

Zefanya Ariel Jimmy Sitompul

✉ zefanya.sitompul24@imperial.ac.uk

📍 Bekasi, West Java, Indonesia

🌐 [jsitompul](https://github.com/jsitompul)

MATHEMATICAL INTERESTS

Numerical Methods, Optimization, and Machine Learning.

EDUCATION

Imperial College London

London, United Kingdom

Master of Science (MSc) in Applied Mathematics

September 2024 - Present

Colorado State University

Fort Collins, Colorado, USA

GPA: 3.901/4.000

Bachelor of Science (B.S.) in Mathematics,
Applied Mathematics Concentration

August 2019 - May 2023

PENABUR Secondary Tanjung Duren

Jakarta, Indonesia

CIE A Level Mathematics: A*

High School Diploma (CIE A Levels)

August 2016 - April 2019

SKILLS

Mathematics: Numerical Analysis, Linear Algebra, Differential Equations, Probability, Analysis

Programming & Markup: Python, MATLAB, Java, \LaTeX , HTML, CSS, JavaScript

Languages: English (Fluent), Indonesian (Native), German (Intermediate), Spanish (Intermediate)

MATHEMATICS PROJECTS

Singular Value Decomposition (SVD) Implementation on Facial Recognition

May 2023

Mentor: Dr. Michael Kirby

- Implemented Singular Value Decomposition (SVD) as a dimensionality reduction technique for cat and dog face recognition.
- Utilized high-level computational work using Python and NumPy library to represent the cat and dog images as matrices of pixel numbers, to perform the SVD for reducing the dimension of the images, and to generate eigenfaces.
- Implemented cat and dog image projection methods to transform facial images into a reduced-dimensional space, emphasizing the extraction of essential facial features.

Tensors and Multilinear Algebra: An Approach To Kronecker Product and Applications in Image Representations

May 2023

Mentor: Dr. Mark Shoemaker

- Elaborated on the understanding of tensor algebra, emphasizing the multilinear operations.
- Investigated the algebraic properties and computational aspects of the Kronecker product.

- Explored the role of the Kronecker product in image representations, demonstrating its utility in manipulating and transforming image data.

Game Theory and The Markowitz Framework in Investment Strategies

March 2023

Mentor: Dr. Michael Kirby

- Developed a Game Theory model to simulate strategic interactions among investors in the financial market, incorporating diverse risk preferences and market conditions.
- Utilized the Markowitz Framework to construct portfolios that maximize expected returns while minimizing overall portfolio risk.
- Implemented a robust MATLAB-based simulation with linear programming, facilitating analysis of investment strategies under varying game scenarios and market dynamics.

BCH Codes: Encoding and Decoding Process

May 2022

Mentor: Dr. Rachel Pries

- Explored the mathematical principles behind finite fields and polynomial algebra, foundational to the construction of BCH codes
- Elaborated the theoretical foundations of BCH codes, exploring their algebraic properties and error-correction capabilities.
- Developed an understanding of the encoding and decoding process, dissecting the systematic generation of BCH codewords to detect and correct errors.

Applications of Abstract Algebra in Numerical Analysis: Polynomials in Lagrange Interpolation

December 2021

Mentor: Dr. Hortensia Soto

- Investigated the theoretical foundations of abstract algebra with emphasis on algebraic structures such as fields
- Explored Lagrange interpolation as a numerical technique for approximating functions, highlighting its significance in data fitting and interpolation.
- Elaborated the connections between abstract algebra and numerical analysis, particularly in constructing interpolation polynomials.

MATHEMATICS POSTERS

Weierstrass-Enneper Parametrisation of Minimal Surfaces

December 2022

Mentor: Dr. Clayton Shonkwiler

- Studied the Weierstrass-Enneper parametrization from the perspective of complex analysis, providing the connections between analytical functions and minimal surfaces.
- Utilized visualization techniques to represent minimal surfaces through the Weierstrass-Enneper parametrization.
- Facilitated discussions and interactions about the poster project at the 2022 CSU Mathematics Poster Session.

The Group Theory Approach to Sudoku

December 2022

Mentor: Dr. Rachel Pries

- Applied fundamental group theoretical concepts, including group actions and cosets, to analyze the inherent symmetries within Sudoku grids.
- Translated abstract algebraic principles into tangible solving strategies for Sudoku.
- Received an Outstanding Poster Award for the CSU Math Poster Session presentation.

TEACHING EXPERIENCE

Mathematics Lead Tutor

Fort Collins, Colorado, USA

*The Institute for Learning and Teaching (TILT) at
Colorado State University*

August 2020 - May 2023

- Tutored twice-weekly group study sessions in mathematics subjects. Course tutored include: One-variable Calculus, Multivariable Calculus, Linear Algebra, and Ordinary Differential Equations (ODE).
- Sharpened students' knowledge and understanding of concepts taught in the class through active learning.
- Mentored all mathematics tutors to maintain successful tutoring sessions and help students succeed in their mathematics courses.

Mathematics of Information Security Course (MATH360) Teaching Assistant/Tutor

Fort Collins, Colorado, USA

Department of Mathematics at Colorado State University

February 2022 - May 2022

- Assisted Dr. Rachel Pries in teaching MATH 360 students through the twice-weekly office hours and group study sessions.
- Developed students' approaches to solving theoretical cryptography problems.
- Guided students to succeed in class through small active learning sessions and exam reviews.

Mathematics Tutor for Adult Learner & Veteran Students

Fort Collins, Colorado, USA

*The Adult Learner and Veteran Services (ALVS) at
Colorado State University*

August 2020 - August 2021

- Tutored adult and veteran students in Pre-Calculus and Calculus courses.
- Enhanced adult and veteran students' understanding of mathematical concepts through practice problems and one-on-one review sessions.
- Created study plans for students to track their academic performance.

AWARDS

- **Graduation with Distinction Honors (*Cum Laude*)** *May 2023*
Awarded for graduating from the B.S. in Mathematics program with a cumulative GPA of 3.901/4.000.
- **CSU College of Natural Sciences Dean's Lists (Spring Semester 2023)** *May 2023*
Awarded for maintaining a GPA above 3.75 for the semester.
- **CSU College of Natural Sciences Dean's Lists (Fall Semester 2022)** *December 2022*
Awarded for maintaining a GPA above 3.75 for the semester.
- **2022 Mathematics Outstanding Poster Award** *December 2022*
Awarded for presenting the best poster for the 2022 CSU Mathematics Poster Session.
- **CSU College of Natural Sciences Dean's Lists (Fall Semester 2020)** *December 2020*
Awarded for maintaining a GPA above 3.75 for the semester.
- **CSU College of Natural Sciences Dean's Lists (Spring Semester 2020)** *May 2020*
Awarded for maintaining a GPA above 3.75 for the semester.
- **CSU College of Natural Sciences Dean's Lists (Fall Semester 2019)** *December 2019*
Awarded for maintaining a GPA above 3.75 for the semester.