

Jaehyeon Seo

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Research Interests

Extremal graph theory, graph homomorphism inequalities, transversal substructures, and more

Education

Combined Master's and Doctoral Program in Mathematics <i>Yonsei University</i> <ul style="list-style-type: none">Supervised by Joonkyung Lee	Mar 2023–Present Seoul, Korea
Integrated Master's/PhD Program in Mathematics <i>Korea Advanced Institute of Science and Technology</i> <ul style="list-style-type: none">Supervised by Jaehoon KimNot finished	Mar 2020–Aug 2022 Daejeon, Korea
Bachelor's in Mathematics <i>Pohang University of Science and Technology</i> <ul style="list-style-type: none">Magna Cum Laude	Feb 2016–Feb 2020 Pohang, Korea
High school for science-gifted students <i>Korea Science Academy of KAIST</i>	Feb 2013–Feb 2016 Busan, Korea

Experiences

Visiting Student Researcher <i>California Institute of Technology</i> (Host: David Conlon)	Jan 2026–Jul 2026 Pasadena, CA, US
Researcher <i>Hanyang University Industry–University Cooperation Foundation</i>	Oct 2022–Feb 2023 Seoul, Korea
Visiting student <i>Extremal Combinatorics and Probability Group, Institute of Basic Science</i>	Apr 2022–Aug 2022 Daejeon, Korea
Exchange student <i>Graz University of Technology</i>	Feb 2018–Jul 2018 Graz, Austria

Publications and Preprints

- Degree-sequence bounds for independent sets via multivariate local occupancy.** Preprint (2026). [link](#)
With Ewan Davies, Juspreet Singh Sandhu, Brian Tan.
- Lower bounds for multivariate independence polynomials and their generalisations.** Submitted (2026). [link](#)
With Joonkyung Lee.
- Semi-Autonomous Mathematics Discovery with Gemini: A Case Study on the Erdős Problems.** Preprint (2026). [link](#)
With Tony Feng, Trieu Trinh, Garrett Bingham, Jiwon Kang, Shengtong Zhang, Sang-hyun Kim, Kevin Barreto, Carl Schildkraut, Junehyuk Jung, Carlo Pagano, Yuri Chervonyi, Dawsen Hwang, Kaiying Hou, Sergei Gukov, Cheng-Chiang Tsai, Hyunwoo Choi, Youngbeom Jin, Wei-Yuan Li, Hao-An Wu, Ruey-An Shiu, Yu-Sheng Shih, Quoc V. Le, Thang Luong.
- Counting homomorphisms in antiferromagnetic graphs via Lorentzian polynomials.** Submitted (2025). [link](#)
With Joonkyung Lee, Jaeseong Oh.
- Transversal cycles and paths in tournaments.** Submitted (2024). [link](#)
With Debsoumya Chakraborti, Jaehoon Kim, Hyunwoo Lee.
- Hamilton transversals in tournaments.** *Combinatorica* 44, 1381–1400 (2024). [link](#)
With Debsoumya Chakraborti, Jaehoon Kim, Hyunwoo Lee.

2. **On a rainbow extremal problem for color-critical graphs.** *Random Structures & Algorithms* 64 (2024), Pages 460–489. [link](#)
With Debsoumya Chakraborti, Jaehoon Kim, Hyunwoo Lee, Hong Liu.
1. **On 1-Subdivisions of Transitive Tournaments.** *The Electronic Journal of Combinatorics*, Volume 29, Issue 1 (2022), P1.51. [link](#)
With Jaehoon Kim, Hyunwoo Lee.

Research Visits

Research visitor <i>Colorado State University</i> (Host: Ewan Davies)	May 24–31, 2026 Fort Collins, CO, US
Research visitor <i>Shanghai Center for Mathematical Science</i> (Host: Yaobin Chen)	Jun 9–14, 2025 Shanghai, China

Teaching Experiences

Teaching assistant <i>Yonsei University</i>	Mar 2023–Dec 2025 Seoul, Korea
<ul style="list-style-type: none"> • Combinatorics • Discrete Mathematics • Combinatorics • Discrete Mathematics, Probability • Linear Algebra(2) • Mathematics and Programming 	<ul style="list-style-type: none"> Fall 2025 Spring 2025 Fall 2024 Spring 2024 Fall 2023 Spring 2023
Teaching assistant <i>Korea Advanced Institute of Science and Technology</i>	Mar 2020–Aug 2022 Daejeon, Korea
<ul style="list-style-type: none"> • Probability and Statistics, Scientific Writing (for math majors) • Calculus 1, Introduction to Graph Theory • Introduction to Linear Algebra, Introduction to Number Theory • Differential Equations and Applications, Introduction to Differential Geometry • Differential Equations and Applications 	<ul style="list-style-type: none"> Spring 2022 Fall 2021 Spring 2021 Fall 2020 Spring 2020
Excellent Student Teaching Assistant <i>Pohang University of Science and Technology</i>	Mar 2019–Dec 2019 Pohang, Korea
<ul style="list-style-type: none"> • Calculus 2 • Calculus 1 	<ul style="list-style-type: none"> Fall 2019 Spring 2019
Teaching assistant <i>KAIST Cyber Gifted Education</i>	Oct 2016–Feb 2017 Online
<ul style="list-style-type: none"> • Introduction to Number Theory, Linear Algebra 	Fall 2016

Outreach

Teaching assistant <i>POSTECH Potential Development Camp for High School Students</i> (POSTECH 잠재력개발과정)	Jan 2018 Pohang, Korea
<ul style="list-style-type: none"> • Tutoring high school students for undergraduate level mathematics 	

Awards and Grants

- International Joint Training Support of Outstanding Graduate Students in BK21FOUR: Jan 2026–Jul 2026
(4단계 BK21사업 우수대학원생 국제공동연수)
- Best student from the Brain Korea (BK) evaluation in the department: Spring 2024, Spring 2025
- 2024 Spring Poster Presentation, School of Mathematics and Computing, Yonsei University: Excellence award
- POSTECH Department of Mathematics, Dean's list: Fall 2016, Spring 2017, Fall 2017, Spring 2019
- 2016 POSTECH Programming Contest: Excellence prize
- National Scholarship (science and engineering), Korea Student Aid Foundation, Feb 2016–Feb 2020

Talks

- **ASIACOMB 2026**, Daejeon Convention Center
Multivariate occupancy fraction bounds Daejeon, Korea
Aug 24, 2026
- **Workshop for Young Mathematicians in Korea 2026**, KAIST
TBD Daejeon, Korea
Aug 19, 2026
- **2026 SIAM Conference on Discrete Mathematics**, UCSD
Lower bounds for multivariate independence polynomials and their generalisations San Diego, CA, US
Jun 23, 2026
- **Graduate Student Combinatorics Conference 2026**, UIC
Lower bounds for multivariate independence polynomials and their generalizations Chicago, IL, US
Mar 28, 2026
- **Math Graduate Student Seminar**, Caltech
Extremal questions on independent sets, colorings, and graph homomorphisms Pasadena, CA, US
Feb 24, 2026
- **RS&A 2025**, TU Wien
Counting homomorphisms in antiferromagnetic graphs via Lorentzian polynomials Vienna, Austria
Aug 5, 2025
- **FPSAC 2025**, Hokkaido University
Counting homomorphisms in antiferromagnetic graphs via Lorentzian polynomials
(poster) Sapporo, Japan
Jul 21, 2025
- **Combinatorics Student Seminar**, Shanghai Center for Mathematical Science
Graph homomorphism inequalities and Lorentzian polynomials Shanghai, China
Jun 11, 2025
- **CanADAM 2025**, University of Ottawa
Graph homomorphism inequalities and Lorentzian polynomials Ottawa, Canada
May 21, 2025
- **4th East Asia Workshop on Extremal and Structural Graph Theory**, Sun-Yat Sen
University
Graph homomorphism inequalities and Lorentzian polynomials Guangzhou, China
Mar 30, 2025
- **Sinchon Seminar of Graduates 5**, Ewha Womans University
Graph homomorphisms and Lorentzian polynomials Seoul, Korea
Dec 27, 2024
- **KIAS Graduate Student Meeting in Pure Mathematics**, KIAS
Graph homomorphisms and Lorentzian polynomials Seoul, Korea
Oct 21, 2024
- **2024 Combinatorics Workshop**, Chungbuk National University
Hamilton transversals in tournaments Cheongju, Korea
Aug 29, 2024
- **2024 Korea Student Combinatorics Workshop**, Gongju Traditional Korean Vil-
lage
Extremal graph theory and rainbow substructures Gongju, Korea
Jul 30, 2024
- **2023 KMS Spring Meeting**, Daejeon Convention Center
Rainbow oriented Hamiltonian paths and cycles in tournaments Daejeon, Korea
Apr 29, 2023
- **KAIST Math Graduate Student Seminar**, KAIST
How can we find a rainbow subgraph? Online
Mar 24, 2022
- **Discrete Math Seminar**, IBS DIMAG
A rainbow Turán problem for color-critical graphs Daejeon, Korea
Jan 18, 2022
- **2021 Combinatorics Workshop**, The Bloomvista
On multicolor extremal problems Yangpyeong, Korea
Dec 21, 2021

Professional Activities

- Co-organizer, Korean Student Combinatorics Workshop 2026 Winter [link](#) Feb 2–6, 2026
- Co-organizer, Korean Student Combinatorics Workshop 2025 [link](#) Aug 20–24, 2025
- Co-organizer, Discrete Analysis Seminar at Yonsei University [link](#) Apr 2023–Present

Peer Review Activities

- SIAM Journal on Discrete Mathematics 2026
- Combinatorics, Probability and Computing; SIAM Journal on Discrete Mathematics 2025
- Journal of Graph Theory 2024

Student Seminars

- Co-organizer, Discrete Analysis & Insights Seminar at Yonsei [link](#) Oct 2024–Present
 - Student-led seminar at Yonsei University, primarily focusing on extremal combinatorics
- Participant, Deep Seminar in Combinatorics [link](#) Jan 2024–Present
 - Student-led seminar at KAIST
- Participant, Seminars on Gowers Norms [link](#) Jul 2025–Nov 2025

Selected Academic Events

Outside of Korea

- 2026 SIAM Conference on Discrete Mathematics, UCSD [link](#) San Diego, CA, US. Jun 22–25, 2026
- Flags in the Mountains, Colorado State University Mountain Campus [link](#) Bellvue, CO, US. Jun 1–5, 2026
- Graduate Student Combinatorics Conference 2026, UIC [link](#) Chicago, IL, US. Mar 27–29, 2026
- 22nd International Conference on Random Structures & Algorithms (RS&A 2025), TU Wien [link](#) Vienna, Austria. Aug 4–8, 2025
- 37th International Conference on Formal Power Series and Algebraic Combinatorics (FPSAC 2025), Hokkaido University [link](#) Sapporo, Japan. Jul 21–25, 2025
- Canadian Discrete and Algorithmic Mathematics conference (CanaDAM) 2025, University of Ottawa [link](#) Ottawa, Canada. May 20–23, 2025
- 4th East Asia Workshop on Extremal and Structural Graph Theory, Sun-Yat Sen University [link](#) Guangzhou, China. Mar 27–31, 2025
- Summit280, Eötvös University [link](#) Budapest, Hungary. July 8–12, 2024
- 30th British Combinatorial Conference (BCC 2024), Queen Mary University of London [link](#) London, UK. Jul 1–5, 2024
- 3rd East Asia Workshop on Extremal and Structural Graph Theory, The Southern Beach Hotel & Resort Okinawa [link](#) Okinawa, Japan. Nov 1–5, 2023

AI-related

- AI and Mathematics, KIAS [link](#) Seoul, Korea. Aug 3–7, 2026
Invited to the fourth week on “Algebra, Combinatorics, and Topology”
- Summer School on Formalization in Lean, ICARM [link](#) Pittsburgh, PA, US. Jul 7–18, 2026
- 2025 KIAS Winter School on Mathematics and AI, Park Roche [link](#) Jeongseon, Korea. Dec 2–5, 2025
Attended team sessions on ML and Discrete Mathematics, focusing on FunSearch
- Machine Learning and Mathematics, KIAS [link](#) Seoul, Korea. Jul 7–11, 2025
- AI for Mathematics Workshop on Formalization, KIAS [link](#) Seoul, Korea. Dec 17, 2024
- Samsung Global Research Symposium: Mathematical Theory of AI, InterContinental Seoul COEX [link](#) Seoul, Korea. Aug 1–3, 2023

Schools

- IBS-DIMAG Winter School on Graph Minors, IBS DIMAG [link](#) Daejeon, Korea. Feb 3–19, 2025
Sebastian Wiederrecht and Maximilian Gorsky, Graph Minor Structure Theorem
- ECOPRO–CAS–SDU Joint Winter Course, IBS ECOPRO [link](#) Daejeon, Korea. Jan 6–10, 2025
Huy Tuan Pham, Recent developments in probabilistic combinatorics: New synergies
- IBS–SDU Frontiers of Combinatorics, Part 2, IBS ECOPRO [link](#) Daejeon, Korea. Aug 5–9, 2024
Tung Nguyen, Recent work on the Erdős–Hajnal conjecture
- 2024 Summer School on Combinatorial Algorithms, KAIST [link](#) Daejeon, Korea. Jul 22–26, 2024
Chien-Chung Huang, Combinatorial Optimization
Sebastian Wiederrecht, From treewidth to grid minor theorem
- IBS–CAS–SDU Joint Course, IBS ECOPRO [link](#) Daejeon, Korea. Feb 26–Mar 1, 2024
Bjarne Schülke, Hypergraph Turán problems

2025

- 5th East Asia Workshop on Extremal and Structural Graph Theory, Fraser Place Namdaemun [link](#) Seoul, Korea. Nov 27–30, 2025
- 1st Early Career Workshop in Extremal Combinatorics, IBS ECOPRO [link](#) Daejeon, Korea. Oct 20–30, 2025
- KIAS-KAIST Workshop on current challenges in mathematics, KIAS [link](#) Seoul, Korea. Aug 25–28, 2025
- 2025 Korean Student Combinatorics Workshop, The-K Hotel Gyeongju [link](#) Gyeongju, Korea. Aug 20–24, 2025
- Discrete Analysis at Yonsei, Yonsei University [link](#) Seoul, Korea. Jun 16–20, 2025

2024

- 2024 Korean Student Combinatorics Workshop, Gongju Traditional Korean Village [link](#) Gongju, Korea. Jul 30–Aug 2, 2024
- 2024 IBS-DIMAG Workshop on Combinatorics and Geometric Measure Theory, IBS [link](#) Daejeon, Korea. Jul 14–19, 2024
- 3rd Korea–China Young Scholar’s Symposium on Discrete Mathematics, Utop Ubless Hotel Jeju [link](#) Jeju, Korea. Jun 24–27, 2024

2023

- 2023 KIAS Summer Workshop on Graph Theory, KIAS [link](#) Seoul, Korea. Aug 8–9, 2023