

# JEFFREY KAM

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## INTERESTS

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I am interested in graph theory and its applications, with a particular interest in structural graph theory and graph algorithms. In addition, I am also keen on topics related to discrete optimization.

## EDUCATION

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### University of Waterloo

Sep 2017 - Present

*Currently in 4th year*

- Double Major in Combinatorics & Optimizations and Computer Science
- Minor in Pure Mathematics
- Term Dean's Honours List

### Relevant Courses

*Taken already / Expected before Summer 2021.*

*G = Graduate Course*

- Graph-theoretic Algorithms - CS762 [G]
- Algorithms for Graph Minors - CO749 [G]
- Algebraic Graph Theory - CO444 [G]
- Network Flow Theory - CO351
- Introduction to Graph Theory - CO342
- Introduction to Optimization - CO250

### Relevant Projects

- **Bounded Queue-number in Planar Graphs (CS762)** - [Project Page](#)  
Explore a recent proof by Dujmović et al [1] for a 20-year old conjecture on whether the queue-number of planar graph is bounded.
- **Tangles are Decided by Weighted Vertex Sets (CO749)** - [Project Page](#)  
Explore a partial solution by Elbracht et al [2] to an open problem by Diestel, who asked whether we can find a vertex subset  $X$  that can definitively characterize a tangle by seeing which side of a low order separation has more vertices in  $X$ .

## PUBLICATIONS

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- **UBCIS: Ultimate Benchmark for Container Image Scanning**,  
with Shay Berkovich and Glenn Wurster  
Published in 13th USENIX Workshop on Cyber Security Experimentation and Test (CSET 20).  
<https://www.usenix.org/conference/cset20/presentation/berkovich>
- **bioSyntax: Syntax Highlighting For Computational Biology**,  
with A. Babaian, et al.  
Published in BMC Bioinformatics 19, 303 (2018).  
<https://doi.org/10.1186/s12859-018-2315-y>

## RESEARCH EXPERIENCE

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**University of Waterloo - Symbolic Computation Group**

May 2020 - Sep 2020

*Undergraduate Research Assistant**Supervised by Armin Jamshidpey**Waterloo, Canada*

- Researched different methods to find Smith Normal Form over  $\mathbb{Z}_{p^2}$  efficiently, such as experimenting with probabilistic algorithms and utilizing  $J$ -ideal
- Investigate new efficient methods of finding normal bases in  $\mathbb{F}_{p^n}$  and revisited various topics in abstract algebra and Galois theory

**BlackBerry - Security Research Group**

January 2020 - April 2020

*Security Research Intern**Supervised by Shay Berkovich and Glenn Wurster**Waterloo, Canada*

- Researched and designed a universal benchmark to quantitatively measure the effectiveness and accuracy of container image scanners
- Analyzed techniques of image inspection and vulnerability scanning through open source technologies
- Designed a universal import framework for Anchore Engine to extend our scanning capabilities
- Researched on utilizing machine learning for fuzzing algorithmic complexity vulnerabilities (ACV) by reading multiple security-related journals and conference papers
- Presented to the security research group on current developments of ML-based fuzzing and fuzzing techniques for ACVs, along with potential problems, experiments, and optimizations

**WORK EXPERIENCE**

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**GTS**

Sep 2020 - Present

*Software Engineering Intern**New York, US*

- Working on performant C++ and Python code for the core trading engine

**Zenefits**

May 2019 - Aug 2019

*Software Engineering Intern**Vancouver, Canada*

- Developed new permission services in Python to guard against unauthorized review editing
- Designed a sequential document update service using a distributed message queue system

**Horizn**

May 2018 - Aug 2018

*Software Developer Intern**Toronto, Canada*

- Wrote automation scripts in Python to scrape data from files and database into JSON files
- Learned foundational object-oriented programming skills, such as factory and observer pattern

**AWARDS**

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- First place in HackSeq 2017 bioinformatics competition in UBC
- Honourable mention in Canadian Computing Competition Hong Kong 2017
- University of Waterloo President's Scholarship

**SKILLS**

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**Programming**

Python, C++, SAGE, Scheme

**Tools**

Git, C++ tools (i.e. GCC, GDB, Valgrind), Docker, Linux, Jupyter

## References

- [1] Vida Dujmovic et al. “Planar Graphs have Bounded Queue-Number”. In: *2019 IEEE 60th Annual Symposium on Foundations of Computer Science (FOCS)* (2019). DOI: [10.1109/focs.2019.00056](https://doi.org/10.1109/focs.2019.00056).
- [2] Christian Elbracht, Jakob Kneip, and Maximilian Teegen. “Tangles are Decided by Weighted Vertex Sets”. In: *Advances in Combinatorics* (July 2020). DOI: [10.19086/aic.13691](https://doi.org/10.19086/aic.13691).