

# Nhut Hung Nhan

Ottawa, Ontario

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## Summary

Detail-oriented Mathematics student with hands-on experience in computational math, numerical computing, programming, and scientific research.

## Experience

### Teaching Assistant, Carleton University, Ottawa

Aug 2023 - Current

- Completed coursework in Numerical Analysis, Ordinary Differential Equations, Mathematical Methods, Mathematical Reasoning, Calculus, and Linear Algebra.
- Recipient of the Mathematics and Statistics Teaching Assistant Excellence Award for 2024–2025.

### Research Assistant, Carleton University, Ottawa

May 2025 - October 2025

- Modeling and analyzing quantum wave dynamics in deformed 2D graphene using tight-binding model (Schrodinger base) and finite element approximation model (Dirac base).
- Designing and modifying the model of graphene with lattice deformation for numerical experiments.
- Simulating time-dependent wave propagation using Kwant/tkwant.
- Integrating finite element modeling using FEniCS to solve PDEs and validate deformation models.
- Enhancing results of a time-independent tight-binding solver to compute eigenvalues, band structures, and local density of states (LDOS) for spectral analysis.

### Research Assistant, Carleton University, Ottawa

May 2024 - Sep 2024

- Utilized Physics-Informed Neural Networks (PINNs) with JAX in Python.
- Conducted numerical experiments in MATLAB, achieving measurable improvements in accuracy or efficiency.
- Enhanced code efficiency for improved computational accuracy and complexity.
- Reviewed and revised research papers.

## Skills

### Programming:

- Python, Java, SQL, C, C++.
- MATLAB, R, Maple, Sage, CCGSuite, LaTeX.
- HTML, CSS, JavaScript.
- Excel, VBA, Macros.

### Libraries:

- NumPy, Matplotlib, Pandas.
- JAX, Scikit-learn, PyTorch.
- FEniCS, Pybinding, Kwant.
- MPI.

**Soft Skills:** Analytical problem solving, Research rigor, Technical communication, Mentorship and instruction, Collaborative work, Attention to detail, Self-directed learning.

**OS & Tools:** Linux, Git, CLI.

## Projects

- Analyzed student academic outcomes (Predict Students' Dropout and Academic Success dataset) using PCA, hierarchical clustering, and Random Forest models to identify early predictors of dropout and characterize heterogeneous dropout subgroups.
- Developed and implemented multiple regression models (Linear Regression, KNN, Decision Trees, Random Forest, SVR, Gradient Boosting) using Scikit-learn to predict outcomes, and evaluated performance.
- Implemented a Convolutional Neural Network with NumPy to recognize handwritten digits (MNIST dataset).
- Analyzed token growth and hallucination risks in LLMs using Python and DeepInfra API.
- Developed advanced VBA macros to automate complex workflows featuring conditional branching.
- Implemented MPI-based Finite Difference Schemes in C++ and visualized outputs in MATLAB.
- Developed and maintained a website for the CU Math & Stat Society using HTML, CSS, JavaScript.

## Education

### Carleton University

Sep 2025 - Current

*Master of Science: Mathematics.*

### Carleton University

Sep 2021 - Apr 2025

*Bachelor of Mathematics Honours: Concentration in Applied Analysis.*

- CGPA: 11.35/12 - GPA: 3.9/4 - 94.6%.

## Publications

1. Emmanuel Lorin, Siming Tian and **Howl Nhan**. Microlocal derivation of low energy Dirac operators for locally deformed graphene surfaces. *Journal of Physics A: Mathematical and Theoretical*. In review.
2. Emmanuel Lorin and **Howl Nhan**. Data-driven fractional algebraic system solver. *Mathematics and Computers in Simulation*. 236:170–182, 2025.