HANOI - SINGAPORE MEETING

Program Booklet

Vietnam Institute for Advanced Study in Mathematics (VIASM)

Department of Mathematics, National University of Singapore (NUS)

Saturday-Sunday, 4-5 April 2026

Ha Noi, Viet Nam

Connecting researchers, students, and institutions across pure and applied mathematics.

Workshop Overview

The Hanoi - Singapore Meeting is a two-day workshop designed to strengthen research connections between the Department of Mathematics at the National University of Singapore and the mathematical community in Ha Noi, Viet Nam. The program brings together faculty, postdoctoral researchers, PhD students, and local participants for a shared exploration of current directions in both pure and applied mathematics.

Alongside educational and tutorial talks, the meeting introduces students to graduate study opportunities at NUS Mathematics, including the PhD and Master's programs. A central aim of the event is to create space for sustained academic exchange through discussion sessions, recruitment conversations, and follow-up collaborations between researchers and institutions.

Organizing Institutions

- Vietnam Institute for Advanced Study in Mathematics (VIASM)
- Department of Mathematics, National University of Singapore (NUS)

Scientific Committee

- Prof. Yao Yao, National University of Singapore
- Prof. Dinh Tien Cuong, National University of Singapore

Organizing Committee

- Prof. Le Minh Ha, Vietnam Institute for Advanced Study in Mathematics (VIASM)
- Prof. Han Fei, National University of Singapore
- Prof. Cai Zhenning, National University of Singapore
- Prof. Tran Chieu Minh, National University of Singapore
- Prof. Nguyen Hung Minh Tan, National University of Singapore

Speakers and Delegates

- Prof. Yao Yao
- Prof. Dinh Tien Cuong
- Prof. Matteo Mucciconi
- Prof. Han Fei
- Prof. Tran Chieu Minh
- Prof. Li Qianxiao
- Prof. Cai Zhenning
- Prof. Nguyen Hung Minh Tan
- Prof. Than Quang Khoat
- Dr. Do Thai Duong
- Dr. Benoît Corsini
- Mr. Tran Viet Hoang
- Mr. Tran Hoang Anh
- Mr. Maxime Meyer

Acknowledgement

- Prof. Ngo Quoc Anh, Hanoi University of Science
- Prof. Le Quy Thuong, Hanoi University of Science
- Prof. Le Hong Phuong, Hanoi University of Science
- Prof. Le Van Hien, Hanoi National University of Education
- Prof. Si Duc Quang, Hanoi National University of Education
- Prof. Cung The Anh, Hanoi National University of Education
- Prof. Nguyen Thi Van Anh, Hanoi National University of Education
- Prof. Huynh Thi Thanh Binh, Hanoi University of Science and Technology
- Prof. Nguyen Canh Nam, Hanoi University of Science and Technology
- Prof. Than Quang Khoat, Hanoi University of Science and Technology
- Prof. Nguyen Phi Le, Hanoi University of Science and Technology
- Prof. Nguyen Thi Thu Thuy, Hanoi University of Science and Technology
- Prof. Dam Quang Tuan, Hanoi University of Science and Technology
- Prof. Doan Thai Son, Institute of Mathematics, Vietnam Academy of Science and Technology
- Prof. Tran Quoc Long, VNU University of Engineering and Technology
- Ms. Nguyen Hong Anh, VIASM
- Ms. Vu Lan Anh, VnExpress
- Ms. Vu Khanh Linh, VnExpress

About NUS and the Mathematical Sciences Community

About the National University of Singapore

The National University of Singapore (NUS) is one of Asia's leading universities, known for academic rigor, research excellence, and a strong global outlook. Founded in 1905, it offers a broad range of programs across disciplines while supporting interdisciplinary inquiry, innovation, and collaboration with industry and government. Its vibrant campus and international community make NUS a dynamic environment for learning and research.

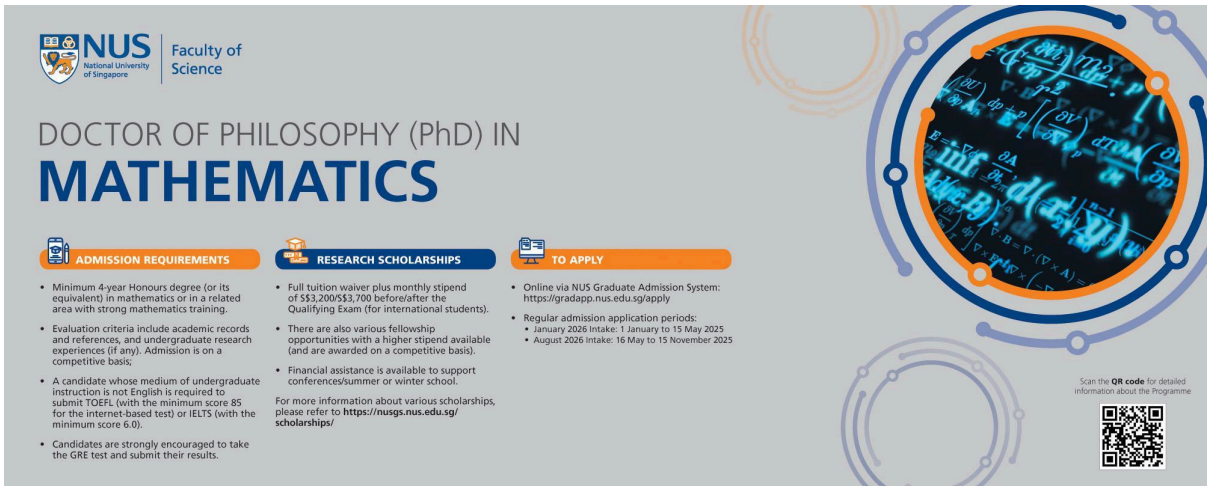
NUS Department of Mathematics

The Department of Mathematics at NUS is one of the leading mathematics departments in Asia, with strengths spanning pure mathematics, applied mathematics, statistics, and mathematical aspects of modern data science. The department offers a rigorous graduate training environment and maintains active research collaborations with institutions around the world.

Institute for Mathematical Sciences

The Institute for Mathematical Sciences (IMS), founded in 2000, is a university-level research institute dedicated to advancing fundamental and interdisciplinary mathematical research. It provides a platform for interaction between mathematics and neighboring scientific disciplines, fosters talent development, and connects the scientific community in Singapore with the wider international research ecosystem.

Mathematics PhD Program at NUS



The PhD program in Mathematics at NUS offers focused research training across a broad spectrum of areas. Students work closely with faculty on frontier problems while building strong foundations through coursework, seminars, and collaboration. Graduates move on to careers in academia, research institutes, and industry in Singapore and internationally.

NUS National University of Singapore | Department of Mathematics Faculty of Science

PhD in MATHEMATICS

EARLY OFFERS ADMISSION PROGRAMME

The Department of Mathematics at NUS has been ranked 1st among Asia Universities and top 20 worldwide in recent QS World University by Subject . The Department offers a diverse and vibrant programme in graduate studies, in fundamental and applied mathematics. Faculty members' research covers all major areas of contemporary mathematics.

The Doctor of Philosophy in Mathematics Programme is designed to provide advanced research training in mathematical sciences. Students enrolled into the programme will have the opportunity to work with prominent researchers in major research themes such as Combinatorics, Dynamical Systems, Geometry & Topology, Imaging & Vision Science, Mathematical Economics and Mathematical Finance, Mathematical Logic & Theoretical Computer Science, Numerical Analysis & Scientific Computing, Optimization, Partial Differential Equations, Probability and Representation Theory & Automorphic Forms. They will also interact with faculty members and renowned visiting mathematicians at colloquiums and seminars and participate in overseas research attachments and conferences with financial support.

For more information about the department and the PhD Programme, please refer to: https://www.math.nus.edu.sg/

About the Early Offers Admission Programme

- The standard deadline for the normal application cycle is November 15, 2026.
- In the Early Offers admission programme, the department recruits distinguished students with strong academic backgrounds for its Ph.D. programme with full scholarship in all areas of mathematics and applied mathematics.
- For more details **about research areas and the faculty members, please refer to**: https://www.math.nus.edu.sg/people/regular-faculty/
- Interested applicants can refer to the following webpage URL for more information about the admission requirements: https://www.math.nus.edu.sg/pg/phd/phd-prospective/

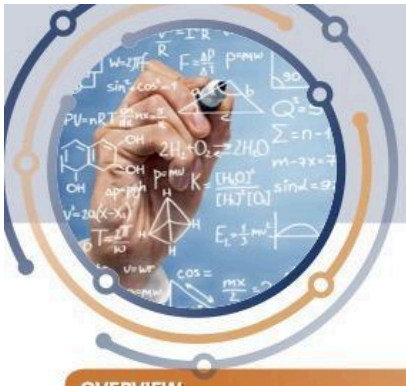
PhD Scholarship Information

- The PhD scholarship includes tuition fee waiver + up to S$4100 stipend (tax free) per month.
- Outstanding students with strong academic record can be considered for admission with GRE and TOEFL waiver.
- Department will recommend top students shortlisted from the Early Offers Programme to be considered for the prestigious **President's Graduate Fellowship (PGF)** with higher stipend.
- The details about the PGF can be found in the following link: **https://nusgs.nus.edu.sg/scholarships/presidents-graduate-fellowship**

TO APPLY

Interested applicants for early offer admissions to the August 2027 intake, please scan the QR code

OR access the link: https://tinyurl.com/t3tt7maz to register before **May 23rd 2026**



NUS National University of Singapore | Faculty of Science

DOCTOR OF PHILOSOPHY (PhD) IN MATHEMATICS

OVERVIEW

The Department of Mathematics at NUS has been ranked 1st among Asian Universities and top 20 worldwide in recent QS World University Rankings by Subject. The Department offers a diverse and vibrant graduate programme in fundamental and applied mathematics. Faculty members' research covers all major areas of contemporary mathematics.

The Doctor of Philosophy (PhD) in Mathematics programme is designed to provide advanced research training in mathematical sciences. Students enrolled into the programme will have the opportunity to work with prominent researchers in Pure and Applied Mathematics. They will also interact with faculty members and renowned visiting mathematicians at colloquiums and seminars as well as participate in overseas research attachments and conferences with financial support.

FACULTY

The Department of Mathematics has prominent researchers in major research themes such as Combinatorics, Dynamical Systems, Geometry & Topology, Imaging & Vision Science, Machine Learning, Mathematical Finance and Mathematical Economics, Mathematical Logic & Theoretical Computer Science, Numerical Analysis & Scientific Computing, Optimisation, Partial Differential Equations, Probability Theory, Representation Theory & Automorphic Forms.

CAREER OPPORTUNITIES

Graduates of our PhD in Mathematics programme are highly sought after in both academia and industry:

- Postdocs and faculty positions at leading universities worldwide:
  - USA: UC Berkeley, Yale University, University of Chicago, University of Wisconsin–Madison, University of Maryland-College Park, University of Minnesota
  - UK: University of Oxford
  - France: Centre national de la recherche scientifique, Institut de recherche en informatique et en automatique
  - Austria: University of Vienna
  - China: Tsinghua University, Fudan University
- Research Scientists at leading institutes worldwide:
  - China: Chinese Academy of Sciences
  - Singapore: Temasek Laboratories, A*STAR institutes such as Institute of High Performance Computing, Bioinformatics Institute
- Quantitative Analysts, Risk Managers and Strategists at leading companies worldwide including ANZ Bank, Barclays, Credit Suisse, Deutsche Bank, DBS Bank, Goldman Sachs, JP Morgan, Morgan Stanley, Nomura, Standard Chartered Bank, UBS AG

PROGRAMME STRUCTURE AND CANDIDATURE

The programme has two intakes per academic year, in August and January. Candidates are also expected to:

- Pass PhD Qualifying Examination within the first 24 months;
- Pass the English language course offered by NUS;
- Pass a prescribed list of courses;
- Maintain a minimum Grade Point Average (GPA) of 3.5 (out of 5.0) ('B' grade on average);
- Complete a thesis and oral defence to the satisfaction of the examination panel;
- Complete the above requirements within 5 years (maximum candidature).

For more information about the programme, please refer to:
https://www.math.nus.edu.sg/pg/phd/phd-prospective/

ADMISSION REQUIREMENTS

- Minimum 4-year Bachelor's (Honours) degree (or its equivalent) in mathematics or in a related area with strong mathematics training
- Evaluation criteria include academic records and references, and undergraduate research experiences (if any). Admission is on a competitive basis
- A candidate whose medium of undergraduate instruction is not English is required to submit TOEFL (with the minimum score of 85 for the internet-based test) or IELTS (with the minimum score of 6.0)
- Candidates are strongly encouraged to take the GRE test and submit their results

RESEARCH SCHOLARSHIPS

The National University of Singapore provides research scholarships to successful applicants for a period of up to four years. These scholarships cover full tuition fees and include a monthly stipend to support the recipients' studies and research. Candidates of outstanding academic calibre may be nominated by the Department for consideration for the President's Graduate Fellowship (PGF), one of the University's most prestigious awards. Recipients of other scholarships will receive an additional allowance of S$500 per month from the Department, in addition to the standard University stipend. Financial support for a fifth year of study may be granted on a merit basis, subject to satisfactory academic progress and departmental recommendation.

For more information, please refer to **https://nusgs.nus.edu.sg/scholarships/**

TO APPLY

- Online via NUS Graduate Admission System:
  https://gradapp.nus.edu.sg/apply
- Regular admission application periods:
  - January 2027 Intake: 1 January to 15 May 2026
  - August 2027 Intake: 16 May to 15 November 2026

Scan the **QR code** for detailed information about the Programme

NUS National University of Singapore | Department of Mathematics
Faculty of Science

GRADUATE RESEARCH PROGRAMMES
Department of Mathematics
Faculty of Science
National University of Singapore

Block S17, 10 lower Kent Ridge Road, Singapore 119076
ASKMATH-res@nus.edu.sg
https://www.math.nus.edu.sg

Schedule - Saturday, 4 April 2026

Time	Program
8:00 am - 8:50 am	Registration
Session 1	Chair: Prof. Yao Yao
8:50 am - 9:00 am	Opening remarks Prof. Le Minh Ha (Managing Director of VIASM) Prof. Yao Yao (Vice Dean of NUS Graduate School)
9:00 am - 9:40 am	Talk 1 - *An introduction to complex dynamics* Prof. Dinh Tien Cuong
9:40 am - 10:20 am	Talk 2 - *Machine learning and approximation theory* Prof. Li Qianxiao
10:20 am - 10:40 am	Tea Break
10:40 am - 11:20 am	Talk 3 - *Singularity, regularity and asymptotics in nonlinear PDEs* Prof. Yao Yao
11:20 am - 12:00 pm	Talk 4 - *An introduction to pluripotential theory and higher complex Sobolev spaces* Dr. Do Thai Duong
12:00 pm - 2:00 pm	Lunch (Buffet)
Session 2	Chair: Prof. Tran Chieu Minh
2:00 pm - 2:40 pm	Talk 5 - *TBA*
2:40 pm - 3:20 pm	Talk 6 - *What is nonabelian additive combinatorics (and why does logic help?)* Prof. Tran Chieu Minh
3:20 pm - 3:40 pm	Tea Break
3:40 pm - 4:20 pm	Talk 7 - *Functional Equivalence in Neural Networks* Tran Viet Hoang
4:20 pm - 5:00 pm	Breakout sessions

Program subject to minor updates.

Schedule - Sunday, 5 April 2026

Time	Program
8:00 am - 8:50 am	Registration
Session 3	Chair: Prof. Cai Zhenning
9:00 am - 9:40 am	Talk 8 - *Introduction to NUS Math, PhD and Master programs at NUS* Prof. Han Fei
9:40 am - 10:20 am	Talk 9 - *Quantum Computation, Quantum Error Correction and Open Quantum Systems* Prof. Cai Zhenning
10:20 am - 10:40 am	Tea Break
10:40 am - 11:20 am	Talk 10 – *TBA* Prof. Matteo Mucciconi

11:20 am - 12:00 pm	Talk 11 - *Three tree problems* Dr. Benoît Corsini
12:00 pm - 2:00 pm	Lunch (Buffet)
Session 4	Chair: Prof. Nguyen Hung Minh Tan
2:00 pm - 2:40 pm	Talk 12 - *Why Deep Networks Work So Well? A geometric perspective* Prof. Than Quang Khoat
2:40 pm - 3:00 pm	Talk 13 - *Sum-of-Squares Hierarchy for the Gromov-Wasserstein Problem* Tran Hoang Anh
3:00 pm - 3:20 pm	Talk 14 - *How Do Large Language Models Scale with Context Length?* Maxime Meyer
3:20 pm - 4:00 pm	Talk 15 - *Steering Large Language Models: A Geometric and Control-Theoretic Approach* Prof. Nguyen Hung Minh Tan
4:00 pm - 4:40 pm	Breakout sessions
4:40 pm - 5:20 pm	Panel Discussion
5:20 pm - 5:30 pm	Closing remarks

Program subject to minor updates.

Selected Profiles

Professor Gan Wee Teck

Head, Department of Mathematics, National University of Singapore

Wee Teck Gan is a Professor of Mathematics and Head of the Department of Mathematics at NUS. He is internationally known for his work on automorphic forms and representation theory in the context of the Langlands program, especially theta correspondence, the Gan-Gross-Prasad conjecture, and Brylinski-Deligne covering groups. He studied at Churchill College, Cambridge, and completed his PhD at Harvard University under Benedict Gross before serving on the faculties of Princeton and UC San Diego.

Associate Professor Han Fei

Department of Mathematics, National University of Singapore

Han Fei is an Associate Professor in the Department of Mathematics at NUS and currently serves as Deputy Head of Department. His research lies in differential geometry, topology, and mathematical physics, with interests including spin geometry, the Atiyah-Singer index theorem, string dualities, and quantum field theory.

Associate Professor Yao Yao

Department of Mathematics, National University of Singapore

Yao Yao is an Associate Professor at NUS and Vice Dean of the NUS Graduate School. She received her PhD from UCLA in 2012 and previously held positions at the University of Wisconsin-Madison and Georgia Institute of Technology. Her research focuses on the analysis of partial differential equations in mathematical biology and fluid dynamics.

Associate Professor Cai Zhenning

Department of Mathematics, National University of Singapore

Zhenning Cai is an Associate Professor at NUS whose research focuses on modeling and simulation in rarefied gas dynamics, numerical methods, and the computation of open quantum systems. He received his PhD from Peking University and held research positions at RWTH Aachen University and Duke University before joining NUS.

Associate Professor Li Qianxiao

Department of Mathematics, National University of Singapore

Qianxiao Li is an Associate Professor in the Department of Mathematics and a principal investigator in the Institute for Functional Intelligent Materials at NUS. He studied mathematics at Cambridge and applied mathematics at Princeton. His research interests include machine learning, dynamical systems, control theory, stochastic optimization, and scientific machine learning.

Assistant Professor Nguyen Hung Minh Tan

Department of Mathematics, National University of Singapore

Nguyen Hung Minh Tan is an Assistant Professor in the Department of Mathematics at NUS and leads the Mathematical AI Group at NUS. Prior to joining NUS, he was a postdoctoral scholar at UCLA and completed his PhD in Machine Learning at Rice University. His research studies the statistical, dynamical, and geometric foundations of modern AI systems, with interests spanning large language models, dynamical systems, and optimal transport.

Professor Tien-Cuong Dinh

Department of Mathematics, National University of Singapore

Tien-Cuong Dinh is a Professor at NUS and a member of the Scientific Council of VIASM. He is a leading expert in complex geometry, several complex variables, and complex dynamical systems, and has previously held positions at Pierre and Marie Curie University, École Polytechnique, and the École Normale Supérieure in Paris.

Assistant Professor Tran Chieu Minh

Department of Mathematics, National University of Singapore

Tran Chieu Minh is an Assistant Professor at NUS specializing in model theory and its connections with geometry, topology, and combinatorics. He earned his PhD from the University of Illinois at Urbana-Champaign and later held a postdoctoral fellowship at the University of Notre Dame.

Assistant Professor Matteo Mucciconi

Department of Mathematics, National University of Singapore

Matteo Mucciconi is an Assistant Professor in the Department of Mathematics at NUS. He received a PhD in Physics from Tokyo Institute of Technology and previously held positions at the University of Warwick. His research interests lie in probability theory, statistical mechanics, and combinatorics.

Dr. Benoît Corsini

Research Fellow, Department of Mathematics, National University of Singapore

Benoît Corsini is a Research Fellow in the Department of Mathematics at NUS, working in discrete probability with interests in random models of permutations, trees, and graphs. He received his PhD from McGill University and held a postdoctoral position at TU Eindhoven before moving to Singapore.

Dr. Thai Duong Do

Visiting Senior Research Fellow, National University of Singapore

Thai Duong Do is a Visiting Senior Research Fellow at NUS under the SG Academies South-East Asia Postdoctoral Fellowship Programme. His research interests lie in complex analysis, especially pluripotential theory, and he completed his PhD at the Institute of Mathematics, Vietnam Academy of Science and Technology.

Mr. Tran Viet Hoang

PhD Candidate, Department of Mathematics, National University of Singapore

Viet-Hoang Tran is a PhD candidate in the Department of Mathematics at NUS. His research focuses on machine learning, particularly the functional equivalence of neural architectures.

Mr. Tran Hoang Anh

PhD Candidate, Department of Mathematics, National University of Singapore

Hoang Anh Tran is a PhD candidate in the Department of Mathematics at NUS. His research focuses on polynomial optimization, SOS-moment hierarchy methods, semidefinite programming, and optimal transport.

Mr. Maxime Meyer

PhD Candidate, Department of Mathematics, National University of Singapore

Maxime Meyer is a PhD student in the Department of Mathematics at NUS. His research focuses on machine learning and the theoretical foundations of large language models, with a particular interest in approximation theory.

Titles and Abstracts of the Talks

Prof. Dinh Tien Cuong

An introduction to complex dynamics

In this talk, we will give an introduction to the theory of dynamical systems associated with holomorphic maps on complex manifolds and related topics, in particular some research directions that are actively being developed by my colleagues at the National University of Singapore.

Prof. Yao Yao

Singularity, regularity and asymptotics in nonlinear PDEs

Partial differential equations (PDEs) arise naturally in modeling a wide range of phenomena in sciences, from fluid dynamics to mathematical biology. In this talk, through a variety of examples of nonlinear PDEs, I will illustrate how the interplay between nonlinearity and underlying structure gives rise to rich dynamics, including the formation of singularities, the stability and instability of steady states, and the regularity properties of solutions.

Prof. Han Fei

Introduction to NUS Math, PhD and Master programs at NUS

Prof. Cai Zhenning

Quantum Computation, Quantum Error Correction and Open Quantum Systems

Quantum computing offers a fundamentally new paradigm of computation based on the principles of quantum mechanics. This talk introduces basic concepts such as qubits, quantum gates, and representative algorithms including Shor's algorithm and Grover's algorithm. It also presents the basic ideas of quantum error correction and discusses open quantum systems as a framework for understanding the impact of environmental noise on quantum information processing.

Prof. Li Qianxiao

Machine learning and approximation theory

This talk explores mathematical aspects of machine learning through the lens of approximation theory - the study of approximating complicated functions by simpler ones. We begin with classical results, then turn to challenges arising in modern AI, including high-dimensional approximation, distributional approximation, and the use of compositional hypothesis spaces.

Prof. Matteo Mucciconi

Title to be announced

Prof. Tran Chieu Minh

What is nonabelian additive combinatorics (and why does logic help?)

This talk is a short introduction to nonabelian additive combinatorics, which studies product-set growth in groups and the structure behind small doubling. It will explain some of the main questions in the area and how tools from logic help address them.

Prof. Nguyen Hung Minh Tan

Steering Large Language Models: A Geometric and Control-Theoretic Approach

Inference-time activation steering offers a lightweight way to control foundation-model behavior without updating weights, but standard "add-a-direction" interventions can be brittle and hard to tune. This talk highlights two first-principles advances: Angular Steering, which treats steering as a geometric rotation in a low-dimensional subspace for smooth and interpretable control, and PID Steering, which frames behavior control through classical feedback control to improve robustness and stabilize outcomes across prompts and settings.

Prof. Than Quang Khoat

Why Deep Networks Work So Well? A geometric perspective

This talk provides an overview of recent advances in understanding generalization in deep neural networks, while highlighting why many elegant results still lead to vacuous guarantees for modern architectures. It then introduces a geometry-aware perspective in which test error is decomposed into a distributional complexity term and a local alignment term, offering a new lens for diagnosing and understanding generalization in deep learning.

Dr. Do Thai Duong

An introduction to pluripotential theory and higher complex Sobolev spaces

This talk gives a brief introduction to pluripotential theory, focusing on plurisubharmonic functions and the complex Monge-Ampère operator. It also discusses higher complex Sobolev spaces and their role in recent developments, and highlights some ongoing research directions connected to work at NUS.

Dr. Benoît Corsini

Three tree problems

This talk introduces several problems in discrete probability through three random tree models: binary search trees, minimum spanning trees, and height-biased trees. Together, these models illustrate a range of universal behaviors and connections between probability, combinatorics, and network structure.

Tran Viet Hoang

Functional Equivalence in Neural Networks

In neural networks, parameter space serves as a proxy for function space, but the mapping is non-injective: distinct parameters can represent the same function. This talk introduces this phenomenon, surveys classical and modern results, and discusses its applications.

Tran Hoang Anh

Sum-of-Squares Hierarchy for the Gromov-Wasserstein Problem

This talk studies the Gromov-Wasserstein problem through tractable semidefinite relaxations based on the Sum-of-Squares hierarchy. It explains how these relaxations provide computationally tractable proxies for otherwise intractable Gromov-Wasserstein and distortion distances over metric measure spaces.

Maxime Meyer

How Do Large Language Models Scale with Context Length?

Large language models perform strongly on many tasks, yet often struggle with copying, retrieval, and long-context reasoning. This talk presents a theoretical perspective on these failures and identifies limitations in how transformers store and process information over long sequences.