

# XIAO (ANTHONY) HONG

+1 (314)-857-4211 | email: [hong.x@wustl.com](mailto:hong.x@wustl.com)  
website: <https://anthonyhongxiao.github.io/>

## EDUCATION

### Washington University in St. Louis

St. Louis, United States

B.S. in Economics & Computer Science; Double Major in Mathematics

Aug 2021 – May 2025

- **Overall GPA:** 3.98/4.00; **Major GPA:** 3.99/4.00
- **Selected Honors:** Brian Blank Award, Dean's List, Freiwald Scholar, Tau Beta Pi Engineering Honor Society invitation (Upper 8<sup>th</sup> of McKelvey School of Engineering)
- **Selected Courses:** Math5045 Algebraic Topology (A); Math5046 Differential Topology (A); Math5031 Algebra I (A+); Math5022 Complex Analysis II (A-); Math547 Theory of Polytopes (A+); Math560 Compact Lie Group (in progress); CSE543T Algorithms of Nonlinear Optimization (A); Math5440 High-dimensional Probability (A+); Math586 Network Statistics (A).

## PUBLICATIONS

1. **Xiao Hong.** (2020, December). "Study of Intergenerational Mobility and Urbanization Based on OLS Method and Ordered Probit Model." *2020 International Conference on Management Science Informatization and Economic Innovation and Development (MSIEID)*. IEEE, 10.1109/MSIEID52046.2020.00092

## RESEARCH EXPERIENCES

### Summer Geometry Initiative, Massachusetts Institute of Technology

Remote

Mentored group projects

Jul 2024 – Aug 2024

#### Deforming Mesh (Dr. [Nickolas Sharp](#))

- Computed and compared the Gromov-Hausdorff distance, Hausdorff distance, and Chamfer distance as shape dissimilarity measures.

#### Signed Distance Functions (Prof. [Oded Stein](#) and Prof. [Silvia Sellán](#))

- Designed and reconstructed signed distance functions (SDFs) using the marching squares algorithm.
- Proved the theorem of characterization of SDF on plane by Eikonal equation and closest point condition.

#### Fitting Inconsistent Input with Noise Regularization (Prof. [Amir Vaxman](#))

- Used shallow neural networks and adversarial modules to reconstruct surfaces from Poisson disc samples, visualized by Polyscope.

#### Winding Numbers Vectorization (Prof. [Edward Chien](#))

- Computed winding numbers as harmonic functions on torus and its universal cover via C++ and CMake.
- Utilized intrinsic triangulations to resolve color region disconnections on the mesh, optimizing edge lengths in the feature space embedding.

### Freiwald Scholars Program, Washington University in St. Louis

St. Louis, United States

Independent study supervised by Prof. [Renato Feres](#)

Jul 2023 – Jan 2024

#### Curvature of Cayley Graph of Abelian and Nilpotent Groups

- Developed efficient algorithms for computation of the Ollivier-Ricci curvature of Cayley graphs of abelian and nilpotent groups.
- Studied Wasserstein distance of point measures evolving along geodesics.
- Presented on Midstates Consortium for Math and Science 23 at University of Chicago and WashU SP24 Undergraduate Research Symposium.

### Washington University in St. Louis

St. Louis, United States

Undergraduate honor thesis supervised by Prof. [Xiang Tang](#)

Feb 2024 – Present

#### The Atiyah-Guillemin-Sternberg Convexity Theorem

- Worked through Ana Cannas da Silva's *Lectures on Symplectic Geometry* and *Symplectic Toric Manifolds*.
- Wrote a report on Atiyah-Guillemin-Sternberg convexity theorem.

### Imperial College London

Remote

Group project supervised by Prof. [Jeroen Lamb](#)

Aug 2024 – Sep 2024

#### Multifractals

- Reviewed theorem on Hausdorff dimension of  $\alpha$ -level set of the local dimension of self-similar measure
- Interpreted and visualized  $f(\alpha)$  and  $\tau(q)$  plots of multifractals in real-world data by Matplotlib.

## COURSE PROJECTS

### Hex & Brouwer Paper Report (Math4181 Topology II)

Mar 2022

- Corrected an equivalence proof in David Gale's "The Game of Hex and The Brouwer Fixed-Point Theorem."

**Split Spoils: Solution to Stolen Necklace Problem Via Borsuk-Ulam Theorem (Math4181 Topology II)** *May 2022*

- Solved the 2-dimensional Necklace division problem using the Borsuk-Ulam Theorem.

**Image Classification Using Wasserstein Distance from Monge-Kantorovich Solvers (CSE543 Algorithms of Nonlinear Optimization)** *Dec 2023*

- Surveyed algorithms of gradient descent and numerical PDE for Monge problems in image classification.

**Brion's Theorem and Khovanskii-Pukhlikov Theorem (Math547 Theory of Polytopes)** *May 2024*

- Presented Brion's theorem and applied Todd operator to volume perturbation of unimodular polytopes.

**WORK EXPERIENCE**

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<b>Department of Mathematics, Washington University in St. Louis</b>	St. Louis, United States
Teaching Assistant, Math5046 Differential Topology, Prof. Rachel Roberts	<i>Jan 2024 – May 2024</i>
• Held weekly office hours; graded weekly assignments.	
Grader, Math4111 Introduction to Analysis, Prof. Ari Stern	<i>Aug 2022 – Dec 2022</i>
Grader, Math4171 Topology I, Prof. Tang Xiang	<i>Aug 2023 – Dec 2023</i>
Grader, Math5051 Measure Theory and Functional Analysis I, Prof. Henri Martikainen	<i>Aug 2024 – Dec 2024</i>

**TALKS AND SEMINARS**

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<b>University of Chicago</b>	Chicago, United States
Speaker at Midstates Consortium for Math and Science 23	<i>Nov 2023</i>

- Presented work on curvature of Cayley graph of abelian and nilpotent groups

<b>Washington University in St. Louis</b>	St. Louis, United States
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- Reading Group SP23: Algebraic Geometry.
- Reading Group FL23: Representation Theory.
- Speaker at Online Early Career Morning Sessions held by Prof. Henri Martikainen.
- UNC Undergraduate Analysis and PDE Online Seminar FL22-SP23.
- Convention on Stan Programming and Bayesian Modeling 23 Workshop.
- WUSTL Metamorphic Architecture Workshop 2019.

**ADDITIONAL INFORMATION**

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**Computer and Language Skills**

- Software skills: Latex, Python, Java, MATLAB, Adobe Illustrator, Octave, R, Stata.
- Bilingual: Chinese & English.

**Interests**

- Classical Music, Chinese Calligraphy, Printmaking & Travelling, Tennis.