

# Ivan Lau | Curriculum Vitae

National University of Singapore, School of Computing

🏠 <https://ivanphlau.github.io/>

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## CURRENT RESEARCH INTERESTS

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Multi-armed bandits, online learning, learning theory,

## EDUCATION

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### National University of Singapore

*Ph.D. in Computer Science*

**Singapore, Singapore**

August 2024 - Present

Advisor: Jonathan Scarlett

### Rice University

*Graduate student in Electrical and Computer Engineering*

**Houston, TX, United States**

August 2022 - December 2023

CGPA: 4.00/4.00

Advisors: César A. Uribe and Shiqian Ma

### Simon Fraser University

*M.Sc. in Mathematics*

**Burnaby, BC, Canada**

September 2019 - August 2021

CGPA: 4.07/4.33

Thesis: 🌀 Nonuniform Compressed Sensing Schemes with Sublinear Measurements, Sublinear Time, and Low Entropy (awarded Certificate with Distinction)

Advisor: Jonathan Jedwab

Thesis committee members: Ben Adcock, Weiran Sun (Chair), Paul Tupper (Examiner)

### University of Edinburgh

*B.Sc. (Hons) in Computer Science and Mathematics*

**Edinburgh, United Kingdom**

September 2015 - June 2019

Degree classification: First-Class Honours

Informatics Honours Project: 🌀 Hermitian Spectral Theory of Mixed Graphs

Mathematics project: 🌀 Left Braces and the Solutions of the Yang-Baxter Equation (awarded best project)

## EMPLOYMENT

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### National University of Singapore

*Research Assistant, Department of Computer Science*

**Singapore, Singapore**

January 2024 - August 2024

### Rice University

*Teaching Assistant, Department of Electrical and Computer Engineering*

**Houston, TX, United States**

August 2023 - December 2023

### Rice University

*Research Assistant, Department of Electrical and Computer Engineering*

**Houston, TX, United States**

May 2023 - December 2023

### National University of Singapore

*Research Assistant, Department of Computer Science*

**Singapore, Singapore**

September 2021 - August 2022

**Simon Fraser University**  
*Research and Teaching Assistant, Department of Mathematics*

**Burnaby, BC, Canada**  
September 2019 - August 2021

**University of Edinburgh**  
*Teaching Assistant, School of Informatics*

**Edinburgh, United Kingdom**  
September 2017 - May 2019

**University of Edinburgh**  
*Research Intern, Laboratory for Foundations of Computer Science*

**Edinburgh, United Kingdom**  
June 2018 - August 2018

## RESEARCH EXPERIENCE

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**Rice University**  
*Ph.D. student, Department of Electrical and Computer Engineering*

**Houston, TX, United States**  
August 2022 - December 2023

Supervisors: César A. Uribe and Shiqian Ma

Description: Studied decentralized optimal transport and decentralized equitable optimal transport problems [2]. We proposed an algorithm with an iteration complexity of  $O(1/\epsilon)$ , which matches existing centralized first-order approaches.

**National University of Singapore**  
*Research Assistant, Department of Computer Science*

**Singapore, Singapore**  
September 2021 - August 2022

Supervisor: Jonathan Scarlett

Description: Studied model-based group testing [5] and infinite-armed bandits [3]. In the model-based group testing, we showed that the number of tests can be significantly decreased by leveraging the structural dependencies between the items. In the infinite-armed bandits, we consider a bandit problem in which there are a number of groups each consisting of infinitely many arms, and the goal is to identify the group whose distribution has the highest quantile of interest.

**Simon Fraser University**  
*Mathematics Master's Thesis, Department of Mathematics*

**Burnaby, BC, Canada**  
September 2019 - August 2021

Supervisor: Jonathan Jedwab

Description: Designed compressed sensing schemes which simultaneously achieve low measurement complexity, fast recovery algorithm, and low entropy. Thesis was awarded Certificate with Distinction and led to a publication [1].

**University of Edinburgh**  
*Undergraduate Mathematics Project, School of Mathematics*

**Edinburgh, United Kingdom**  
September 2018 - April 2019

Supervisor: Agata Smoktunowicz

Description: Studied the algebraic structures related to Yang-Baxter equation. I resolved a question asked by Cedó, Gateva-Ivanova and Smoktunowicz. Project was awarded William and Isabella Dick Fourth Year Project Prize, and led to a publication [4].

**University of Edinburgh**  
*Informatics Honours Project, School of Informatics*

**Edinburgh, United Kingdom**  
September 2018 - April 2019



Supervisor: He Sun

Description: Studied the spectral theory of directed and mixed graphs in Hermitian representations, as an attempt to circumvent the inconvenience caused by the complex eigenvalues in the conventional binary adjacency matrix representation.


## PUBLICATIONS

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### Journal Papers

5. **Ivan Lau**, Jonathan Scarlett, Yang Sun.  Model-Based and Graph-Based Priors for Group Testing, *IEEE Transactions on Signal Processing*, 2022.
4. **Ivan Lau**.  An Associative Left Brace is a Ring. *Journal of Algebra and Its Applications*, 19(09): 2050179, 2020

### Machine Learning Conference Papers

3. **Ivan Lau**, Yan Hao Ling, Mayank Shrivastava, Jonathan Scarlett.  Max-Quantile Grouped Infinite-Arm Bandits, *International Conference on Algorithmic Learning Theory (ALT)*, 2023.

### IEEE Conference Papers

2. **Ivan Lau**, Shiqian Ma, César A. Uribe. Decentralized and Equitable Optimal Transport, accepted to American Control Conference (ACC) 2024.
1. **Ivan Lau** and Jonathan Jedwab.  Construction of binary matrices for near-optimal compressed sensing. *IEEE International Symposium on Information Theory (ISIT)*, pages 1612–1617, 2021.

## TALKS

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### Groups, Rings and Associated Structures 2019

*From the YBE to the Left Braces*

**Spa, Belgium**

June 2019

## TEACHING EXPERIENCE

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### Rice University

Random Signals (Teaching Assistant)

Fall 2023

### Simon Fraser University

Calculus Workshop (Teaching Assistant)

Fall 2020

Applied Calculus Workshop (Teaching Assistant)

Summer 2020

Computing with Linear Algebra (Teaching Assistant)

Spring 2020

Algebra Workshop (Teaching Assistant)

Spring 2020, Fall 2019

### University of Edinburgh

Informatics 2B - Algorithms, Data Structures, Learning (Teaching Assistant)

Spring 2019

Informatics 2D - Reasoning and Agents (Teaching Assistant)

Spring 2019, Spring 2018

Algorithms and Data Structures (Teaching Assistant)

Spring 2019

Discrete Mathematics and Mathematical Reasoning (Teaching Assistant)

Fall 2018, Fall 2017

Informatics 1 - Cognitive Science (Teaching Assistant)

Spring 2018

## AWARDS AND HONOURS

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National University of Singapore Research Scholarship.	2024
Rice University Department of Electrical and Computer Engineering Fellowship	2022
Simon Fraser University Department of Mathematics Certificate "With Distinction"	2021
Simon Fraser University Graduate Fellowship	2020
Simon Fraser University Special Graduate Entrance Scholarship	2019
University of Edinburgh William and Isabella Dick Fourth Year Project Prize	2019

Malaysian Computing Challenge (Perfect Score)	2014, 2013
Malaysian National Mathematical Olympiad (4th - 13th Place Bracket)	2013
International Competitions and Assessments for School (Gold Medal in Science)	2012

## **PROFESSIONAL ACTIVITIES**

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Reviewer for American Control Conference (ACC) 2024, 2025

Reviewer for International Conference on Acoustics, Speech, and Signal Processing (ICASSP) 2024