

Chair, Department of Combinatorics and Optimization
Faculty of Mathematics
University of Waterloo

Dear Dr.

I have become very interested in the Combinatorics and Optimization Undergraduate Research Program, since the Combinatorics and Optimization advisor, _____ recommended it to me. I have a keen interest in mathematics and in doing research. Accordingly, I have had a great deal of exposure to various mathematical disciplines. I have excellent analysis and problem solving skills and superior communication abilities that I feel would be an important component of working within a research position. I am a quick and eager learner and problem solver and would enjoy applying my mathematical skills to find the best solutions to new problems.

My education, interests and skill-sets are a good match for this position. I enjoy problem solving and abstract thinking, particularly in mathematics and computer science. For example, I have found that I have an affinity for the logic and reasoning required in handling abstract objects and developing proofs. As such, I have studied a broad range of topics in mathematics, both in courses, and on my own.

I have a great desire to understand how things work, whether it is an abstract idea, the universe, or a computer program. As such, I love to learn and have an aptitude for conceptual reasoning. To complement this, I have a good command of verbal and written communication skills, particularly in regard to abstract reasoning. I have had many discussions on abstract ideas and written many proofs. Being in pure math, and combinatorics and optimization has helped me hone these skills. As mentioned, I do love to learn and try new things, consequently I am also in co-op, and would be considering this program as a co-op term.

Please find my resume and a recent grade report attached for your review. I look forward to discussing this opportunity with you in greater detail. Feel free to contact me

Sincerely,

References

1. Dr. John Doe – jdoe@email.com - Instructor, Linear Algebra
2. Jane Deer – jane.deer@email.com - Supervisor, MathCamp

Permanent Address

Current Address

Skills Summary

- Fundamental knowledge in and experience with various areas of Mathematics gained through personal study and various classes and learning opportunities, such as the Canada-USA MathCamp
- Proficient in reasoning and problem solving from handling a diverse collection of abstract and practical mathematical challenges, personal study, organised educational programs, and competitions
- Strong verbal reasoning and communication as demonstrated via debates and aiding peers with math and science subjects
- Completed various mathematical research projects both independently and as part of a team
- Experience with Mathematica, Racket, C, low-level programming and currently learning Maple and R
- Quick learner to satisfy my obsessive thirst for knowledge and love of learning as my various scholarships corroborate

Education

Candidate for Bachelor of Mathematics,

Honours, Co-operative Program, St. Jerome's University, Waterloo, Ontario

Relevant Courses: Algebra; Linear Algebra 1 & 2; Calculus 1, 2, & 3; Probability; Introduction to Combinatorics; Introduction to Optimization; Introduction to Differential Equations; Designing Functional Programs; Elementary Algorithm Design and Data Abstraction. (All Advanced level)

Expected to have before the Summer: Statistics (Advanced level); Coding Theory; Integer Programming; Complex Analysis; Elementary Differential Geometry.

Relevant Projects:

Topics in Algebra

Algebra (Advanced level)

- Exploration of various topics in Modern Algebra and Number theory through open ended problems
 - Topics explored included: continued fractions, finite fields, quadratic forms, quadratic reciprocity, Lagrange's four square theorem, Minkowski's Theorem

Scheme Interpreter

Designing Functional Programs, and Elementary Algorithm Design and Data Abstraction

- Developed Scheme interpreter in Scheme (an eager functional programming language) and modifications for this interpreter to be implemented in C
- Continuous learning, task planning and organisation necessary to develop the interpreter through various iterations (as I had no prior formal training in computer programming)
- Required problem solving and attention to detail to get the components of interpreter to work together

Activities & Interests

Algebraic Geometry Conference

Fields Undergraduate Network at Queen's University, Kingston, ON

Canada-USA MathCamp (five weeks each summer)

Classes Included (but not limited to): (i.e. following involved large self-discovery component)

- Point-Set Topology
- Theoretical Computer Science
- Information Theory
- Planar Graphs (Moore Method)
- Domino on Chessboards (Moore Method)

Relevant Projects:

- Studied Hidden Markov Methods, developed Viterbi Algorithm, Forward-Backward Algorithm, and Baum-Welch Algorithm. Compared algorithms' analyses with that of volunteers, and presented work at project fair. (In collaboration with four other students and under supervision of a mentor)
- Proved and presented proof of Wagner's Theorem for Moore Method class on Planar Graph Theory. (Independently)
- Developed aid for scheduling classes based on students' votes using Singular Value Decomposition and presented this work at project fair. This work has since been used by academic coordinators to help schedule classes. (In collaboration with two other students and a mentor)

Lloyd Auckland Invitational Mathematics Seminar

University of Waterloo

Algebra, Trigonometry, and Combinatorics

School of Mathematics and Statistics at Carleton University

Employment Experience

Web Developer, Molecular Photonics Group, National Research Council Canada, Ottawa Ontario

- Demonstrated affinity for learning by developing many new skills in a short period of time
- Learnt Dreamweaver and HTML and created new and updated old websites for the group
- Worked with a variety of Linux based operating systems including Mint, Ubuntu, and Lubuntu
- Observed and helped set up experiments

Awards and Scholarships

Ronald G. Scoins National Scholarship, presented by the University of Waterloo for recognition of accomplishments in Mathematics

Adam Ballantyne Scholarship and L.W. Rentner Memorial Award, presented by Lisgar Collegiate Institute for the highest aggregate on six Grade 12 courses, and for most outstanding student in Mathematics

Canadian Open Mathematics Challenge organised by the Canadian Mathematical Society in collaboration with the Centre for Education in Mathematics and Computing
Gold Medals (Ontario East Division)

Fermat Contest organised by the Centre for Education in Mathematics and Computing
Gold Medallist

Ontario Association of Physics Teachers Grade 11 Contest
2nd place

International Kangaroo Contest

Gold Medals for top in Ottawa

3rd in Canada Grade 12

1st in Canada Grade 10

4th in Canada Grade 9