

# Junghyun Lee

291 Daehak-ro  
Yuseong-gu, Daejeon 34141

Github: <https://github.com/nick-jhlee>

Phone: (+82)10 5819-2684  
Email: [jh\\_lee00 \(AT\) kaist.ac.kr](mailto:jh_lee00@kaist.ac.kr)  
Alt: [nick.jhlee00 \(AT\) gmail.com](mailto:nick.jhlee00@gmail.com)

Personal website: <https://nick-jhlee.netlify.app/>

## PARTICULARS

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### EDUCATION

Korea Advanced Institute of Science and Technology (KAIST)  
BSc in Mathematical Sciences, Computer Science(*Double Major*)

Daejeon, ROK  
*August 2021 (expected)*

Changwon Science High School (CSHS)  
*Early graduation*

Changwon, ROK  
*March 2017*

### CURRENT STATUS

Citizen of Republic of Korea (ROK).

### ACADEMIC INTERESTS

- (Theoretical) Machine/Deep Learning
- Probabilistic Machine/Deep Learning
- Related mathematical theories (e.g. Probability Theory, Optimization, Statistics)
- GNN, Graphs
- Various applications of ML/DL
- Fairness, Privacy
- “Other” mathematics (graph theory, discrete geometry, algorithms...etc.)

### ACADEMIC HONORS

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- Freshmen Dean’s List, Spring 2017.
- Hansung Son Jae Han Scholarship for Gifted Students, 2016.

### RESEARCH EXPERIENCE

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- **Undergrad Research: Optimization and Statistical Inference Lab (OSI Lab)**, Spring 2020 - Present.  
**Advisor:** Prof. Se-Young Yun (Graduate School of AI, KAIST)  
**Collaborators**<sup>1</sup>: SeongYoon Kim\*, Namgyu Ho\*\*, Minchan Jeong\*\*\* (\*Industrial and System Engineering, KAIST; \*\*Intern, OSI Lab; \*\*\*Graduate School of AI, KAIST)  
**Research topic:** *Toward a Better Understanding of Dynamics of Deep Neural Networks and SGD*
- **Undergrad Research: Artificial Intelligence & Machine Learning Lab (AIM Lab)**, Fall 2019 - Present.  
**Advisor:** Prof. Chang Dong Yoo\*, Prof. Gwangsu Kim\* (\*School of Electrical Engineering, KAIST)  
**Collaborator:** Matt Olfat (UC Berkeley & Citadel)  
**Research topic:** *Can Fairness in Principal Components be Obtained, Even in High Dimensions?*

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<sup>1</sup>Briefly collaborated with Cheolhyeong Lee (currently post-doctoral associate of Center for Data Science at NYU)

- **Undergrad Research: Biomedical Mathematics Group (BIMAG)**, Spring 2021 - Present.  
**Advisor:** Prof. Jae Kyoung Kim (Dept. of Mathematical Sciences, KAIST)  
**Collaborator:** Seokmin Ha\*, Dae Wook Kim\* (\*Dept. of Mathematical Sciences, KAIST)  
**Research topic:** *Applying machine learning methodologies to infer the underlying model of plant circadian clocks*
- **Undergrad Research: Computational Intelligence for Software Engineering Lab (COINSE Lab)**, Fall 2021 - Present.  
**Advisor:** Prof. Shin Yoo (School of Computing, KAIST)  
**Collaborator:** Chani Jung\*, Yoo Hwa Park\*, Dongmin Lee\*, Juyeon Yoon\* (\*School of Computing, KAIST)  
**Research topic:** *SWAY for Decision Space of Permutations with Case Study on Test Case Prioritisation*
- **[Alone] Individual Study**, Summer 2019 - Fall 2019.  
**Advisor:** Prof. Andreas Holmsen (Dept. of Mathematical Sciences, KAIST)  
**Research topic 1:** *Asymptotics for the number of  $C_4$ 's in a graph under certain condition,*  
**Research topic 2:** *Maximum number of columns in a  $0$ - $1$   $2n \times n$  matrix with no induced  $2 \times 2$  identity matrix*
- **CSHS Mathematics Research and Education Program (R&E)**, Mar 2015 - Feb 2017.  
**Advisor:** Mr. Seungkyun Cha\*, Prof. Jisoo Byun\*\* (\*Division of Mathematics, CSHS; \*\*Dept. of Mathematics Education, Kyungnam University)  
**Collaborator:** Minyoung Hwang\*, Cheolwon Bae\* (\*Division of Mathematics, CSHS)  
**Research topic:** *Some Loci in the Animation of a Sangaku Diagram*

## PUBLICATIONS

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### WORKING/PENDING PAPERS

1. **Junghyun Lee**, Gwangsu Kim, Matt Olfat, Chang D. Yoo. "Can Fairness in Principal Components be Obtained, Even in High Dimensions?" (Under review)
2. **Junghyun Lee\***, Chani Jung\*, Yoo Hwa Park\*, Dongmin Lee\*, Juyeon Yoon, Shin Yoo. "SWAY for Decision Space of Permutations, with Case Study on Test Case Prioritisation" (Work in progress)  
(\*: equal contributions)

### JOURNAL

1. **Junghyun Lee**, Minyoung Hwang, Cheolwon Bae. "Some Loci in the Animation of a Sangaku Diagram", *Forum Geometricorum*, 2016, vol. 16, pp. 187-191.

## COURSEWORKS

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### PROJECTS

- **CS454: Artificial Intelligence based Software Engineering**, Fall 2020.  
**Instructor:** Prof. Shin Yoo (School of Computing, KAIST)  
**Collaborator:** Chani Jung\*, Yoo Hwa Park\*, Dongmin Lee\* (\*School of Computing, KAIST)  
**Project topic:** *SWAY for Decision Space of Permutations, with Case Study on Test Case Prioritisation*
- **CS376: Machine Learning**, Fall 2018.  
**Instructor:** Prof. Eunho Yang (School of Computing, KAIST; now at Graduate School of AI, KAIST)  
**Collaborators:** Youngjin Jin\*, Minsung Park\*\*, Hyunjin Kim\*\*\* (\*School of Electrical Engineering, KAIST; \*\*Dept. of Biological Sciences, KAIST; \*\*\*School of Computing, KAIST)  
**Project topic:** *Building a predictive model for predicting Gotham city's apartment prices*
- **MAS480(B): Introduction to Mathematical Biology**, Fall Semester, 2018.  
**Instructor:** Prof. Jaekyung Kim (Dept. of Mathematical Sciences, KAIST)  
**Collaborator:** Seokmin Ha (Dept. of Mathematical Sciences, KAIST)  
**Project topic:** *Reverse Analysis Problem of Two-gene System in the Perspective of Adaptation*

- **CS492(I): Special Topics in Computer Science <Deep Learning for Real-World Problems>**, Fall 2020.  
**Instructors:** Prof. Seunghoon Hong\*, Prof. Alice Oh\* (\*School of Computing, KAIST)  
**Collaborators:** Minyoung Hwang\*, Junseok Choi\* (\*School of Computing, KAIST)  
**Project topic:** *Deep learning based solution for semi-supervised classification on Naver Fashion Dataset, and Korean Open-Domain QA task on Naver KorQuAD-Open dataset. (2nd, 1st place in leaderboard, respectively)*
- **CS470: Introduction to Artificial Intelligence**, Fall Semester, 2019.  
**Instructor:** Prof. Seunghoon Hong (School of Computing, KAIST)  
**Collaborator:** Youngjin Jin\*, Minsung Park\*\* (\*School of Electrical Engineering, KAIST; \*\*Dept. of Biological Sciences, KAIST)  
**Project topic:** *Implementing a model for music genre classification problem.*

## REPORTS

1. **Junghyun Lee**, Chani Jung, Yoo Hwa Park, Dongmin Lee. “SWAY for Decision Space of Permutations with Case Study on Test Case Prioritisation”, *CS454: Artificial Intelligence Based Software Engineering*, 2020 Fall.
2. Seokmin Ha, **Junghyun Lee**. “Reverse Analysis Problem of Two-gene System in the Perspective of Adaptation”, *MAS480(B): Topics in Mathematics <Introduction to Mathematical Biology>*, 2018 Fall.
3. **Junghyun Lee**. “Lecture Note 5: Randomized Algorithms”, *CS500: Design and Analysis of Algorithm*, 2020 Spring.
4. **Junghyun Lee**. “Critical Review on Theoretical Aspects of Binary Decision Diagram, with a Focus in Variable Ordering”, *CS402: Introduction to Logic for Computer Science*, 2020 Spring.
5. Junseok Choi, Minyoung Hwang, **Junghyun Lee** “Semi-Supervised Learning Task on Naver Fashion Dataset”, *CS492(I): Special Topics in Computer Science <Deep Learning for Real-World Problems>*, 2020 Fall.
6. Minyoung Hwang, Junseok Choi, **Junghyun Lee** “Korean Open-Domain QA Task on Naver KorQuAD-Open Dataset”, *CS492(I): Special Topics in Computer Science <Deep Learning for Real-World Problems>*, 2020 Fall.

## TEACHING EXPERIENCE

### TEACHING ASSISTANT

- **HSS302: Special Lectures on Linguistics <Language Register and English>**, Prof. Seonmin Park, Spring 2018, KAIST.
- **English Camp for Incoming Freshmen**, EFL Office, Jan 2019, KAIST.
- **English Camp for Incoming Freshmen**, EFL Office, Jan 2018, KAIST.

### FRESHMEN TUTORING

- **MAS102: Calculus 2**, Fall 2018, KAIST.
- **MAS101: Calculus 1**, Spring 2018, KAIST.

### UNOFFICIAL/VOLUNTARY TUTORING

- **MAS102, PH142, MAS109**, Fall 2017, KAIST.  
with 10~15 freshmen taking the courses
- **MAS101, PH141, CH101, MAS109**, Spring 2017, KAIST.  
with 10~15 freshmen taking the courses

## SKILLS

### PROGRAMS

- Languages: **Python, Matlab**
- Applications : **LaTeX**

## LANGUAGE

- **Korean:** Native
- **English:** Highly proficient  
(Mock) TOEFL iBT 118 (2017)  
TOEIC 985/990 (2021)

## MISC.

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### KAIST Mathematical Sciences Student Council

- Member of department student council, Mar 2018 - Present.
- In charge of *Mathematical Sciences Help-Desk* (Mar 2018 - June 2019)  
A short lecture series (given by selected math undergrad.) that takes place a week before the exam period to help all students with Basic Elective courses. (MAS109, MAS201, MAS250)

### KAIST ORCHESTRA

- First Violinist, Mar 2017 - Present.
- **Principal First Violinist**, Jan 2018 - Dec 2018.

### ICISTS

- Division of Global Partnership, Sep 2018 - Aug 2019.
- **TF leader** of *Opening/Gala Night* (ICISTS-2019)
- TF member of *Science in a Nutshell* (ICISTS-2019)
- **Vice President**, Sep 2019 - Jul 2020.