harvard House Award — 2018
- Brockport Physics, Mathematics, and Computer Science Award — 2018, 2017
- Dean's Citation for Diversity, University of Rochester — 2018