

# Kyusoon Kim

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## Academic Appointments

### Assistant Professor, Soongsil University (Abbr. SSU)

Department of Statistics and Actuarial Science

Seoul, Korea  
Sep. 2025 - Current

## Education

### Seoul National University (Abbr. SNU)

Ph.D. candidate, Statistics

Dissertation title: Dimension Reduction and Feature Extraction of Graph-Valued Data

Advisor: Hee-Seok Oh

Seoul, Korea  
Sep. 2020 - Aug. 2025

### Seoul National University (SNU)

B.S., Statistics

Seoul, Korea  
Mar. 2014 - Feb. 2020

### Queen Mary University of London (QMUL)

Summer school student (Course: Practical Machine Learning)

London, England  
Jul. 2019 - Aug. 2019

### Gyeonggi Science High School (GSHS)

Specialized high school for students talented in math and science

Suwon, Korea  
Mar. 2011 - Feb. 2014

## Research and Professional Experience

### Research Scientist

Sentience Inc.

Gangnam, Korea  
Feb. 2020 - Jul. 2020

### Participant of Undergraduate Research Internship Program

Bayesian Statistics Lab.

Advisor: Jaeyong Lee

Seoul National University  
Sep. 2019 - Feb. 2020

### Military Service

R.O.K Armed Forces (Sergeant)

- Served in fulfillment of the mandatory military service duty for Republic of Korea citizens
- Created and improved auto-processing software for data processing using Python

Seongnam, Korea  
Jul. 2017 - Apr. 2019

## Publications

### Published papers

- [1] **Kim, K.** and Oh, H.-S. (2026). "Graph frequency-domain factor modeling," *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 48(3), 3445-3457. [\[paper\]](#) [\[code\]](#)
- [2] **Kim, K.** and Oh, H.-S. (2025). "Cross-spectral analysis of bivariate graph signals," *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 47(12), 11141-11151. [\[paper\]](#) [\[code\]](#)
- [3] **Kim, K.** and Oh, H.-S. (2025). "Quantile-based fitting for graph signals," *Statistics and Computing*, 35(6), 180. [\[paper\]](#) [\[code\]](#)
- [4] **Kim, K.**<sup>†</sup>, Oh, S.<sup>†</sup>, Bae, K., and Oh, H.-S. (2025). "Prediction of wafer performance: Use of functional outlier detection and regression," *IEEE Access*, 13, 35298-35308. [\[paper\]](#) [\[code\]](#)
- [5] Kang, S.<sup>†</sup>, **Kim, K.**<sup>†</sup>, Kwon, Y.<sup>†</sup>, Park, S.<sup>†</sup>, Park, S.<sup>†</sup>, Shin, H.-Y.<sup>†</sup>, Kim, J. and Oh, H.-S. (2025). "Semiparametric approaches for the inference of univariate and multivariate extremes," *Extremes*, 28(1), 123-148. [\[paper\]](#) [\[code\]](#)
- [6] **Kim, K.** and Oh, H.-S. (2024). "Network time series forecasting using spectral graph wavelet transform," *International Journal of Forecasting*, 40(3), 971-984. [\[paper\]](#) [\[code\]](#)
- [7] **Kim, K.**, Oh, H.-S. and Park, M. (2023). "Principal component analysis for river network data: Use of spatiotemporal correlation and heterogeneous covariance structure," *Environmetrics*, 34(4), e2753. [\[paper\]](#) [\[code\]](#)

## Papers under review

- [8] **Kim, K.\*** (2026+). “Graph frequency-domain regression,” under review. [\[code\]](#)
- [9] **Kim, K.** and Oh, H.-S. (2026+). “Graph canonical coherence analysis,” under review. [\[arXiv\]](#) [\[code\]](#)
- [10] **Kim, K.†**, Park, S.†, Shin, H.-Y.†, Choi, J., Ha, J., Kim, J., Kwon, Y., Park, S. and Kang, S. (2026+). “Extremal PCA-based synthetic event generation for the inference of extreme precipitation,” under review. [\[code\]](#)
- [11] **Kim, K.** and Oh, H.-S. (2026+). “Principal component analysis in the graph frequency domain,” under review. [\[arXiv\]](#) [\[code\]](#)
- [12] Cho, H.†, **Kim, K.†** and Oh, H.-S. (2026+). “Statistical graph empirical mode decomposition by graph denoising and boundary treatment,” under review. [\[code\]](#)
- [13] Shin, H.-Y., **Kim, K.\***, Lee, K. and Oh, H.-S. (2026+). “Absolute average and median treatment effects as causal estimands on metric spaces,” under review. [\[arXiv\]](#) [\[code\]](#)

\*: corresponding author(s), †: equal contributions

## Grants and Funding

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### Young Scientist Grants Type A (Basic Individual Research Grant)

*NRF*

National Research Foundation of Korea (NRF) grant funded by the Korean government (MSIT)

Mar. 2026 - Feb. 2029

- Research Project Title: Extended frameworks for graph-valued data analysis
- Role: Principal Investigator (PI)

### Autonomous Core Research Institute Program (Basic Science Research Program)

*NRF*

National Research Foundation of Korea (NRF) grant funded by the Ministry of Education

Mar. 2026 - Feb. 2027

- Research Project Title: Dimensionality reduction for multivariate graph-indexed data with multiple datasets
- Role: Co-Investigator (Co-I)
- Integrative Institute of Basic Sciences (IIBS), Soongsil University

### New Faculty Research Support (Soongsil University Research Fund)

*Soongsil University*

Soongsil University

Nov. 2025 - Oct. 2026

- Research Project Title: Statistical analysis of multivariate graph-valued data
- Role: Principal Investigator (PI)

### Autonomous Core Research Institute Program (Basic Science Research Program)

*NRF*

National Research Foundation of Korea (NRF) grant funded by the Ministry of Education

Sep. 2025 - Feb. 2026

- Research Project Title: Factor modeling for multivariate graph-valued data
- Role: Co-Investigator (Co-I)
- Integrative Institute of Basic Sciences (IIBS), Soongsil University

### Research Subsidies for Ph.D. Candidates (Basic Science Research Program)

*NRF*

National Research Foundation of Korea (NRF) grant funded by the Ministry of Education

Sep. 2024 - Aug. 2025

- Research Project Title: Spectral analysis of graph-valued data
- Role: Principal Investigator (PI)

## Awards and Honors

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### Scholarship for Next Generation Scholars in Fundamental Science

*Seoul National University*

Seoul National University

Mar. 2021 - Feb. 2022,

Mar. 2024 - Aug. 2025

### 4th Prize in Extreme Value Analysis 2025 Data Competition

*Extreme Value Analysis*

Extreme Value Analysis 2025

Jun. 2025

- Team name: SHSmultiscale
- Task: Prediction of extreme precipitation from a large ensemble of climate model runs

### 2025 KISS Outstanding Student Paper Awards

*KISS*

Korean International Statistical Society (KISS)

Jan. 2025

### IMS 2024 ICSDS Student Travel Awards

*IMS ICSDS*

IMS International Conference on Statistics and Data Science (ICSDS) 2024

Dec. 2024

### Best Student Oral Presentation Award (1st Prize)

*Korean Statistical Society*

Korean Statistical Society Conference 2024 Winter

Nov. 2024

### Best Student Oral Presentation Award (3rd Prize)

*Korean Statistical Society*

Korean Statistical Society Conference 2024 Summer

Jul. 2024

## Outstanding Research Talent Fellowship

BK21 FOUR (Brain Korea 21 Program for Leading Universities & Students)

Seoul National University

Mar. 2022 - Aug. 2023

## Best Student Oral Presentation Award (4th Prize)

Korean Statistical Society Conference 2023 Summer

Korean Statistical Society

Jul. 2023

## 2nd Prize in Extreme Value Analysis 2023 Data Competition

Extreme Value Analysis 2023

Extreme Value Analysis

Jun. 2023

- Team name: SHSmultiscale
- Task: Prediction of extremal quantiles and joint probabilities of exceedance events

## Best Student Oral Presentation Award (4th Prize)

Korean Statistical Society Conference 2022 Summer

Korean Statistical Society

Jul. 2022

## Excellent Teaching Assistant Award

Faculty of Liberal Education

Seoul National University

Feb. 2022

- Course Title: The World of Uncertainty and Statistics

## Scholarship for Graduate Student Instructor

College of Natural Sciences

Seoul National University

Sep. 2020 - Feb. 2021

## The National Scholarship for Science and Engineering

Korea Student Aid Foundation

Seoul National University

Mar. 2014 - Aug. 2017,

Sep. 2019 - Feb. 2020

- All semesters during the undergraduate period

## Top 30 teams in NAVER AI Vision Hackathon 2018

NAVER Corp.

NAVER CONNECT ONE

Dec. 2018 - Feb. 2019

- Image retrieval challenge using a large dataset

## Army Chief of Staff Award

Ministry of Defense Start-up Challenge 2018

KT&G Sangsangmadang

Chuncheon

Jun. 2018 - Sep. 2018

- Developed a diary app for self-management by researching state-of-the-art NLP techniques including Deep Learning
- Advanced to K-Startup Challenge 2018

## Dean's list

College of Natural Sciences

Seoul National University

Jun. 2014 - Dec. 2017

- 2014 1st semester, 2014 2nd semester, 2015 1st semester, 2016 2nd semester, 2017 1st semester

## Bronze medal in Collegiate Mathematics Competition

Korean Mathematical Society

Seoul National University

Nov. 2014

## Silver medal in Korean Mathematics Olympiad

Korean Mathematical Society

Seoul National University

Aug. 2012

- Placed within the top 50 candidates for the International Mathematical Olympiad

## Talks and Presentations

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### Korean Data & Information Science Society Conference 2025 Fall

Title: Principal component analysis in the graph frequency domain (Oral Session)

Daegu, Korea

Oct. 2025

### Joint Statistical Meeting 2025

Title: Principal component analysis in the graph frequency domain (Oral Session / KISS Outstanding Student

Nashville, Tennessee

Paper Award)

Aug. 2025

### IMS International Conference on Statistics and Data Science (ICSDDS) 2024

Title: Cross-spectral analysis of bivariate graph signals (Oral Session / Student Travel Award)

Nice, France

Dec. 2024

### Korean Statistical Society Conference 2024 Winter

Title: Principal component analysis in the graph frequency domain (Oral Session)

Daejeon, Korea

Nov. 2024

### Korean Statistical Society Conference 2024 Summer

Title: Quantile-based fitting for graph signals (Oral Session)

Seoul, Korea

Jul. 2024

### Graph Signal Processing Workshop 2024

Title: Quantile-based fitting for graph signals (Oral Session)

Delft, The Netherlands

Jun. 2024

## Joint Statistical Meeting 2023

Title: Network time series forecasting using spectral graph wavelet transform (Oral Session)

Toronto, Canada

Aug. 2023

## Korean Statistical Society Conference 2023 Summer

Title: Absolute average and median treatment effects as causal estimands on metric spaces (Oral Session)

Busan, Korea

Jun. 2023

## Data Science, Statistics & Visualisation 2022 Conference

Title: Principal component analysis for river network data: Use of spatio-temporal correlation and heterogeneous covariance structure (Oral Session)

Tainan, Taiwan, ROC (Hybrid)

Jun. 2022

## Korean Statistical Society Conference 2022 Summer

Title: Principal component analysis for river network data: Use of spatio-temporal correlation and heterogeneous covariance structure (Oral Session)

Seoul, Korea

Jun. 2022

## 10th World Congress in Probability and Statistics

Title: Geum River network data analysis via weighted PCA (Poster Session)

Seoul, Korea (Virtual)

Jul. 2021

## Teaching Experience

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### Teaching

Deep Learning Analysis (2150687701, 2150687702)

Multivariate Analysis (2150346901, taught in English)

Quality Control (2150212501)

Soongsil University

Spring 2026

Fall 2025

Fall 2025

### Teaching Assistant

Statistical Consulting and Practices (326.517A)

The World of Uncertainty and Statistics (046.003)

Theories of Statistics 1 (326.519A)

Probability Concept and Applications (326.211)

The World of Uncertainty and Statistics (046.003)

Probability Concept and Applications (326.211)

Statistical Computing and Lab. (326.212)

Seoul National University

Spring 2022, Fall 2022, Spring 2025

Fall 2024

Spring 2024

Spring 2023

Fall 2021

Spring 2021

Fall 2020

### Lab Instructor

Public lecture (Exploratory Data Analysis / Regression Analysis / Analysis of Variance)

Public lecture (Regression Analysis / Analysis of Variance)

Special lecture (Statistical Prediction)

Statistical Research Inst., SNU

Aug. 2022, Aug. 2024

Feb. 2023, Feb. 2024

Feb. 2022

## Referee Service

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### Peer-Reviewed Journals

*Computational Statistics*

*Extremes*

## Technical Skills

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### Programming

R, Python, SAS, C, JAVA

### Machine Learning Frameworks

Tensorflow, Keras, PyTorch

### Typesetting

$\LaTeX$ , Beamer

### Languages

Korean (Native), English (Intermediate)