

Heng (Haggai) Liu | Curriculum Vitae

Simon Fraser University - Department of Mathematics | 12508129618 | haggail@sfu.ca

Education

Simon Fraser University (SFU): 8888 University Drive, Burnaby, BC V5A 1S6

PhD. Mathematics Candidate: Algebraic Combinatorics, Algebraic Geometry May 2021 – present

- Cumulative GPA 4.24 (A+) on a 4.33-point grading scale

MSc. Mathematics: Enumerative and Analytic Combinatorics September 2018 – April 2021

- Cumulative GPA 4.13 (A) on a 4.33-point grading scale
- Thesis: On the cogrowth series of free products of finite groups

University of Victoria (UVic): 3800 Finnerty Road, Victoria, BC V8W 2Y2

BSc Computer Science and Mathematics September 2012 – December 2017

- Cumulative GPA 8.51 (A+) on a 9-point grading scale
- Upper-level GPA 8.89 (A+) on a 9-point grading scale

Research Interests

- Algebraic Combinatorics: Moduli of curves, Schubert calculus, Representation theory, Cluster algebra, Lie algebra, Young tableaux, Posets and lattices
- Algebraic Geometry: Varieties, Schemes, Blow-ups and exceptional divisors
- Algebraic Topology: Fundamental Groups, Cell Complexes

Awards and Distinctions

Graduate Dean Entrance Scholarship (GDES) – SFU May 2022-present

Graduate Fellowship – SFU January 2019

Special Graduate Entrance Scholarship (SGES) – SFU September 2018

University of Victoria Alumni Undergraduate Scholarship – UVic November 2017

Howard Petch Scholarship – UVic September 2016

President's Scholarship – UVic September 2016

Department of Computer Science 10th Anniversary Scholarship – UVic September 2016

Jamie Cassels Undergraduate Research Awards (JCURA) – UVic September 2015 – April 2016

Undergraduate Student Research Awards (USRA) – UVic May 2015 – August 2015

Research Experience

Research Assistant (PhD.) – SFU (Department of Mathematics)	May 2021 – present
Classifying invariants on weighted moduli spaces on genus zero curves with nodal singularities.	
Research Assistant (MSc.) – SFU (Department of Mathematics)	May 2020 – April 2021
Analyze the generating function describing walks on an infinite Cayley graph. Obtain degree bounds for this algebraic function by solving a system of polynomial equations derived from the theory of free probability.	
Research Assistant (BSc.) – UVic (Department of Mathematics and Statistics)	May – August 2016
Investigated the structure of facets of cones generated by characteristic vectors of triangles. Wrote Sage code to obtain classifications of such facets.	
USRA Research Assistant (BSc.) – UVic (Department of Mathematics and Statistics)	May – August 2015
Studied Euler equations for the Earth’s rotation and analyzed the linear estimates for the solutions to the equations, on flat Euclidean space and Spherical space.	

Publications

- J. Bell, H. Liu, and M. Mishna. Cogrowth Series for Free Products of Finite Groups. (Published in International Journal of Algebra and Computation - January 2023)

Presentations

Moduli Spaces of Weighted Stable Curves and their Fundamental Groups March 16, 2024
 Early-Career Conference in Combinatorics (ECCC) 2024, Urbana, USA

Moduli Spaces of Weighted Stable Curves and their Fundamental Groups June 1, 2024
 Canadian Mathematical Society (CMS) Summer Meeting 2024, Saskatoon, SK:

- **Session:** Moduli Spaces in Complex and Algebraic Geometry: Recent Developments

Moduli Spaces of Weighted Stable Curves and their Fundamental Groups March 16, 2024
 Graduate Student Combinatorics Conference (GSCC) 2024, Pittsburgh, USA

Moduli Spaces of Weighted Stable Curves and their Fundamental Groups February 29, 2024
Department of Mathematics Number Theory and Arithmetic Geometry (NTAG)
Seminar at SFU

Moduli Spaces of Weighted Stable Curves and their Fundamental Groups December 2, 2023
Canadian Mathematical Society (CMS) Winter Meeting 2023, Montreal, Quebec:

- Student Research Session

Enumerative Properties of Cogrowth Series on Free Products of Finite Groups July 24, 2021
Applications of Computer Algebra (ACA 2021, Online International Conference):

- Session on Algorithmic Combinatorics: Invited talk

Enumerative Properties of Cogrowth Series on Free Products of Finite Groups June 30, 2021
Department of Mathematics Discrete Math Seminar at SFU

A Penalty Method for Stress Minimization with Box Constraints September 26, 2019
Department of Mathematics Grad Social at SFU

Cone of Weighted Graphs Generated by Triangles August 18, 2016
Canadian Undergraduate Mathematics Conference (CUMC 2016) at Uvic

Workshops

Combinatorics and Geometry of Moduli Spaces of Curves (COMOC) at Banff International Research Station (BIRS) July – August 2024

Certificate Program in University Teaching and Learning (CPUTL) at SFU January – April 2022
Instructional Skills Workshop (ISW) at SFU February 2020

Other Activities

Organize SFU Math Graduate Social Seminar January 2020 – present