Luc D. Ta

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Education

Yale University — New Haven, CT
B.A. Mathematics (intensive track with thesis) & Ethnicity, Race, and Migration; GPA: 3.8 — Aug 2021 – May 2025

- **Senior thesis advisor:** Sam Raskin
- **Graduate coursework:** Representation Theory (spring 2025), Algebraic Topology (current), Quantum Invariants of Knots and 3-Manifolds (current), Commutative Algebra and Category Theory (grade: A)

Budapest Semesters in Mathematics — Budapest, Hungary
Study abroad, facilitated by St. Olaf College — Jun 2023 – Aug 2023

- **Coursework:** Graph Theory (grade: A+), Advanced Combinatorics (grade: A)

Research Interests

- **Primary:** Algebraic geometry and arithmetic geometry, connections to representation theory and Lie theory
- **Secondary:** Algebraic and categorical approaches to geometric topology, particularly knot theory

Research Experience

REU: Research Challenges of Computational Methods in Discrete Mathematics — Bethlehem, PA
Moravian University, Department of Mathematics — May 2024 – Jul 2024

- **Supervisors:** Samantha Pezzimenti (Penn State Brandywine) and Wing Hong Tony Wong (Kutztown University)
- Conducted [1] and [2] using methods from topology, knot theory, algebra, and combinatorics and Python algorithms
- Answered three open questions about the mosaic numbers of Legendrian knots and toric mosaic numbers of knots
- Organized, prepared, and delivered weekly presentations about in-progress work to all REU participants and mentors

Publications

Research Articles

[1] Margaret Kipe, Samantha Pezzimenti, Leif Schaumann, Luc Ta, and Wing Hong Tony Wong. *Bounds on the mosaic number of Legendrian knots.* 2024+. Submitted. Preprint, arXiv:2024.08064 [math.GT].

[2] Kendall Heiney, Margaret Kipe, Samantha Pezzimenti, Kaelyn Pontes, and Luc Ta. *Constructions of and bounds on the toric mosaic number.* 2024+. In preparation.

Editor-Reviewed Publications

[3] Luc Ta. Integer sequences "A375353," "A375355," "A375356," "A375357," "A375392," "A375619," and "A376155" related to knot mosaics, hyperbolic links, and extremal graphs. *On-Line Encyclopedia of Integer Sequences (OEIS)*, 2024.

[4] Margaret Kipe, Samantha Pezzimenti, Leif Schaumann, Luc Ta, and Wing Hong Tony Wong. Integer sequences "A374939," "A374942," "A374943," "A374944," "A374945," "A374946," "A374947," and "A375354" related to Legendrian knot mosaics as detailed in [1]. *On-Line Encyclopedia of Integer Sequences (OEIS)*, 2024.

Additional Academic Experience

Independent Study of Lie Theory and Representation Theory — New Haven, CT
Yale University, Department of Mathematics — Jan 2023 – May 2023

- **Advisor:** Andrew Neitzke
- Organized weekly readings, meetings, and discussions of Stillwell's *Naive Lie Theory* and Hall's *Lie Groups, Lie Algebras, and Representations* for a group of six undergraduates from the mathematics and physics departments
- Produced and presented an original final report classifying all (semi)simple complex Lie algebras using the Dynkin diagrams corresponding to irreducible root systems over $\mathbb{C}$, supplemented with original figures and examples

Directed Project on Commutative Algebra — Remote
Polymath, Jr. Undergraduate Research Program — Jun 2022 – Aug 2022

- **Advisor:** Ananthnarayan Hariharan (Indian Institute of Technology, Bombay)
- Collaborated on a research-style directed study of commutative algebra with applications to algebraic number theory

Science, Technology, and Research Scholars (STARS) Program — New Haven, CT
Yale University, Science and Quantitative Reasoning Center — Aug 2021 – May 2022

- Chosen by committee approval for highly selective, departmentally funded program to study research practices, technical writing, and other professional skills requisite for careers in academia and research in the sciences

Presentations

Computing the Mosaic Numbers of Legendrian Knots (Contributed talk; accepted) — Seattle, WA
Joint Mathematical Meetings, Spectra Special Session on Research by LGBTQ+ Mathematicians — Jan 2025

Thrown for a Loop: A Survey of Knot Theory (Half expository seminar, half research talk) — New Haven, CT
Pizza Seminar Series, Yale Undergraduate Mathematics Society, Yale University — Sep 2024

Toric Knot Mosaics (Contributed talk; joint with Kendall Heiney) — Seattle, WA
UnKnot V Conference, Seattle University, Department of Mathematics — Jul 2024

Legendrian Knot Mosaics (Invited talk; joint with Margaret Kipe and Leif Schaumann) — Gettysburg, PA
REU Symposium, Gettysburg College, Department of Mathematics — Jun 2024

Teaching

Introduction to Abstract Algebra — Yale University
Undergraduate Learning Assistant — Aug 2024 – Dec 2024

- Created and distributed original midterm review problems; design and conduct interactive exam review sessions; hold regular office hours for 41 students

Analysis II: Lebesgue Integration and Complex Fourier Series — Yale University
Undergraduate Learning Assistant — Jan 2024 – May 2024

- Created and distributed original midterm and final exam review problems; designed and conducted multiple interactive exam review sessions and collected student feedback throughout the term; held regular office hours
- Served as the only on-campus ULA for all 40 students; wrote and provided solution sets to assist the off-campus ULA

Real Analysis — Yale University
Undergraduate Learning Assistant — Aug 2023 – Dec 2023

- Designed and led weekly proof-writing workshops to introduce 44 students to set-theoretic concepts, proof techniques, and mathematical writing; conducted interactive midterm and final exam review sessions; held regular office hours

Introduction to Functions and Calculus I-II — Yale University
Undergraduate Learning Assistant and Peer Tutor — Aug 2022 – May 2023

- Designed and led semiweekly interactive practice workshops; organized and conducted weekly small-group review sessions; created original practice problems for all 88 students and solution sets for other ULA's to consult during workshops

Employment

Web Developer — New Haven, CT
Yale University Bands — Aug 2023 – present

- Apply HTML, CSS, and JavaScript to oversee web development and upkeep for Yale's concert, jazz, and marching bands

Undergraduate Learning Assistant — New Haven, CT
Yale University, Department of Mathematics — Aug 2022 – present

- Hired after a highly selective interview and teaching evaluation process with mathematics faculty
- For further information, please refer to the "Teaching" section above.

Mathematics Tutor — New Haven, CT and remote
Self-employed — Aug 2021 – present

- Work one-on-one with students of all ages to develop and reinforce mathematical confidence, review material for courses and standardized testing, and nurture mathematical curiosity by exploring connections to higher mathematics

Event Assistant — New Haven, CT
"Crossroads of Algebra, Geometry, and Physics" Conference at Yale University — May 2022

- Worked alongside mathematics faculty and staff to facilitate and usher for a Yale mathematics conference
- Took advantage of the opportunity to attend presentations and explore algebraic geometry as a future research interest

Extracurricular and Volunteer Experience

Delegate, Student Advisory Committee — New Haven, CT
Yale University, Department of Mathematics — Feb 2024 – present

- Plan, organize, and secure funding for panel and roundtable discussions, mentorship opportunities, and partnerships with affinity groups to bridge the gap between students and faculty, turning students' feedback into concrete policies
- Elected by students across mathematics-related majors to represent students' diverse needs and voices in the department
- Advocate in particular for the needs of first-generation and marginalized students at biweekly meetings

Undergraduate Peer Mentor — New Haven, CT
Yale Undergraduate Mathematics Society — Aug 2023 – present

- Mentor first-year students interested in studying mathematics, especially other first-generation students
- Engage with Yale's broader mathematics community through various events, seminars, and presentations

Mathematics Advisor, Academic Fair — New Haven, CT
Yale University, Department of Mathematics — Aug 2023 & Aug 2024

- Introduced incoming students to Yale's mathematics department, answering questions about courses and the major

Cofounder and Vice Chair — New Haven, CT
Yale Students for Ranked-Choice Voting — Aug 2022 – present

- Lead and mentor students interested in statistical and combinatorial research on ranked-choice voting in New Haven

Workshops

Mathematics Graduate School Panel (Organized) — New Haven, CT
Yale University, Department of Mathematics — Apr 2024

Departmental Town Hall (Organized and led) — New Haven, CT
Yale University, Department of Mathematics — Apr 2024

- Secured departmental funding to plan, organize, and lead discussions at a session open for all students to provide feedback for the department, especially regarding its inclusivity, climate, and potential structural reforms
- Compiled a report of students' experiences and critiques to share with the Dean of Undergraduate Studies in Mathematics

Mathematics Course Scheduling and Major Planning Workshop (Organized and hosted) New Haven, CT
Yale University, Department of Mathematics Apr 2024

Honors & Grants

Prospective Ph.D. Preview Program Scholar (6% acceptance rate) Aug 2024
Princeton University, Graduate School Deans and Administration

Delta Alpha Pi Honor Society (Founding member) Jan 2023 – present
Yale University

Richter Summer Fellowship ($1,500) Jun 2023
Paul K. Richter and Evalyn E. Cook Richter Memorial Fund

International Study Award ($3,400) Jun 2023
Yale University

Summer Experience Award ($4,000) May 2022
Yale University

Winston T. Townsend Prize for Excellence in English Composition ($1,000) May 2022
Yale University, Department of English

Professional Memberships & Affiliations

- Association on Higher Education and Disability (AHEAD)
- Center for Minorities in the Mathematical Sciences (CMMS)
- Out in Science, Technology, Engineering, and Mathematics (oSTEM)
- Sines of Disability
- Spectra, the Association for LGBTQ+ Mathematicians

Skills

- **Programming languages:** Python, Java, R, HTML, CSS, JavaScript, Wolfram Language
- **Other software:** LaTeX, PGF/Ti*k*Z, Mathematica, Singular, KnotPlot, Jupyter Notebook, Git, Logger Pro, Adobe Creative Cloud
- **Human languages:** American Sign Language (advanced), Spanish (intermediate), Vietnamese (conversational), Italian (reading only)