

# Luc D. Ta

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## EDUCATION

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### 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), Algebra (A)

### Budapest Semesters in Mathematics

Budapest, Hungary

Study abroad, facilitated by St. Olaf College

Jun 2023 – Aug 2023

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

## RESEARCH INTERESTS

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- **Primary:** Algebraic geometry, Lie theory, geometric group theory
- **Secondary:** Algebraic and categorical approaches to smooth knot theory and geometric topology

## RESEARCH EXPERIENCE

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### REU: Research Challenges of Computational Methods in Discrete Mathematics

Bethlehem, PA

NSF Award #2150299; Moravian University, Department of Mathematics

May 2024 – Jul 2024

- **Supervisors:** Samantha Pezzimenti (Penn State Brandywine) and Wing Hong Tony Wong (Kutztown University)
- Conducted two research projects constructing and investigating mosaic projections of torus knots and Legendrian knots using methods from topology, knot theory, skein theory, linear algebra, and combinatorics along with Python algorithms
- Rigorously proved sharp bounds for mosaic numbers of Legendrian knots and toric mosaic numbers of smooth knots
- Organized, prepared, and delivered weekly presentations about in-progress work to all REU participants and mentors

## PUBLICATIONS

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### ARTICLES IN PREPARATION

- [1] Margaret Kipe, Samantha Pezzimenti, Leif Schaumann, Luc Ta, and Wing Hong Tony Wong. Bounds on mosaic number of Legendrian knots. 2024+. In preparation.
- [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](#),” and “[A375619](#)” 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

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### Independent Study of Lie Theory

Yale University, Department of Mathematics

New Haven, CT

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

Polymath, Jr. Undergraduate Research Program

Remote

Jun 2022 – Aug 2022

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

### Science, Technology, and Research Scholars (STARS) Program

Yale University, Science & Quantitative Reasoning Center

New Haven, CT

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

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### Thrown for a Loop: A Survey of Knot Theory (Expository seminar & research talk)

Pizza Seminar Series, Yale Undergraduate Mathematics Society, Yale University

New Haven, CT

Sep 2024 (in preparation)

### Toric Knot Mosaics (Contributed talk; joint with Kendall Heiney)

UnKnot V Conference, Seattle University, Department of Mathematics

Seattle, WA

Jul 2024

### Legendrian Knot Mosaics (Invited talk; joint with Margaret Kipe and Leif Schaumann)

REU Symposium, Gettysburg College, Department of Mathematics

Gettysburg, PA

Jun 2024

## TEACHING

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### Introduction to Abstract Algebra

Undergraduate Learning Assistant

Yale University

Aug 2024 – Dec 2024

### Analysis II: Lebesgue Integration & Complex Fourier Series

Undergraduate Learning Assistant

Yale University

Jan 2024 – May 2024

- Created and distributed original [midterm](#) and [final exam](#) review problems and worksheets; 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

Undergraduate Learning Assistant

Yale University

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 & Calculus I-II

Undergraduate Learning Assistant & Peer Tutor

Yale University

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

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### **Web Developer & Office Assistant**

Yale University Bands

New Haven, CT

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**

Yale University, Department of Mathematics

New Haven, CT

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**

Self-employed

Remote

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**

“Crossroads of Algebra, Geometry, and Physics” Conference at Yale University

New Haven, CT

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 & VOLUNTEER EXPERIENCE

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### **Delegate, Student Advisory Committee**

Yale University, Department of Mathematics

New Haven, CT

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**

Yale Undergraduate Mathematics Society

New Haven, CT

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**

Yale University, Department of Mathematics

New Haven, CT

Aug 2023

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

### **Cofounder, Yale Students for Ranked-Choice Voting**

Yale University

New Haven, CT

Aug 2022 – present

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

## WORKSHOPS

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### **Mathematics Graduate School Panel (Organized)**

Yale University, Department of Mathematics

New Haven, CT

Apr 2024

### **Departmental Town Hall (Organized & led)**

Yale University, Department of Mathematics

New Haven, CT

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 & Major Planning Workshop** (Organized & hosted)  
Yale University, Department of Mathematics

New Haven, CT  
Apr 2024

## HONORS & GRANTS

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**P3 Scholar** Aug 2024  
Princeton University, Graduate School Deans and Administration

**Delta Alpha Pi Honor Society** Jan 2023 – present  
Founding Member, Yale University Chapter

**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

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- 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

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- **Programming languages:** Python, Java, R, HTML, CSS, JavaScript
- **Other software:**  $\text{\LaTeX}$ , PGF/TikZ, Mathematica, Singular, KnotPlot, Jupyter Notebook, Git, Logger Pro, Adobe Creative Cloud
- **Human languages:** American Sign Language (conversational), Spanish (conversational), Italian (reading)