

# Donghwan Rho

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## Research Interests

- Implementing Language Models with Homomorphic Encryption
- Mathematical Reasoning in Large Language Models
- Interpretability of Language Models

## Education

- Ph.D. Seoul National University**, Mathematical Sciences Mar. 2021 – Present
- Advisor: [Ernest K. Ryu](#)
  - Expected Graduation: Feb. 2026
- BS Korea University**, Mathematics Education Mar. 2015 – Feb. 2021
- Graduated 1st in Class
  - (Mandatory) Military Service: May 2017 - Jan. 2019
  - Teacher's Certificate for Secondary Regular Teacher of Mathematics.

## Experience

- SNU-KAIST ML Theory Workshop**, Workshop Coordinator Gangneung, South Korea  
Aug. 2024
- Assisted in planning the schedule, selecting the venue, and managing workshop programs.
- Teaching Practicum** Seoul, South Korea  
Apr. 2020 - May 2020
- Danggok high school.
- Military Service**, Auxiliary Police Seoul, South Korea  
May 2017 – Jan. 2019
- Assisted in maintaining public order and security.

## Publications

∗: Equal Contribution

- [2] **Random Sampling of Language Models under Homomorphic Encryption**  
**Donghwan Rho**<sup>∗</sup>, Sieun Seo<sup>∗</sup>, Hyewon Sung, Chohong Min, Ernest K. Ryu  
In Progress
- [1] **Encryption-Friendly LLM Architecture** Oct. 2024  
**Donghwan Rho**<sup>∗</sup>, Taeseong Kim<sup>∗</sup>, Minje Park, Jung Woo Kim, Hyunsik Chae, Ernest K. Ryu,  
Jung Hee Cheon  
International Conference on Learning Representations (ICLR) 2025  
[Paper](#) [Code](#)

## Talks & Presentations

- SNU-Samsung Electronics Collaboration Symposium**, Poster Presentation Aug. 2024
- Title: Encryption-Friendly LLM Architecture
- SNU-KAIST ML Theory Workshop**, Poster Presentation Aug. 2024
- Title: Encryption-Friendly LLM Architecture

## Honors and Awards

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<b>University Students Contest of Mathematics</b> , Silver Prize	Dec. 2018
<b>Academic Excellence Scholarship</b> , Korea University	Aug. 2015

## Teaching

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<b>Lead Teaching Assistant</b> , Peer Tutoring in Basic Sciences	Mar. 2024 - Present
<ul style="list-style-type: none"><li>• Represented section TAs to ensure the smooth operation of the peer tutoring program.</li><li>• Oversaw tutorings in Mathematics, Physics, Chemistry, Biology, and Statistics.</li></ul>	
<b>Teaching Assistant</b> , Basic Calculus	Sep. 2021 - Present
<ul style="list-style-type: none"><li>• Matched tutors and tutees for the <i>Basic Calculus</i> peer tutoring program.</li><li>• Managed program logistics to ensure efficient operation.</li></ul>	
<b>SNU Pre-College Program</b> , Head TA, Instructor	
<ul style="list-style-type: none"><li>• Managed logistics of the mathematics program for freshman undergraduate.</li><li>• Gave lectures.</li><li>• Winter 2024, Winter 2023, Winter 2022</li></ul>	
<b>Introduction to Computer Programming and Artificial Intelligence for Scientists</b> , Instructor	Spring 2025
<ul style="list-style-type: none"><li>• English Course</li></ul>	
<b>Topics in Machine Intelligence</b>	Fall 2024
<ul style="list-style-type: none"><li>• Topics: Continuous-depth neural networks, Diffusion Models, Large Language Models, Vision Language Models, State-space Models</li><li>• English Course</li><li>• Graduate Course</li></ul>	
<b>Mathematical algorithms II</b>	Fall 2022
<ul style="list-style-type: none"><li>• Topics: Reinforcement Learning, Diffusion Models, Natural Language Processing</li><li>• English Course</li><li>• Graduate Course</li></ul>	
<b>Calculus 2 Practice</b> , Instructor	Fall 2021
<b>Calculus 1 Practice</b> , Instructor	
<ul style="list-style-type: none"><li>• Spring 2024, Fall 2023, Spring 2023, Spring 2022, Spring 2021</li></ul>	

## Technical Skills

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**Languages:** Korean (Native), English (Fluent)

**Programming Languages:** Python, C++

**Tools & Technologies:** LaTeX, GitHub