

# Michael Matsuda

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## Education

### Queen's University

Kingston, ON

*Bachelor of Applied Science, Mathematics and Engineering*

*Expected Completion: May 2027*

**Awards and Achievements:** Dean's Scholar (2023-2024), First Place – Queen's Engineering Competition 2023 (Bioengineering), Finalist – Ontario Engineering Competition 2024 (Bioengineering)

## Relevant Coursework

**MTHE 217** (Algebraic Structures with Applications) (A), **MTHE 237** (Differential Equations for Engineering Science) (B), **MTHE 280** (Advanced Calculus) (A+), **MTHE 212** (Linear Algebra) (A+), **MTHE 281** (Introduction to Real Analysis) (A)

## Research Interests

**Applied Mathematics** - Machine Learning (Beginner-level self-study)

## Experience

### Undergraduate Research Assistant

May 2025 - Present

*Department of Civil Engineering, Queen's University*

*Kingston, ON*

- Engineered MATLAB scripts and converted preexisting scripts into functions to streamline numerical model testing and experimental planning, reducing model setup time by 90%.
- Conducted research on the numerical methods used to model dam breach failures, successfully identifying key characteristics which affect model accuracy.
- Conducted data analysis and applied different regression models to predict rheological characteristics of tailings materials.

## Projects

### Concrete Compressive Strength Prediction Model | Python, Pandas, Numpy, Matplotlib, scikit-learn

- Developed and compared multiple regression models to predict concrete compressive strength from raw material features.
- Preprocessed data, performed train-test splits, and utilized GridSearchCV for hyperparameter optimization.
- Evaluated models (Linear, Ridge, Lasso, Random Forest, Gradient Boosting, CatBoost) using  $R^2$ , RMSE, and MAE metrics.
- Achieved Robust predictions with the Cat GBT model, demonstrating an  $R^2$  of 0.9342, RMSE of 4.1162, and MAE of 2.8881.
- Generated comparative visualizations including actual vs. predicted plots, residual plots, and a model error comparison bar chart to communicate findings with supervisors and mentors.

### Financial Options Valuation & Risk Analysis Tool | Python, Numpy, Financial Modelling

- Engineered a Python script to accurately price European options using both the analytical Black-Scholes model and a numerical Binomial Tree Approach.
- Implemented functions to calculate key option "Greeks" (Delta, Gamma, Theta, Vega, Rho) to assess and manage portfolio sensitivity.

## Skills

**Programming** (Python, MATLAB, C), Data Analysis & Preprocessing, Technical Writing and Presentation, Project Management, Critical Thinking, Team Leadership, Problem-Solving

