MACAS 2019

Mathematics and its connections to the arts and sciences

Program

Faculty of Education
McGill University
Montreal, Quebec, Canada

June 18 – 21, 2019

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University of Southern Denmark
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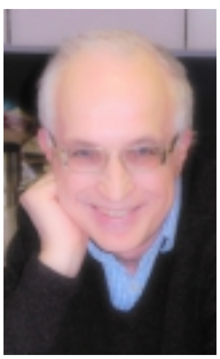
Dr. Astrid Beckmann
University of Education Schwäbisch Gmünd
Germany



Dr. Viktor Freiman
Université de Moncton
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Uffe Thomas Jankvist
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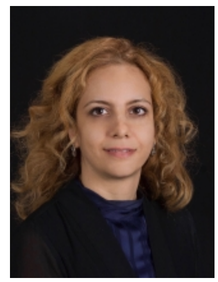
Dr. Annie Savard (Chair)
Associate Professor

Alexandre Cavalcante
Ph. D. Candidate



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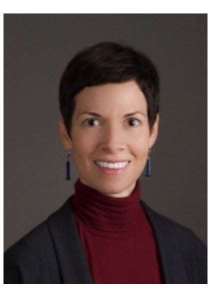

Rebecca Pearce
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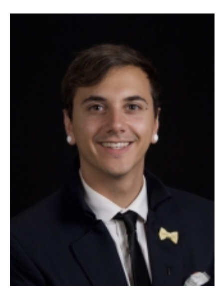

Louis-Philippe Turineck
M. A. Student

Message from the International Program Committee (IPC)

The symposium series MACAS (Mathematics and its Connections to the Arts and Sciences) was founded in 2005 by an international group of researchers and held for the first time at the University of Education Schwäbsich Gmünd, Germany. Subsequent MACAS-meetings were held in Odense, Denmark (2007), and in Moncton, Canada (2009). For its 10th anniversary in 2015 MACAS turned back to Schwäbisch Gmünd and in 2017 it returned to Denmark, this time Copenhagen.

The vision which the MACAS-initiative is based upon is to develop a humanistic approach to education that combines various disciplines in a single curriculum – an approach first suggested by renaissance philosophers. According to this philosophical notion, the aim is to educate students by enabling them to pursue diverse fields of research while at the same time exploring the aesthetic and scientific connections between the arts and science. In view of the challenges of the 21st century, a modern approach to education with a focus on multi- and interdisciplinarity is more important than ever. The field of mathematics assumes a key role in this approach as it is connected to all other disciplines and can serve as a bridge between them. This is the approach of MACAS – Mathematics and its Connections to the Arts and Sciences.

MACAS brings together educators and researchers focused on or connected to these fields of study: both those well-established at the forefront of international research and practice and emerging young talents. The conference will provide a breeding ground for scientific exchange, new partnerships and reflection on commonalities and differences between different viewpoints and approaches.

Welcome to MACAS-2019! The international organization team wishes you a great conference, new insights and inspiring exchanges.

Members of the IPC

Message from the Local Organizing committee (LOC)

Dear MACAS community,

It is a great pleasure to welcome you here in Montréal at McGill University for the 6th edition of the MACAS symposium. We are thrilled by the variety and the richness of the proposals received. We hope that you will enjoy the program and your stay in our vibrant city!

Annie and the local committee

Getting to the Venue

All activities of the 2019 MACAS Symposium will be held at the Faculty of Education, McGill University (3700 Rue McTavish) and Thomson House (3650 Rue McTavish). The following map represents part of the McGill Downtown Campus showing the location of the events. For a more detailed version of the map, please consult the following link: https://www.mcgill.ca/campusplanning/files/campusplanning/2014_jul_3_downtownenglish.pdf

Please be aware that getting to the buildings involves **walking up a hill**.

Getting to the Venue from the Airport

Montreal is home to Pierre-Elliott Trudeau International Airport, one of the busiest airports in Canada.

You can get to the venue using the following options:

- **taxi**: rates to downtown Montreal are fixed at $40; [1] or
- **bus**: the 747 Express Bus costs $10 and stops at the Lionel-Groulx (first stop) and Berri-UQAM Metro stations downtown with a few stops in between. Tickets can be bought from vending machines inside the airport or on the bus (exact change only, no bills). The ride to downtown Montreal takes approximately 45 minutes and buses operate 24 hours a day, 7 days a week**. Please note that the $10 ticket is also a 1-day bus pass**. You might want to keep your ticket if you plan on taking a city bus or Metro whenever during the following 24 hours.

Getting to the Venue by Car

Please note that **you cannot make a right turn on a red light when driving on the island of Montreal.**

If you decide to rent a car at the airport, here are the directions for getting to the Faculty of Education:

1. In 30 m, keep left onto boulevard Roméo-Vachan N towards Arrivées and ValeParc.
2. In 1.3 km, keep left to merge onto QC-420 E.
3. In 300 m keep left to merge onto QC-20 E towards Montreal and Centre-Ville.
4. In 11 km, continue onto Autoroute Ville-Marie towards Montreal Centre-Ville.
5. In 3.4 km, exit 3 towards Montreal and Centre-Ville.
6. In 800 m, continue onto Rue.
7. In 600 m, turn right onto rue Sherbrooke O.
8. In 450 m, turn left onto Rue Redpath.
9. In 350 m, turn right onto Avenue du Doctor-Penfield.
10. In 600 m, turn left onto Rue McTavish.
11. The trip is about 26 minutes.

The following table contains routes, distances and time estimations departing from the major cities near Montreal.

Major City	Details
From Sherbrooke	• West on Autoroute 10. • The trip is about 150 km, or 1 hour and 40 minutes.
From Ottawa	• East on TransCanada Highway 417, and east on Autoroute Transcanadienne 40. • The trip is about 200 km, or about 2 hours.
From Toronto	• East on Highway 401. • The trip is about 540 km, or about 5. Hours and 30 minutes.
From Québec City	• West on autoroute Transcanadienne 40. • The trip is about 250 km or about 2 hours and 45 minutes.

[1] All money amounts in this document are in Canadian dollars.

Parking at the Venue

For on-campus parking, here are the four options closest to the buildings where the conference will be held. For more information on parking zones on the campus, and to get a map of the campus, please visit the following link https://www.mcgill.ca/transport/parking/downtown/visitors

Education Garage (Underground parking garage at the Faculty of Education):

- Monday to Friday: $3.50 per 30 minutes to a maximum of $19.00 between 7:00 and 22:30; $3.50 per 30 minutes to a maximum of $10.00 for entry after 17:00 until 22:00. It closes at 22:30 on Fridays.
- Closed Saturday and Sunday.
- Accessible with an elevator.

McIntyre Garage:

- Monday to Friday: $3.50 per 30 minutes to a maximum of $19.00 between 6:00 and midnight; $3.50 per 30 minutes to a maximum of $10.00 for entry after 17:00 until midnight; $3.50 per 30 minutes to a maximum of $10.00 for the overnight period between midnight and 6:00.
- Saturday and Sunday: $3.50 per 30 minutes to a maximum of $10.00 between 6:00 and midnight.
- This is a 7-floor garage, without an elevator.

Drummond lot:

- Monday to Friday: $3.50 per 30 minutes to a maximum of $19.00 between 6:00 and midnight; $3.50 per 30 minutes to a maximum of $10.00 for entry after 17:00 until midnight.
- Saturday and Sunday: $3.50 per 30 minutes to a maximum of $10.00 between 6:00 and midnight.
- This is an outdoor parking lot and usually fills up quickly, but a good option on weekends.

Transit in Montreal: Metro

Along with the city bus system, Montreal is also equipped with an underground Metro station. Tickets can be purchased in 1 trip, 2 trips, 10 trips, unlimited evening (6 pm to 5:00), unlimited weekend (Friday 16:00 to Monday 5:00), 1 day, 3 days, or weekly pass (Monday to Sunday) formats. For more information, you can visit the Société du transport de Montréal (STM) website at http://www.stm.info/en/info/fares. 1 trip tickets can be purchased aboard a bus with **exact change only**. All other formats must be purchased inside a Metro station. **All passes are valid for both the metro and buses**.

The closest Metro Station to the conference is Peel on the Green Line. Entrances Metro stations are indicated by this sign:

For more information about Bus and Metro maps, please consult the following website: http://www.stm.info/en/info/networks/maps.

Regarding the MACAS Symposium

The 2019 MACAS Symposium will begin at 15:00 on Tuesday, June 18, 2019, and will end on Friday, June 21 at approximately 13:00. All scientific activities related to the conference will be held at the Faculty of Education, McGill University.

Conference Schedule

The following is the 2019 MACAS Symposium schedule. Registration will begin at 12:30 in the Faculty of Education Lobby on the first floor (at the entrance). The registration desk will be open from 12:30 to 15:00 on Tuesday, June 18, from 9:00 to 9:30 on Wednesday, June 19. If you have any questions during the conference, you may present yourself at the registration desk or address yourself to one of the members of the Local Organizing Committee.

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<tr><th></th><th>Tuesday
June 18</th><th>Wednesday
June 19</th><th>Thursday
June 20</th><th>Friday
June 21</th></tr>
<tr><td>09:00 - 09:30</td><td rowspan="7"></td><td></td><td></td><td></td></tr>
<tr><td>09:30 - 10:00</td><td rowspan="2">Keynote:
Cecile de Hosson</td><td rowspan="2">Presentations
Session 5</td><td rowspan="2">Presentations
Session 8</td></tr>
<tr><td>10:00 - 10:30</td></tr>
<tr><td>10:30 - 11:00</td><td>Coffee Break</td><td>Coffee Break</td><td>Coffee Break</td></tr>
<tr><td>11:00 - 11:30</td><td rowspan="3">Presentations
Session 2</td><td rowspan="3">Presentations
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Michelle Wilkerson</td></tr>
<tr><td>11:30 - 12:00</td></tr>
<tr><td>12:00 - 12:30</td><td rowspan="2">Closing Remarks and
Farewell</td></tr>
<tr><td>12:30 - 13:00</td><td rowspan="5">Registration</td><td rowspan="3">Lunch</td><td rowspan="3">Lunch</td></tr>
<tr><td>13:00 - 13:30</td><td rowspan="11"></td></tr>
<tr><td>13:30 - 14:00</td></tr>
<tr><td>14:00 - 14:30</td><td rowspan="3">Presentations
Session 3</td><td rowspan="3">Presentations
Session 7</td></tr>
<tr><td>14:30 - 15:00</td></tr>
<tr><td>15:00 - 15:30</td><td>Opening</td></tr>
<tr><td>15:30 - 16:00</td><td rowspan="2">Keynote:
Richard
Barwell</td><td>Coffee Break</td><td rowspan="6">Excursion</td></tr>
<tr><td>16:00 - 16:30</td><td rowspan="2">Presentations
Session 4</td></tr>
<tr><td>16:30 - 17:00</td><td rowspan="3">Presentations
Session 1</td></tr>
<tr><td>17:00 - 17:30</td><td rowspan="3"></td></tr>
<tr><td>17:30 - 18:00</td></tr>
<tr><td>18:00 - 20:00</td><td>Cocktail</td></tr>
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Keynote Speakers

Keynote presentations will be held in room 129 (first floor) of the Faculty of Education. Keynote presentations will be 45 minutes long followed by a 12-minute question or discussion period.

Keynote 1: Dr. Richard Barwell, University of Ottawa
Tuesday, June 18, from 15:30 to 16:30

In Dialogue with Planet Earth: Thoughts on a Mathematics Education for a Sustainable Future

Over the past 50 years, there has been a growing concern for sustainability, illustrated most notably by the United Nations Sustainable Development Goals. Mathematics plays a central role in thinking about sustainability. Mathematics is used to describe the multiple environmental crises we face, to model future developments, and to communicate this information to scientists, policymakers and the general public. So what mathematics do citizens need to know to engage with questions of sustainability? What should children learn in order to participate in democratic debates about the future of Planet Earth? How can mathematics teaching prepare children for their future? In this talk, I will offer some preliminary thoughts about these questions. My thinking is informed by critical mathematics education, post-normal science and a dialogic epistemology. These ideas lead to a critique of “human exceptionalism” and the need for a relational approach, in which knowing is seen as contingent, situated, discursive and multi-voiced. As a result, the human activity of mathematics is understood as being in relation with the planetary ecosystem.

Keynote 2: Dr. Cécile de Hosson, Université Paris Diderot
Wednesday, June 19, from 9 :30 to 10 :30

When the Student Becomes an Author: Didactic Analysis of Comics’n Science Workshops

The “Comics’n Sciences workshops”, created in 2011 by the Stimuli association (France), aim to enable middle and high school students to become authors of a comic strip involving scientific knowledge. In concrete terms, a professional illustrator, a young researcher (PhD student) and a scientific mediator accompany a dozen teenagers of homogeneous age group in the creation of one-page comic strips dealing with a science topic discovered during the workshop. In this keynote I will present the analysis of the impact of these workshops since some of them (7) have been the target of a research program involving mathematics and natural science education researchers. The instrumental genesis has been chosen as a conceptual framework to characterize the terms of the dialectical interplay between the specific attributes of a comic strip, and the scientific knowledge to be translated. The results show that the students, as authors, followed the specific codes of the comic strip and took a certain distance with the scientific integrity of the staged knowledge. Nevertheless, being involved in the creative process likely allowed them to understand the reasons for some scientific illustration or narrative choices. This approach could encourage the emergence of a critical spirit towards reading scientific stories created in other contexts.

Keynote 3: Dr. Michelle Wilkerson, University of California Berkeley
Friday, June 21, from 11:00 to 12:00

P**utting Artistic and Mathematical Expression into Conversation Through Computing**

As educators, we hope that students will come to see mathematics as a language—something they can use to express the relationships and patterns they care about. My research explores how we can introduce learners to the expressive value of mathematics by connecting mathematical representation to other familiar forms of expression, such as sketching and storytelling, through computing. In this talk, I'll describe projects we have been exploring in the Computational Representations in Education research group that attempt to bridge art and mathematics, with a focus on expressivity. I will focus on one recent project, DataSketch, that allows students to explore patterns and relationships in large datasets by creating their own data-driven digital ink sketches. The project demonstrates a sophisticated interplay between students' *artistic* and *epistemic* activities whereby decisions in one domain motivate or constrain possibilities and discoveries within the other.

Oral Presentation Sessions

All oral presentations will be in parallel sessions in rooms 434 and 436 of the Faculty of Education. A chair in each room will lead the sessions. Please see below the schedule of the presentations with the rooms and chairs.

Each room is equipped with a projector and VGA and HDMI connectors. Please be aware that there are **no desktop computers in the rooms**. You are advised to bring your laptops. We will have laptops as well as various plugins in reserve to meet your needs. If you need a laptop or other equipment for your presentation, please contact Dominic Manuel at dominic.manuel@mcgill.ca **before June 15** to be sure that we can make arrangements for you.

Each presentation will be 20 minutes followed by an 8-minute question or discussion period. There will be a 2-minute transition period between presentations for presenters to get ready. The chair in the room will facilitate time management and will have signs to indicate how many minutes you have left to present (5 minutes left, 2 minutes left, and Stop! Time is up).

Please note that the presentations in the following schedule are identified by the names of authors only. You can view the list of authors and their contact information of the presentations at the end of the program. We provided the information to permit further collaborations.

SESSION 1 – TUESDAY, JUNE 18 (16:30 – 18:00)		
	A – Technology Room 434 Chair: Dominic Manuel	**B - Arts** Room 436 Chair: Rebecca Pearce
16:30 – 17:00	Astrid Beckmann *Best Practice for Learning the Concept of Function in the Digital Era: Real-world Experiments, Virtual Environments, Apps or Smart Speakers?*	Line Rønn Shakoor, Lars Emmerick Damaard Knudsen, Uffe Thomas Jankvist *Sewing a Skirt: A Design for an Interdisciplinary Material Activity in Mathematics, Arts and Crafts*
17:00 – 17:30	France Caron *Involving Mathematics in the Use of Models and Simulation for Understanding Climate Change*	Gloriana González *Visual Art Contexts in High School Geometry Textbooks in the United States*
17:30 – 18:00	Michael Deutsch, Annie Savard *Talk to Learn Math, Talk to Learn Coding*	Zoltán Kovács, Barbara Lichtenegger, Tomás Recio, Philippe R. Richard, M. Pilar vélez *Exploring Artwork Through Delaunay Triangulations*

SESSION 2 – WEDNESDAY, JUNE 19 (11:00 – 12:30)		
	C - Tools for Mathematics Room 434 Chair: Dominic Manuel	**D – Citizenship** Room 436 Chair: Azadeh Javaherpour
11:00 - 11:30	Takam Djambong, Viktor Freiman *Middle-school Students Promoting Closer Integration of STEM Disciplines using Virtual Simulators in Scientific Investigations*	Rebecca Pearce *The Surprising Link Between Prematurity and Mathematics: A Review and Reconceptualization*
11:30 - 12:00	Viktor Freiman *3D Modeling and Printing to Support Students' STEM Explorations in School Makerspaces: Lessons from one Case Study from New Brunswick, Canada*	Yasmine Abtahi, Lisa Steffensen, Kjellrun Hiis Hauge *Teaching Issues of Climate Change in Mathematics Classrooms to Promote Critical Citizenship*
12:00 - 12:30	Eduardo Sarquis Soares, Alexandre Cavalcante *Exploring the Potential of a Manipulative: The Weighing Scale, Torque and Mathematical Ideas*	Priscilla Bengo *Equity, diversity and inclusion in STEM: An Analysis and Meta-synthesis of the Research*

SESSION 3 – WEDNESDAY, JUNE 19 (14:00 – 15:30)		
	E - Financial Education Room 434 Chair: Annie Savard	**F – Music** Room 436 Chair: Rebecca Pearce
14:00 - 14:30	Philippe Turineck *Financial Literacy Task Design: A Middle School Mathematics Approach*	Dana L. Collins, Héctor Jiménez, Portnoy *Music: Art, Physics and Mathematics - A Practical Example of Interdisciplinary Teaching and Learning*
14:30 - 15:00	Alexandre Cavalcante, Annie Savard, Azadeh Javahepour *The Importance of Financial Literacy in a Statistics class: The Case of Outliers*	Hans Peter Nutzinger *Domain-general Cognitive Structuring Systems – An Interdisciplinary Approach Between Modelling Processes in Music and Mathematics*
15:00 - 15:30	Azadeh Javaherpour, Annie Savard, Alexandre Cavalcante *Towards Professional Learning Community: Professional Collaboration Between Mathematics and Social*	Stajka Rajić, Vesna Todorčević *Mathematics and Music in Children's Development*

	Sciences Teachers who Teach Financial Education	

SESSION 4 – WEDNESDAY, JUNE 19 (16:00 – 17:00)		
	G – Information, Science & Mathematics Room 434 Chair: Dominic Manuel	**H - Mathematics 1** Room 436 Chair: Azadeh Javahepour
16:00 - 16:30	Shuzhu Gao, Huan Yu, Lin Feng, Xikai Hu, Qian Zheng *Chinese Historical Perspectives on Chicken with Rabbit Cage Problem*	Dennis Lee Jarvis B. Ybañez *Mathematical Abstraction Towards Visualization: Designing an Instructional Material Towards Visual Thinking in Solving Probabilities*
16:30 - 17:00	Heather McPherson *Information Literacy for STEM High School Students: An Action Research Study*	Hans Walser *Semi Cubes*

SESSION 5 – THURSDAY, JUNE 20 (9:30 – 10:30)		
	I – Science Room 434 Chair: Dominic Manuel	**J - STEAM 1** Room 436 Chair: Rebecca Pearce
9:30 - 10:00	Janelle P. McFeetors, Mijung Kim *Problematizing Integration of Math and Science Learning: Using Reasoning as a Cognitive Process for Authentic Intersection*	Karen François, Kathleen Coessens, Jean Paul Van Bendegem *Beyond the Two Cultures: STEM and STEAM Research*
10:00 - 10:30	Anila Asghar, Ying-Syuan Huang, Kenneth Elliott, Annie Savard *Diagnostic Assessment Tools to Elicit Students' Reasoning about Conservation of Mass*	David K. Pugalee *STEM to STEAM: Considering Possibilities and Barriers for Mathematics Education*

SESSION 6 – THURSDAY, JUNE 20 (11:00 – 12:30)		
	K – Davydov Room 434 Chair: Annie Savard	**L - Inquiry Based Learning** Room 436 Chair: Rebecca Pearce
11:00 - 11:30	Azadeh Javaherpour, Elena Polotskaia, Annie Ssvard *How Exploring the Physical World Might Support Young Children's Algebraic Reasoning?*	Dominic Manuel *Foundations of Using Inquiry-based Learning in an Interdisciplinarity Context: What does Research Say?*
11:30 - 12:00	Elena Polotskaia, Annie Savard, Catherine Nadon *Mathematical Problem Solving and the Art of Representation*	Xavier Robichaud, Viktor Freiman *Fostering Creativity in an Inquiry-based Interdisciplinary Environment by Connecting Mathematics, Music, and Technology*
12:00 - 12:30	Elena Vysotskaya, Iya Rekhtman, Anastasia Lobanova, Mariya Yanishkaya *Context Limits and Benefits: The Case of Proportions*	Ton Ming Focusing on Teaching Formula to Use or Teach How to create Formula?

SESSION 7 – THURSDAY, JUNE 20 (14:00 – 15:30)		
	M - Challenges of STEAM Room 434 Chair: Azadeh Javahepour	**N - Mathematics 2** Room 436 Chair: Dominic Manuel
13:30 - 14:00	Steven K. Khan *After the S.H.A.M.E. of Man Towards an Autopoiesis of the Human: Make kin Places of Loving Dindness in Elementary Mathematics Teacher Education for Flourishing in the Anthropocene through a Genre of Maroon Mythopoetics*	Nargess Hashemi *Omar Khayyam: The Poet Mathematician Problem Solver*
14:00 - 14:30	Eva Knoll, Wendy Landry, Tara Taylor, Paul Carreiro, Katie Puxley *Integrated Teaching: Bridging the Gap?*	Thu-Huong Vu-Nhu, Nga Nguyen-Thi *Mathematical Modelling and Interdisciplinary Teaching in Vietnam: Reality, Opportunities and Challenges*
14:30 - 15:00	Stéphanie Lafortune, Sara Iatauro *Overcoming the Barriers for Implementation of a STEAM Initiative*	Annie Savard, Alexandre Cavalcante, Azadeh Javaherpour, Louis-Philippe Turineck *Practices and Needs of Teachers in Financial Education: A Study with*

		Secondary Mathematics Teachers from Québec, Canada

SESSION 8 – FRIDAY, JUNE 21 (9:30 – 10:30)		
	O – Games Room 434 Chair: Azadeh Javaherpour	**P - Mathematics 3** Room 436 Chair: Rebecca Pearce
9:30 - 10:00	Lester C. Hao, Joshua Adrian P. Paboroquez, John Philip F. Ty *Gamification, Engagement and Motivation in Mathematics Through Learner-initiated: Activities Using an Online Quiz Bee Application*	Maria-Josée Bran Lopez *Teaching Practices and the Learning of Cégep Calculus*
10:00 - 10:30	Marc Higgins, Janelle P. McFeetors *Pedagogically Pivoting Through Serious Play: Board Games as Aesthetic Relationality Within Math and Science*	Maria Kirstine Østergaard, Anna Karlskov Skyggebjerg, Uffe Thomas Jankvist *Mr. Frog Challenged by Fermat's Last Theorem*

Internet Connection

You may use Eduroam to connect to the network during the conference. If you have technical issues, members at the registration desk will be able to assist you.

Meals

Wednesday's and Thursday's lunches will be at Thomson House in the Ballroom on the second floor. Tuesday evening's cocktail will also be held in the same room.

Coffee breaks on Wednesday, Thursday and Friday will be in room 437 on the fourth floor. We will have refreshments before the excursion in the Faculty of Education lobby during registration on Tuesday.

Other Information

Excursion

Montreal the second-largest metropolitan city in Canada and has various attractions. We are thus not organizing any formal excursions for this conference. Instead, we leave you with some free time to explore Montreal on your own or as a group. We provide you with some of our absolute favourite things to do in Montreal (nos coups de Coeur). In addition, you can grab a list of recommended restaurants at the registration table. The vast majority of the places are accessible either by Metro and/or bus.

For other options for places to visit, you can consult the Montreal tourism booklet provided in your conference bag. For continuously updated information about special activities happening in Montreal, consider downloading the MTL 375 app.

Here are recommended places to visit:

- Montreal Botanical Garden (http://espacepourlavie.ca/en/botanical-garden);
- Musée des Beaux-Arts de Montréal (https://www.mbam.qc.ca/en/) ;
- McCord Museum (http://www.musee-mccord.qc.ca/en/);
- Pointe-à-Callière Museum (https://pacmusee.qc.ca/en/) ;
- Canadian Centre for Architecture (http://www.cca.qc.ca/en/);
- Local Montreal Food Tours (walking food tours) (http://localmontrealtours.com/);
- Parisian Laundry (Montreal art gallery) (http://www.parisianlaundry.com/en);
- Place Ville-Marie 46th Floor 360° Observation Deck & Exhibits (http://ausommetpvm.com/en/observation-deck/);
- Montreal Science Centre (http://www.montrealsciencecentre.com/);
- Mount-Royal Park - within easy walking distance from McGill. The "interactive map" is especially useful (http://www.lemontroyal.qc.ca/en/learn-about-mount-royal/homepage.sn);
- Old Montreal/Old Port (http://www.vieux.montreal.qc.ca/eng/accueila.htm);
- Free Old Montreal walking tours and local food tours (http://www.freemontrealtours.com/).

Please note that the 2019 MACAS Symposium falls during the week prior to the province of Quebec's national holiday: la St-Jean. There will be plenty of activities all over Montreal during the weekend. You can extend your stay in Montreal and experience Quebec's culture.

Accommodations

We are happy to suggest the following McGill Residence as well as Hotel accommodations. Please note that all guest room rates are subject to GST and PST rates in effect at the time of the event. Presently, such taxes are 5% GST, 9,975% PST and 3.5% lodging tax. Please note that the prices indicated below may increase as availability decreases.

McGill Residences

Please see below information for all residences as well as pricing.

The Royal Victoria College - 3425 University Street
(please refer to: ttp://www.mcgill.ca/accommodations/summer/rvc);

Offers traditional residence accommodations. Each room is equipped with a small fridge, access to shared bathrooms (multiple private toilets and shower stalls) and common kitchen. All rooms are supplied with fresh linen, towels and soap. Air conditioning not available, fans can be rented ($). In the study room on the main floor we provide computers, as well in-room free WI-FI available.

- Rooms rates are $45-$140/night + taxes.
- Limited on-site parking is from $20/day.
- Breakfast is **not** available.

New Residence Hall - 3625 Parc Avenue (please refer to: http://www.mcgill.ca/accommodations/summer/nrh);

Offers hotel type accommodations. Each room is equipped with a private bathroom, Air conditioning, cable television, standard amenities, free-local calls and WI-FI; plus, daily housekeeping and a Business Center as a complementary service.

- Rooms rate taxes $130-$270/night+ taxes.
- Underground parking (one in & out access) is $25/day.
  Extra Services.
- Complimentary full buffet breakfast is included in the room mate.
- Laundry room is available 24/7 ($).
- Business Centre is a complementary service.
- Underground shopping centre.
- Gym (with an outdoor pool) located in the shopping centre at a reduced rate.
- ❖ For further information contact Rachel Savard at 1-514-398-6396 or rachel.savard@mcgill.ca

La Citadelle - 410 Sherbrooke West Street
(please refer to: ttp://www.mcgill.ca/accommodations/summer/lc);

It is the newest hotel-type accommodation. Each room is equipped with a private bathroom, Air conditioning, cable television, free local calls and WI-FI; plus, daily housekeeping and both Fitness and Business Center available free of charge.

- Rooms rates $140-$400/night + taxes
- Off-site parking is $25/day.

For Reservations

To book your accommodation, please contact the McGill University-Accommodations and Conference Services reservations department directly:
Phone: 514-398-5200
Fax: 514-398-4521
E-mail: reserve.residences@mcgill.ca
*Refer to group name: MACAS

Please provide the following information:

- Name of the Residence of your choice (*Royal Victoria College/New Residence Hall/Carrefour Sherbrooke/La Citadelle*);
- Name;
- Name of group:
- Address and Phone number;
- Arrival & Departure date (check in is at 15:00 and check out is at 11:00);
- Type and number of Rooms requested & Number of guests;
- Type of booking group or individual?

Hotels near McGill University

The list of hotels below are registered hotels in the McGill Official Hotels Program. To access the discounted rates listed below please make your booking over the telephone and mention McGill University.

Hotel Omni Mont-Royal
1050 rue Sherbrooke St. West, Montreal, QC H3A 2R6
Tel.: 1-514-284-1110
https://www.omnihotels.com/montreal

- McGill promotion only available if booking over the telephone.
- Rooms rates $350- $450/night + taxes.
- Parking $35/day.
- Wheelchair accessible.

Le Meridien Versailles
1808 Sherbrooke St. West (south side) Montreal, QC H3A 1B4
Tel.: 1-514-933-8111
https://www.marriott.com/montreal

- McGill promotion only available if booking over the telephone.
- Rooms rates: $185-$389/night + applicable taxes
  Parking $27/day.
- Wheelchair accessible.

Sofitel Montreal Golden Mile
1155 Sherbrooke Street West, Montreal, QC H3A 2N3
Tel : 1-514-285-9000
https://sofitel.accorhotels.com

- McGill promotion only available if booking over the telephone.
- Rooms rates: $220-$450/night + applicable taxes.
- For parking and accessibility details please contact the hotel directly.
- Breakfast not included.

Delta Montreal Hotel
475 President Kennedy Avenue, Montreal, Quebec H3A 1J7 Tel.: 1-514-286-1986,
https://www.marriott.com/hotels/travel/yuldb-delta-hotels-montreal/?scid=bb1a189a-fec3-4d19-a255-54ba596febe2

- McGill promotion available when booking over the telephone.
- Rooms rates: $230-$350/night+ applicable taxes.
- Parking $26.50/day.
- Wheelchair accessible except for Spa entrance.

Emergency

In case of emergency during the conference, you can contact McGill Security Service available at 1-514-398-4556; for emergencies call 1-514-398-3000.

2019 MACAS Presentation Contact Information

Please note that given the fact that we did not have access to all the authors and co-authors' emails, only one email is provided as a corresponding email for each presentation.

Session 1 – Tuesday, June 18 (16:30 – 18:00)

A – Technology

Best Practice for Learning the Concept of Function in the Digital Era: Real-World Experiments, Virtual Environments, Apps or Smart Speakers?

Astrid Beckmann
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Involving Mathematics in the Use of Models and Simulation for Understanding Climate Change

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Talk to Learn Math, Talk to Learn Coding

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B - Arts

Sewing a Skirt: A Design for an Interdisciplinary Material Activity in Mathematics, Arts and Crafts

Line Rønn Shakoor
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Lars Emmerik Damaard Knudsen
Aarhus University, Denmark

Uffe Thomas Jankvist
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Visual Art Contexts in High School Geometry Textbooks in the United States

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Exploring Artwork Through Delaunay Triangulations

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Barbara Lichtenegger
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Tomás Recio
Universidad de Cantabria, Spain

Philippe R. Richard
Université de Montréal, Canada

M. Pilar Vélez
Universidad Antonio de Nebrija, Spain

Session 2 – Wednesday, June 19 (11:00 – 12:30)

C – Tools for Mathematics

Middle-school Students Promoting Closer Integration of STEM Disciplines Using Virtual Simulators in Scientific Investigations

Takam Djambong
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Viktor Freiman
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3D Modeling and Printing to Support Students' STEM Explorations in School Makerspaces: Lessons from One Case Study from New Brunswick, Canada

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Exploring the Potential of a Manipulative: The Weighing Scale, Torque and Mathematical Ideas

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D - Citizenship

The Surprising Link Between Prematurity and Mathematics: A Review and Reconceptualization

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Teaching Issues of Climate Change in Mathematics Classrooms to Promote Critical Citizenship

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Equity, Diversity and Inclusion in STEM: An Analysis and Meta-Synthesis of the Research

Priscilla Bengo
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Session 3 – Wednesday, June 19 (14:00 – 15:30)

E – Financial Education

Financial Literacy Task Design: A Middle School Mathematics Approach

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The Importance of Financial Literacy in a Statistics Class: The Case of Outliers

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Towards Professional Learning Community: Professional Collaboration Between Mathematics and Social Sciences Teachers who Teach Financial Education

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F - Music

Music: Art, Physics and Mathematics - A Practical Example of Interdisciplinary Teaching and Learning

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Héctor Jiménez
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Arturo Portnoy
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Domain-general Cognitive Structuring Systems – An Interdisciplinary Approach Between Modelling Processes in Music and Mathematics

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Mathematics and Music in Children's Development

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Vesna Todorčević
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Session 4 – Wednesday, June 19 (16:00 – 17:00)

G – Information, Science and Mathematics

Chinese Historical Perspectives on Chicken with Rabbit Cage Problem

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Information Literacy for STEM High School Students: An Action Research Study

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H – Mathematics 1

Mathematical Abstraction Towards Visualization: Designing an Instructional Material Towards Visual Thinking in Solving Probabilities

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Semi Cubes

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Session 5 – Thursday, June 20 (9:30 – 10:30)

I - Science

Problematizing Integration of Math and Science Learning: Using Reasoning as a Cognitive Process for Authentic Intersection

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Diagnostic Assessment Tools to Elicit Students' Reasoning about Conservation of Mass

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Kenneth Elliott
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Annie Savard
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J – STEM 1

Beyond the Two Cultures: STEM and STEAM Research

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Kathleen Coessens
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Jean Paul Van Bendegem
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STEM to STEAM: Considering Possibilities and Barriers for Mathematics Education

David K. Pugalee
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Session 6 – Thursday, June 20 (11:00 – 12:30)

K - Davydov

How Exploring the Physical World Might Support Young Children's Algebraic Reasoning?

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Elena Polotskaia
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Mathematical Problem Solving and the Art of Representation

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Context Limits and Benefits: The Case of Proportions

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L – Inquiry-based Learning

Foundations of Using Inquiry-based Learning in an Interdisciplinarity Context: What Does Research Say?

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Fostering Creativity in an Inquiry-based Interdisciplinary Environment by Connecting Mathematics, Music, and Technology

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Viktor Freiman
Université de Moncton, Canada

Focusing on Teaching Formula to Use or Teach how to Create Formula?

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Session 7 – Thursday, June 20 (14:00 – 15:30)

M – Challenges of STEM

After the S.H.A.M.E. of Man Towards an Autopoiesis of the Human: Make Kin Places of Loving Kindness in Elementary Mathematics Teacher Education for Flourishing in the Anthropocene through a Genre of Maroon Mythopoetics.

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Integrated Teaching: Bridging the Gap?

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Wendy Landry
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Paul Carreiro
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Overcoming the Barriers for Implementation of a STEAM Initiative

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Sara Iatauro
English Montreal School Board

N – Mathematics 2

Omar Khayyam: The Poet Mathematician Problem Solver

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Mathematical Modelling and Interdisciplinary Teaching in Vietnam: Reality, Opportunities and Challenges

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Practices and Needs of Teachers in Financial Education: A Study with Secondary Mathematics Teachers from Québec, Canada

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Louis-Philippe Turineck
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Session 8 – Friday, June 21 (9:30 – 10:30)

O – Games

Gamification, Engagement and Motivation in Mathematics through Learner-Initiated: Activities using an Online Quiz Bee Application

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Joshua Adrian P. Paboroquez
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John Philip F. Ty
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Pedagogically Pivoting through Serious Play: Board Games as Aesthetic Relationality within Math and Science

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Janelle P. McFeetors
University of Alberta, Canada

P – Mathematics 3

Teaching Practices and the Learning of Cégep Calculus

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Mr. Frog Challenged by Fermat's Last Theorem

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