

Xinran Yu

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Education

University of Illinois Urbana-Champaign (UIUC) , Champaign, IL Ph.D in Mathematics: Expected May 2026 Research Focus: Conformal geometry, Modifying Einstein's Theory of General Relativity.	2019–2026
University of Liverpool , Liverpool, UK BSc in Mathematics with Honors Thesis: Analytic Continuation and Riemann Surfaces. Supervisor: Dr. Jon Woolf.	2015–2017
Xi'an Jiaotong-Liverpool University , Suzhou, China BSc in Applied Mathematics	2013–2015

Preprints

Conformally compact metrics and the Lovelock tensors , arxiv:2505.24188	2025
Witten Instanton Complex and Morse-Bott Inequalities on Stratified Pseudomanifolds with Gayana Jayasinghe and Hadrian Quan, arxiv:2412.12003	2024

Projects

Analysis of US Mortality Data , Internship network in the mathematical sciences, UIUC • Performed data cleaning, exploratory analysis, and visualization to highlight mortality trends using Python . • Built predictive models (decision trees, random forests, KMeans, neural networks) to explore causes of death.	Feb 2025
Bird-Aircraft Collision , Internship network in the mathematical sciences, UIUC • Conducted statistical analysis, including multi-linear regression, log regression, and hypothesis testing. • Modeled damage cost versus altitude and number of strikes using Python .	Nov 2024
Safety Analysis of Autonomous Vehicles , ECE471 mini project, UIUC • Analyzed AV safety using simulated data from Carla and real-world data from the California DMV. • Used statistical analysis, Bayesian inference, and data visualization to assess and improve AV reliability.	Sep 2024

Technical Skills

Programming Languages: Python (NumPy, Pandas, Matplotlib, Scikit-learn, PyTorch, Statsmodels, Seaborn), Mathematica

Data Analysis & Modeling: Statistical analysis, PDEs, machine learning, data science analytics

Languages: Chinese (native), English (fluent), German (translation project experience), Japanese (intermediate)

Related Courses: Partial Differential Equations, Differential Geometry, Functional Analysis, Machine Learning

Honors & Awards

Susan C. Morisato IML Scholarship , UIUC	Summer 2025
Ruth V Shaff & Genevie I. Andrews Fellowship , UIUC	Spring 2024
Teachers Ranked as Excellent by their Students , UIUC	Spring and Fall 2021
Wills Prize in Mathematics , University of Liverpool	Jul 2017
IMA Prize , University of Liverpool	Jul 2017

Teaching & Mentoring

Instructor, Calculus II, UIUC

Spring 2025 & 2022

- Delivered three weekly lectures, covering integral calculus, sequences, and series.
- Designed and managed course materials, including syllabus, assignments, quizzes, and exams.
- Provided student support through office hours, in-class discussions, and supplementary resources.

Graduate Team Leader, Illinois Math Lab, UIUC

2024–2025

Project: *Historical Mathematical Models*

Recipient of the [Nancy D. Anderson Undergraduate Research Award](#) for Spring 2024

- Led a team to catalog one of the world's largest collections of historical mathematical models in collaboration with the University Library.
- Developed digital catalog descriptions using **Mathematica**, enhancing public exhibits and long-term access.
- Created educational materials and 3D print files for mathematical visualization outreach.

Graduate Team Leader, Illinois Geometry Lab, UIUC

Fall 2019

Project: *Simulating Multi-Soliton Solutions to NLS and KdV and Studying Interactions*

- Simulated multi-soliton solutions to the nonlinear Schrödinger (NLS) equation with nonzero boundary conditions.
- Used **Python** for data visualization and model creation.
- Led the project's mid-semester presentation, open house event, and final report.

Teaching Assistant, UIUC

2019–present

- Led discussion sections for introductory and advanced Calculus courses.
- Provided individualized support to students and tutored differential equations with a focus on problem-solving.

Talks

Dirichlet-to-Neumann map for conformally compact Einstein metrics

Oct 2024

Graduate Student Geometry and Topology Seminar at UIUC

Conformal geometry in Lovelock gravity theories

Apr 2024

AWM Graduate Student Colloquium at UIUC

The fractional Laplacian through Dirichlet problem formulation

Feb 2024

Graduate Geometry and Analysis Seminar at UIUC

Services & Enrichment

Translation Project, Mathematics Library, UIUC

2024-2025

- Revised and edited translations of the early 20th-century M. Schilling catalog from German to English.
- Collaborated with library staff to validate the documentation of mathematical models in Altgeld Hall.

Microlocal Analysis and Quantum Dynamics 2024

Summer 2024

Northwestern summer school

International TA Panel Panelist, UIUC

Aug 2022

- Shared strategies for overcoming language barriers and improving communication as an international TA.
- Compared U.S. and international teaching methods, aiding adaptation to diverse academic environments.
- Provided advice on navigating cultural differences in academic expectations and classroom management.