

Mathematics for Health: An International Thematic Semester Led by Professor Bouchra Nasri at the Centre de recherches mathématiques

From July 28 to November 13, 2026, the Centre de recherches mathématiques (CRM), located in the André-Aisenstadt Pavilion at the University of Montreal, will dedicate its thematic semester to mathematics for health. The program includes two Aisenstadt Chairs, three training schools, several specialized workshops, and numerous collaborative events at the national and international levels, notably with partners in Africa and Australia. These activities will bring together experts from around the world to explore a rapidly expanding field at the intersection of mathematics, statistics, artificial intelligence, and the health sciences.

The semester is led by Bouchra Nasri, a professor of biostatistics at the University of Montreal and a specialist in public health threat modeling, alongside two internationally recognized co-organizers: Caroline Colijn of Simon Fraser University, whose work focuses on the dynamics of infectious diseases, and Celia M. T. Greenwood of McGill University, a specialist in statistical genetics. Together, they embody the interdisciplinary spirit that runs throughout the program.

“What makes this thematic semester unique is the convergence of complementary areas of expertise—mathematical modeling, statistics, and artificial intelligence—with partners from all over the world. It is this diversity of perspectives that will enable us to better address the health challenges that lie ahead.” -Bouchra Nasri

Numbers That Tell a Complex Story

Behind every curve, every projection, and every statistical or mathematical model lies an attempt to better understand health phenomena that are often elusive to the naked eye. Whether it's tracking the spread of a virus, evaluating the effectiveness of a treatment, or identifying a hidden signal among millions of genomic data points, mathematical tools have become indispensable allies in the health sciences.

“The emergence and re-emergence of infectious diseases, together with the rising global burden of non-communicable diseases, rank among the defining public health challenges of our time. Mathematics and statistical data analytics — increasingly augmented by artificial intelligence — provide the rigorous framework through which we gain realistic insight and understanding into the transmission dynamics and control of these diseases, and through which sound, evidence-based

public health policy is designed." - Abba B. Gumel, Aisenstadt Chair, will be in residence from September 14 to 18 at the Centre de recherches mathématiques.

Beyond disease modeling, the scope of application is vast: Bayesian statistics are transforming the way clinical trials are designed and analyzed; high-dimensional machine learning is revealing previously undetectable biological signals in genomic data; and differential equations are helping to unravel the interactions between pathogens, the immune system, and treatments. Artificial intelligence, for its part, opens up new possibilities in precision medicine, the monitoring of emerging threats, and decision support for public health.

"To gain a deep understanding of the relationships—whether causal or not—between our characteristics, exposures, environment, lifestyles, and health, it is essential to conduct detailed and accurate mathematical and statistical modeling. Furthermore, estimating variability and understanding the appropriate inferential contexts for predictions or associations are essential to their usefulness and impact." -Celia Greenwood, professor at McGill University and co-organizer of the thematic semester.

A Crossroads of Disciplines

The semester has a twofold objective: to advance quantitative research and education in health, while building lasting bridges between the communities of mathematics, statistics, computer science, artificial intelligence, and the health sciences. Mathematicians, statisticians, AI specialists, epidemiologists, biologists, clinicians, public health experts, and partners from the healthcare network will come together throughout the four-month program.

"To understand the intricate machinery of human health, we must speak the language of nature, which is inherently mathematical. Advanced mathematical research and statistical training provide the light needed to see the patterns of disease, transforming complex biological mysteries into predictable, life-saving solutions" - Alessandro Selvitella, assistant professor at Purdue University in Indiana and a Simons Fellow.

Two Exceptional Voices: The 2026 Aisenstadt Chairs

Two leading figures in the field will hold the Aisenstadt Chair this year. Abba B. Gumel of the University of Maryland, renowned for his work on modeling emerging infectious diseases, will be visiting the CRM from September 14 to 18. Daniela M. Witten, from the University of Washington, whose expertise in statistical learning applied to genomic data is internationally recognized, will be there from September 28 to 30.

Their visits will feature lectures and discussions highlighting the latest developments in quantitative health research, while creating opportunities for dialogue among the mathematical, statistical, computational, and clinical communities.

“It is an incredibly exciting time, as massive amounts of data across all aspects of biology and medicine are available, and AI enables analyses that might have previously taken weeks to be conducted in a matter of minutes. However, fundamental questions remain: how trustworthy are these results? will they hold up on a new patient cohort? These are the questions that statisticians seek to answer.” - Daniela M. Witten, Aisenstadt Chair, will be in residence from September 28 to 30 at the Centre de recherches mathématiques.

The Simons Foundation’s Impact

The semester also benefits from the support of the Simons Foundation, which will host 14 internationally renowned researchers at the CRM for research stays of one month or longer. This extended presence will foster in-depth collaborations with the Quebec scientific community, students, and healthcare practitioners, going far beyond a simple series of one-off lectures.

Iain Moyles, a professor at York University, sees this as a rare opportunity to forge lasting links between mathematics and the health sciences, at a time when public trust in scientific data is increasingly fragile.

“With significant public health threats over the last 5 years such as COVID-19, mpox, and avian influenza, a thematic program on mathematics for health is timely and needed. We live in a world with increasing access and availability to data, but also an increasingly skeptical populace regarding trust of that data and the underlying scientific expertise. Now, more than ever, we need to better integrate mathematical models of disease, human behaviour, and data so that we can improve public health messaging and rebuild community trust. I am honoured to be a Simon’s Fellow for this program and to visit the CRM to work with experts at the interface of disease modelling and public health such as Jacques Bélair and Bouchra Nasri. The success of the thematic program will enhance Canada’s capacity and knowledge mobilization for identifying and controlling emerging and established infectious diseases.” -Iain Moyles, associate professor at York University in Toronto and Simons Fellow.

Investing in the Next Generation

A budget of \$60,000 will be specifically allocated to facilitate access for students and postdoctoral fellows to the semester's activities. Beyond financial support, this offers them a true springboard: the opportunity to work alongside world-class researchers, present their own work, and forge connections that could shape their scientific careers for years to come.

Bouchra Nasri et Vanessa Bellegarde (Université de Montréal)