

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>	Mar 2023–Current Seoul, Korea
• Supervised by Joonkyung Lee	
Integrated Master's/PhD Program in Mathematics <i>Korea Advanced Institute of Science and Technology</i>	Mar 2020–Aug 2022 Daejeon, Korea
• Supervised by Jaehoon Kim	
• Not finished	
Bachelor in Mathematics <i>Pohang University of Science and Technology</i>	Feb 2016–Feb 2020 Pohang, Korea
• Magna Cum Laude	
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>	Jan 2026–Jul 2026 Pasadena, CA, USA
• Hosted by David Conlon	
Research visitor <i>Shanghai Center for Mathematical Science, Shanghai</i>	Jun 9–14, 2025 Shanghai, China
• Hosted by Yaobin Chen	
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 Chevronyi, 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	Mar 2023–Current
<i>Yonsei University</i>	Seoul, Korea
• Combinatorics	Fall 2025
• Discrete Mathematics	Spring 2025
• Combinatorics	Fall 2024
• Discrete Mathematics, Probability	Spring 2024
• Linear Algebra(2)	Fall 2023
• Mathematics and Programming	Spring 2023
Teaching assistant	Mar 2020–Aug 2022
<i>Korea Advanced Institute of Science and Technology</i>	Daejeon, Korea
• Probability and Statistics, Scientific Writing (for math majors)	Spring 2022
• Calculus 1, Introduction to Graph Theory	Fall 2021
• Introduction to Linear Algebra, Introduction to Number Theory	Spring 2021
• Differential Equations and Applications, Introduction to Differential Geometry	Fall 2020
• Differential Equations and Applications	Spring 2020
Excellent Student Teaching Assistant	Mar 2019–Dec 2019
<i>Pohang University of Science and Technology</i>	Pohang, Korea
• Calculus 2	Fall 2019
• Calculus 1	Spring 2019
Teaching assistant	Oct 2016–Feb 2017
<i>KAIST Cyber Gifted Education</i>	Online
• Introduction to Number Theory, Linear Algebra	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 Programming 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 <i>Graph homomorphism inequalities and Lorentzian polynomials</i>	Guangzhou, China Mar 30, 2025
• Sinchon Seminar of Graduates 5 , Ewha Womans University <i>Graph homomorphisms and Lorentzian polynomials</i>	Seoul, Korea Dec 27, 2024
• KIAS Graduate Student Meeting in Pure Mathematics , KIAS <i>Graph homomorphisms and Lorentzian polynomials</i>	Seoul, Korea Oct 21, 2024
• 2024 Combinatorics Workshop , Chungbuk National University <i>Hamilton transversals in tournaments</i>	Cheongju, Korea Aug 29, 2024
• 2024 Korea Student Combinatorics Workshop , Gongju Traditional Korean Village <i>Extremal graph theory and rainbow substructures</i>	Gongju, Korea Jul 30, 2024
• 2023 KMS Spring Meeting , Daejeon Convention Center <i>Rainbow oriented Hamiltonian paths and cycles in tournaments</i>	Daejeon, Korea Apr 29, 2023
• KAIST Math Graduate Student Seminar , KAIST <i>How can we find a rainbow subgraph?</i>	Online Mar 24, 2022
• Discrete Math Seminar , IBS DIMAG <i>A rainbow Turán problem for color-critical graphs</i>	Daejeon, Korea Jan 18, 2022
• 2021 Combinatorics Workshop , The Bloomvista <i>On multicolor extremal problems</i>	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*
 - **IBS–CAS–SDU Joint Course**, IBS ECOPRO [link](#)
Bjarne Schülke, Hypergraph Turán problems
- Daejeon, Korea. Jul 22–26, 2024
- Daejeon, Korea. Feb 26–Mar 1, 2024

2025

- **35th KIAS Combinatorics Workshop**, Shilla Stay Haeundae [link](#)
 - **5th East Asia Workshop on Extremal and Structural Graph Theory**, Fraser Place Namdaemun [link](#)
 - **1st Early Career Workshop in Extremal Combinatorics**, IBS ECOPRO [link](#)
 - **KIAS-KAIST Workshop on current challenges in mathematics**, KIAS [link](#)
 - **2025 Korean Student Combinatorics Workshop**, The-K Hotel Gyeongju [link](#)
 - **2025 Combinatorics Workshop**, IBS [link](#)
 - **Machine Learning and Mathematics**, KIAS [link](#)
 - **Discrete Analysis at Yonsei**, Yonsei University [link](#)
 - **34th KIAS Combinatorics Workshop**, Uni Hotel [link](#)
 - **2025 KMS Spring Meeting**, KAIST [link](#)
 - **33rd KIAS Combinatorics Workshop**, KIAS [link](#)
- Busan, Korea. Dec 22–24, 2025
- Seoul, Korea. Nov 27–30, 2025
- Daejeon, Korea. Oct 20–30, 2025
- Seoul, Korea. Aug 25–28, 2025
- Gyeongju, Korea. Aug 20–24, 2025
- Daejeon, Korea. Aug 18–20, 2025
- Seoul, Korea. Jul 7–11, 2025
- Seoul, Korea. Jun 16–20, 2025
- Jeju, Korea. May 29–31, 2025
- Daejeon, Korea. Apr 24–26, 2025
- Seoul, Korea. Feb 20–21, 2025

2024

- **Sinchon Seminar of Graduates 5**, Ewha Womans University [link](#)
 - **32nd KIAS Combinatorics Workshop**, Shilla Stay Haeundae [link](#)
 - **AI for Mathematics Workshop on Formalization**, KIAS [link](#)
 - **The 4th Workshop on Developments in Combinatorics**, IBS ECOPRO [link](#)
 - **2024 KMS Annual Meeting**, Sungkyunkwan University Natural Sciences Campus [link](#)
 - **KIAS Graduate Student Meeting in Pure Mathematics**, KIAS [link](#)
 - **KPPY Combinatorics Seminar 99**, Yeungnam University [link](#)
 - **2024 Combinatorics Workshop**, Chungbuk National University [link](#)
 - **2024 Korean Student Combinatorics Workshop**, Gongju Traditional Korean Village [link](#)
 - **2024 IBS-DIMAG Workshop on Combinatorics and Geometric Measure Theory**, IBS [link](#)
 - **3rd Korea–China Young Scholar’s Symposium on Discrete Mathematics**, Utop Ubless Hotel Jeju [link](#)
 - **31st KIAS Combinatorics Workshop**, Utop Ubless Hotel Jeju [link](#)
 - **30th KIAS Combinatorics Workshop**, KIAS [link](#)
- Seoul, Korea. Dec 27, 2024
- Busan, Korea. Dec 19–21, 2024
- Seoul, Korea. Dec 17, 2024
- Online. Nov 27, 2024
- Suwon, Korea. Oct 24–26, 2024
- Seoul, Korea. Oct 21, 2024
- Gyeongsan, Korea. Oct 5, 2024
- Cheongju, Korea. Aug 28–30, 2024
- Gongju, Korea. Jul 30–Aug 2, 2024
- Daejeon, Korea. Jul 14–19, 2024
- Jeju, Korea. Jun 24–27, 2024
- Jeju, Korea. May 30–Jun 1, 2024
- Seoul, Korea. Mar 8–9, 2024

2023

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

2022

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