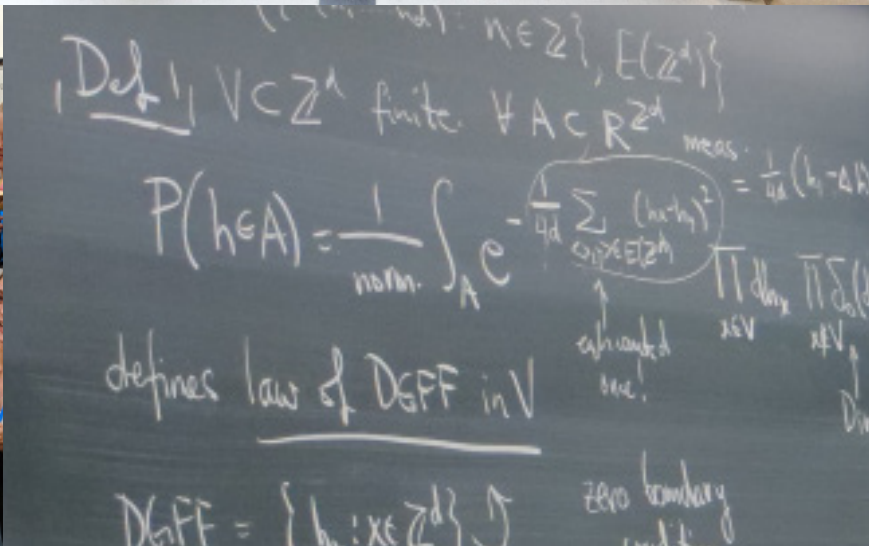


2020 PIMS Diversity In Mathematics: High School Summer Math Camp



Week 2: August 10 - 14, 2020
ONLINE PROGRAM



Photo: Sgt Johanie Maheu, Rideau Hall

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THE GOVERNOR GENERAL • LA GOUVERNEURE GÉNÉRALE

Message from the Governor General on the occasion of the third edition of the Diversity in Mathematics program

Math is the language of science, technology and engineering. And in math, there is a place for everyone—all genders, races, identities and orientations. *Every voice*. After all, inclusivity in math, and in all STEM fields, brings diversity in knowledge—differing points of view that shape the direction and velocity of innovation.

Whether you are in high school or university, you all share an interest in math and a curiosity to see where it can take you. The possibilities are endless and the sky is not the limit. The Diversity in Mathematics program is a chance to discover the types of careers you could have and find like-minded people who can inspire you to pursue your dreams.

And when the program is over, remember that each of you has something to bring to this unique world we share. Your wit, your passion and your contributions are needed in every field.

Thank you to the University of British Columbia, Simon Fraser University and the Pacific Institute for the Mathematical Sciences for offering such a challenging opportunity to young, inquisitive minds!

I wish all of you a productive and informative program.

$$e^{i\pi} + 1 = 0$$



THE GOVERNOR GENERAL · LA GOUVERNEURE GÉNÉRALE

Message de la gouverneure générale à l'occasion de la troisième édition du programme Diversité en mathématiques


Les mathématiques sont la langue des sciences, de la technologie et de l'ingénierie. Et en mathématiques, chaque personne fait partie de l'équation : peu importe son genre, sa race, son identité et son orientation. *Chaque perspective compte!* Après tout, l'inclusion dans les mathématiques, et dans tous les domaines des STIM, favorise la diversité des connaissances et des points de vue et permet d'influencer l'orientation et la vitesse de l'innovation.

Que vous soyez au secondaire ou à l'université, vous avez tous un intérêt pour les mathématiques et une envie de découvrir où elles peuvent vous mener. Sachez que les possibilités sont infinies, qu'il n'y a aucune limite. Le programme Diversité en mathématiques vous permettra de découvrir les différentes carrières qui s'offrent à vous et de côtoyer des personnes aux vues similaires qui pourraient vous inspirer à poursuivre vos rêves.

Et une fois le programme terminé, n'oubliez pas que vous avez une contribution à apporter à ce monde unique qui est le nôtre. Votre vivacité d'esprit, votre passion et vos compétences seront les variables d'une formule gagnante dans tous les domaines.

Merci à l'Université de la Colombie-Britannique, à l'Université Simon Fraser et au Pacific Institute for the Mathematical Sciences de proposer une expérience aussi stimulante aux jeunes esprits avides de connaissances!

Je vous souhaite un programme formateur et enrichissant.



$e^{i\pi} + 1 = 0$

Week Two:

Q: Where do I check in on the first day?

Online, though the zoom link on page 6.

Q: Will the program change?

Program changes and updates will be announced at each session.

Q: Should my video always be off?

No, please have your video on so that your colleagues and the instructors can see you. If you need to step away for a few minutes, you can turn it off, but let your colleagues know through the chat.

Q: Where can I go for help during the sessions?

If you need assistance or have a question during the summer school, please connect with the High School Coordinator

Q: What is the joint High School Session about?

In these sessions, undergraduates are paired up with students from the DIM High School Summer camp, and will work on various STEM issues together

Course #1: Communicating in Secret: The mathematics of Cryptography

Course Instructor: Jamie Mulholland

Course Description:

Cryptography is the method of encoding a message so that if the message falls into the wrong hands then they will not be able to read it. Only the intended recipient will have the ability to reconstruct the original message. In our digital world it is no surprise that cryptography plays a vital role: for example, people wouldn't want their credit card number transmitted across the internet unsecured? In this mini-course we'll play around with some of the basic cryptographic schemes, and get some experience encoding and decoding messages. We'll also take on the role of a spy and use a computer to help us crack an encoded message. The cryptographic methods we'll be using are based on mathematics so we will also cover the required background knowledge in number theory: integers, prime numbers, and modular arithmetic.

Program Overview: Week Two

Time	MON 10	TUE 11	WED 12	THUR 13	FRI 14
8:30am - 8:50am	Week 2 Check In				
9:00am - 10:00am	Lecture by Jamie Muholland	Lecture by Jamie Muholland	Lecture by Jamie Muholland	Lecture by Jamie Muholland	<u>Academic Journey Talk</u> Sophie Macdonald Shawna Narayan
10:00am - 10:30am	Break				
10:30am - 12:00pm	Lecture by Jamie Muholland	High School Math Camps Joint Session 3 Seckin Demirbas	Lecture by Jamie Muholland	High School Math Camp: Joint Session 4 Kseniya Garaschuk	Lecture by Jamie Muholland
12:00pm - 1:00pm	Lunch				
1:00pm - 2:00pm	Problem Session #1	Problem Session #2	Problem Session #3	Problem Session #4	END
2:00pm - 3:00pm	SFU Undergraduate Admissions Presentation Angel Kwan	UBC Undergraduate Admissions Presentation Sashah Raheemtulla	<u>Career Talk</u> Laura G Funderburk	<u>OPTIONAL: Women in Industry</u> <u>Talk</u> with Undergraduate Section	

Zoom Links:

- **Daily Zoom link:** Zoom links have been shared with confirmed participants only.
- **Optional Women in Industry Panel Thur Aug 13@ 2:00pm:** This link will be shared on Thursday Afternoon.

Week 2: High School Participants

1. Promise Ajayi, Holy Trinity School, Fort McMurray
2. Giselle Del Valle, Picture Butte High school
3. Lyra Fletcher, North Island Secondary School
4. Heidi Hansch, Santa Catalina School
5. Hannah Herman, PMSS
6. Jordan Kurtzweg, Foremost School
7. Kristina Law, Gleneagle Secondary Student
8. Nathaniel Leonard, Esquimalt High School
9. Jordan Li, Pinetree Secondary
10. John Li, Holy Cross Regional High School
11. Genevieve Lyder, Louis St Laurent
12. Paula Mali, Elgin Park Secondary School
13. Sarah Mushumanski, Nechako Valley Secondary School
14. Shahan Nedadahandeh, Pinetree Secondary
15. Oliver Ridge, Rossland Summit School
16. Eknor Toor, Ecole Panorama Ridge
17. Teresa Tran, Spectrum Community School
18. Portia Wainwright, Merritt Secondary School
19. Shenzhaozhu Xu, Pinetree Secondary
20. Vincent Yee, High School Student
21. Olivia Zaccagnini, Queen Elizabeth High School

2020 Organizers

1. Pacific Institute for the Mathematical Sciences
2. Malgorzata Dubiel, SFU
3. Veselin Jungic, SFU
4. Malabika Pramanik (Committee Chair), UBC
5. Annie Li, UBC

Instructor and Speaker Biographies (Alphabetical)

Brenda Davidson, SFU

Brenda Davison is a senior lecturer in the department of mathematics at Simon Fraser University teaching calculus, linear algebra, ordinary differential equations and numerical analysis. Prior to joining SFU, Brenda worked for 12 years as an electrical engineer and she is currently a PhD candidate in mathematics. Her primary scholarly interests are in the history of mathematics as well as mathematical pedagogy.

Seckin Demirbas, UBC

Seckin Demirbas is an Instructor at University of British Columbia, Math Department. He received his Ph.D. from the University of Illinois at Urbana-Champaign under Burak Erdoğan and Nikolaos Tzirakis. After that, he worked as a research instructor at Northeastern University for a year before he started his current position at UBC. Seckin's research interests are in partial differential equations, mostly dispersive equations. He received his BS in Mathematics from the Bogazici University, in 2007, and his MS in Mathematics from the same university in 2010 under Alp Eden.

Laura Gutierrez-Funderburk: Callysto Instructor

Laura Gutierrez-Funderburk is a data scientist for the Callysto project, a federally-funded initiative in Canada helping students and teachers learn data science skills (coding, data analysis, and data visualization). Laura has developed numerous data science teaching resources for students and teachers alike. She is experienced in research, conference organization, and facilitating data science learning experiences which celebrate diversity and are tailored to a variety of skill levels. Laura holds a Bachelor of Mathematics from Simon Fraser University (SFU). Her alma mater recognized her work in creating enriching learning experiences by awarding her the Terry Fox Gold medal. Laura enjoys sharing her enthusiasm for coding and problem solving, and hopes this will inspire students to explore mathematics and data science.

Kseniya Garaschuk, University of the Fraser Valley

Kseniya Garaschuk is originally from Belarus. She received her PhD in Combinatorics from the University of Victoria in 2014 and her Master's degree from Simon Fraser University, both in British Columbia, Canada. Kseniya then pursued a Post Doctoral Fellowship with Carl Weiman Science Teaching and Learning Initiative with focus in mathematics education at the University of British Columbia. She is currently an Assistant Professor at the University of the Fraser Valley, Canada. Kseniya is the Editor-in-Chief of Crux Mathematicorum, a problem-solving journal published by the Canadian Mathematical Society.

Angel Kwan - SFU Student Recruitment Coordinator

Angel Kwan is from the Student Recruitment and Admissions team at Simon Fraser University. She has been involved in the post-secondary education sector for 10+ years and has worked in universities in Canada and in Hong Kong. As a Student Recruitment Coordinator, She is the first point of contact for prospective students interested in undergraduate studies at SFU. She works closely with international students and often gives talks overseas -- but she welcomes questions from anyone and would be happy to support you through the application process! In her spare time, she enjoys travelling, art, and photography.

Sophie MacDonald - UBC PhD Student in Mathematics

Sophie MacDonald is a PhD student in mathematics at UBC. Her research involves ideas from statistical physics, computer science, geometry, and number theory. She has been a teaching assistant for various mathematics and data science courses, and leads interdisciplinary teaching workshops for other graduate students and postdocs. During her time at UBC, she has come out as a transgender woman and been diagnosed

with ADHD, which has motivated her to become involved in access and representation initiatives in the academic community. In her spare time, Sophie likes to read, exercise, cook, and try to remember where she put her face mask.

Jamie Mulholland- Instructor of SFU

Jamie Mulholland is a senior lecturer in the Department of Mathematics, at Simon Fraser University. He has been a member of the department since the summer of 2006. Jamie's background is in pure mathematics; in particular abstract algebra, algebraic topology, combinatorial group theory, and number theory. He is also very interested in mathematics education and promoting mathematics to students at all age levels: elementary school through college/university. For Jamie, mathematics is a very beautiful subject, and highlights some of the greatest achievements in human thought, unfortunately not everyone hangs on long enough to reach the stage where they get to encounter this beauty. Jamie notes that some of the nicest mathematics will not be seen until a student reaches their first, second or even third year university level mathematics course. This is not to say that a high level of sophistication is required to understand or appreciate the ideas, in fact, quite the opposite is true. Some of the ideas can be presented to students as early as elementary school. Boosting a community appreciation towards mathematics is something that interests him a great deal. Jamie is always happy to meet with students who wish to talk about mathematics at any level, so please feel free to connect with him at the camp.

Shawna Narayan- Director of Empower

Shawna Narayan is the Founder and Executive Director of Empower The Future, a non-profit that aims to support inner-city students with the transition from high school to post-secondary life through mentorship and workshops. As a UBC Experimental Medicine Graduate Student, she leads the CREDA Study which explores the experience visible minorities have with online mental health resources and treatments. On top of her academics and volunteerism, she currently works with the BC Centre on Substance Use. She is a UBC Physics Alumna and the recipient of the Medal of Good Citizenship from the Government of British Columbia.

Sashah Rahemtulla - UBC Student Recruiter-Advisor

Sashah Rahemtulla is a Student Recruiter-Advisor for the University of British Columbia. Her job involves visiting schools and university fairs sharing information all about UBC. Sashah also provides advising for students who are applying to UBC, offering support with the application process. She is looking forward to sharing information about UBC Admissions with all of you.