

Heng-Chien (Leo) Liou

NETWORK SCIENCE · COMPUTATIONAL SOCIAL SCIENCE · ALGORITHMIC FAIRNESS

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"Philosophers have hitherto only interpreted the world in various ways; the point is to change it."-Karl Marx

Research Statement

My goal is to use engineering and computational methods to understand complex social and natural systems, and to even solve the associated problems.

Keywords: *Network Science, Computational Social Science, Algorithmic Fairness*

Education

National Taiwan University College of Electrical Engineering & Computer Science

Taipei, TWN

Bachelor of Science in Engineering, **Electrical Engineering** 📄

2021

- **GPA: 4.26/4.30** and **Ranking: 1/222** 📄, cumulative to Jan 2021
- Honors: Phi Tau Phi Honor Fellow, Mr. Chien Shih-Liang Memorial Scholarship, Irving T. Ho Memorial Scholarship
- One of the ten Diploma Conferment Representatives for class 2020, Dept. of Electrical Engineering
- Academic Advisor: **Shyh-Kang Jeng**
Research Advisor: **Hung-Yun Hsieh** (Networks), **Hsuan-Wei Lee** (Computational Sociology), **Ho-Lin Chen** (Algorithms)
- Selected Courses 📄 (all with letter grade **A+**; † denotes graduate-level courses)
 - **Information and Decision Systems**
Eng Math-Linear Algebra, Eng Math-Differential Equation, Probability & Statistics, Signals & Systems, Data Structure & Programming, Design & Analysis of Algorithms†, Control Systems, Information Theory†, Convex Optimization†
 - **Social and Behavioral Science**
Economics I-II, Game Theory†, Introductory Sociology, Sociological Theory (1)-(2), General Psychology, Social Psychology, Psychology of Personality, Abnormal Psychology, Neural and Behavioral Modeling†

University of British Columbia

Vancouver, BC, CAN

Summer Program, Design Thinking

2017

- Received training on design thinking with group project and presentation experience.

Taipei Municipal Chien Kuo High School

Taipei, TWN

High School Diploma, Math and Natural Science

2016

- Recipient of **Taipei City Mayor Award** (for the students with highest GPA in class)
- Scored full marks (75/75) in General Scholastic Ability Test 2016 [CNA News]

Research Experience

Institute of Sociology, Academia Sinica

Taipei, TWN

Undergrad Research on Computational Sociology, advised by Prof. Hsuan-Wei Lee

Jan. 2020 - PRESENT

- Social Consensus and Cultural Variation: Modeling and Theorizing for Social Dynamics
 - Proposal admitted by MOST Research Grant for University Students
 - Abstract admitted by 2020 Conference on Computational Sociology poster track and 2020 Taiwanese Sociological Association Annual Meeting

Collective Algorithms Lab, National Taiwan University

Taipei, TWN

Undergrad Research on Algorithmic Fairness, advised by Prof. Ho-Lin Chen

Sep. 2019 - PRESENT

- Fairness for Vaccine Allocation on Networks
 - Introduced the concern of fairness into the vaccine allocation problem

TONIC Research Group, National Taiwan University

Undergrad Research on Network Science, advised by Prof. Hung-Yun Hsieh

Taipei, TWN

Sep. 2018 - Apr. 2020

- Formation of Friendship Networks among Agents with Personality Traits
 - Proposal admitted by MOST Research Grant for University Students
 - Developed computational network models to incorporate psychological concept into network science research
 - Received MOST Research Creativity Award

Publications

PREPRINTS

- **Heng-Chien Liou**, and Hsuan-Wei Lee. 2020. "Social Contagion and Associative Diffusion in Multilayer Networks." *arXiv preprint arXiv:2011.07746*. [[arXiv](#)] [[TSA2020 slide](#)]
- **Heng-Chien Liou**, and Hung-Yun Hsieh. 2020. "Modeling Friendship Networks among Agents with Personality Traits." *arXiv preprint arXiv:2004.12901*. [[arXiv](#)]

Professional Development and Certification

MITx

Online

MicroMasters Program in **Statistics and Data Science**

Ongoing

- Completed four graduate level courses, at a similar pace and level of rigor as on-campus courses at Massachusetts Institute of Technology; waiting to complete the capstone exam.
- Credentials: Probability [↗](#), Data Analysis in Social Science [↗](#), Fundamentals of Statistics [↗](#), Machine Learning [↗](#)

Coursera & edX

Online

Online Courses

Indefinite

- **Information and Decision Systems**
Probability [↗](#), Fundamentals of Statistics [↗](#), Machine Learning [↗](#), Quantum Machine Learning [↗](#)
- **Social and Behavioral Science**
Data Analysis in Social Science [↗](#), Game Theory [↗](#), Moral Foundations of Politics [↗](#), Introduction to Social Research Methods [↗](#), Classical Sociological Theory [↗](#), Network Dynamics of Social Behavior [↗](#), Anthropology of Current World Issues [↗](#)

Honors & Awards

RESEARCH GRANTS

2020	MOST RESEARCH GRANT FOR UNDERGRADUATE STUDENTS, Ministry of Science and Technology	TWN
2019	MOST RESEARCH GRANT FOR UNDERGRADUATE STUDENTS, Ministry of Science and Technology	TWN

FELLOWSHIP

2021	PHI TAU PHI HONOR FELLOW, The Phi Tau Phi Scholastic Honor Society	TWN
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SCHOLARSHIP

2020	DELTA ELECTRONICS SCHOLARSHIP, Delta Electronics	TWN
2019	MR. CHIEN SHIH-LIANG MEMORIAL SCHOLARSHIP, National Taiwan University	TWN
2018	DELTA ELECTRONICS SCHOLARSHIP, Delta Electronics	TWN
2018	NTUHKAA SCHOLARSHIP, National Taiwan University Hong Kong Alumni Association	TWN
2018	IRVING T. HO MEMORIAL SCHOLARSHIP ↗ , Irving T. Ho Memorial Foundation	TWN

AWARDS

2020	RESEARCH CREATIVITY AWARD ↗ , Ministry of Science and Technology	TWN
2017-9	PRESIDENTIAL AWARD (TOP 5% OF CLASS) FOR 4 SEMESTERS ↗ , National Taiwan University	TWN
2016	MAYOR AWARD, Chien Kuo High School and Taipei City Government	TWN

OTHERS

2020	DIPLOMA CONFERMENT REPRESENTATIVE, Department of Electrical Engineering, NTU	TWN
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Extracurricular Activity

Viking Bar

Writer for Technology and Business

Taipei, TWN

2016 - 2018

- Analyzed several topics in modern technology development.
- Also wrote articles about personal growth, interdisciplinary learning, gender equality.

Global Initiatives Symposium Organizing Committee

Officer of Academics and Curation

Taipei, TWN

2016 - 2017

- Organized and host Pre-Symposium Speech: Revolution of Sustainable Life.
- Was responsible for one of the academic topics- Low Carbon Economy in annual symposium.

National Taiwan University Musical Club

NTU Musical

Taipei, Taiwan

Club Member

2016 - 2017

- Learned how to act and sing like a musical actor.
- Participated in annual musical performance as one of the main actors.

Chien Kuo High School Physics Club

CKPC

Taipei, Taiwan

Officer of Public Relations & Activities

2014 - 2015

Club Member

2013 - 2014

- Coordinator of the Inter-Club Spring Camp (with HSNU Natrual Science Club and ZSGHS Natrual Science Club), 2014
- Representative of CKPC in the Inter-Club Winter Camp (with other six clubs), 2014-2015
- Staff of CKPC Summer Camp, Inter-Club Summer Camp, Inter-Club Countryside Service, Inter-Club Orientation, Inter-Club Autumn Camp, 2014 and 2016

Skills

Software Systems \LaTeX

Programming Language Python, C++, MATLAB, R

Python Library NetworkX, graph-tool, NumPy

Natural Language Mandarin (native), English (fluent), Taiwanese (listening)