

LEBANESE MATHEMATICS DAY 2026

Program Booklet

Saturday, July 25, 2026

American University of Beirut

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Program

Time	Activity	Location
8:30-9:00	Check-in and Registration	
9:00-9:30	Reception, Coffee and Refreshments	West Hall
9:30-10:15	Opening Session	Bathish Auditorium
10:30-11:30	Workshops	
	Samer Israwi	Nicely 211
	Joseph Bakarji	Nicely 415
	Re-Mi Hage	West Hall Auditorium B
	Samer Habre	Nicely 212
11:30-11:50	Break	
12:00-13:00	Math Trivia	Bathish Auditorium
	Poster Session	West Hall Common Room
13:00-13:15	Group Picture	Green Oval
13:15-14:30	Lunch Break	
14:30-15:50	Talks	Nicely Hall
	Poster Session	West Hall Common Room
16:00-17:00	Panel Discussion	Bathish Auditorium
	Invited Speaker: Assaf Kfoury	Nicely 415
17:00-17:15	Closing Ceremony	Bathish Auditorium

Career Exploration and Networking Area

The Career Exploration and Networking Area will be open throughout the day in the **West Hall Common Room**.

Workshops

The following four workshops will be offered as part of the Lebanese Mathematics Day 2026 program. All workshops will take place in parallel from **10:30 to 11:30**. Participants are invited to select one workshop to attend.

The Mathematics of Turning a Rope into a Musical Instrument

Joseph Bakarji, American University of Beirut

The Mathematics of Risk: From Probability to Artificial Intelligence

Re-Mi Hage, Notre Dame University-Louaize

Inquiry Oriented Learning - An Eye on Differential Equations

Samer Habre, Lebanese American University

Mathematics in Action: Modeling Waves, Natural Hazards, and Real-World Risk

Samer Israwi, Lebanese University



Joseph Bakarji

American University of Beirut

Time: 10:30-11:30

Location: Nicely 415

Workshop Title

The Mathematics of Turning a Rope into a Musical Instrument

Short Synopsis / Abstract

What are the dynamics of swinging a rope around your body? How does it couple to the dynamics of the human body? How do we measure those dynamics, categorize them, and map them to sound? And how do we make that sound musical? This workshop will take you through the mathematical modeling journey involved in turning a physical interface equipped with sensors into a digital musical interface, combining machine learning, physical modeling, digital signal processing, computational musicology, and sonification.

Short Bio

Joseph Bakarji is an Assistant Professor in the Department of Mechanical Engineering, and the School of Computing and Data Sciences, at the American University of Beirut. He received his PhD at Stanford University in 2020, working on multiscale stochastic models for granular materials. He spent three years as a postdoctoral fellow at the AI institute in Dynamic Systems, at University of Washington, where he worked on sparse identification of nonlinear dynamics and dimensionless group discovery from data with Nathan Kutz and Steven Brunton. His current research spans a range of applications and algorithmic development around AI for scientific discovery, algorithmic music composition, and design of digital musical interfaces.



Samer Habre

Lebanese American University

Time: 10:30-11:30

Location: Nicely 212

Workshop Title

Inquiry Oriented Learning, An Eye on Differential Equations

Short Synopsis / Abstract

It is generally recognized that the teaching of mathematics is done in the traditional lecture mode where students passively watch instructors lecture and they are tasked to solve problems by working mostly individually. This mode of delivery is being revisited because students feel detached from the learning process. A significant number of university mathematics educators are developing more effective and innovative curricula and instructional practices. One such practice is Inquiry Based Learning (IBL) where emphasis is placed on students' reinvention of concepts. IBL is rooted in an instructional design theory which rejects the predominant idea of Math as a ready-made system to be presented and memorized by students. Rather, mathematics is an activity of discovery and an interplay of content and form. This workshop elaborates on, and engages attendees in these instructional theories, with a special focus on the teaching and learning of Differential Equations

Short Bio

Samer Habre is an Associate Professor of Mathematics at the Lebanese American University. His research interests vary between the teaching and learning of tertiary mathematics, particularly active learning techniques, and research on discrete dynamical systems. He has numerous publications and was the editor Of a book entitled Dynamical Mathematical Software and Visualization in the Learning of Mathematics (2013). More recently, he served as a guest editor for three special issues of the CODEE Journal <http://scholarship.claremont.edu/codee/>.



Re-Mi Hage

Notre Dame University-Louaize

Time: 10:30-11:30

Location: West Hall Auditorium B

Workshop Title

The Mathematics of Risk: From Probability to Artificial Intelligence

Short Synopsis / Abstract

The Mathematics of Risk is a 60-minute interactive workshop that shows how uncertainty can be transformed into measurable, explainable, and practical decisions. Starting with probability and expected value, participants are introduced to the actuarial logic used to understand and price risk. Through an Excel exercise, participants will price a single motor-insurance policy across seven connected stages, moving from probability, frequency $\times$ severity, and regression to risk scoring and a simplified risk-transition step inspired by Markov models. The workshop then connects these ideas to modern risk management, data science, machine learning, neural networks, and an AI-based example. Throughout the session, a running example links mathematical theory to real actuarial and risk-management decisions. The session concludes with a key message: models can support decisions, but they cannot replace human judgement, ethics, accountability, and clear communication. Open to participants from all backgrounds, the workshop helps attendees understand how risk can be measured, priced, predicted, explained, and managed responsibly.

Short Bio

Re-Mi Hage is an Associate Professor in the Department of Mathematics and Statistics at Notre Dame University-Louaize, with more than ten years of experience in statistical modelling, actuarial science, predictive analytics, artificial intelligence, and computational statistics. She holds a Ph.D. in Applied Mathematics, a Master's degree in Actuarial Sciences, and a Teaching Diploma in Statistics. Re-Mi Hage serves as academic advisor for undergraduate and graduate programs in Actuarial Sciences. Her research and teaching interests include modelling and predictive analytics, optimization, machine learning, deep learning, and computational statistics, with applications in actuarial science, finance, health, medicine, engineering, and risk management. Her work bridges statistical and probability theory with data-driven modelling and real-world decision-making.



Samer Israwi

Lebanese University

Time: 10:30-11:30

Location: Nicely 211

Workshop Title

Mathematics in Action: Modeling Waves, Natural Hazards, and Real-World Risk

Short Synopsis / Abstract

This interactive workshop presents how mathematics can be used to model, simulate, and understand real-world phenomena, with a focus on wave propagation, coastal dynamics, and natural hazards. Starting from accessible examples, participants will see how a physical situation is translated into variables, assumptions, and equations, and how these equations can then be studied analytically or approximated numerically. The workshop will highlight the role of partial differential equations, numerical methods, and computational thinking in predicting wave behavior and assessing risk. It is designed for students with a general mathematical background and aims to show how applied mathematics and mathematical engineering connect theory, simulation, and decision-making in environmental and engineering contexts.

Short Bio

Samer Israwi is Director of Research at CRAMS, AUL, and Director of LM at the Lebanese University. His work lies at the interface of applied mathematics and mathematical engineering, with research interests in partial differential equations, numerical modeling, wave propagation, and applications to coastal dynamics and natural hazards.

Preliminary 60-Minute Workshop Structure

5 minutes	Opening motivation: why mathematics matters for real-world risk and natural hazards.
10 minutes	Real examples: waves, coastal flooding, tsunamis, and environmental hazards.
15 minutes	From reality to model: variables, assumptions, equations, and interpretation.
15 minutes	From equations to simulations: the role of numerical methods and computation.
10 minutes	Interactive activity: how changing parameters changes the predicted behavior or risk.
5 minutes	Discussion, questions, and closing remarks.

Poster Sessions

The Lebanese Mathematics Day 2026 features a diverse poster exhibition bringing together high school students, undergraduate and graduate students, educators, and professionals. The poster sessions will take place at **12:00-1:00 p.m.** and **2:30-3:30 p.m.** in West Hall Common Room.

Presenter	Institution	Poster Title
Ali Al Karar Al Hoseini	High School	Gödel's Incompleteness Theorem
Alwaled Al-Gburi	High School	Breaking GBM's Hidden Network: Harnessing Math and Physics in Brain Cancer Therapy
Amani Kojok	High School	Eco-Geometry: Exploring School Spaces Together
Anthony Youssef	High School	The Simplest Unsolvable Math Problem: The Collatz Conjecture
Barbara Lafe	Notre Dame University-Louaize	Modeling Aggregate Automobile Insurance Losses Using Monte Carlo Simulation and Panjer Recursion
Charbel Dargham	Lebanese University	What Is a Proof? Logic Puzzles, Circuits, and the Limits of Formal Reasoning
Christelle Georges Ghostine	Holy Spirit University of Kaslik	Detection of Brain Cancer Using Topological Data Analysis and Machine Learning
Fatima Al Zahraa Al Hussaini	High School	Exploring the Sizes of Infinity
Gaëlle Tabet	Lebanese University	How Mathematics Shapes Modern Dentistry: Precision, Imaging, and Treatment Planning
Hadi Mohamad Kassem	High School	Bridges of Entropy: How Tiny Mathematical Corrections Predict Wealth and Words
Hajar Daouk	High School	Infinity: The Number That Never Ends
Laura Al Halabe	High School	From Beehives to Engineering: The Mathematics of Honeycomb Optimization
Lea Sassine	Holy Spirit University of Kaslik	Malignant vs. Benign Skin Cancer Detection Using Machine Learning
Mahabba El Sahili	Oxford University	Applying for Postgraduate Studies
Marwa Itani	High School	The Mandelbrot Set: Exploring Infinity Through Mathematics
Maryam Hani El Issa	High School	The Factorial That Shouldn't Exist

Presenter	Institution	Poster Title
Nadjib Tebbal	American University of Beirut	The Stability of Regression Conclusions Across Subpopulations
Paul Bathish	High School	Many Roads, One Truth: The Hidden Unity of Mathematics
Rayan Ismail	High School	Numbers That Protect You
Reem Rahal	High School	Maths in Drug Treatment
Samah Diya	Lebanese University	Mental Calculation
Sara Rashidi	Lebanese University	A Mathematical Framework for Adaptive Self-Healing Systems
Sarah Haidar	High School	Transformations in Astronomy
Sherley Abdel Nour	High School	Trace the Bullet, Find the Shooter: A Math Detective Story
Wissam Saleh Hamd	High School	From Shor to Group Theory: Unlocking the Algebra Behind Quantum Speed

Talks

The contributed talks will take place in parallel from **2:30 to 3:50 p.m.** in Nicely Hall. The talks within each session will be presented in the order listed below.

Session 1

Nicely 210

Talk	Speaker	Institution	Talk Title
1	Akram El Tabbah	Lebanese University	The Mathematics Inside a Computer
2	Haidar Jomaa	American University of Beirut	From Math to Learning: Demystifying AI
3	Bourhan Dernayka	IBM	The Maths Behind LLMs
4	Roudy Haddad	American University of Beirut	If AI Can Solve It, Why Should You Learn It?

Session 2

Nicely 212

Talk	Speaker	Institution	Talk Title
1	Rindala Fayyad	American University of Beirut	Where the Math Goes: From Theory to Public Health
2	Wissam El Hajj	University of Rennes	Math Meets Medicine: How Equations Help Us Understand Human Diseases
3	Bechara Saade	Charles University	How Can Mathematics Help Rheumatologists Prevent Biologic Drug Failure?
4	Sarah Ismail	Università degli Studi di Bari Aldo Moro	From Equations to Action: A Mathematical Path to Climate Control

Session 3

Nicely 214

Talk	Speaker	Institution	Talk Title
1	Hrair Danageuzian	Notre Dame University-Louaize	Operational Risk Modeling Under the Loss Distribution Approach: Estimation of Operational Risk Capital by Business Line Vs. Risk Category
2	Lea Chbib	Holy Spirit University of Kaslik	Modeling Risk Dependence for Solvency Capital Assessment

3	Nicolas Saliba	Notre Dame University-Louaize	A Regime-Based Hybrid Framework for Claim Severity Modelling: Integrating Actuarial and Machine Learning Approaches
4	Georges Sakr	American University of Beirut	Efficient Gradient Recovery in an Inverse Problem: The Adjoint Gradient Method for the Firn Problem

Session 4

Nicely 318

Talk	Speaker	Institution	Talk Title
1	Batoul Serhal	Lebanese University	From Primes to Privacy
2	Daniel Dia	American University of Beirut	Proofs Are Programs: How Types Let Us Prove Theorems and Secure Software
3	Ali Sobh	American University of Beirut	The Mathematics of Algorithmic Quantum Error Correction

Session 5

Nicely 320

Talk	Speaker	Institution	Talk Title
1	Haidar Hayek	University of Oxford	The CUR Decomposition: Theory and Applications
2	Anis Hammoud	American University of Beirut	Learning Optimal Drifter Release Locations for Surface Current Estimation in the Levantine Mediterranean
3	Lea Safetly	Université Saint Joseph	On the Inverse Problem for the Burgers' Equation with Smooth Initial Data in a Bounded Domain
4	Joud Senan	American University of Beirut	Physics-Informed Neural Modeling of Firn-Air Gas Transport: A MATLAB Framework for Forward Modeling and Real-Data Validation in Polar Firn

Session 6

Nicely 322

Talk	Speaker	Institution	Talk Title
1	Eliane Younes	École des mines de Paris	Mathematical Modeling and AI for Predicting Material Microstructures
2	Joe Germany	American University of Beirut	What Functions Can Be Represented as Compositions of Other Functions?

3	Ali Tayyar	American University of Beirut	Discovering Integration Schemes for PDEs on Unstructured Domains via Reinforcement Learning
4	Jolie Lahoud	Université Saint Joseph	Steady State Micropolar Navier-Stokes System: A Posteriori Error Studies

Session 7

Nicely 324

Talk	Speaker	Institution	Talk Title
1	Ali Jomaa	Lebanese University	On the Stability of the Solitary Waves to the Rotation Benjamin-Ono Equation
2	Rida Harb	Université Côte d'Azur	Oleinik Inequality for Balance Laws
3	Mohammad Khalil Hamdan	American University of Beirut	Long Time Dynamics of the Nernst-Planck-Darcy System on $\mathbb{R}^3$
4	Hiba Bayz	Lebanese University	On the Damped Nonlinear Schrödinger Equation: L^2 Concentration, Blow-Up Dynamics, and Scientific Machine Learning

Session 8

Nicely 321

Talk	Speaker	Institution	Talk Title
1	Yara Sleem	American University of Beirut	The Shortest Path Problem
2	Qamar El Solh	American University of Beirut Mediterraneo	All Roads Lead to One: Connecting the Collatz Conjecture to Automata and Statistics
3	Abbass Aoun	Lebanese American University	Why Transformers Need Positional Encoding: A Mathematical Perspective
4	Mohammad El Asal	Lebanese American University	Polynomial Semirings at the Intersection of Number Theory and Algebra

Session 9

Nicely 323

Talk	Speaker	Institution	Talk Title
1	Dima Ismail	American University of Beirut	The Monge-Ampère Equation Behind Modern AI

2	Farah Ayoub	Université Le Havre Normandie	Optimal Control of Second-Order Equations in the Discrete Case
3	Mohamad Tarek El Masri	American University of Beirut	Proving Existence and Uniqueness for an Optics-Inspired Functional ODE
4	Lara Baalbaki	Technical University of Denmark	Stochastic Inverse Source Problems: Stability, Correlation-Based Data, and Multi-Resolution Methods

Session 10

Nicely 325

Talk	Speaker	Institution	Talk Title
1	Marc Fares	University of Neuchâtel	Period Collapse of Markov Triangles
2	Hiba Ayoub	Lebanese University	About Subdivisions of $2t$ -Block Cycles in Strong Digraphs
3	Kifah Kontar	American University of Beirut	Pseudofiniteness and Universal Triangle-Free Graphs

Session 11

Nicely 327

Talk	Speaker	Institution	Talk Title
1	Layla Reslan	Lebanese University	Mathematics Like You've Never Seen Before
2	Nancy Sweid		Decorating the Hidden Math of the World Cup
3	Karam Ballout	Lebanese American University	Prime Numbers: Order Hidden Inside Apparent Chaos
4	Zeinab Ismail	Lebanese American University	Quotients in Mathematics: Building Through Collapsing

Panel Discussion

Graduate Studies and Careers in Mathematics

Time: 4:00-5:00 p.m.

Location: Bathish Auditorium

This panel brings together mathematics graduates who have followed different academic and professional paths in Lebanon and abroad. Drawing on their own experiences, the panelists will discuss graduate studies in mathematics and related fields, the transition from undergraduate study to advanced research and professional careers, and the different opportunities available to mathematics graduates. The session will provide participants the opportunity to hear practical perspectives on choosing and navigating their own paths.



Christopher Chalhoub

Instructor at the American University of Beirut.

B.S. in Mathematics and Statistics from the American University of Beirut.

Master's in Pure Mathematics and Ph.D. in Random Dynamics and Ergodic Theory from Imperial College London.



Eliane Younes

Ph.D. candidate in Applied Mathematics at Mines Paris.

B.S. in Pure Mathematics from the Lebanese University.

Master's in Numerical Analysis and Modeling from Université de Montpellier.



Rindala Fayyad

Biostatistician at the Center for Research on Population and Health (CRPH) at the American University of Beirut.

B.S. in Applied Mathematics from the American University of Beirut.

Master's in Biostatistics from Harvard University.



Wissam El Hagg

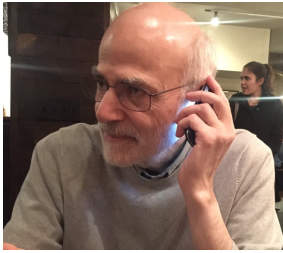
Assistant Professor at Université de Rennes.

B.S. in Mathematics from the Lebanese American University.

Master's in Applied and Computational Mathematics.

Ph.D. in Mathematics from Université Claude Bernard Lyon 1.

Invited Lecture



Assaf Kfoury

Boston University

Time: 4:00-5:00 p.m.

Location: Nicely 415 (Online Lecture)

Lecture Title

Will Artificial Intelligence Put Mathematicians Out of Work?

Abstract

Mathematics as a rigorous scientific discipline has existed for more than two millennia, always sustained by a thriving community of people-the mathematicians-who are constantly engaged in problem formulation, exposition, teaching, refereeing, professional meetings, informal give-and-take, and a lot more. By contrast, Artificial Intelligence (AI) emerged as a distinct and separate scientific discipline about seventy years ago, which moreover cannot exist and develop further without its mathematical foundation. While AI owes its very existence to mathematics, and mathematics has been and will continue to be the foundational backbone of many other disciplines-the mathematical sciences-there are yet influential commentators and decision-makers of the hi-tech industry that predict that mathematics will become obsolete and lose its privileged position because of AI within a few years.

This lecture examines this prediction critically by analyzing three AI tools-Large Language Models (LLMs), Automated Theorem Provers (ATPs), and Interactive Proof Assistants (IPAs)-and asking what mathematics each requires, and what problems each has actually solved. The evidence reveals a different picture: LLMs can be good at solving mathematical problems (without absolute guarantee that they will succeed) but cannot discover new mathematics without guidance and even prodding by human mathematicians; by contrast, ATPs and IPAs excel at verification and formalization, and yet not at discovery. Rather than displacing mathematicians, these tools reveal mathematics to be more essential than ever-as the foundation on which AI itself is built, and as the discipline most capable of ensuring rigorous correctness in an AI-driven world. The lecture concludes that mathematicians are not at risk; instead, their roles are evolving and expanding.

Short Bio

Assaf Kfoury is a mathematician and computer scientist whose work lies at the intersection of mathematical logic, software foundations, and theoretical computer science. Born into a Lebanese-Palestinian family, he was raised in Beirut and Cairo before moving to the United States to complete his higher education. He earned his PhD from the Massachusetts Institute of Technology in 1973. He subsequently joined Boston University, where he is currently Professor of Computer Science. Kfoury was a founding member, with three other mathematicians, of Boston University's Computer Science Department in 1983-84. He served as the department's first Acting Chair for one year and later served additional terms as department chair. His research has addressed computability, program schemes, lambda calculus, type theory, programming-language semantics, and formal methods. He has also worked on compositional approaches to network algorithms and on the mathematical analysis of flow networks.

Organizing Committee

The Lebanese Mathematics Day 2026 is the result of a collaborative effort between faculty, staff, students, and alumni from universities across Lebanon.

Ahmad Sabra

American University of Beirut

Antoine Rizcallah

Notre Dame University-Louaize

Ara Dishjekian

Lebanese American University

Bashar Kiwan

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Hadi Zoghaib

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Hiba Hammoud

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