



# “We are like a wailing wall!”

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Photos MACC  
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For Valérie Gauthier, director of the Applied Mathematics and Computer Sciences Research Group (MACC) at the Universidad del Rosario, mathematics is in everything and brings technological solutions to people's problems.

**M**athematics is not only behind the development of data protection programs; it also creates applications bringing solutions to grave problems that affect communities. This is the understanding of the academics working in the Applied Mathematics and Computer Sciences Research Group (MACC), guiding faculties, offering services, training young people with a differential perspective, and offering firms innovative solutions.

The recent bicentenary of the sage thinker, José Celestino Mutis, brought the chance to look afresh at the Universidad del Rosario's Department of Mathematics. It has progressed from the provision of short made-to-measure courses to become a huge space for thought solving problems with the aid of digital technology and information systems, with mathematics its outstanding stalwart.



← People come and tell us their problem and we provide a technological solution, comments Valérie Gauthier, director of the Applied Mathematics and Computer Sciences Research Group.



“Initially it was a support service unit for different faculties in subjects related to the area. If the School of Management and Business needed a course in calculus or statistics, we supported this by finding a professor, checking academic equivalences, and so on. Today we provide solutions on another level,” explains Valérie Gauthier Umaña, director of MACC and the undergraduate program.

This leap began in 2008 with the creation of the Faculty of Natural Sciences and Mathematics, which gave the department greater reach, keenly focusing the fourth industrial revolution. Today, its work is based on three angles, the first of these being service, which is offered to various faculties, and which includes innovative lines steered towards digital transformation.

“In the next semester we are going to offer the creation of courses in programming for apps and video games. And, further down the line, we want to do this in data analysis and artificial intelligence. In other words, we are putting the fourth industrial revolution at the service of undergrads, applying what this can mean in each area,” emphasizes this PhD holder in Applied Mathematics, acquired in the field of Post-quantum cryptography at the Technical University of Denmark (DTU).

#### MORE THAN MATHS

The department’s second angle is undergraduate studies, which keeps the name—Applied Mathematics and Computer Sciences Re-



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search Group (MACC)—created for it in 2017, and whose oldest students have completed their second semester. The degree course now comes up against a triple challenge: getting itself known internally, in schools, and in firms, so that there is awareness of which professionals are being trained at the University, information they can keep in mind for when their needs have to be met.

From its conception, the program has possessed a differential factor: its broad research lines are worthy of a fourth revolution. The University has a specific advantage on this point, since its faculty professors have their doctoral and postdoctoral qualifications from outside centers, with lines in cyber security, computational physics, data science, and artificial intelligence.



The argument runs that students will understand and project solutions for real problems using mathematics and computational science. “For example, according to its mayor’s office, mobility in the capital city of Bogotá would improve 30 percent through automated traffic signalling. Now, if this was combined with an artificial intelligence input, school routes could be prioritized, with parents receiving an alert on the time they will arrive, and the driver would always take the fastest and safest route,” explains Gauthier.

The field work is extensive, and no bigger anywhere than in information security, since security of personal data is a priority not only for banks but for all firms and individuals. “There is an imperative need, and it was due to this that, in 2015, *The Economics* reported that the best-paid professionals in the the US were applied mathematicians and computational scientists,” says the director. The plan is to train professionals in

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this industrial revolution and, thus, believes Gauthier, Colombia could even see a hike in its economy on the basis of having properly prepared firms.

For this reason, the watchword at MACC is “Training the young people who will digitally transform the country”; the University is convinced that the current historic moment and the boost given to technology by the government and private enterprise are ideal for the construction of a more prosperous nation.

#### EYES ALSO ON THE PRESENT

MACC’s third vertex is its Innovation and Transfer Hub (HINNT). This is a space for seeking solutions to specific problems facing companies, the answers coming from human capital—for now, our professors, and later, the students themselves. The knowledge is transferred via carefully-chosen diploma students, and then the team guides them in resolving the problem, ensuring the training stays.

This is no mere consultancy. The idea is that several of the challenges reaching HINNT will need research or knowledge. “In Stockholm, the mayor installed the traffic lights, Ericson did the sensors, and PhD students developed the system. It is a beautiful example of what we can dream about,” the mathematician adds with enthusiasm.

To channel this line, the unit’s Hub professors are busy looking for internal and external projects within an open innovation framework that may also include some of Colombia’s major problems.

MiNNGaLab is already in the minds of team members. This is a project in pedagogic innovation. In cooperation with the University of Nariño, the search is on to develop open innovation pedagogy with the use of new technology. For two years, experts will be developing methodologies for efficient transfer of knowledge, taking note of what is going on externally, but adapting it to the circumstances of Colombia, and all under a collaborative work umbrella.

“In HINNT, we are going to need multidisciplinary interns from journalism, jurisprudence, philosophy, and medicine..from everywhere, in fact, because mathematics is a transversal tool that helps professionals in all their areas,” the expert comments.

“We are like a wailing wall. People come and tell us their problem and we provide a technological solution. It is a very nice role that would not be possible if we did not have the backing of the Universidad del Rosario, its reputation, and high quality accreditation,” concludes Gauthier. ■