



華東師範大學

EAST CHINA NORMAL UNIVERSITY



KOREA ADVANCED INSTITUTE OF SCIENCE AND TECHNOLOGY

2026

ECNU—KAIST Joint Workshop on Mathematics

Conference Program

May 14 - 16, 2026

School of Mathematical Sciences

East China Normal University

Shanghai • China

2026 ECNU – KAIST  
Joint Workshop on Mathematics

School of Mathematical Sciences  
East China Normal University  
China

Department of Mathematical Sciences  
Korea Advanced Institute of Science and Technology  
Korea

May 14 — 16, 2026, Shanghai, China



# 2026 ECNU – KAIST Joint Workshop on Mathematics

May 14 — 16, 2026

## Introduction:

This workshop is the inaugural event of academic collaborations initiated under the Memorandum of Understanding (MoU) signed between the School of Mathematical Sciences (SMS) at East China Normal University (ECNU) and the Department of Mathematical Sciences (DMS) at Korea Advanced Institute of Science and Technology (KAIST) in August 2025. The MoU aims to foster deep and extensive cooperation in scientific research, talent cultivation, and academic exchange.

This workshop, hosted by ECNU, will have a special focus on Applied Mathematics.

The program will consist of plenary talks by distinguished experts from ECNU and KAIST.

## Conference Objectives:

The workshop aims to enhance academic exchange and cooperation between the mathematical communities of China and Korea, as well as with the broader international community. It will serve as a high-level platform for mathematicians and researchers to:

- Explore the frontiers of mathematics and its applications.
- Leverage the complementary strengths of both institutions.
- Discuss significant topics such as the development of the mathematical sciences and the cultivation of top-tier innovative talent.

## Co-Chairs:

Hairong Yuan (School of Mathematical Sciences, ECNU)

Myoungjean Bae (Department of Mathematical Sciences, KAIST)

Committee Members:

ECNU

Xia Huang  
Dong Ye  
Longtu Yuan  
Chunyi Zhao  
Haibiao Zheng  
Feng Zhou

KAIST

Beomjun Choi  
Wooseok Ha  
Wanmo Kang  
Ilmun Kim

Hosted by:

School of Mathematical Sciences, East China Normal University (ECNU), China

Co-organized by:

Department of Mathematical Sciences at Korea Advanced Institute of Science and Technology (KAIST), Korea

Supported by:

Key Laboratory of Mathematics and Engineering Applications, Ministry of Education,  
P. R. China

Contacts:

Hairong Yuan (ECNU) Email: hryuan@math.ecnu.edu.cn; Phone: +86 - 13764387644

Minghong Han (ECNU) Email: 52275500054@stu.ecnu.edu.cn; Phone: +86 - 18808142072

## Conference Schedule:

May 14: Conference Registration

May 15: Presentation

May 16: Open Discussion; Departure

## Venue:

Lecture Hall 102, Math Building, ECNU Minhang Campus

华东师范大学闵行校区数学楼 102 报告厅

## Accommodation:

Baolong Yiyue Hotel (Wujing Minhang Zizhu ECNU-SJTU Branch)

(No. 1, Lane 39, Shangyi Road, Wujing, Minhang District, Shanghai)

宝龙艺悦酒店 (吴泾闵行紫竹华师大交大店)

(上海市闵行区吴泾镇尚义路 39 弄 1 号)

## Transportation (to Baolong Yiyue Hotel):

By Subway:

From Pudong International Airport, Hongqiao International Airport, or Hongqiao Railway Station, it is recommended to take the Airport Link Line to Jinghong Road Station, transfer to Metro Line 15, and exit from Exit 2 of Yongde Road Station.

From Shanghai Railway Station, it is recommended to take Metro Line 1 to Shanghai South Railway Station (or start directly from Shanghai South Railway Station), transfer to Metro Line 15, and exit from Exit 2 of Yongde Road Station.

After exiting the station, you can take a taxi to Baolong Yiyue Hotel (Wujing Minhang Zizhu ECNU-SJTU Branch), or walk about 1.1 kilometers to the hotel.

By Taxi:

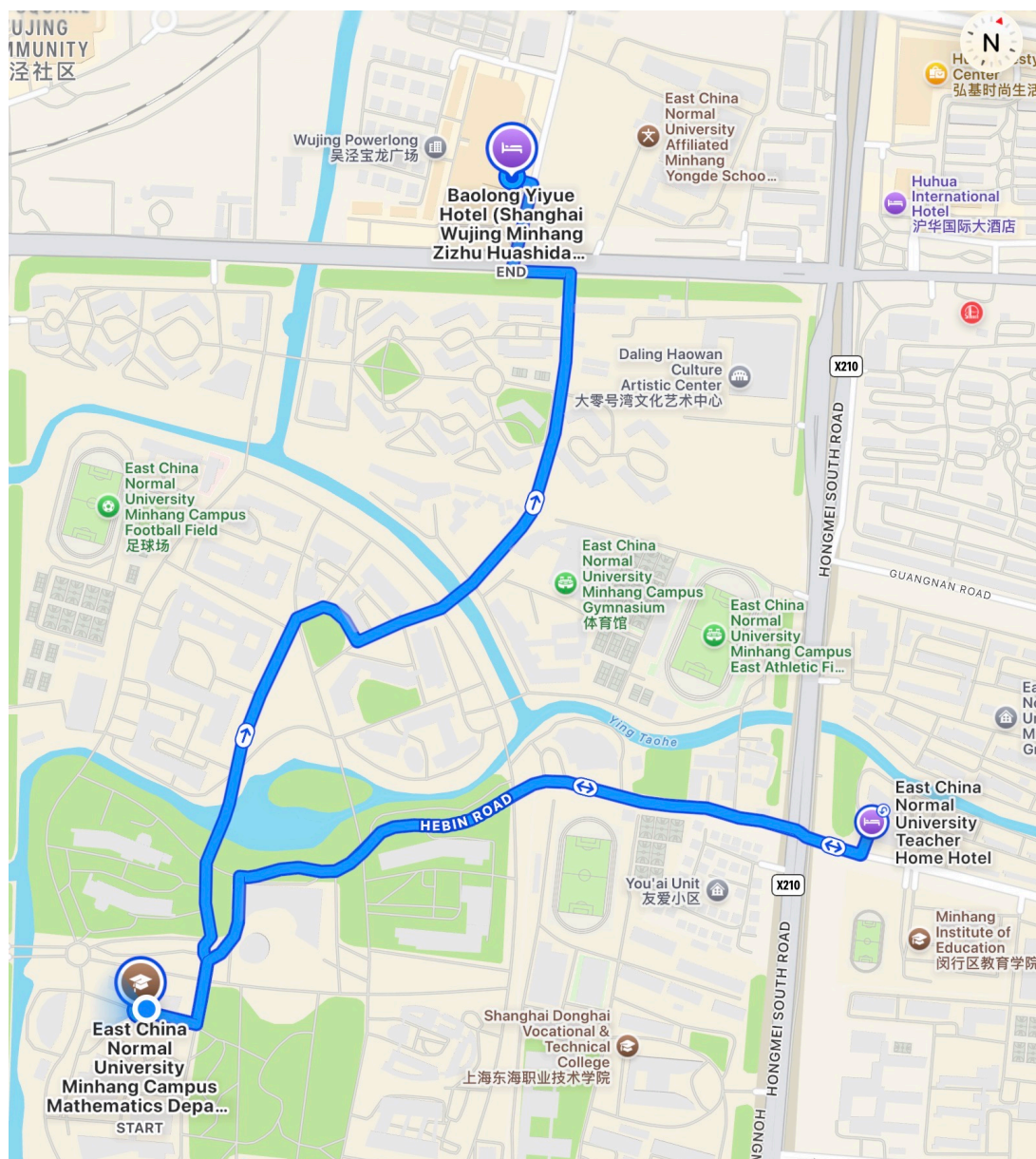
Please tell the taxi driver to go to the following address:

Baolong Yiyue Hotel (Wujing Minhang Zizhu ECNU-SJTU Branch)  
No. 1, Lane 39, Shangyi Road, Wujing, Minhang District, Shanghai

宝龙艺悦酒店 (吴泾闵行紫竹华师大交大店)  
上海市闵行区吴泾镇尚义路 39 弄 1 号

From Pudong International Airport, Hongqiao International Airport, Hongqiao Railway Station, Shanghai Railway Station, or Shanghai South Railway Station, you can take a taxi directly to the hotel.

The hotel is a 3-5 minute walk from the North Gate of the ECNU Minhang Campus, and a 15-20 minute walk from the Math Building.



Recommended Walking Route

## Venue

Lecture Hall 102, Math Building, ECNU Minhang Campus.

华东师范大学闵行校区数学楼 102 报告厅.

Teacher Home Hotel, located 890 meters northeast of the Math Building.

教师之家, 位于数学楼东北侧 890 米处.



# Part 1 Conference Program

## Program at a Glance

Thursday, May 14, 2026		
Conference Registration (Baolong Yiyue Hotel)		
19:00	Dinner (Baolong Yiyue Hotel)	
Friday, May 15, 2026		
Venue (Lecture Hall 102, Math Building, ECNU)		
Time	Presentation\Event	Chair
8:30 - 8:50	Opening Ceremony Dean Prof. Bo Liu, Head Prof. Wanmo Kang; Group photo	Li Luo
8:50 - 9:40	Ilmun Kim	Hairong Yuan
9:40 - 10:30	Wooseok Ha	Dong Ye
10:30 - 10:50	Coffee Break	
10:50 - 11:50	Official Meeting between the Delegation from SMS-ECNU and the Delegation from DMS-KAIST	Head Prof. Zhi Jia  Head Prof. Wanmo Kang
12:00 - 13:30	Lunch (Teacher Home Hotel)	
14:00 - 14:50	Yuanyuan Feng	Wanmo Kang
14:50 - 15:40	Xin Gao	Myoungjean Bae
15:40 - 16:10	Coffee Break	
16:10 - 17:00	Beomjun Choi	Haibiao Zheng
17:00 - 17:50	Yuqing Li	Wooseok Ha
18:10 - 19:40	Dinner (Teacher Home Hotel)	
Saturday, May 16, 2026		
9:30 - 11:30	Open Discussion	
12:00 - 14:00	Lunch (Baolong Yiyue Hotel)	
Departure		

Thursday, May 14

Conference Registration

Venue: Baolong Yiyue Hotel (Wujing Minhang Zizhu ECNU-SJTU Branch).

Hotel Address: No. 1, Lane 39, Shangyi Road, Wujing, Minhang District, Shanghai (Next to Powerlong Plaza).

Phone: +86 - 21 - 33880888.

19:00 Dinner: Baolong Yiyue Hotel

Friday, May 15

Chair Li Luo

8:30 — 8:50 Opening Ceremony (Dean Prof. Bo Liu, Head Prof. Wanmo Kang); Group photo

Chair Hairong Yuan

8:50 — 9:40 Ilmun Kim: Statistical Inference via Sample Splitting

Chair Dong Ye

9:40 — 10:30 Wooseok Ha: From Invariant Features to Target-efficient Fine-tuning in Domain Adaptation

10:30 — 10:50 Coffee Break

Chair Head Prof. Zhi Jia and Head Prof. Wanmo Kang

10:50 — 11:50 Official Meeting between the Delegation from SMS-ECNU and the Delegation from DMS-KAIST

12:00 — 13:30 Lunch: Teacher Home Hotel

Chair Wanmo Kang

14:00 — 14:50 Yuanyuan Feng: The Applications of Dissipation Enhancing Flows to Cahn-Hilliard Equation

Chair Myoungjean Bae

14:50 — 15:40 Xin Gao: Geometric Structures of Pseudo-Sonic Curves in the Self-Similar Solutions for Potential Flow

15:40 — 16:10 Coffee Break

Chair Haibiao Zheng

16:10 — 17:00 Beomjun Choi: Mean Field Game and Stability of Nash Equilibrium

Chair Wooseok Ha

17:00 — 17:50 Yuqing Li: Condensation Phenomena and Stochastic Methods: From Neural Networks to Particle Systems

18:10 — 19:40 Dinner: Teacher Home Hotel

Saturday, May 16

9:30 — 11:30 Open Discussion

12:00 — 14:00 Lunch: Baolong Yiyue Hotel

Departure

## Part 2 Titles and Abstracts

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### Statistical Inference via Sample Splitting

Ilmun Kim  
(KAIST)

This talk presents a general framework for statistical inference based on sample splitting and studentization, with a focus on high-dimensional hypothesis testing. Classical methods in modern high-dimensional settings often suffer from miscalibration, loss of power, computational complexity, and strong modeling assumptions. To address these issues, we propose a simple strategy that uses one part of the data to estimate an informative projection or optimal direction and the other part to construct a studentized test statistic in a reduced one-dimensional space. For high-dimensional mean testing, this approach yields an explicit Gaussian limiting null distribution, fast and uniform convergence under mild conditions, and minimax rate-optimal power. We then show that the same principle extends naturally to broader problems with variational representations, including integral probability metrics such as maximum mean discrepancy. Overall, the framework provides a simple, broadly applicable, and theoretically grounded approach to modern high-dimensional inference.

# From Invariant Features to Target-efficient Fine-tuning in Domain Adaptation

Wooseok Ha  
(KAIST)

Domain adaptation aims to build predictive models that remain accurate when the source and target distributions differ. In this talk, I will discuss a framework that first identifies invariant predictive structure and then uses limited target supervision to adapt beyond it. I will begin with conditionally invariant features, whose distributions remain stable across domains given the label. Such features arise naturally in many prediction problems where covariates are generated downstream of the label, and they can be used to obtain target risk guarantees, correct label shift, and improve invariant representation learning. I will then discuss how these invariant features can serve as adaptive starting points for semi-supervised domain adaptation. When only a small number of labeled target samples are available, fine-tuning from these starting points along low-dimensional directions can achieve strong target performance with substantially fewer target labels than target-only training. If time permits, I will also briefly discuss how paired or coupled source-target observations can support more effective representation learning.

# The Applications of Dissipation Enhancing Flows to Cahn-Hilliard Equation

Yuanyuan Feng

(East China Normal University)

In this talk, we would study how stirring would help dissipate the energy and the applications to Cahn-hilliard equations. For the advective Cahn-Hilliard equation, the phase separation would be suppressed when the amplitude of the advective mixing flow is large. If the shear flow is added, at sufficiently large times and when the strength of the shear is strong enough, the isotropic patterns typical of the 2D CHE are distorted into elongated patterns along the direction of the shear and ultimately banded patterns appear.

# Geometric Structures of Pseudo-Sonic Curves in the Self-Similar Solutions for Potential Flow

Xin Gao

(East China Normal University)

In this talk, we introduce our recent work on the geometric structures of pseudo-sonic curves in the two-dimensional self-similar solutions for the Euler equations for potential flow when the supersonic states are not necessarily uniform. Mathematically, the governing second-order potential flow equation is of mixed hyperbolic-elliptic type with degeneracy on the pseudo-sonic curve. We develop rigorous mathematical approaches to analyze the geometric structures of the pseudo-sonic curves in the self-similar solutions for potential flow. Moreover, based on the properties obtained above, we analyze the pseudo-sonic curve structures for the shock reflection-diffraction problem with nonuniform incoming flow. We prove that the pseudo-sonic curve must be an arc if a solution is a  $C^2$ -small perturbation either in the pseudo-supersonic region or in the pseudo-subsonic region of the solution with uniform incoming flow as obtained in Chen-Feldman (Ann. of Math. 2010). This is a joint work with Prof. Gui-Qiang G. Chen, Prof. Mikhail Feldman, and Prof. Wei Xiang.

# Mean Field Game and Stability of Nash Equilibrium

Beomjun Choi

(KAIST)

Nash equilibrium is a basic notion of stability in game theory, and it also arises naturally in modern minimax problems in machine learning, including adversarial training and GAN-type models. In this talk, I will discuss a Langevin mean-field game arising from an entropically regularized two-player zero-sum interaction, where strategies are probability measures and the evolution is governed by a coupled mean-field PDE. Although the mixed Nash equilibrium is unique, its dynamical stability is far from obvious beyond convex-concave settings. I will explain how Wasserstein geometry, combined with spectral analysis, can be used to prove that this equilibrium is locally exponentially stable. This is joint work with M. Shin, G. Seo, and P. Monmarché.

# Condensation Phenomena and Stochastic Methods: From Neural Networks to Particle Systems

Yuqing Li

(East China Normal University)

We study condensation phenomena driven by stochasticity in neural network training and interacting particle systems. In neural networks, we characterize a phase diagram of condensation in two-layer and convolutional models, where training induces concentration of weights along finitely many directions, improving generalization. We further show that Dropout admits a stochastic modified equation description, which captures its dynamics and explains its role in promoting and stabilizing condensation at late training stages. In a second direction, we develop a quasi-Ewald splitting method for charged particles in nanoscale confinement. By combining importance sampling with random batch techniques in Fourier space, we obtain an  $O(N)O(N)O(N)$  algorithm for electrostatic interactions. The method also reveals dielectric boundary effects and anisotropic diffusion induced by confinement. These results highlight stochasticity as a unifying mechanism underlying emergent low-dimensional structures in learning systems and efficient computation in complex physical systems.

## Part 3 Partial List of Participants

No.	Name	Institution
1	Wanmo Kang	Head, Department of Mathematical Sciences, KAIST
2	Myoungjean Bae	KAIST
3	Beomjun Choi	KAIST
4	Wooseok Ha	KAIST
5	Ilmun Kim	KAIST
6	Changhong Lyu	Assistant President of ECNU Dean of the Undergraduate School, ECNU
7	Zhi Jia	Head, School of Mathematical Sciences, ECNU
8	Bo Liu	Dean, School of Mathematical Sciences, ECNU
9	Li Luo	Associate Dean, School of Mathematical Sciences, ECNU
10	Tao Cheng	Associate Dean, School of Mathematical Sciences, ECNU
11	Hairong Yuan	Associate Dean, School of Mathematical Sciences, ECNU
12	Ping Bi	East China Normal University
13	Haohui Dai	East China Normal University
14	Jie Du	East China Normal University
15	Ruoxia Du	East China Normal University
16	Yuanyuan Feng	East China Normal University
17	Wei Fu	East China Normal University
18	Xianlong Fu	East China Normal University
19	Xin Gao	East China Normal University
20	Xueping Guo	East China Normal University

No.	Name	Institution
21	Jialin He	East China Normal University
22	Xiaoqing He	East China Normal University
23	Xia Huang	East China Normal University
24	Fang Li	East China Normal University
25	Yuqi Li	East China Normal University
26	Yuqing Li	East China Normal University
27	Xingbo Liu	East China Normal University
28	Yinping Liu	East China Normal University
29	Chuwen Ma	East China Normal University
30	Mingkang Ni	East China Normal University
31	Jianyu Pan	East China Normal University
32	Xiaoyan Tang	East China Normal University
33	Liping Wang	East China Normal University
34	Xiangfeng Wang	East China Normal University
35	Pengbo Xu	East China Normal University
36	Zili Xu	East China Normal University
37	Zhuhong Yang	East China Normal University
38	Danping Yang	East China Normal University
39	Dong Ye	East China Normal University
40	Qingjie Ye	East China Normal University
41	Longtu Yuan	East China Normal University
42	Xingzhi Zhan	East China Normal University
43	Jing Zhang	East China Normal University
44	Xiangyun Zhang	East China Normal University
45	Yanyan Zhang	East China Normal University
46	Chunyi Zhao	East China Normal University

No.	Name	Institution
47	Haibiao Zheng	East China Normal University
48	Feng Zhou	East China Normal University
49	Shengfeng Zhu	East China Normal University
50	Peng Chen	East China Normal University
51	Ting Xiao	East China Normal University
52	Zhengrong Xie	East China Normal University
53	Wenhan Zhang	East China Normal University
54	Ke Liu	East China Normal University
55	Minghong Han	East China Normal University
56	Shuxin Ge	East China Normal University
57	Yuhang Zhou	East China Normal University
58	Yunxiao Li	East China Normal University
59	Li Hang	East China Normal University
60	Wan Li	East China Normal University
61	Mingbo Zhou	East China Normal University
62	Gaoyang Li	East China Normal University
63	Shanwen Xu	East China Normal University
64	Xuqiong Zeng	East China Normal University
65	Yunfeng Lu	East China Normal University
66	Yuxin Chen	East China Normal University



## Part 4 Introduction to the School of Mathematical Sciences

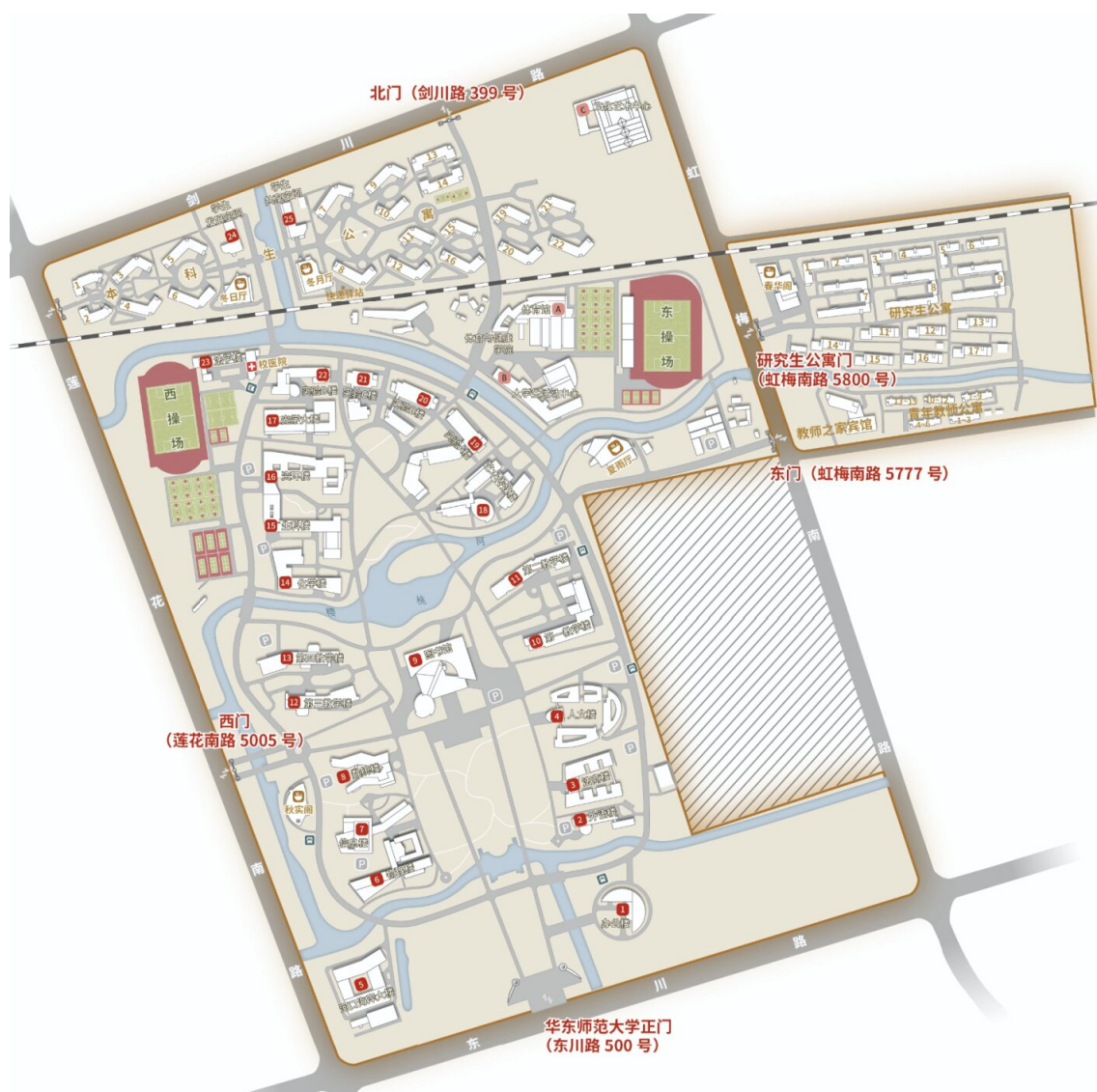
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The School of Mathematical Sciences at East China Normal University is a major national hub for mathematical research, talent cultivation, and the preparation of secondary school mathematics teachers. In the latest round of disciplinary evaluations by the Ministry of Education, the School received an excellent rating, and its research output ranks in the top 0.5% globally according to ESI rankings.

The School comprises three departments: Pure Mathematics, Applied Mathematics, and Mathematics Education. It offers a full range of specializations and possesses strong research capabilities. Its research platforms include the Ministry of Education Key Laboratory of Mathematics and Engineering Applications, the Shanghai Key Laboratory of Pure Mathematics and Practice, and several specialized mathematics research centers.

The discipline has a rich historical legacy. In particular, since the 1980s, under the guidance of mathematicians and educators such as Cao Xihua, Xiao Gang, and Zhang Dianzhou, East China Normal University became a pioneer in algebraic group and algebraic geometry research in China, as well as a leading institution in mathematics education research.

The School has an outstanding reputation in talent cultivation. It has been recognized as a national base for scientific research and talent training, a national characteristic program, and a national first-class un-



ECNU Minhang Campus Map

dergraduate program. The School also offers a special program for students in basic sciences and has been selected for the Ministry of Education's "Pilot Program 2.0 for Top-Notch Talent Training". It has cultivated a large number of mathematicians, scientists, educators, entrepreneurs, and technology professionals, making it a successful model for cultivating diverse, interdisciplinary talent in mathematics.

# Part 5 Introduction to the Key Laboratory of Mathematics and Engineering Applications, Ministry of Education

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The Key Laboratory of Mathematics and Engineering Applications, Ministry of Education, focuses on theoretical and applied research addressing the mathematical needs in smart transportation engineering and coastal and ecological engineering. Being problem-oriented and aiming for practical implementation, the laboratory conducts problem-driven mathematical research and applications, deeply investigating the underlying mathematical theories for broader applications. Leveraging Shanghai's locational advantages, the laboratory serves the regional construction and development needs of both the nation and the Shanghai area.

The laboratory integrates university-level research platforms at East China Normal University, such as the Algebra Research Center, the Center for Partial Differential Equations, the Center for Geometric Analysis, and the Center for Applied Mathematics and Interdisciplinary Studies. It consolidates key development directions, precisely aligns with national strategies, and enhances the capability for collaborative innovation across industry, academia, and research, as well as the capacity to undertake major national and local projects. In basic research, it focuses on frontier fundamental problems with application prospects, using pure mathematics to provide disruptive technologies for mathematical applications. In applied

mathematics, it conducts problem-driven research to provide mathematical support for national and regional innovative development.

# KAIST

Korea Advanced Institute of  
Science and Technology

