

DUONG TRAN

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EDUCATION

Michigan State University

B.S in Computer Science.

Additional Major: Advanced Mathematics.

01/2021 - 05/2025

Major GPA: 3.74/4.0

Major GPA: 3.78/4.0

RESEARCH INTERESTS

Graph Theory, Enumerative Combinatorics, Theoretical Computer Science, Data Structure & Algorithm.

RESEARCH EXPERIENCE

Vietnam Institute of Advanced Studies in Math REU 2025

Advisor: Prof. Tan Nguyen

Hanoi, Vietnam

08/2025 - Present

- Title: On cyclotomic factors of certain polynomials
- Developed and proposed a revised conjecture to explain cyclotomic factors of Fekete polynomials via the distribution of their exponents.
- Investigated factorization properties by analyzing the ring-theoretic structure of Mahler algebras and their modules.
- Proved several new propositions that identify cyclotomic factors for generalized polynomial families and new questions related to Mahler algebra.

Independent Research

Advisor: Independent

East Lansing, MI

01/2025 - Present

- Title: Ramsey Numbers for Multicolor Paths and Cycles.
- Investigated multicolor Ramsey numbers for paths and cycles, proved theorems, bounds for case of two and three colors.
- Analyzed proof strategies for $R_3(P_{10})$, building on existing work on $R_3(P_8)$ and $R_3(P_9)$.
- Authored an expository article and delivered internal presentations on findings.

Undergraduate Thesis

Advisors: Prof. Leonid Chekhov

East Lansing, MI

05/2024 - 12/2024

- Title: Fundamental about Ramsey Numbers, Ramsey Theory and Their Combinatorial Significance
- Synthesized and analyzed foundational concepts of finite and multicolor Ramsey numbers.
- Investigated applications of Ramsey Theory across graph theory, number theory, and theoretical computer science.
- Reconstructed classical proofs and analyzed computational approaches for open problems in asymptotic behavior.
- Authored a comprehensive undergraduate thesis and presented the research to departmental faculty.

Research Assistant

Advisors: Prof. Leonid Chekhov

East Lansing, MI

05/2024 - 12/2024

- Title: Random Matrix Model
- Analyzed topics from Prof. Chekhov's textbook, "Matrix Model: Integrability and Topology."
- Delivered weekly presentations synthesizing advanced sections of the book.
- Authored an expository article on Virasoro Constraints and the Kontsevich matrix model.

Research Assistant

Advisors: Prof. Peter Magyar

East Lansing, MI

05/2024 - 12/2024

- Title: Partition Lattice q-Analog.
- Constructed q-analog formulas for the twelvefold way and q-analog versions of various posets.
- Analyzed and presented material weekly from Stanley's "Enumerative Combinatorics I" and related papers.
- Authored an expository article summarizing properties of q-analog numbers, detail in q-Stirling and q-Bernoulli numbers.

Research Assistant - Discover America Project

Advisors: Prof. Jianliang Qian

East Lansing, MI

09/2023 - 05/2024

- Title: Towards High-resolution Computerized Traveltime Tomography Based on Eikonal Solvers.
- Developed and implemented first-order and high-order Eikonal equation solvers for traveltime tomography.

- Created better reconstruction of the original images after using optimized algorithms in Computerized Traveltime Tomography.

RELEVANT COURSES

Grad. Graph Theory (audit)	Textbooks used: Modern Graph Theory, Bollobas
Grad. Algorithmic Graph Theory	Textbooks used: Graph Theory, Bondy & Murty
Grad. Combinatorics I	Textbooks used: Enumerative Combinatorics, Vol. I, Stanley
Honors Abstract Algebra I & II	Textbooks used: Algebra, Artin & Topics in Algebra, Herstein
Honors Real Analysis I & II	Textbooks used: Net based approached to analysis
Complex Analysis	Textbooks used: Complex Variables, Fisher

TEACHING EXPERIENCE

Private Tutor <i>Self-employed</i>	Hanoi, Vietnam 06/2019 - Present
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- Provided Mathematics classes for 25 students, focusing on Mathematics entry exam for high school for gifted students, where around 800 gifted students participated in the exam, and only about 100 qualified and the topics covered for the exam included equations, inequalities, number theory, Euclidean geometry, and discrete math.
- Provided Algorithms tutoring services for 20 students, focusing on Algorithms for students who want to compete in the National Olympiad and higher. The topics covered for the competition include Dynamic Programming, Data Structures and Graph Theory.
- Built teaching curriculum, delivered tutorials in person or online twice a week, and trained students with created contests as the real one.

Teaching Assistant <i>Michigan State University</i>	East Lansing, MI 09/2021 - 12/2024
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- Teaching Assistant Classes:
 - CSE 232: Introduction to Programming II - Prof. J. Nahum - Teaching Assistants are chosen from the top 5% of the applied students. Number of students in semesters: Fall 2021 (73 students), Spring 2022 (68 students), Fall 2022 (80 students), Spring 2023 (74 students).
 - MTH 132: Calculus I - Prof. A. Drachman: Number of students in semesters: Fall 2023 (68 students), Spring 2024 (62 students), Fall 2024 (60 students).
- Assist students from diverse educational backgrounds, host recitation lessons, lab lessons. Facilitate group discussions, hold weekly in-person and online help rooms, answer student inquiries, grade weekly quizzes, midterm, and final examinations.

SCHOLARSHIPS & AWARDS

Vietnam Institute of Advanced Studies in Math Third Prize for outstanding project in VIASM REU 2025.	2025
MSU Student Mathematics Conference Best Presentation Award in 21st MSU Student Mathematics Conference	2024
Herzog Competition Second Prize in Herzog Competition - An annual Mathematics Competition at Michigan State University.	2022
International Collegiate Programming Contest Represent Michigan State University for International Collegiate Programming Contest (ICPC) in East Central North America region contests.	2021 - 2024

EXTRACURRICULAR EXPERIENCE

Active Member <i>Michigan State University ICPC Team</i>	East Lansing, MI 09/2021 - 05/2025
<ul style="list-style-type: none"> Present new topics biweekly for multiple Michigan State University ICPC Teams Host weekly Programming Contest as a training for multiple Michigan State University ICPC Teams 	