

Jaehyeon Seo

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Research Interests

Extremal graph theory, graph homomorphisms, 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–Current 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 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> <ul style="list-style-type: none">Hosted by David Conlon	Jan 2026–Jul 2026 Pasadena, CA, USA
Research visitor <i>Shanghai Center for Mathematical Science, Shanghai</i> <ul style="list-style-type: none">Hosted by Yaobin Chen	Jun 9–14, 2025 Shanghai, China
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

- Lower bounds for multivariate independence polynomials and their generalisations.** Preprint (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 and Jaeseong Oh.
- Transversal cycles and paths in tournaments.** Submitted (2024). [link](#)
With Debsoumya Chakraborti, Jaehoon Kim, and Hyunwoo Lee.

- **Hamilton transversals in tournaments.** *Combinatorica* 44, 1381–1400 (2024). [link](#)
With Debsoumya Chakraborti, Jaehoon Kim, and Hyunwoo Lee.
- **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, and Hong Liu.
- **On 1-Subdivisions of Transitive Tournaments.** *The Electronic Journal of Combinatorics*, Volume 29, Issue 1 (2022), P1.51. [link](#)
With Jaehoon Kim and Hyunwoo Lee.

Teaching Experiences

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

Awards and Grants

- International Joint Training Support of Outstanding Graduate Students in BK21FOUR: Jan 2026–Jul 2026
- 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 Programing Contest: Excellence prize
- National Scholarship (science and engineering), Korea Student Aid Foundation, Feb 2016–Feb 2020

Talks

• RS&A 2025 , TU Wien <i>Counting homomorphisms in antiferromagnetic graphs via Lorentzian polynomials</i>	Vienna, Austria Aug 5, 2025
• FPSAC 2025 , Hokkaido University <i>Counting homomorphisms in antiferromagnetic graphs via Lorentzian polynomials</i> (poster)	Sapporo, Japan Jul 21, 2025
• Combinatorics Student Seminar , Shanghai Center for Mathematical Science <i>Graph homomorphism inequalities and Lorentzian polynomials</i>	Shanghai, China Jun 11, 2025
• CanaDAM 2025 , University of Ottawa <i>Graph homomorphism inequalities and Lorentzian polynomials</i>	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 Village
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 of Korean Student Combinatorics Workshop 2026 Winter [link](#) Feb 2–6, 2026
- Co-organizer of Korean Student Combinatorics Workshop 2025 [link](#) Aug 20–24, 2025
- Co-organizer of Discrete Analysis Seminar at Yonsei University [link](#) Apr 2023–Current

Peer Review Activities

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

Participated Academic Events

Outside of Korea

- **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

Schools

- **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
- **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
- **2024/25 CALOP Winter Lecture**, POSTECH [link](#) Pohang, Korea. Jan 13–17, 2025
Dabeen Lee, Introduction to Modern Combinatorial Optimization: Mathematical Programming, Algorithms, and Machine Learning
- **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](#)
Chien-Chung Huang, Combinatorial Optimization
Sebastian Wiederrecht, From treewidth to grid minor theorem
Daejeon, Korea. Jul 22–26, 2024
- **IBS–CAS–SDU Joint Course**, IBS ECOPRO [link](#)
Bjarne Schülke, Hypergraph Turán problems
Daejeon, Korea. Feb 26–Mar 1, 2024

2025

- **35th KIAS Combinatorics Workshop**, Shilla Stay Haeundae [link](#)
Busan, Korea. Dec 22–24, 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
- **2025 Combinatorics Workshop**, IBS [link](#)
Daejeon, Korea. Aug 18–20, 2025
- **Machine Learning and Mathematics**, KIAS [link](#)
Seoul, Korea. Jul 7–11, 2025
- **Discrete Analysis at Yonsei**, Yonsei University [link](#)
Seoul, Korea. Jun 16–20, 2025
- **34th KIAS Combinatorics Workshop**, Uni Hotel [link](#)
Jeju, Korea. May 29–31, 2025
- **2025 KMS Spring Meeting**, KAIST [link](#)
Daejeon, Korea. Apr 24–26, 2025
- **33rd KIAS Combinatorics Workshop**, KIAS [link](#)
Seoul, Korea. Feb 20–21, 2025

2024

- **Sinchon Seminar of Graduates 5**, Ewha Womans University [link](#)
Seoul, Korea. Dec 27, 2024
- **32nd KIAS Combinatorics Workshop**, Shilla Stay Haeundae [link](#)
Busan, Korea. Dec 19–21, 2024
- **AI for Mathematics Workshop on Formalization**, KIAS [link](#)
Seoul, Korea. Dec 17, 2024
- **The 4th Workshop on Developments in Combinatorics**, IBS ECOPRO [link](#)
Online. Nov 27, 2024
- **2024 KMS Annual Meeting**, Sungkyunkwan University Natural Sciences Campus [link](#)
Suwon, Korea. Oct 24–26, 2024
- **KIAS Graduate Student Meeting in Pure Mathematics**, KIAS [link](#)
Seoul, Korea. Oct 21, 2024
- **KPPY Combinatorics Seminar 99**, Yeungnam University [link](#)
Gyeongsan, Korea. Oct 5, 2024
- **2024 Combinatorics Workshop**, Chungbuk National University [link](#)
Cheongju, Korea. Aug 28–30, 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
- **31st KIAS Combinatorics Workshop**, Utop Ubless Hotel Jeju [link](#)
Jeju, Korea. May 30–Jun 1, 2024
- **30th KIAS Combinatorics Workshop**, KIAS [link](#)
Seoul, Korea. Mar 8–9, 2024

2023

- **29th KIAS Combinatorics workshop**, Shilla Stay Haeundae [link](#)
Busan, Korea. Dec 26–28, 2023
- **2023 Combinatorics Workshop**, Yonsei University [link](#)
Seoul, Korea. Aug 16–18, 2023
- **2023 KIAS Summer Workshop on Graph Theory**, KIAS [link](#)
Seoul, Korea. Aug 8–9, 2023
- **Samsung Global Research Symposium: Mathematical Theory of AI**, InterContinental Seoul COEX [link](#)
Seoul, Korea. Aug 1–3, 2023
- **28th KIAS Combinatorics workshop**, Utop Ubless Hotel [link](#)
Jeju, Korea. Jun 1–3, 2023
- **2023 KMS Spring Meeting**, Daejeon Convention Center [link](#)
Daejeon, Korea. Apr 27–29, 2023

2022

- **25th KIAS Combinatorics workshop**, Utop Ubless Hotel [link](#)
Jeju, Korea. Jun 15–18, 2022
- **24th KIAS Combinatorics Workshop**, Shilla Stay Haeundae [link](#)
Busan, Korea. Feb 22–24, 2022